2015

Rice Varieties

& Management Tips

LSU AgCenter
Research · Extension · Teaching

Rice Varieties and Management Tips 2015

This publication handles information likely to become dated in a short time, such as, changes in varieties, pest management products, and other recently developed production practices.

Decisions on variety selection are some of the earliest and most critical you will make. This information will help you decide which rice varieties are best-suited to your particular growing conditions.

The varieties are grouped on the basis of grain type (long or medium/short) and use (special purpose). After each variety name are letters in parentheses to indicate the state of origin of the variety. A brief description of the agronomic characteristics of each of the recommended varieties is provided. In addition to recommended varieties, descriptions of other varieties are included. These are varieties that are not recommended but may be grown on limited acreage. In some cases, the lines have performed well in testing, but the number of years in testing is less than the minimum required for recommendation.

This publication is available through the LSU AgCenter's rice Web page at:

www.lsuagcenter.com/en/crops_livestock/rice.

Data were generated at four research locations. These include the Rice Research Station at Crowley and off-station locations in Acadia, Evangeline, and Vermilion parishes.

There was some Newpath drift from unknown sources noted at the Acadia, Evangeline, and Vermilion parish research sites. This may have had some impact on the yield performance of the non-Clearfield varieties and lines in these tests. Therefore, it is recommended to avoid comparing the performance of non-Clearfield and Clearfield lines at these locations.

The following information is included:

Yield: Dry weight, lb/A

Milling:

a) Head - percent of whole kernels after milling
b) Total - percent of all kernels (whole and broken) after milling

Seedling Vigor: Vigor ratings are based on subjective estimates made during yield testing.

Days to 50 percent Heading: Average number of days from emergence to 50 percent heading. This occurs when half of the flag leaf sheaths have panicles emerging from them. Most varieties will reach harvest maturity (20 percent grain moisture) within 30-40 days after heading under normal conditions. Medium grains normally require 5-7 days longer after heading to reach harvest maturity than do long grains under similar environmental conditions. Clearfield (CL) varieties are resistant to NewPath and Beyond herbicides for use in the Clearfield production system.

Recommended Long Grains

Catahoula (LA): an early, semidwarf, long-grain variety with excellent yield potential and very good milling as well as other grain quality traits. The variety is similar in plant type, maturity, and plant height to Cocodrie.

Catahoula is rated as susceptible to sheath blight and straighthead and resistant to blast. It has displayed good seedling vigor and second crop potential. Catahoula has good straw strength and has displayed fairly good resistance to lodging.

CL151 (LA): a very early, semidwarf, long-grain variety that displays excellent yield potential. The variety is rated very susceptible to sheath blight, susceptible to blast, and very susceptible to straighthead. CL151 has shown consistently high head rice yields but has displayed somewhat more kernel chalk than some other long-grain varieties. The variety has very good seedling vigor and second crop potential. CL151 is moderately susceptible to lodging. Under the severe level of blast disease pressure observed in southwest Louisiana in 2012, this variety displayed a high level of susceptibility to the disease. An appropriate fungicide program is essential and timing of fungicide applications is critical. Please refer to the disease section in this publication for additional information on fungicide use, rates, and timings.

CL152 (LA): an early, semidwarf, long-grain, Clearfield rice variety. The variety has displayed very good yield potential but typical yields are somewhat lower than CL151. However, CL152 has very good resistance to lodging and is superior to CL151 in this trait. The variety also has excellent milling quality and has a low level of chalk under normal growing conditions. It is about three days later in maturity than CL151. CL152 has shown good second crop potential. The variety is susceptible to sheath blight and moderately susceptible to blast, narrow brown leaf spot, and bacterial panicle blight. CL152 is moderately resistant to straighthead. Under the severe level of blast disease pressure observed in southwest Louisiana in 2012, this variety displayed a moderate level of susceptibility to the disease. An appropriate fungicide program is essential and timing of fungicide applications is critical. Please refer to the disease section in this publication for additional information on fungicide use, rates and timings.

Cocodrie (LA): a very early, semidwarf, long-grain variety that has displayed excellent yield potential. It is about the same height as Cypress but has displayed better resistance to lodging. Cocodrie averages two to three fewer days to 50 percent heading than Cypress. It has displayed good second crop potential, good milling quality, and fair seedling vigor. It is susceptible to sheath blight and straighthead and moderately susceptible to blast disease.

Mermentau (LA): an early maturing, long-grain rice variety with good grain and milling yields as well as good grain quality. The variety has displayed grain yields

Table 1. Agronomic Characteristics and Yields of Recommended Rice Varieties (2012-2014) in Louisiana

Variety	Grain Type	Seedling Vigor	Lodging	Days to 50% Heading	Plant Height (inches)	Milling % (Whole - Total)					Grain Yield			
						2012	2013	2014	Mean*		2012	2013	2014	Mean*
Long Grain														
Catahoula	L	G	R	85	37	62-72	54-70	66-73	63-73		7542	8717	8307	8139
Roy J	L	G	MR	90	40	51-67	53-69	65-73	56-70		6258	8435	8384	7582
Cheniere	L	G	R	87	35	62-72	64-72	68-74	65-73		6256	7848	7623	7167
Cocodrie	L	G	MR	85	356	60-71	58-69	66-74	62-72		5406	7682	8352	7521
Mermentau	L	G	MR	84	36	56-68	61-70	67-42	61-70		6088	8739	7781	7488
Medium Grain														
Jupiter	M	G	MR	88	35	59-64	58-65	63-38	61-66		8389	8809	9575	8904
Caffey	M	G	MR	88	36	59-66	59-66	64-69	61-67		7967	7906	9267	8626

* Mean is the average of 13 yield trials conducted over the three-year period. Mean is not the average of the three years (2012-2014), since there were different numbers of trials each year.
Height: Height at maturity in inches from soil line to extended panicle.
Lodging: Comparative estimate of resistance to lodging. Varieties rated as resistant still can lodge, especially under excessive levels of nitrogen.
Abbreviations: R = resistant, MR = moderately resistant, MS = moderately susceptible, VG = very good, G = good.

comparable to Cocodrie and Cheniere. Mermentau is rated as susceptible to sheath blight, moderately resistant to blast, and moderately susceptible to bacterial panicle blight. The variety is similar in maturity and height to Cocodrie and Cheniere and has displayed good resistance to lodging under most conditions. Mermentau has shown good seedling vigor and ratoon crop potential.

Other Long Grains

Antonio (TX): Antonio is an early, semidwarf, long-grain variety developed by Texas A&M. It is similar in height and maturity to Mermentau. Antonio has good yields (similar to Cheniere) and slightly lower head rice yields in limited testing in Louisiana. It is moderately resistant to lodging and moderately susceptible to straighthead. In limited testing, Antonio has exhibited susceptibility to blast and sheath blight and moderate susceptibility to Cercospora and panicle blight.

CL142 (AR): an early, Clearfield, long grain with good yield potential and milling quality. The variety was developed by the University of Arkansas. The variety is a conventional height variety but has shown fairly good resistance to lodging. CL142 has a large kernel which might be advantageous for the parboiling industry. It has very good seedling vigor and good blast resistance. Under the severe level of blast disease pressure observed in southwest Louisiana in 2012, this variety displayed a high level of susceptibility to the disease. An appropriate fungicide program is essential and timing of fungicide applications is critical. Please refer to the disease section in this publication for additional information on fungicide use, rates, and timings.

CL161 (LA): an early, semidwarf, long-grain, Clearfield rice variety. It has good yield potential and very good quality characteristics. It is very similar to Cypress in appearance but slightly later in maturity. The variety is also similar to Cypress in yield and milling potential but has a somewhat smaller grain size. CL161 is rated very susceptible to sheath blight and susceptible to blast.

CL162 (MS): an early, long-grain, Clearfield rice variety developed by Mississippi State University. It has shown good yield and milling potential in Louisiana testing. The variety is comparable in height to CL151 but has better lodging resistance. CL162 is similar in maturity to CL151. Under the severe level of blast disease pressure observed in southwest Louisiana in 2012, this variety displayed a high level of susceptibility to the disease. An appropriate fungicide program is essential and timing of fungicide applications is critical. Please refer to the disease section in this publication for additional information on fungicide use, rates, and timings.

CLXL729 (RiceTec): a very high-yielding, long-grain hybrid with resistance to NewPath herbicide for use in the Clearfield production system. CLXL729 has excellent yield characteristics and fair milling characteristics. It should be harvested at optimum grain harvest moisture (18-20 percent) to maximize milling yields. The hybrid also has excellent seedling vigor. CLXL729 has a good disease package and is moderately resistant to sheath blight and blast, as well as straighthead.

Table 2. Agronomic Characteristics and Yields of Recommended Clearfield Rice Varieties (2012-2014) in Louisiana.

Variety	Grain Type	Seedling Vigor	Lodging	Days to 50% Heading	Plant Height (inches)	Milling % (Whole - Total)				Grain Yield			
						2012	2013	2014	Mean*	2012	2013	2014	Mean*
Clearfield Long Grain													
CL111	L	G	MR	82	37	60-71	55-70	67-73	61-71	7109	9514	8491	8274
CL151	L	G	S	84	37	54-68	60-71	66-73	59-69	5491	9909	9436	8064
CL152	L	G	R	87	37	53-67	63-71	68-74	59-69	5181	8923	8257	7279
Clearfield Medium Grain													
CL261	M	G	MS	87	36	64-70	61-70	69-72	66-72	9463	9258	8932	9136
CL271	M	G	MR	84	37	54-63	63-69	67-72	63-69	2352	8412	8406	7811

* Mean is the average of 13 yield trials for long grains and 9 yield trials for medium grains conducted over the three-year period. Mean is not the average of the three years (2012-2014), since there were different numbers of trials each year.
Height: Height at maturity in inches from soil line to extended panicle.
Lodging: Comparative estimate of resistance to lodging. Varieties rated as resistant still can lodge, especially under excessive levels of nitrogen. Abbreviations: R = resistant, MR = moderately resistant, MS = moderately susceptible, VG = very good, G = good.

CLXL745 (RiceTec): a very high-yielding, long-grain hybrid with resistance to NewPath herbicide for use in the Clearfield production system. CLXL745 has excellent grain yield and good milling quality. Efforts, however, should be made to harvest at optimum grain moisture (18-20 percent) to minimize milling yield reductions. The hybrid has a good disease package and is moderately resistant to sheath blight and blast, as well as straighthead disorder. This hybrid also appears to have somewhat more resistance to grain shattering at maturity.

CLXP756 (RiceTec): a new Clearfield hybrid from RiceTec. Yield potential is similar to CLXL729, but it matures about five to seven days later. Grain retention is comparable to CLXL745. It should be harvested at 18 to 20 percent grain moisture. It has an excellent disease package and is more tolerant of sheath blight than other Clearfield hybrids.

Colorado (TX): Colorado a semidwarf, early, long grain with good yield performance, good milling quality, and very good grain appearance. The variety, although a semidwarf, is moderately susceptible to lodging. Colorado is rated moderately susceptible to sheath blight, Cercospora, and bacterial panicle blight and susceptible to blast disease and straighthead disorder. It has shown good ratoon potential in limited testing.

Cypress (LA): a semidwarf, long-grain variety that may be more susceptible to lodging than Cocodrie. It has good yield potential and excellent grain quality. Cypress also displays better milling yield stability than most varieties, which allows it to maintain high wholegrain milling yields at lower harvest moisture. The variety also has excellent seedling vigor and very good second crop potential. Cypress is susceptible to sheath blight and blast, but displays fairly good resistance to physiological straighthead.

LaKast (AR): LaKast is a conventional height, very early, long-grain variety with very high yield potential that was developed in Arkansas. The variety has shown good milling quality characteristics in limited evaluation in Louisiana. LaKast is 4-5 inches taller than Louisiana semidwarfs and appears to be moderately susceptible to lodging. It is moderately susceptible to Cercospera and straighthead and susceptible to blast, sheath blight, and bacterial panicle blight.

Milagro Filipino (IRRI): a variety developed and released by the International Rice Research Institute in 1966 that launched the Green Revolution in many rice producing areas of the world. It has been grown in Texas for a number of years to accommodate a specific market in Mexico. Because of the water shortage in the Texas western rice growing area, a number of Louisiana farmers produced this variety. It is a high-yielding conventional height variety that is susceptible to lodging. However, it will produce good grain yields at lower nitrogen rates. It has an intermediate grain length that displays a very high level of chalk. It has moderate head rice yields and should be harvested at optimum grain moisture. It is moderately resistant to sheath blight and blast. It is a very long season variety requiring about 20 – 30 days more to mature than traditional Louisiana varieties.

Roy J (AR): a conventional height, long-grain variety, averaging two inches taller than Wells in Louisiana testing. Roy J is rated as susceptible to lodging and straighthead disorder. It has shown excellent yield potential but only fair milling yields.

XL723 (RiceTec): a very high-yielding, long-grain hybrid with very good seedling vigor. This hybrid has displayed fair milling yields but should be harvested at optimum grain harvest moisture (18-20 percent) to maxi-

mize milling yields and minimize shattering losses. XL723 has a good disease package and is moderately resistant to sheath blight and blast, as well as straighthead.

XP753 (RiceTec): a very high-yielding, long-grain hybrid that is similar to XL723 in many aspects. It has better grain retention than XL723 but should be harvested at 18-20 percent moisture to maximize grain quality and retention. It is NOT a Clearfield hybrid thus is NOT tolerant of Newpath or Beyond herbicides.

XP754 (RiceTec): a long-grain hybrid that has better grain retention than XL723. Yield potential is similar to XL723. It has an excellent disease package. Maturity is seven to ten days later than XL723. It is NOT a Clearfield variety thus is NOT tolerant to Newpath or Beyond herbicides.

XP760 (RiceTec): a long-grain hybrid that is very similar to XL723 in both yield and milling quality with significant improvement in grain retention characteristics. It is NOT a Clearfield hybrid thus is NOT tolerant of Newpath or Beyond herbicides.

Medium Grains

Caffey (LA): an early, short stature, medium-grain rice variety. It has excellent yield potential, comparable to that of Jupiter. Caffey also has excellent milling quality with low level of chalk and a very bold milled grain. The variety is comparable in maturity to Jupiter and Neptune. Caffey is similar in plant height to Jupiter but displays somewhat more resistance to lodging. Caffey is moderately susceptible to sheath blight, blast bacterial panicle blight, and straighthead and moderately resistant to narrow brown leaf spot.

CL261 (LA): the first medium-grain type available for use with the Clearfield system. The variety was developed from a cross of CL161 and Bengal. It has shown good yield potential as well as very good grain quality; both good grain clarity and high head rice yields. CL261 is moderately susceptible to sheath blight but has displayed susceptibility to blast and panicle blight. CL261 has shown good second crop potential in limited testing. Under the severe level of blast disease pressure observed in southwest Louisiana in 2012, this variety displayed a high level of susceptibility to the disease. An appropriate fungicide program is essential and timing of fungicide applications is critical. Please refer to the disease section in this publication for additional information on fungicide use, rates, and timings.

CL271 (LA): CL271 is a Clearfield medium-grain with very good first and ratoon crop yield potential and excellent grain quality. CL271 is moderately resistant to blast and Cercospera, moderately susceptible to bacterial panicle blight, and susceptible to sheath blight. The variety is moderately susceptible to lodging and moderately resistant to straighthead disorder. CL271 is similar to Caffey and Jupiter in plant height and maturity.

Jupiter (LA): a very high-yielding, semidwarf, medium-grain variety. It has consistently out-yielded Bengal by several hundred pounds per acre. Compared with Bengal, Jupiter has improved resistance to panicle blight, sheath blight, and straighthead. It has shown good seedling vigor and milling quality. The grain size of Jupiter is somewhat smaller than that of Bengal.

Special-purpose Long-grain Varieties

Della-2 (LA): an early maturing, short stature, aromatic, long-grain variety with good grain and milling yields and excellent grain quality. Della-2 has comparable grain quality and aroma to Della but much higher yield potential. The variety is comparable in height and maturity to Cheniere and has shown good resistance to lodging. Della-2 is susceptible to sheath blight, moderately resistant to blast, and moderately susceptible to bacterial panicle blight. The variety has shown good ratoon potential in limited testing."

Jazzman (LA): a Jasmine-type, aromatic, long-grain variety. Jazzman has good yield potential and good milling quality. Its aroma, flavor, and soft-cooking characteristics are similar to that of imported Thai Jasmine. Jazzman is similar to Wells in plant height and maturity. It is moderately susceptible to sheath blight, straighthead, and lodging but moderately resistant to blast.

Jazzman-2 (LA): an early maturing, semidwarf, Jasmine-type, aromatic, long-grain variety. It has good yield potential, good lodging tolerance, and very good milling quality. Jazzman-2 has typical Jasmine rice quality characteristics found in imported Thai Jasmine, which include soft-cooking, glassy appearance, sweet flavor, and very strong aroma. Jazzman-2 is similar to Cocodrie in height and maturity but about 4 inches shorter and 4 days earlier than Jazzman. Jazzman-2 is very susceptible to sheath blight, susceptible to bacterial panicle blight and straighthead, but resistant to blast.

TORO-2 (LA): a special-purpose, low amylose, soft-cooking, long-grain, semidwarf variety. In taste tests, TORO-2 was judged to have acceptable TORO-type cooking and taste characteristics. TORO-2 is resistant to the predominant blast races and moderately susceptible to sheath blight. It is also very susceptible to straighthead. Because of the unique characteristics of these special-purpose long grains, they should not be commingled with standard U.S. long-grain varieties.

Seeding Dates

Because environmental conditions are variable in different locations and years, the optimum seeding time is typically presented as a range of dates. Rice yields may be reduced by planting too early or too late outside of the recommended range. Average daily temperature at seeding, calculated by adding the daily high and low temperatures and dividing by 2, is crucial in stand establishment.

Remember: At or below 50°F, rice seed germination is negligible. From 50 to 55°F germination increases, but not to any great extent until temperature is above 60°F.

Seedling survival is not satisfactory until the average daily temperature is above 65°F.

Based on information from seeding date research trials, the optimum planting dates for rice are:

Southwest Louisiana – March 10 to April 15
North Louisiana – April 1 to May 5

Extremely early seeding can lead to a number of problems including (1) slow emergence and poor growth under colder conditions because of the inherent lack of seedling vigor and cold tolerance in many varieties, (2) increased damage from seedling diseases under cool conditions, (3) increased damage from birds (blackbirds, ducks, and geese), which are more numerous in the early spring, and (4) interactions with herbicides.

Extremely late seedings also can be detrimental to yield. Stand establishment can be equally difficult in hot weather. The yield potential of many varieties will decrease significantly with later seedings. Bacterial panicle blight is thought to be associated with higher-than-normal day and night temperatures during pollination and grain fill. Late-planted rice is more likely to encounter these conditions. Also, many diseases (especially blast) and insect problems are more severe, and grain quality is often decreased with later-seeded rice. To assure adequate time for a ratoon or second crop to develop prior to the onset of cold weather, the first crop should be harvested before mid-August. Rice planted by or before April 15 in southwest Louisiana has the most potential for meeting this harvest deadline and producing good grain yields in the ratoon crop.

Seeding Rates

Establishing a satisfactory stand is an essential first step in a successful rice-production program. The amount of seed necessary to accomplish this depends primarily on the type of seeding system (dry- or water-seeded) used.

Rice in Louisiana is planted in three basic ways: water-seeded (dry or presprouted seed dropped into a flooded field); drill-seeded (planted with a drill on 7- to 10-inch rows); and broadcast dry (broadcast on a dry seedbed by either ground equipment or airplane).

Regardless of the seeding system used, the desired plant stand is identical. The optimum stand is 10-15 plants per square foot; the minimum stand is six to eight plants per square foot. Rice (like most grasses) has the ability to tiller or stool. This is why a somewhat satisfactory stand can be produced from as few as six to eight seedlings per square foot if proper cultural practices are used. Stands can be too thick as well as too thin. Excessively thick stands can often lead to increased disease pressure as well as spindly plants that may be susceptible to lodging.

Experimental results and commercial experience have shown that different seeding rates are often necessary to reach these desired stands, depending on the type of seeding system used. For this reason, planting on the basis of seeds per acre to obtain the desired plant population is more accurate than planting pounds per acre. For example, 90 pounds of Caffey will contain fewer seeds than 90 pounds of CL151. For conventional varieties, an ideal plant population is approximately 10-15 plants per square foot. Seeding rates of hybrids are much lower than inbred varieties. Growers should consult the hybrid seed representative for guidelines and recommended seeding rates. Under typical conditions, in a drill-seeded system, about one-half of the seed survives to produce a plant. Therefore, if the target rice stand is 10-15 plants per square foot, approximately 20-30 seeds per square foot will have to be planted. Use the information in Table 5 to determine the pounds of seed per acre required to achieve the desired plant population.

When water-seeding or dry broadcasting, about 80-120 pounds of seed per acre will be required. When drill seeding, about 50-80 pounds of seed per acre will be required. Refer to the plant growth regulator section for recommendations on reduced drill seeding rates when using seed treated with gibberellic acid. Use the higher rates when planting under less than optimum conditions.

Table 3. Agronomic Characteristics and Yields of Recommended Specialty Rice Varieties (2012-2014) in Louisiana.

Variety	Grain Type	Seedling Vigor	Lodging	Days to 50% Heading	Plant Height (inches)	Milling % (Whole - Total)				Grain Yield			
						2012	2013	2014	Mean*	2012	2013	2014	Mean*
Specialty													
Jazzman	L	G	MS	88	38	59-70	59-69	63-71	61-70	6230	7874	8065	7255
Jazzman-2	L	G	MR	84	33	62-71	59-68	69-73	65-72	5938	7727	6508	6187

* Mean is the average of 1 yield trials conducted over the three-year period. Mean is not the average of the three years (2012-2014), since there were different numbers of trials each year.
Height: Height at maturity in inches from soil line to extended panicle.
Lodging: Comparative estimate of resistance to lodging. Varieties rated as resistant still can lodge, especially under excessive levels of nitrogen.
Abbreviations: R = resistant, MR = moderately resistant, MS = moderately susceptible, VG = very good, G = good.

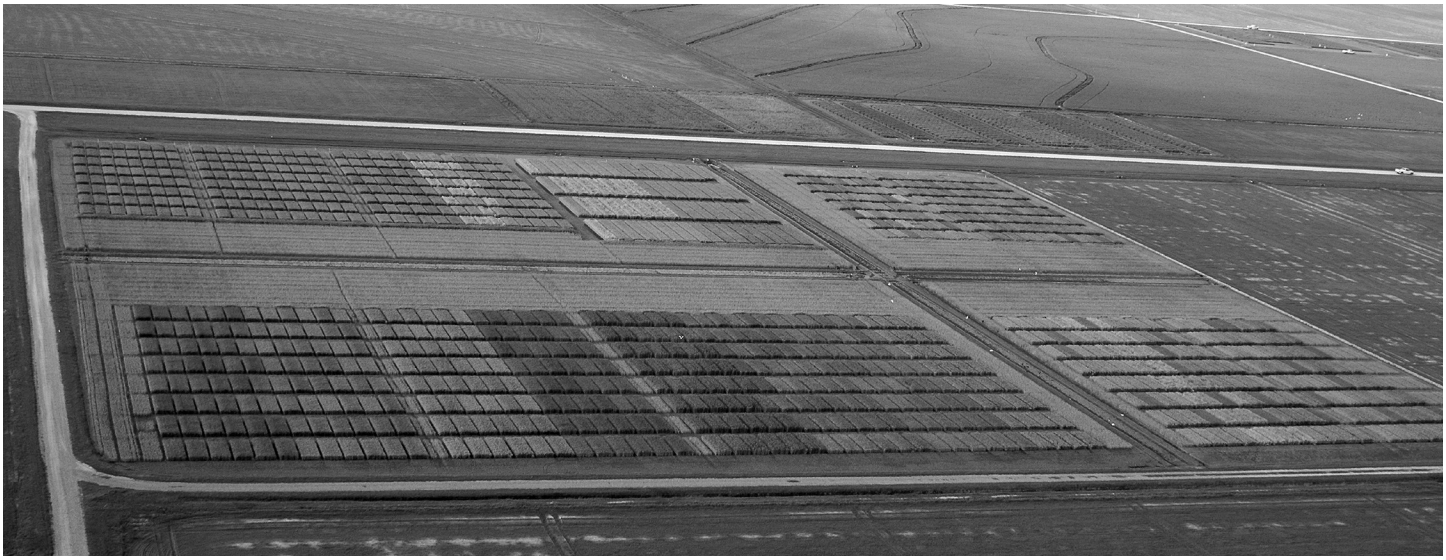
Table 4. Results of the 2014 Louisiana Rice Variety Trials.

Entry	Grain Type	Days to 50% Heading	Plant Height (inches)	Milling %* Whole Total	LDG	RRS**	AD**	EV**	LA**		MEAN
CLXL745	L	83	45	66-70	MS	10532	9942	10296	9810		10145
XL753	L	86	43	66-73	MS	10213	10799	10711	8757		10120
CLXL729	L	85	45	64-72	MS	10426	9698	10281	9199		9901
CL151	L	87	40	66-73	S	10016	8081	9078	10570		9436
LaKast	L	87	43	67-76	MS	9209	9833	8821	8222		9021
CL111	L	84	40	67-73	MR	9538	7470	8016	8939		8491
Roy J	L	91	45	65-73	MR	10691	7587	8527	6729		8384
Cocodrie	L	88	39	66-74	MR	9115	7793	8255	8245		8352
Catahoula	L	87	40	66-73	MR	8969	8666	8106	7489		8307
CL152	L	90	41	68-74	MR	9146	7315	7936	8630		8257
Wells	L	90	42	63-73	MS	10557	6753	7998	7553		8215
CL161	L	90	40	68-73	MS	8276	7441	8111	8725		8138
Rex	L	88	42	64-71	MR	8990	8051	7231	7975		8062
Antonio	L	88	39	67-73	MR	9740	7216	8571	6692		8055
Mermentau	L	87	40	67-72	MR	9635	7396	7929	6987		7987
Colorado	L	83	39	65-73	MS	8505	7616	7868	7136		7781
Cypress	L	90	40	65-71	MS	9448	6890	7580	6678		7646
Cheniere	L	89	38	68-74	MR	8720	7629	7483	6661		7623
Presidio	L	89	39	68-74	MR	8812	7252	7183	6660		7477
Jazzman	L	91	42	63-71	MR	10352	7901	7640	6365		8065
Della-2	L	91	41	64-72	MR	8819	7529	8448	7122		7980
Jazzman-2	L	89	37	69-73	MR	7978	6042	6518	5493		6508
Jupiter	M	90	39	63-38	MS	11452	10170	8768	7911		9575
Caffey	M	90	39	64-69	MS	10819	9603	8441	8205		9267
CL271	M	88	39	69-72	MS	10118	8356	8481	8773		8932
CL261	M	86	40	67-72	MS	8831	8164	7705	8923		8406
Neptune	M	91	37	64-70	R	10005	8260	7408	7866		8385

* Milling data = average of RRS, LA.
** RRS = Rice Research Station; AD = Acadia Parish, R&Z Farm; EV = Evangeline Parish, Kody and Larry Beiber Farm; LA=Vermilion Parish, Lounsberry Farm

Table 5. Seed per Pound and Average Number of Seed per Square Foot for Important Rice Varieties										
Variety	Seed/lb*	Seeding Rate (lb/A)								
		40	50	60	70	80	90	100	110	120
		----------seed/ft^2----------								
Antonio	19,414	18	22	27	31	36	40	45	49	53
Caffey	15,701	14	18	22	25	29	32	36	40	43
Catahoula	18,251	17	21	25	29	34	38	42	46	50
Cheniere	19,744	18	23	27	32	36	41	45	50	54
CL111	18,198	17	21	25	29	33	38	42	46	50
CL142	16,986	16	19	24	27	31	35	39	43	47
CL151	19,501	18	22	27	31	36	40	45	49	54
CL152	21,375	20	25	29	34	39	44	49	54	59
CL161	19,593	18	22	27	31	36	40	45	49	54
CL162	18,219	17	21	25	29	33	38	42	46	50
CL261	18,776	17	22	26	30	34	38	43	47	52
CL271	17,486	16	20	24	28	32	36	40	44	48
Cocodrie	19,014	17	22	26	31	35	39	44	48	52
Cypress	19,096	18	22	26	31	35	39	44	48	53
Della-2	17,771	16	20	24	29	33	37	41	45	49
Jazzman	18,449	17	21	25	30	34	38	42	47	51
Jazzman-2	20,509	19	24	28	33	38	42	47	52	56
Jupiter	17,373	16	20	24	30	32	36	40	44	48
LaKast	18,015	17	21	25	29	33	37	41	45	50
Mermentau	19,400	18	22	27	31	36	40	45	49	53
Neptune	16,856	15	19	23	27	31	35	39	43	46
Roy J	19,281	18	22	27	31	35	40	44	49	53
Taggart	17,147	16	20	24	28	31	35	39	43	47
TORO-2	16,432	15	19	23	26	30	34	38	41	45

*Average seed weights are determined from multiple seed sources and years.



LSU AgCenter Soil Testing Tables

Soil testing is a very useful tool in assessing the soil fertility status and determining fertilizer application rates. Currently, the LSU AgCenter Soil Testing and Plant Analysis Laboratory uses the Mehlich-3 soil test extraction for phosphorus (P), potassium (K), sulfur (S), and zinc (Zn), the most commonly deficient nutrients in commercial rice production in Louisiana.

Mehlich-3 soil test based recommendation tables for P, K, S, and Zn are included below as a reference. Generally, if your soil test results fall into the very low, low or medium categories, fertilizer applications would be recommended to increase rice yields. Recommendation tables do not include ratoon rice needs. Recent research has shown that rice grown on soils that test very low, low or medium in soil test P or K, may need an additional 30 pounds of P_2O_5 and K_2O fertilizer to maximize ratoon yields. The additional P and K can be applied with first crop fertilization or after the main crop harvest.

Table A. Potassium Fertilizer Recommendations and Soil Test Ratings Based on the Mehlich 3 Soil Test Extraction.

Soil Type	Texture	Very Low	Low	Medium	High	Very High
		----------ppm----------				
Alluvial						
	clay, silty clay	<114	114 - 182	183 - 227	228 - 273	>273
	clay loam, silty clay loam	<91	91 - 136	137 - 182	183 - 205	>205
	loam and silt loam	<57	57 - 91	92 - 136	137 - 159	>159
	sandy loam	<45	45 - 80	81 - 114	115 - 136	>136
Upland						
	clay, silty clay	<114	114 - 182	183 - 227	228 - 250	>250
	clay loam, silty clay loam	<57	57 - 102	103 - 148	149 - 170	>170
	loam and silt loam	<57	57 - 91	92 - 136	137 - 159	>159
	sandy loam	<45	45 - 80	81 - 114	115 - 136	>136
Fertilizer Recommendation		**---------- lb K_2O / Acre ----------**				
		60	**40**	**20**	**0**	**0**

Table B. Phosphorus Fertilizer Recommendations and Soil Test Ratings Based on the Mehlich 3 Soil Test Extraction.

Soil Test Ratings	Very Low	Low	Medium	High
	----------ppm----------			
	<10	11 - 20	21 - 35	≥36
Fertilizer Recommendation	**---------- lb P_2O_5 / Acre ----------**			
	60	40	20	0

Table C. Sulfur Fertilizer Recommendations and Soil Test Ratings Based on the Mehlich-3 Soil Test Extraction.

Soil Test Ratings	Low	Medium	High
	----------ppm----------		
	<12	12-16	≥16
Fertilizer Recommendation	----------lb S/Acre----------		
	40	20	0

*Application of 100 pounds of ammonium sulfate will provide 21 pounds of N and 24 pounds of S.

Table D. Zinc Fertilizer Recommendations and Soil Test Ratings Based on the Mehlich-3 Soil Test Extraction and Current Research on the Effects of pH on Zinc Availability[1]

Soil Test	≤ 1 ppm		1 - 1.5 ppm			1.6 - 2 ppm	
pH	≥ 7	< 7	≥ 7	6.9 - 6.0	< 6	≥ 7	<7
Granular Fertilizer Recommendation[2]	15 lb/A	10 lb/A	10 lb/A	5 lb/A[2]	none	5 lb/A	none

[1] The granular zinc fertilizer source must be at least 50 percent water soluable or higher rates of zinc may be needed.
[2] Even distribution of most granular zinc fertilizer sources at rates of less than 10 pounds per acre is difficult to achieve. It can be achieved, however, when the zinc is premixed with a starter N application using 50-100 pounds ammonium sulfate.

Considerations include:

a. Use higher seeding rates when planting early in the season when there is potential for unfavorably cool growing conditions. Cool conditions will favor seedling diseases. This can reduce stands. Varieties also differ in tolerance to cool growing conditions in the seedling stage.
b. Varieties differ considerably in average seed weight. Thus, a variety with a lower average seed weight will have more seed per pound. Table 5 shows seed weight per pound and the average number of seed per square foot at several seeding rates for most of the varieties mentioned in this publication. Producers may want to adjust seeding rates for this factor.
c. Where seed depredation by blackbirds is potentially high, use a higher seeding rate.
d. Where seedbed preparation is difficult and a less than optimum seedbed is prepared, use a higher seeding rate.
e. If it is necessary to use seed of low-germination percentage, compensate with increased seeding rates. Always use high-germination, certified seed if possible.
f. When water-seeding into stale or no-till seedbeds with excessive vegetation, use higher seeding rates.
g. If any other factor exists that may cause stand establishment problems (such as slow flushing capability or saltwater problems), consider this when selecting a seeding rate.
h. Water-seeding research has shown that the best stands are obtained when planting presprouted seeds. Presprouted seed typically will lead to better stands than dry (non-presprouted) seed.

Plant Growth Regulators

Seed treatment with gibberellic acid promotes rapid, uniform emergence in dry-seeded systems. It is especially effective on semidwarf varieties. With gibberellic acid, seeding depth can be increased to ensure seed placement into soil moisture adequate for germination and emergence to minimize flushing, but the depth should not be more than 1 1/2 inches. In drill-seeded rice, the seeding rate can be decreased to 50-80 pounds per acre when planting under warm conditions (daily average temperature higher than 70 °F). Under cool conditions (daily average temperature of 60 to 70 °F), the higher rates are recommended.

Rice Fertilization

Generally, lime is not recommended for rice production unless the pH of the soil is 5.4 or lower. Crops grown in rotation with rice such as cotton, soybeans and other pH sensitive crops may benefit from liming. The pH of the soil should not be increased to more than 6.2 for rice production. Over liming can induce zinc deficiency in rice.

Phosphorus (P) and potassium (K) should be applied according to soil test recommendations. On soils where P and K are needed, apply fertilizer preplant or before rice reaches the 4-leaf stage of development. Currently, soil test based fertilizer recommendations (Tables A to D) only address main rice crop needs and do not address ratoon rice needs. Recent research has shown that rice grown on soils that test very low, low or medium, in soil test P or K need an additional 30 pounds of P (as P2O5) or K (as K2O) to maximize ratoon yields. The additional P and K fertilizer can be applied with P and K in the first crop or can be applied after first crop harvest. Potassium deficiency has been associated with increased disease incidence and severity.

Fertilizer nutrients are most efficiently used by rice when applied immediately before planting to before the rice reaches 4-leaf stage of development. There are situations when fall application of some nutrients may be a suitable alternative. Neither nitrogen (N) nor zinc (Zn), however, should be applied in the fall. For more details, consult the Louisiana Rice Production Handbook (Pub. No. 2321).

Starter N applications of 10-20 pounds of N per acre can be applied to seedling rice to improve early season growth. Research has shown that starter N applications do not improve rice grain yields. However, starter N applications do increase early season seedling growth and often result in the ability to apply the permanent flood (in a delayed flood system) earlier as compared with rice which does not receive a starter N application. This may provide an advantage in weed control. Starter N ap-

plications are very inefficient and should not be counted toward your targeted N rate total.

In a water-seeded pinpoint flood system, 1/3 of the crop's N fertilizer needs should be applied during the brief drain period between planting and re-flooding. If urea is the fertilizer source, it should be treated with a urease inhibitor product containing the active ingredient NBPT. The second third of the N fertilizer should be applied one to two weeks later and the final third by internode elongation (green ring). In a drill-seeded, dry broadcast, or water-seeded delayed flood system, 2/3 of the N should be applied immediately before permanent flood. The balance of the N should be applied when at internode elongation (green ring) or earlier if deficiency symptoms occur.

Nitrogen fertilizer applied as urea is prone to loss through ammonia volatilization. A urease inhibitor which contains the active ingredient N-(n-butyl) thiophosphoric triamide (NBPT) can be applied to the surface of urea fertilizer to slow down its break down and reduce ammonia volatilization. Urease inhibitor products containing NBPT, which have been tested at the LSU AgCenter Rice Research Station and shown to be effective in reducing ammonia volatilization, include: Agrotain, Agrotain Ultra, N-Fixx, Arborite AG, and Factor.

Use of a urease inhibitor is recommended to reduce volatilization losses when applied urea is expected to remain on the soil surface for longer than three days prior to flood establishment.

Rice varieties may differ in their N requirements by location. Native soil fertility, soil type, and other factors determine the efficiency of N utilization. Rice growers should determine the N rate that provides optimum grain yield on their land. The higher N rates within the recommended ranges for each variety are generally required in central and northeast Louisiana. Avoid N deficiency and excessive N fertilization.

Ratoon, or second-crop rice, should be fertilized with 75-90 pounds of N per acre when first crop harvest is before August 15. When conditions appear favorable for good second crop production (minimal field rutting, little or no red rice, healthy stubble), apply the higher rate of N. Apply N and establish a shallow flood within five days after harvest. Research has consistently shown that N fertilizer should be applied and the field flooded as soon as possible after first crop harvest to maximize second crop yield. When the main crop is not harvested before August 15, the potential for profitable second crop production is reduced because of the probable delay in maturity, especially at higher N rates and the increased likelihood of unfavorable weather. Days to ratoon maturity increase with increasing N fertilization rates. Therefore, when the first-crop is not harvested before August 15, lower N rates are recommended.

Zinc (Zn) deficiency can be a serious problem in rice resulting in greatly reduced yields if not corrected. Currently, if a soil has less than 1 ppm of extractable Zn using the Mehlich-3 soil test, it is considered deficient in Zn. Soil pH is important in determining the potential for Zn deficiency in rice because, as soil pH increases above 6, the solubility of Zn begins to decrease. This relationship can cause Zn to become unavailable for plant uptake even when soil test levels exceed 1 ppm. There, soil pH and the Mehlich-3 soil test are both used to determine Zn fertilizer needs in rice. See Table D for Zn fertilizer recommendations. Zinc fertilizer recommendations are based on using a granular zinc sulfate. Other Zn sources can be used:;however, inorganic Zn sources should be greater than 50% water soluble. Liquid inorganic or chelated Zn fertilizers can be soil applied at lower rates as compared with granular sources, generally between 2.5-5 pounds, since they can be applied more uniformly. When Zn deficiency symptoms begin to occur (bronzing), it is recommended to immediately drain the field. When the rice begins to show signs of recovery (new growth), a foliar Zn application can be applied to rice at rates between 1 and 2 pounds of Zn per acre. Granular Zn applications at this time have also shown to be equally effective. Application of N fertilizer should also be applied prior to reflooding to account for the N losses associated with draining. Ammonium sulfate is generally the preferred N source in this situation.

Sulfur (S) may be needed at a rate of 20-25 pounds per acre where large amounts of soil have been moved in land leveling. Sulfur deficiencies resemble N deficiencies, producing pale yellow plants which grow slowly. Sulfur deficiency symptoms in rice generally appear beginning with the newest leaf becoming yellow first, while N deficiency symptoms appear first in the lowest (oldest) leaves. If these symptoms appear, applying 100 pounds of ammonium sulfate per acre will provide 21 pounds of N and 24 pounds of S per acre.

Table 6. Nitrogen Recommendations for Rice Varieties

Varieties	N rate (lbs/A)
Antonio, Caffey, Catahoula, Cheniere, CL111, CL142, CL152, CL161, CL162, CL261, CL271, Cocodrie, Colorado, Cypress, Della-2, Jazzman, Jazzman-2, LaKast, Mermentau, Neptune, Roy J, Taggart, Toro-2	120-160
CL151, Jupiter	90 - 130

Rice Insects

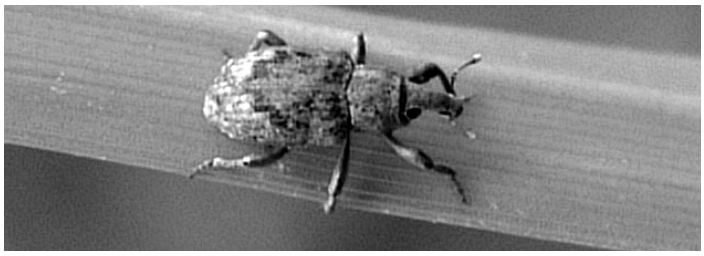
The major insect pests of rice in Louisiana are the rice water weevil and the rice stinkbug. Stem-boring insects are increasing in importance and armyworms, billbugs, chinch bugs, Colaspis, rice leafminer, rice seed midges, the South American rice miner, and sugarcane beetles can cause crop injury. Under high infestation levels, yield can be reduced by all of these pests. Identification and scouting information for these pests is presented. More detailed descriptions can be found in the LSU AgCenter rice production guide or at www.lsuagcenter.com. Information about these pests is also available on the Rice Scout Smartphone app. If you suspect insect injury in your field(s), contact your county agent for verification and help with damage assessment and insect management.

Rice Water Weevil

Adults are grayish-brown (1/8-inch long x 1/16-inch wide) beetles that fly into rice fields to feed on the leaves of rice plants. Leaf feeding by adults causes narrow scars that run lengthwise on the leaf, but this feeding rarely causes economic damage. Females lay eggs in the leaf sheath at or below the water line, primarily after permanent flood is applied. The larvae are white, legless grubs with brown heads that feed on the roots, reducing rice yields. Four instars vary in size from 1/32 inch to 3/16 inch.

Although application of insecticides remains the primary means of controlling or preventing rice water weevil infestations, other practices can significantly reduce the impact of rice water weevils on rice yields. One key to developing an effective management program for this insect is to remember that heavy infestations of the damaging stage (the root-feeding larval stage) will not begin until water is applied to the field. Because water-seeded rice is typically flooded at a younger, more susceptible, stage of growth, yield losses due to the rice water weevil tend to be higher in water-seeded rice. Delaying application of permanent flood to rice can reduce yield losses from weevils but may not be compatible with other agronomic practices, particularly weed control. Another key to managing this insect is early planting of rice. Early planting of rice facilitates weevil management in three ways. First, weevil infestations tend to be less severe in rice planted in mid- to late March than in later-planted rice, because emergence of adults from overwintering sites begins in early April but is not complete until May. Second, yield losses from weevil feeding tend to be lower in early-planted rice than in late-planted rice. Third, single applications of pyrethroids are less effective in late-planted rice than in early-planted rice.

Seeding rice at low rates (e.g., 20-50 lbs per acre in drill-seeded rice) can make rice more susceptible to infestation and yield losses from the rice water weevil. All currently grown rice varieties and hybrids are susceptible to the rice water weevil. Recent research, however, indicates some differences in susceptibility. For example, medium-grain varieties appear to be more susceptible to infestation than long-grain varieties. Nonetheless, no commercially available varieties possess high enough levels of resistance to eliminate the need for insecticides.



Adult rice water weevil

Management of the rice water weevil with seed treatments: Dermacor X-100, CruiserMaxx, and NipsitInside are seed treatments that are applied by the seed dealer. Seed treated with Dermacor X-100 may be used in either dry or water seeding practices. CruiserMaxx and NipsitInside can only be used in rice that is drilled into a dry seedbed. The main target of these insecticides is the rice water weevil. Aside from rice water weevils, these seed treatments control different types of insects. Dermacor X-100 will effectively control fall armyworms and will suppress injury from stem borers later in the season. Cruiser Maxx and NipsitInside will control colaspis larvae and chinch bugs. If these seed treatments are used, there is little need to scout for rice water weevil adults because they are preventative treatments. However, there are some instances when adult rice water weevil feeding injury can be so severe that application of a pyrethroid is necessary to prevent dehydration and death of seedlings. See the label for restrictions concerning crawfish production where seed treatments are used.

Data from small-plot research as well as some data from commercial trials indicate seeding at low rates (30-50 lbs seed per acre) compromises the effectiveness of seed treatments, particularly CruiserMaxx and NipsitInside. If CruiserMaxx or NipsitInside are used in fields seeded at low rates, additional management practices should be considered, such as early planting or treating fields with pyrethroids or Belay if heavy infestations of rice water weevil adults are found.

Management of the rice water weevil with foliar applications of pyrethroid or neonicotinoid insecticides: Declare, Fastac, Karate, Mustang Max, and Prolex are insecticides with similar characteristics. Trebon (etofenprox) is a granular insecticide, the chemistry of which is similar to the pyrethroids. Belay is an insecticide that belongs to the neonicotinoid class of insecticides. Timing of these insecticides for management of rice water weevil is crucial. They kill adult weevils only, not eggs or larvae. The pyrethroids are extremely toxic to crawfish and drift into crawfish ponds must be avoided. Belay is also toxic to crawfish; however, the acute toxicity of Belay is approximately 1,000 times less than the toxicity of the pyrethroids.

Scouting for adult weevils is important and may begin at any time after emergence of rice, but efficacy of these

insecticides is maximized when adults are controlled just before oviposition (egg laying). Oviposition is possible when the field has been saturated by rainfall or flushing or when permanent flood has been established. In most fields, the majority of oviposition is likely to occur after the establishment of permanent flood. Check at least five to 10 locations per field for the presence of adults or their feeding scars. Treat when adult weevils or their scars are observed and conditions for egg laying are favorable as described above. Applications made up to 24 hours before initiation of permanent flood can be effective when adults are present; pre-flood applications appear to be more effective than post-flood applications for Belay. Trebon should not be applied pre-flood, however, because of concerns about movement of the Trebon granules in the flood water. More than one application of pyrethroids may be required. Once fields have been treated, begin sampling again after seven days. All foliar insecticides have the ability to kill adult weevils, but not eggs and larvae. Egg laying (oviposition) must be prevented. Once eggs are laid in rice stems or larvae are in the roots, these insecticides will not be effective. Applications of the insecticides for use against eggs or larvae are a waste of money in addition to the loss already caused by weevils.

Liquid formulations of pyrethroids can also be applied by impregnating granular fertilizer with the pyrethroids and applying the impregnated fertilizer to fields. This application option kills adult weevils, but there is no significant evidence of larval control. Therefore, the impregnated fertilizer should be applied when weevil adults and water are present in the field, immediately prior to or within a few days after the establishment of the permanent flood. Impregnated fertilizer applications made 10 or more days after the establishment of the permanent flood are not effective because most larvae are already established in the root systems. This insecticide delivery method offers the potential to reduce drift of the insecticide to nontarget areas because the material is coated on a granular fertilizer. There is also a potential for reducing application costs because both fertilizer and insecticide are delivered in the same aerial application.

Rice Stink Bug

These tan and golden bugs (about 1/2-inch long) feed on rice when it begins to head. Females lay light green, cylinder-shaped eggs in two-row clusters on leaves, stems, and panicles. Eggs turn red-black just before larval emergence. Nymphs (immatures) are black with red marks on the abdomen. Older nymphs resemble adults. Nymphs and adults suck the sap from developing rice grains. During the flowering and milk stages, this causes empty grains and reduces yield. During the soft-dough stage, pathogens enter the grain at the feeding spot and the pathogen infection and bug feeding together cause pecky rice. To scout for rice stink bugs in the field, use a 15-inch diameter sweep net and take 10 sweeps at 10 different areas around each field. Count the number of bugs collected after every 10 sweeps. In the first two weeks of heading, treat fields when there are 30 or more bugs per 100 sweeps. Pesticides that can be used include a variety of pyrethroids such as Karate Z, Mustang Max, and Prolex. The neonicotinoid, Tenchu, can also be used but this insecticide cannot be applied when rice is flowering because of potential effects on bees. From the dough stage until two weeks before harvest, treat fields when there are 100 bugs per 100 sweeps. When approaching two weeks before harvest, you can treat with any of the chemicals listed above with the exception of Karate Z and Prolex, which have 21-day pre-harvest intervals.

Rice stink bug nymph

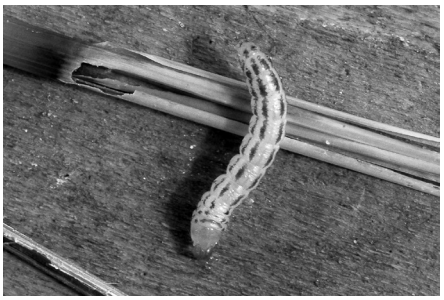
Adult stink bug

Rice Stem Borers

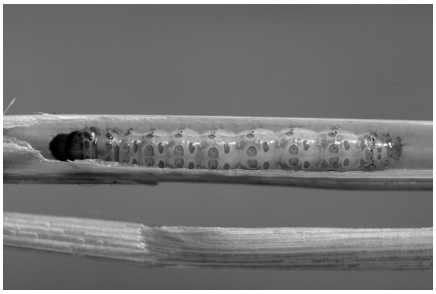
The sugarcane borer, rice stalk borer, and Mexican rice borer are important pests of rice in some regions in Louisiana. Of these species, the sugarcane borer is the most aggressive and economically important in some central and northeastern Louisiana rice areas. The sugarcane borer and the rice stem borer are distributed statewide. Both species overwinter as last instar larvae in the stalks of rice and other host plants. These larvae pupate in the spring, and adult moths emerge during early May. The Mexican rice borer is steadily invading the southwestern portion of Louisiana. A monitoring program using pheromone traps is in place, and the pest has invaded key rice producing parishes in the south-western corner of the state.

Detailed descriptions of the identification, biology, and behavior of the borers that infest Louisiana rice can be found in the rice production handbook. Briefly, adult borers are tan in color with distinct markings on the wings that differentiate the species. Borer egg-laying on rice can begin as early as May, but economically damaging infestations generally do not occur until July through September, when rice is in its reproductive stages. The appearance of eggs varies depending on the species. Sugarcane borer eggs are flat, oval, cream-colored, and positioned like fish scales in clusters of 2-100 eggs. Mexican rice borer eggs

are laid in clusters on dead and dying tissue on the plant. Larvae emerge within four to five days of egg-laying. Young larvae crawl to the base of the leaf while feeding on the leaf surface, followed by feeding on the inside of the leaf sheath. Depending on the species, larvae will bore into the stem from one to seven days after emergence. They will then continue to feed within the stem for three or four weeks. Mature larvae of all borer species may reach 1 inch in length. Larvae of the sugarcane borer are cream-colored, with a series of brown spots on the back. Larvae of the rice stalk borer are cream-colored but lack the brown spots on the back. Instead, they have two pairs of dark stripes running the entire length of the body. Mexican rice borer larvae are white to honey-colored with a pair of dark-brown to purple-colored discontinuous stripes running the length of the body.



Mexican rice borer larva



Sugarcane borer larva

Pupation occurs inside the stem. The pupae are brown, about 1/2-inch long and cylindrical. The pupal stage lasts seven to 10 days. Early infestations by borers are noticed when the young- est partially unfurled leaf of the rice plant begins to wither and die, resulting in a condition called deadheart. Stem feeding that occurs during panicle development causes partial or complete sterility and results in the whitehead condition. Severe infestations cause stalk breakage and plant lodging above the water surface.

Scouting for borers should start at green ring and must be intensified as plants reach early boot stages. Scouts should look for feeding lesions on the inside surface of the leaf sheath. These lesions are caused by the larva that feeds underneath the leaf sheath during the brief period before it bores into the stem. These feeding lesions are easily observed from the outside. Care must be taken, however, to avoid confusing these lesions with those caused by sheath blight. Peel back the leaf sheath to expose the feeding larva or to detect the presence of frass to ensure it is stem borer and not sheath blight damage. In addition, scouts must look for adults and egg masses. The insecticidal seed treatment Dermacor X-100 has been shown to provide a moderate level of control of stem borers, and use of this product is recommended where rice water weevils are a problem and problems with stem borers are anticipated. Applications of foliar insecticides later in the season must coincide with larval emergence so small larvae are killed before they enter the rice stalks or during the time they feed on the inside surface of the leaf sheath. Once larvae enter the stalks, pesticides are not effective. Declare, Karate-Z, and Prolex are labeled for stem borer control in rice. No economic thresholds, however, have been developed for these insects in rice.

Early planting allows the rice crop to avoid severe infestations of stem borers, especially where populations of the sugarcane borer increase in host plants, such as corn and grain sorghum, and move to rice plants later in the season. Destruction of rice stubble and weed management after harvest will also help in borer management by eliminating overwintering populations.

Rice Seed Midge

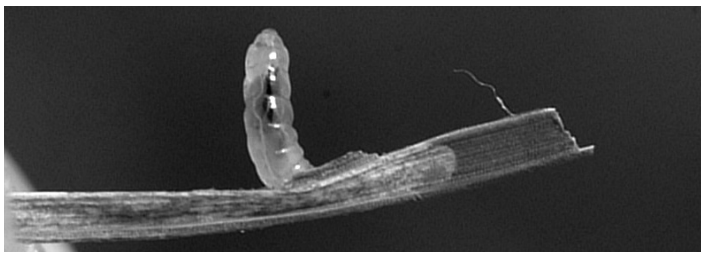
Adult midges resemble small mosquitoes and swarm over rice fields, rice levees, roadside ditches, and other bodies of water. Elongated eggs are laid on the surface of open water in strings. Larvae live on the bottom of flooded rice fields in spaghetti-like tubes. Larvae injure water-seeded rice by feeding on the embryo of germinating seeds or on the developing roots and seeds of very young seedlings. The potential for midge injury increases when fields are flooded far in advance of water-seeding rice.

Water-seeded fields should be scouted for midge injury, checking for hollowed out seed within five to seven days after seeding. Monitor fields until rice seedlings are several inches tall. Depending on the severity of injury whole fields may need to be replanted, while in some cases only a portion of the field may require reseeding.

Control rice seed midge by applying Karate Z, Declare or Prolex if a large number of hollowed out seeds are observed in the first week after planting or stands are being reduced significantly during the first two weeks after planting (less than 15 plants per square foot).

Rice Leafminer

Adult flies are less than 1/4-inch long, with a metallic blue-green to gray thorax and clear wings, and they lay eggs on rice leaves as they lie on the water. The larvae are transparent to cream-colored after hatching but become yellow to light green within a few days. Larvae injury the plant by tunneling between the layers of the leaf, attacking and killing leaves closest to the water before moving up the plant, killing additional leaves. Under heavy infestations, the entire plant may die. Rice is attacked in the early spring, and infestations usually occur in continuously

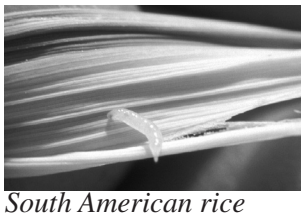


Leaf pulled back to expose rice leafminer maggot

flooded rice on the upper side of levees where water is deepest. Scout for rice leafminer larvae by pulling a rice leaf gently between the thumb and forefinger feeling for the presence of a bump in the leaf. If a bump is detected, the larvae or pupae can be found by separating the layers of the leaf. If plant populations are being reduced to less than optimum stands (10-15 plants per square foot), chemical control may be necessary.

South American Rice Miner

The South American rice miner (SARM) is a sporadic invasive insect pest of rice in the United States. It is a close relative of the rice leafminer, which is widely distributed across U.S. rice fields. Small, gray flies (about 1/10-inch long) deposit elongate, ribbed, white or creamy-colored eggs (0.5 mm long and 1.2 mm wide) singly on the upper surface of rice leaves, near the leaf margins. Larvae are small, white or yellowish legless maggots about 1/4-inch long. The brown puparium is elongated and tapered at both ends. Economic injury to rice plants tends to occur in young rice from emergence until the tillering stages, particularly in late-planted fields (planted in May and June in Central and Southwest Louisiana). Injury is caused by the larva or maggot, which causes large, elongated lesions along the margins of emerging leaves. As the leaf expands, yellow damaged areas are more visible. Affected young leaves usually break off or display a ragged appearance. The maggot continues to feed on the whorl tissue and enters the stem of developing plants. Affected seedling plants are either killed or plant growth is severely retarded. Pupation occurs inside the affected stem, near the collar of the leaf. Field damage is distributed in large patches either in the center or along the margins of the field.



South American rice miner

No chemicals are currently registered to control SARM. The only recommendation available at this time is to avoid late planting. If you suspect a SARM infestation, contact your county agent for damage assessment and to obtain the latest developments on this insect pest.

Colaspis

There are two species of colaspis in Louisiana rice: *Colaspis brunnae* and *Colaspis louisianae*. This pest can be found damaging fields of dry-seeded rice in a soybean-rice or a pasture-rice crop rotation. It is common to find a clumped distribution of larvae in the soil and patches of stand loss. The damage is often concentrated in high spots in the field. Colaspis will complete a single generation in soybeans and lespedeza. The larvae of colaspis overwinter in the soil. When rice, or another crop, is planted into a field that is infested with colaspis larvae, the larvae will begin to feed on the roots of the rice plant. The larvae pupate in the soil and emerge as adults. Oval-shaped, golden-colored adults have tan stripes running the length of the body and are about 1/4-inch in length with long antennae.

To scout for this pest, locate plants that are stunted, withering, dying, and surrounded by declining plants. Dig around the base of the plants, carefully peeling back the soil, and looking for white grubs with brown heads that are a little larger than rice water weevil larvae. CruiserMaxx and NipsitInside seed treatments have shown some ability to control colaspis in drilled rice. When rice is planted following soybeans or pasture, treating seed with CruiserMaxx or NipsitInside may be justified. There are no foliar insecticides labeled to control colaspis in Louisiana rice. Applying permanent flood as soon as possible may help control colaspis. These insects are not aquatic and application of water will decrease feeding injury and eventually cause death of the larvae.

Fall Armyworm

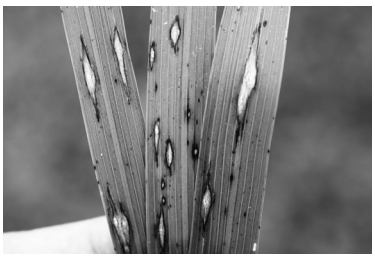
The fall armyworm, *Spodoptera frugiperda* (J. E. Smith), feeds on most grasses found in and around rice fields. It is also a serious pest of corn and pasture grasses. Since rice is not its preferred host, the fall armyworm is only an occasional pest on rice. Adult moths are about 1-inch long with gray-brown sculptured front wings and whitish hind wings. Females lay masses of 50 to several hundred whitish eggs covered with moth scales on the leaves of rice and other grasses in and around rice fields. Light green, brown, or black larvae with white stripes running the length of the body, emerge in less than 10 days and then feed on rice plants for two to three weeks. Mature larvae are about 1-inch long and have a distinctive inverted "Y" on the head. Mature larvae prepare a cocoon and pupate in soil or decomposing plant material. Moths emerge in 10 to 15 days, mate, and disperse widely before laying eggs on new plants.

Larvae feed on the leaves of young rice plants, destroying large amounts of tissue. When large numbers of armyworms are present, seedlings can be pruned to the ground, resulting in severe stand loss. Fall armyworm infestations generally occur along field borders, levees, and in high areas of fields where larvae escape drowning. The most injurious infestations occur in fields of seedling rice that are too young to flood.

To scout for fall armyworms in young rice, begin scouting after germination of seedlings, and continue to scout fields weekly for the presence of larvae on plants. Sample plants every 10 feet along a line across the field, and repeat this process in a second and third area of the field. Treat with pyrethroids when there is an average of one armyworm per two plants. Since adults lay eggs on grasses in and around rice fields, larval infestations can be reduced by effective management of grasses. Cultural control consists of flooding infested fields for a few hours to kill fall armyworm larvae. This requires that levees be in place and that rice plants be large enough to withstand a flood. Parasitic wasps and pathogenic microorganisms frequently reduce armyworm numbers below economical levels. Formulations of *Bacillus thuringiensis* are available, but must be used when caterpillars are small.

Rice Diseases

Since the list of labeled fungicides may change, check with your cooperative extension agent for current recommendations. For more information, consult publication 1802, "Louisiana Plant Disease Guide" at www.lsuagcenter.com/laplantdiseasemanagement-guide or see our Web page lsuagcenter.com\ricediseases.



Leaf blast

Node blast

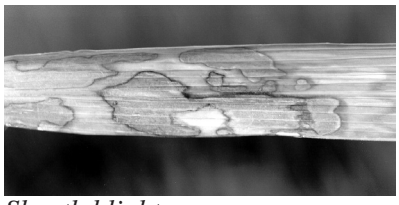
Collar blast

Rotten-neck blast

Blast: Blast is caused by the fungus, *Pyricularia grisea.* The leaf blast phase occurs between the seedling and late tillering stages. Leaf spots start as small white, gray, or blue tinged and then enlarge quickly under moist conditions to either oval diamond-shaped spots or linear lesions with pointed ends with gray or white centers and narrow brown borders. Leaves and whole plants are often killed under severe conditions. Rotten neck symptoms appear at the base of the panicle, starting at the node soon after heading. The tissue turns brown to chocolate-brown and shrivels, causing the stem to snap and lodge. Panicle branches and stems of florets also have gray- brown lesions.

Scouting for blast should begin early in the season during the vegetative phase and continue through to heading. Leaf blast will usually appear in high areas of the field where the flood has been lost or is shallow. As part of management, the flood must be maintained. Areas of heavy nitrogen fertilization and edges of the fields are also potential sites. **If leaf blast is in the field or has been reported in the same general area, and if the variety is susceptible, fungicidal applications are advisable to reduce rotten neck blast. The absence of leaf blast does not mean rotten neck blast will not occur.** Fungicide timing is critical (Table 8). If a single fungicide application is used to control blast, it should be applied when 50-70 percent of the heads have begun to emerge. Application before or after this growth stage will not provide good control of this disease! This growth stage is very difficult to detect, so it is important to scout for the crop growth stage at the same time as scouting for disease. Allow time to obtain a fungicide, schedule the application, and allow for poor weather conditions. Under heavy blast pressure two applications, one at boot and one at 50-70% heading, may be needed to effectively suppress blast.

Sheath Blight: Sheath blight is one of the most important diseases in rice in Louisiana. It is characterized by large oval spots on the leaf sheaths and irregular spots on leaf blades. Infections usually begin during the late tillering/joint-elongation stages of growth. The fungus, *Thanatephorus cucumeris (Rhizoctonia solani)* survives between crops as structures called sclerotia or as hyphae in plant debris. Sclerotia, or plant debris, floating on the surface of irrigation water serve as sources of inoculum that attack and infect lower sheaths of rice plants at the waterline. Fungal mycelium grows up the leaf sheath, forms infection structures, infects, and causes new lesions. The infection can spread to leaf blades. After the panicle emerges from the boot, the disease progresses rapidly to the flag leaf on susceptible varieties. With very susceptible varieties, the fungus will spread into the culm from early sheath infections. Infected culms are weakened and the tillers may lodge or collapse. As lesions coalesce on the sheath, the blades turn yellow-orange and eventually die. Damage is usually most common where wind-blown, floating debris accumulates in the corners of cuts when seedbeds are prepared in the water. Disease severity can be reduced by integrating several management practices. Dense stands and excessive use of fertilizer both tend to increase the damage caused by this disease. Rotation with soybeans or continuous rice increases the amount of inoculum in field soils. Fungicides are available for reducing sheath blight.



Sheath blight

Avoid late application beyond 50-70 percent heading (Table 8). However, in some areas of south Louisiana, the fungus has developed resistance to the strobilurin fungicides and other modes of action must be used to control sheath blight.

Bacterial Panicle Blight: Bacterial panicle blight, caused by the bacteria *Burkholderia glumae* and *gladioli*, is one of the most important rice diseases in the South.

The disease is associated with hot weather. Losses include reduced yields and poor milling. The bacteria are seed-borne and survive in the soil. The bacteria appear to survive as an epiphytic population

Bacterial panicle blight

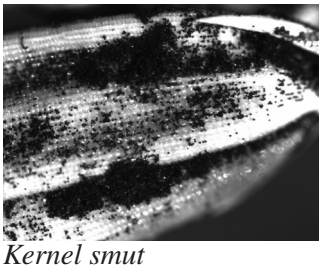
on the leaves and leaf sheaths and follow the canopy up. This population infects the grain at flowering and causes grain abortion and rotting during grain filling. The disease is first detected as a light to medium brown discoloration of the lower third to half of hulls shortly after emergence. The stem below the infected grain remains green. Pollination occurs, but the grain aborts sometime after grain filling begins. The disease tends to develop in circular patterns with the most severely affected panicles in the center remaining upright because of grain not filling. No chemical control measures are recommended. Some varieties have more resistance than others. Rice planted later in the season and fertilized with high N rates tends to have more disease.

Cercospora: The fungus *Cercospora janseana* causes narrow brown leaf spot and other symptoms. Leaf lesions are linear and reddish-brown. On susceptible cultivars, the lesions are wider, more numerous and lighter brown with gray necrotic centers.


Cercospora

Spots usually appear near heading. Both young and old leaves are susceptible. Sheaths and glumes can be infected causing significant discoloration and necrosis. On sheaths, the disease is referred to as "sheath net blotch" because of the brown cell walls and the tan-to-yellow intracellular areas that form a netlike pattern. Branches of the seed heads can become infected causing premature ripening and unfilled grains. Symptoms can be confused with rotten neck and panicle blast lesions. Narrow brown disease lesion symptoms usually are darker brown and develop in the internodal area of the neck. Grain infection appears as a diffused brown discoloration. The disease is often severe on the second crop. Resistance to narrow brown leaf spot is available, but new races of the pathogen develop rapidly. Low nitrogen appears to favor disease development. Fungicides containing propiconazole are most effective. The best timing against all stages of this disease is between panicle differentiation and boot growth stages (Table 8).

Kernel Smut: Kernel smut symptoms appear just before maturity. A black mass of smut spores replaces all or some of the endosperm of the seed. Often, the spores ooze out of the grain leaving a black mass along the seam of the hulls. The fungus, *Tilletia barclayana*, overwinters as spores in soil of affected fields and in seed. Significant quality and yield reductions are possible. Disease development is favored by high nitrogen rates. Research results from other states indicate that boot applications of propiconazole containing fungicides reduce damage significantly.


Kernel smut

False Smut: The false smut fungus, *Ustilaginoidea virens*, infects rice at flowering. The disease is characterized by large orange to olive-green spore balls that replace one or more grains on a head. In the middle of the spore masses are sclerotia that act as the survival structure. These sclerotia can be spread with the seed and infect the next crop. Removal of the sclerotia in seed-cleaning reduces spread. Seed treatment with a fungicide also reduces inoculum potential. False smut spores cause discoloration of milled rice, but no significant yield loss is associated with the disease. Presence of the smut sclerotia in grain for export has caused problems. Some foliar fungicides applied at boot can reduce disease incidence.

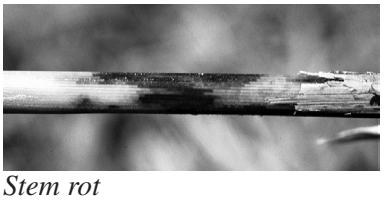

False smut

Sheath Rot: Sheath rot is caused by the fungus *Sarocladium oryzae*. Symptoms are most severe on the uppermost leaf sheaths that enclose the young panicle during the boot stage. Lesions are oblong or irregularly oval spots with gray or light brown centers and a dark reddish-brown diffuse margin. Early or severe infections may affect the panicle so that it only partially emerges. The unemerged portion of the panicle rots with florets turning red-brown to dark brown. A powdery white growth consisting of spores and hyphae of the pathogen is usually observed on the inside of affected leaves. Insect or mite damage to the boot or leaf sheaths increases the damage from this disease. Emerged panicles may be damaged with florets discolored reddish-brown to dark brown and grain not filling. Some varietal resistance is available. The disease is usually minor, affecting scattered tillers in a field and plants along the levee. Occasionally, large areas of a field may have significant damage. No control measures are currently recommended.


Sheath rot

Stem Rot: The fungus *Sclerotium oryzae* causes stem rot. Losses are not usually detected until late in the season when control practices are ineffective. Damage appears as severe lodging, which makes harvesting difficult. Seed sterility also has been reported. No high level of resistance to stem rot is available. High nitrogen and low potassium levels favor the disease. Stem rot is more serious in fields that have been in continuous rice for several years.

The pathogen overwinters as sclerotia in the top 2-4 inches of soil and in plant debris. During early floods, sclerotia float to the surface, come in contact with the plant, germinate, and infect the tissues near the water surface. The first symptom is a


Stem rot

black angular lesion on leaf sheaths near the water line at tillering or later growth stages. As lesions develop, the outer sheath may die, and the fungus penetrates into the inner sheaths and then finally the culm. These become discolored and have black or dark brown lesions. At maturity the softened culm breaks, plants lodge, and numerous small, round, black sclerotia develop in the dead tissues. The fungus can continue to develop in the stubble after harvest, and numerous sclerotia are produced.

Control measures include burning or cultivating stubble after harvest to destroy sclerotia, using crop rotation when possible, applying potassium fertilizer, and avoiding excessive nitrogen rates. Fungicidal sprays used in a general disease control program against other fungal diseases may reduce damage due to stem rot.

Grain and Head Disorders: Many fungi and bacteria infect developing grain and cause spots and discoloration on the hulls or kernels. Damage by the rice stink bug, Oebalus pugnax F., also causes discoloration of the kernel. Kernels discolored by fungal infections or insect damage are commonly called pecky rice. This is a complex disorder in rice that involves many fungi, the white-tip nematode, and insect damage. High winds at the early heading stage may cause similar symptoms. Proper insect control and disease management will reduce this problem.

Straighthead: This physiological disorder is associated with sandy soils, fields with arsenic residues, or fields having anaerobic decomposition of large amounts of organic matter incorporated into the soil before flooding. Panicles are upright at maturity because the grain does not fill or panicles do not emerge from the flag leaf sheath. Hulls may be distorted and discolored, with portions missing or reduced in size. Distorted florets with a hook on the end are called "parrot beak" and are typical of straighthead. Plants are darker green or blue-green and often produce new shoots and adventitious roots from the lower nodes. These symptoms can be mimicked by herbicide damage. Management is by using resistant varieties and draining the field approximately 10 days before internode elongation (green ring) and allowing the soil to dry until it cracks. This growth stage can be determined by slicing the crown of the plant lengthwise and counting the nodes. When three nodes are distinctly visible, internode elongation is approximately 10 days away. The DD-50 Rice Management Program may also be consulted to determine the correct drain time. It is important that the flood be established again by internode elongation.

Table 7. Reaction of Rice Varieties to Major Diseases and Disorders					
Variety	**Blast[1]**	**Sheath Blight[1]**	**Cercospora[1]**	**Bacterial Panicle Blight[1]**	**Straighthead[1]**
Antonio[2]	S	MS	MS	MS	---
Caffey	MR	MS	R	MS	MS
Catahoula	R	S	R	MS	S
Cheniere	MS	S	S	MS	MR
CL111	MS	VS	S	VS	S
CL151	VS	S	S	VS	VS
CL152	S	S	MR	MR	MR
CL161	S	VS	MS	VS	MS
CL261	VS	S	MS	VS	S
CL271	MR	S	MR	MS	MR
CLXL729[2]	R	MS	R	R	---
CLXL745[2]	R	MR	R	MR	---
Cocodrie	MS	S	S	VS	S
Colorado[2]	S	MS	MS	MS	---
Cypress	MS	VS	S	S	MR
Della-2[3]	R	S	MS	MS	MR
Jazzman	R	MS	S	S	MS
Jazzman-2	MR	S	S	VS	VS
Jupiter	MS	MS	R	MR	MR
LaKaste	S	S	MS	S	MS
Mermentau	S	S	MS	MS	S
Roy J	S	MR	R	MS	S
XL723[2]	R	MS	R	MR	---
XL753[2]	R	MR	R	MR	---

[1]R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, and VS=very susceptible
[2]Based on one year of data
[3]Based on two years of data

Rice Disease Management

Yield potential of any rice variety can be severely reduced under high disease levels. An integrated disease management program including the following practices should be implemented:

- Plant resistant varieties
- Avoid late planting
- Maintain proper fertility levels
- Maintain adequate flood (avoid loss of flood)
- Use fungicides at the correct growth stage if necessary

Fungicide timing is critical for disease control (Table 7). Sheath blight should be treated between early boot and heading, but not beyond 50-70 percent heading. Blast must be treated at the 50-70 percent heading growth stage. Yield and grain quality increases as a result of disease control and quickly decreases if fungicide is applied after 70 percent heading. Remember, this growth stage is very difficult to detect, so it is important to scout for the rice growth stage at the same time as you scout for disease.

Also, you will need to allow time to obtain a fungicide, schedule the application, and allow for poor weather conditions to apply the fungicide at the correct time. The use of foliar fungicides is justified in many cases. Some factors to consider in making this decision are whether or not: (a) the field has a history of disease, (b) the variety is susceptible, (c) the yield potential is good, (d) the rice is being grown for seed, (e) the rice was planted late (late-planted rice is more likely to encounter foliar disease problems than early-planted rice), or (f) a second crop is planned. (Disease not suppressed in the first crop may cause significant damage in the second crop.)

Scouting for diseases should begin early in the season. For sheath blight, very susceptible to susceptible cultivars will experience an economic loss if 5-10 percent of the tillers are infected during vegetative stages. For moderately susceptible cultivars, the level is 15 percent. At these levels, consider using a fungicide. For blast control, apply a foliar fungicide at early heading (50-70 percent heads emerging) when leaf blast symptoms are present. Leaf blast does not always precede rotten neck blast, and preventive applications of a fungicide may be warranted if a blast-susceptible variety is grown. The incidence and severity of blast increases when plants are stressed (loss of flood, fertility imbalance, etc.). Draining for straighthead and/or water weevil control may increase the incidence and severity of blast. Also, blast is normally worse on later planted rice. Cercospora disease control and yield increases appear best when fungicides are applied between panicle differentiation and boot growth stages. Propiconazole containing fungicides have the best activity against Cercospora. They may not be applied to the second or ratoon crop. For reaction of rice varieties to major diseases, see Table 7. Additional information on rice disease control can be obtained at www.lsuagcenter.com/ricediseases.

Weed Management in Rice

Management of weeds is critical for optimum rice production in both dry- and water-seeded systems. Although herbicide options and management strategies differ under these systems, managing both herbicides and water in a timely manner is critical.

In dry-seeded production, four to six weeks may elapse between planting and permanent flood establishment and controlling weeds during this period is critical for maximizing yields. During this time, weeds such as barnyardgrass, broadleaf signalgrass, morningglory, and hemp sesbania can become established. Although these weeds can survive a permanent flood, establishment and maintenance of a sufficient flood over these weeds can enhance control.

Herbicide Options for Weed Control

2,4-D – (Burn-down; Post-emergence) Herbicide controls most broadleaf weeds in rice. Apply herbicide after tillering but before panicle initiation. A shallow flood should be present at the time of application. Refer to specific 2,4-D product labels for use on ratoon crop rice.

Aim – (Post-emergence) Contact broadleaf herbicide that controls morningglory, hemp sesbania, jointvetch, and Texasweed. Aim is more effective when tank-mixed with Grandstand or propanil. Aim has no soil activity.

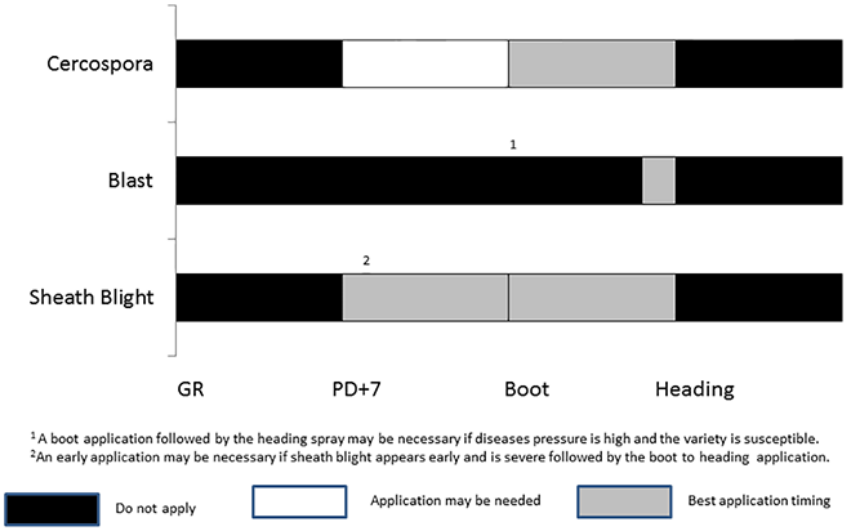
Command – (Pre-emergence, Post-emergence, and Pegging) Command provides economical residual control of annual barnyardgrass, broadleaf signalgrass, sprangletop, and fall panicum when applied before weed emergence. Command may be applied as a surface broadcast application before rice emergence or as an early post-emergence treatment to rice at the 1- to 2-leaf growth stage.

Early post-emergence applications with Command usually include a herbicide such as propanil to control emerged grass and broadleaf weeds. Command rates are soil texture dependent. Apply by ground equipment to minimize drift. Refer to label for aerial application restrictions in Louisiana. In water-seed rice, Command may be applied by air when impregnated on a granular fertilizer; rice should be in the 1- to 2-leaf stage. Use a minimum of 150 pounds of dry fertilizer per acre. Field must be drained prior to application. Applications are restricted to selected parishes. Consult label for specific parishes in Louisiana. Delay re-flooding for at least 48 hours.

Basagran – (Post-emergence) Controls annual and yellow nutsedge, redstem, ducksalad, and dayflower. Basagran is a contact herbicide that must be applied to small, actively growing weeds. Lowering the flood may be required to expose weeds. Basagran may be applied to ratoon rice.

Beyond – (Post-emergence) Apply only to Clearfield rice varieties and Clearfield hybrids in a dry, drill- or water-seeded production. Beyond selectively controls red rice, annual grasses, and broadleaf weeds. The application must be made after an application of Newpath or Clearpath. Beyond can be applied from 4-leaf to panicle

Table 8. Rice Fungicide Timing for Best Disease Management



initiation (green ring) plus 14 days for Clearfield varieties and 4-leaf to panicle initiation (green ring) for Clearfield hybrids. Beyond can be applied from 4 to 6 ounces per application with no more than two applications per season and should not exceed a total of 10 ounces per acre.

Bolero – (Pre-emergence and Post-emergence) Controls barnyardgrass, sprangletop, and annual sedges and suppresses some aquatic weeds. The herbicide should be applied pre-emergence to dry-seeded rice after soil has been sealed by irrigation or rainfall. Apply post- emergence to dry-seeded rice to wet soil after rice has emerged or to dry soil when rice is in the 2- to 3-leaf stage. For water-seeded rice, apply after rice is in the 2-leaf stage. Treatment usually is tank-mixed with a post-emergence herbicide and surface irrigated or flooded within three days. Do not submerge rice when applying permanent flood. Residual control usually will not exceed three weeks.

Broadhead – (Post-emergence) A prepackaged mixture of quinclorac plus carfentrazone (Aim) for control of broadleaf weeds and grasses. Quinclorac provides both residual and post-emergence activity and carfentrazone provides only post-emergence activity. The product is labeled as pre-plant, pre-emergence, and post-emergence to rice, but it has a better fit as a post-emergence herbicide. Rice should have at least two leaves before Broadhead is applied post-emergence.

Clearpath – (Pre-emergence and Post-emergence) Apply only to Clearfield rice varieties and Clearfield hybrids in dry- or water-seeded production. Clearpath is a package mixture of Newpath and Facet. Clearpath controls red rice, annual sedges, barnyardgrass, broadleaf signalgrass, hemp sesbania, jointvetch, and morningglory. This herbicide can be applied seven days prior to rice planting, pre-emergence and post-emergence up to 5-leaf rice in dry-seeded rice and 2- to 5-leaf rice in water-seeded rice. Apply at a rate of 0.5 pounds per acre, which is the equivalent of 4 ounces per acre of Newpath and 0.4 pounds per acre of Facet.

Clincher – (Post-emergence) This contact grass herbicide controls barnyardgrass, broadleaf signalgrass, fall panicum, knotgrass, and sprangletop. Clincher has no activity on broadleaf weeds. Apply to small actively growing grasses in the 2- to 4-leaf stages. Clincher has activity as a post-flood treatment on 4-leaf to 2-tiller grasses. Clincher works best under saturated soil conditions. Refer to label for approved tank mixes.

Facet – (Pre-emergence and Post-emergence) Provides pre-emergence and post-emergence control of barnyardgrass, hemp sesbania, broadleaf signalgrass, and morningglory. The herbicide does not control sprangletop or nutsedge. Pre-emergence applications are restricted to drill-seeded rice only. Rainfall or surface irrigation is necessary for herbicide activation. Post-emergence appli-cations should be applied after rice is in the 2-leaf stage. A 0.5 pound per acre rate of Facet DF is equivalent to 32 ounces per acre of the Facet L. Follow the label concerning the addition of crop oil or surfactants. Tomatoes and cotton are sensitive to Facet drift.

Facet + Pendimethalin – (Delayed Pre-emergence and Post-emergence) The combination controls annual grasses including sprangletop and several broadleaf weeds in drill- seeded rice. Rice seed must have imbibed germination water prior to herbicide application or five to nine days after planting. Do not apply to water-seeded rice as a delayed pre-emergence application.

Grandstand – (Post-emergence) Controls alligatorweed, hemp sesbania, Texasweed, jointvetch, and other broadleaf weeds. It does not control ducksalad. Do not overlap swaths or dress ends during application. Grandstand may be applied to ratoon rice. Grandstand works better in a herbicide mixture with propanil or another post-emergence herbicide.

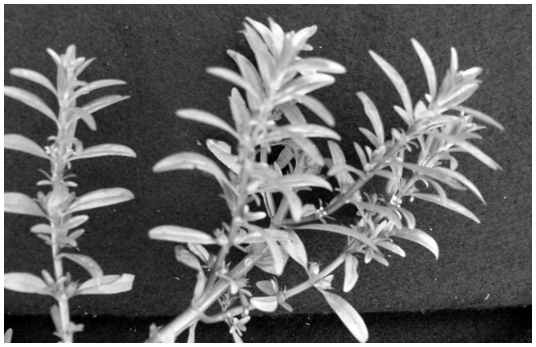
Grasp – (Pre-emergence and Post-emergence) Controls barnyardgrass, annual sedges, and broadleaf weeds. The residual activity is limited to approximately 10 days. Temporary crop injury, in the form of stunting and root mass reduction, may occur. This injury is transient, however, and the plant normally recovers within two to three weeks. Refer to label for approved surfactants and tank mixes.

Grasp Xtra – (Post-emergence) This is a prepackaged mixture of penoxulam plus triclopyr. The two products together improve control of difficult-to-control weeds compared to when applied alone. In drill-seeded production, apply to rice in the 2- to 3-leaf to 0.5 inch internode growth stages. In water-seeded production, apply to rice in the 3- to 4-leaf to 0.5 inch internode growth stages. Do not apply more than 22 ounces per acre per year.

League – (Pre-emergence and Post-emergence) League can be applied from 3 to 6 ounces per acre. League should be applied at 5 to 6 ounces per acre pre-emergence.

Significant injury can occur on long-, medium-, and short-grain rice when applied pre-emergence. Post-emergence applications should be applied at 3 to 4 ounces per acre. The 4 ounce rate can provide some residual activity. The herbicide has activity on grasses, sedges, hemp sesbania, jointvetch, and Texasweed. Refer to the label for tank mixes and recommended adjuvants.

Indian toothcup



Londax – (Post-emergence) Controls hemp sesbania, ducksalad, pickerelweed, and other aquatic broadleaf weeds and sedges. The herbicide is most effective when applied to submerged weeds one to seven days after the permanent flood is established. When applied before permanent flood, tank-mix with propanil to broaden weed control spectrum. Londax may be used for aquatic broad- leaf weed control in areas where 2,4-D is prohibited.

Newpath – (Pre-emergence and Post-emergence) Apply only to Clearfield rice varieties and Clearfield hybrids. Newpath controls red rice, sedges, and annual grasses. The first application to Clearfield rice should be Newpath or Clearpath for red rice control. The herbicide is weak on hemp sesbania and jointvetch. A total post-emergence program is more effective. Adequate soil moisture is required for optimum herbicide residual activity. Newpath must be applied prior to flooding when rice is in the 3- to 5-leaf growth stages. Permanent flood should be established as soon as possible after second application.

Obey – (Pre-emergence and Post-emergence) Obey is a pre-package mixture of Command plus quinclorac. The mixture provides both broadleaf and grass control. Obey controls barnyardgrass, broadleaf signalgrass, sprangletop, jointvetch, and hemp sesbania. Apply post-emergence to 2- to 5-leaf rice. Follow the label concerning the addition of crop oil concentrate. Refer to rates for specific soil types. Obey can be applied from 26 to 52 ounces per acre.

Permit/Halomax – (Pre-emergence and Post-emergence) Controls annual and perennial sedges, hemp sesbania, and jointvetch. Permit/Halomax may be mixed with other post-emergence herbicides to broaden weed control spectrum. Applications may be made pre- or post-flood. Can also be used as a salvage treatment 48 days prior to harvest.

Permit Plus – (Pre-emergence and Post-emergence) A prepackaged mix of halosulfuron and thifensulfuron. The addition of thifensulfuron to Permit broadens the weed spectrum. The herbicide has excellent activity on all weeds controlled by Permit with increased activity on alligatorweed and ducksalad. The herbicide should be applied at 0.75 ounces per acre, and the rate should not be reduced as is often done with Permit. The 0.75 ounces per acre rate provides 0.5 ounces per acre of Permit and 0.06 ounces per acre of thifensulfuron. A reduction in rate will reduce the benefit of the thifensulfuron in the mix. It can also be used as a salvage treatment 48 days prior to harvest, but crop maturity may be delayed.

Propanil – (Post-emergence) Sold under several trade names. Controls annual grasses, annual sedges, and broadleaf weeds in the seedling stage. Best control is achieved when applied 10 to 14 days after seeding. Propanil is often tank-mixed with a residual herbicide such as Command, Prowl ,or Bolero.

RebelEX – (Post-emergence) A prepackaged mixture of Clincher plus Grasp. This product should be applied to small actively growing weeds. Grasses should not exceed the 3-leaf stage to avoid antagonism. The field should be wet for maximum Clincher activity, but weed vegetation should be 75 percent exposed for Grasp activity.

Regiment – (Post-emergence) A contact herbicide with activity on barnyardgrass and broadleaf weeds. The herbicide has little to no soil activity. Do not apply to rice prior to the 3-leaf stage. Temporary crop injury, in the form of stunting, may occur. Refer to label for approved

surfactants and herbicide mixes.

RiceBeaux – (Post-emergence) A pre-packaged mixture of Bolero (thiobencarb) plus propanil for control of broadleaf and grass weeds. Provides control of barnyardgrass, sprangletop, and broadleaf aquatic weeds.

Ricestar HT – (Post-emergence) Controls barnyardgrass, broadleaf signalgrass, and sprangletop. Ricestar has no activity on broadleaf weeds. Apply to small actively growing grasses in the 2- to 3-leaf stages. Ricestar HT works best under saturated soil conditions. The best option for Nealley's sprangletop control at 24 oz/A. Refer to label for approved tank mixes.

Sharpen – (Preemergence and Post-emergence) When used as a pre-emergence apply 2 oz/A. Do not apply more than 1 oz/A when applying post-emergence. Controls many broadleaf weeds and grasses less than 2-3-leaf. Suppression is observed on aquatic weeds. Excessive injury can occur under saturated conditions. Refer to label for appropriate surfactants.

Strada – (Post-emergence) Controls annual sedges, hemp sesbania, and jointvetch. Strada may be mixed with other post-emergence herbicides to broaden spectrum. A Strada plus propanil mixture often is recommended.

Strada PRO – (Post-emergence) A prepackaged mixture of Strada plus halosulfuron that broadens the weed control spectrum compared with Strada alone, especially on sedge species. It is formulated as a 54 percent wettable granule. Apply 2.08 to 2.5 ounces per acre prior to rice emergence through permanent flood. Do not apply after the 0.5 inch internode stage.

Strada XT – (Post-emergence) A prepackaged mixture of Strada plus quinclorac. The mixture provides both broadleaf and grass control. It is formulated as a 70 percent wettable granule. Apply 6 to 10 ounces per acre prior to or after rain or flushing. Rice seed exposed to spray may be severely injured.

Harvest Aids

Aim - May be applied to rice to desiccate troublesome broadleaf weeds that may be present at harvest at 1.6 to 3.2 oz/A. Aim may be used alone or as a tank mixture with other harvest aids. Applications shall be made when the crop is mature and the grain has begun to dry down. May be applied 3 days prior to harvest; more time is usually needed for satisfactory results. Activity is directly related to temperature and sunlight. Refer to the Aim label for appropriate timings, adjuvants, and application volume (GPA).

Sodium Chlorate – Several formulations of sodium chlorate are labeled for use in rice. Refer to each label for appropriate rates, timings, adjuvants, and application volume (GPA). Sodium chlorate works best with high water volume (GPA) to aid in coverage. Activity is directly related to temperature and low humidity. Use sodium chlorate to facilitate harvest and reduce moisture in fully mature seed heads and to desiccate some weeds in mature rice. Apply 7 to 10 days before anticipated harvest. Thorough coverage of the crop is essential to achieve good results.

Red rice

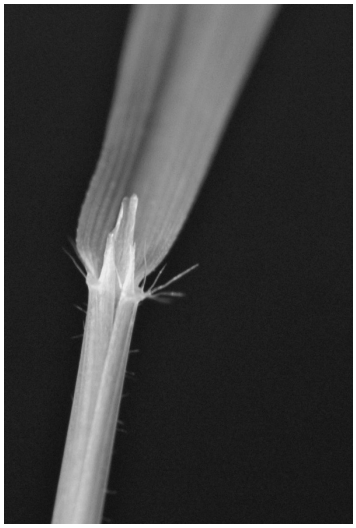


Table 9. Effectiveness of Selected Rice Herbicides

	palmleaf morningglory	eclipta	barnyardgrass	red rice	sprangletop	signalgrass	fall panicum	sedge	alligatorweed	ducksalad	redstem	hemp sesbania	waterhyssop	jointvetch	smartweed	dayflower	texasweed
Pre-plant Incorporated Or Pre-emergence	---------- **Weed Control Ratings** ----------																
Bolero PPS	4	0	8	8	8	7	6	5	4	7	3	0	6	4	5	7	5
Bolero PRE/DPRE	5	8	8	0	8	5	7	5	4	8	8	6	8	5	5	8	6
Clearpath	8	8	9	8	8	9	5	9	6	8	8	7	6	7	6	7	8
Command	0	0	9	0	8	8	9	0	0	7	0	0	0	0	2	7	0
Facet L	8	8	9	0	0	9	5	2	4	3	4	7	6	7	0	5	4
Newpath (PPI/PRE)	8	6	8	8	8	9	5	9	6	8	8	4	6	4	6	7	8
Obey (PRE)	8	8	9	0	8	9	8	2	4	7	4	7	6	7	2	7	4
Pendimethalin + Facet (DPRE)	8	8	9	0	9	8	5	4	6	3	2	8	4	7	0	3	6
Sharpen	8	7	4	4	4	4	6[6]	6	4	4	6	7	6	7	6	7	7
Post-emergence																	
2,4-D	9	9	0	0	0	0	0	2[3]	8	9	9	9	9	7	6	8	9
Aim[4]	8	6	0	0	0	0	0	5	5	4	6	9	7	6	8	5	6
Aim + Grandstand	9	8	0	0	0	0	0	5	8	6	9	9	8	9	8	6	7
Basagran	8	8	0	0	0	0	0	8	4	8	9	4	8	3	7[2]	9	2
Beyond	8	6	8	9	7	9	7	8	3	2	8	3	6	3	5	6	7
Blazer	5	4	0	0	0	0	0	0	4	3	9	9	0	0	0	0	5
Bolero + Propanil (RiceBeaux)	5	9	9	0	9	9	8[2]	7	5	7[2]	7[2]	9	9	8[2]	6[2]	8[2]	8
Broadhead	8	9	9	0	0	9	5[2]	5	6	4	6	9	7	7	8	5	6
Clearpath	8	9	9	8	6	9	6	8	6	3	3	8	6	8	6	6	7
Clincher	0	0	9	0	9	9	8	0	0	0	0	0	0	0	0	0	0
Facet L	8	9	9	0	0	9	5[2]	4	6	3	3	8	3	8	0	3	6
Facet L + Propanil	8	9	9	0	7[2]	9	8[2]	5[3]	6	7[2]	7[2]	9	8	9[2]	6[2]	7[2]	8
Grandstand	9	8	0	0	0	0	0	5	7	3	9	7	8	8	7	6	9
Grasp	3	7	9	0	3	3	3	8	7	8	8	9	7	7	8	7	6
Grasp Xtra	9	8	9	0	3	3	3	8	7	8	9	9	8	8	8	7	9
League	8	8	0	0	0	0	0	8	6	7	8	9	-	8	-	8	8
Londax	5	8	0	0	0	0	0	8	7	9	9	6	9	6	6	8	8
Newpath	8	6	8	8	6	9	4	8	3	2	8	3	6	3	4	6	7[4]
Obey	8	9	9	0	7[2]	9	7[2]	4	6	3	3	8	3	8	0	3	6
Permit/Halomax	7[4]	8	0	0	0	0	0	9	4	5	8	9	4	9	4	8	7[4]
Permit/Halomax + Londax	7[4]	8	0	0	0	0	0	9	7	9	9	9	9	9	6	8	8
Permit Plus	7[4]	9	0	0	0	0	0	9	6	7	9	9	6	9	8	8	7[4]
Propanil	5	8	9	0	7[2]	9	8[2]	4[3]	5	6[2]	7[2]	7	8	8[2]	6[2]	6[2]	6
Propanil + Aim	9	8	9	0	7	9	8[2]	6	5	6	7	9	8	9	8[2]	6	6
Propanil + Londax	9	9	9	0	7[2]	9	8[2]	9	7	7	9	9	8	9[2]	8	8[2]	9
Propanil + Permit/Halomax	9	9	9	0	7[2]	9	8[2]	9	5	5	8	9	9	9	5	8	8[4]
Pendimethalin + Facet	8	8	9	0	8	9	5[2]	4	6	3	2	8	4	7	0	3	6
Pendimethalin + Propanil	5	9	9	0	9	9	8[2]	5	5	7	9	9	8[2]	8[2]	6[2]	7	6
RebelEX	3	7	9[2]	0	9[2]	9[2]	8[2]	8	7	8	8	9	7	7	8	7	6
Regiment	8	6	9	0	3	3	0	7[3]	7	8[2]	8	8	7	8	7	7	8
Ricestar HT	0	0	9	0	8	9	7[2]	0	0	0	0	0	0	0	0	0	0
Sharpen	8	8	0	6	6[2]	5[2]	6[2]	6[3]	7	8	9	8	-	9	7	7	8[5]
Strada	7	8	0	0	0	0	0	8	5	7	9	9	8	9	6	9	6
Strada PRO	7	8	0	0	0	0	0	9	5	7	9	9	8	9	6	9	6
Strada XL	8	9	9	0	0	9	5[2]	8	6	7	8	9	8	9	6	9	4

[1]With proper water management.
[2]Controlled only when small (less than two-leaf).
[3]Annual sedge suppression.
[4]Weeds must be less than 4 inches tall.

Table 10. Effectiveness of Selected Burndown Herbicides

Pre-plant Burndown	Rice Plant Back (Days)	annual ryegrass	annual bluegrass	Carolina foxtail	little barley	henbit	cutleaf evening primrose	chickweed	geranium spp.	curly dock	buttercup spp.	mare's tail	smartweed	swinecress	shephard's purse	bittercress
		Weed Control Ratings														
2,4-D	30; 1 inch rain	0	0	0	0	5	9	3	6	7	9	6	6	6	9	7
FirstShot + glyphosate	0	7	9	9	9	9	7	9	8	9	9	9	9	9	9	9
Gramoxone XL	0	4	9	8	9	8	4	9	9	4	9	5	4	2	9	9
Grandstand + glyphosate	21 dry-seed/14 water-seed	7	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Glyphosate	0	7	9	9	9	6	5	9	5	6	9	9	7	7	9	9
Leadoff	pH<6.5 60 days pH>6.5 90 days	8	9	-	-	9	9	9	-	-	9	9	9	-	-	-
Sharpen + glyphosate	15	7	9	9	9	9	8	9	7	9	9	9	9	9	9	9
Valor + glyphosate	30 days	7	9	9	9	9	8	9	6	8	9	9	9	8	9	9

Table 11. Activity of Selective Herbicide Programs for Perennial Grass Control

	Brook paspalum	Knotgrass	Creeping Rivergrass[3]	Water paspalum	Nealley's Sprangletop
Command PRE[2]	4	5	4	5	5
Command PRE fb Clincher1	5	9	8	8	6
Command + Facet PRE[2]	4	5	4	5	6
Command + Facet PRE2 fb Clincher[1]	5	9	8	9	6
Command PRE fb Grasp[1]	5	5	7	5	6
Facet + pendimethalin DPRE[2]	4	6	5	7	6
Facet + pendimethalin DPRE fb Clincher[1]	6	9	7	9	6
Grasp[1]	4	2	6	2	6
Clincher fb Clincher[1]	7	9	8	9	6
Newpath fb Beyond[1]	7	9	8	8	6
Newpath fb Newpath[1]	7	9	8	8	6
Regiment fb Regiment1	3	2	7	2	4
Ricestar HT fb Ricestar HT[1]	3	4	6	5	8
Propanil1	2	3	3	2	5

[1]Control rating is based on herbicides applied to small actively growing plant segments.
[2]Weed control rating taken two weeks after application.
[3]Also referred to as perennial barnyardgrass.

Table 12. Crawfish Production and Rice Herbicides

Aim	Commercial crawfish not specifically mentioned; however, herbicide is moderately toxic to fish.
Basagran	Do not use Basagran on rice fields in which the commercial cultivation of crawfish is practiced.
Beyond	Crawfish production not specifically mentioned.
Blazer	Do not harvest crawfish from treated rice areas for food.
Bolero	Crawfish production not specifically mentioned. Toxic to shrimp.
Broadhead	Do not use treated rice fields for the aquaculture of edible fish and crustaceans.
Clearpath	Do not use treated rice fields for aquaculture of edible fish and crustaceans.
Clincher	Do not fish or commercially grow fish, shellfish, or crustaceans on treated acres during the year of treatment.
Command	Do not apply on rice fields in which concurrent crawfish farming is included in the cultural practices.
Duet	Do not apply to fields where commercial crawfish farming is practiced.
Facet	Do not use treated fields for aquaculture of edible fish or crawfish.
Grandstand	Do not commercially grow shellfish or crustaceans on treated acres during the year of treatment.
Grasp	Except for crawfish, do not fish or commercially grow fish, shellfish, or crustaceans on treated acres during the year of treatment.
GraspXtra	Do not apply later than 3 months prior to crawfish production.
League	Do not apply to rice fields if fields are used for the aquaculture of edible fish and/or crustaceans.
Londax	Do not harvest crawfish prior to harvesting rice.
Newpath	Crawfish production not specifically mentioned.
Obey	Do not apply on rice fields in which concurrent crayfish or catfish farming are included in the cultural practices.
Permit/Halomax	Crawfish production not specifically mentioned in restrictions.
Pendimethalin	Crawfish not specifically mentioned. Product may be hazardous to aquatic animals.
Permit Plus	Crawfish not specifically mentioned.
Propanil	Crawfish not specifically mentioned in restrictions. Commercial catfish production prohibited.
RebelEX	Do not fish or commercially grow fish, shellfish, or crustaceans on treated acres during the year of treatment.
Regiment	Crawfish not specifically mentioned.
RiceBeaux	Applications to fields where catfish/crayfish farming is practiced and draining water from treated fields into areas where catfish farming is practiced is prohibited during 12 months following treatment. Do not use adjacent to catfish/crayfish ponds.
Ricestar HT	Ricestar must not be applied to fields where crawfish are cultured commercially.
Roundup Ultra Max	Crawfish production not mentioned in restrictions. Herbicide cannot be applied to areas where surface water is present.
Sharpen	Sharpen may be applied to rice fields used for crustacean (including crayfish) production and commercial fish production.
Storm	Do not use Storm on rice fields where commercial crawfish production is practiced.
Strada	Crawfish production not specifically mentioned.
Strada PRO	Crawfish production not specifically mentioned.
Strada XT	Crawfish production not specifically mentioned.
2,4-D	May be toxic to aquatic invertebrates.

NOTES

Authors

This publication was prepared by the following personnel of the LSU AgCenter:
John Saichuk, Agronomy
Sebe Brown, Entomology
Barrett Courville, County Agent
Donald Groth, Plant Pathology
Dustin Harrell, Rice Fertility
Clayton Hollier, Plant Pathology
Steve Linscombe, Rice Breeding
Jim Oard, Rice Breeding
Michael Stout, Entomology
Eric Webster, Weed Science
Larry White, Foundation Seed Program
Rick Zaunbrecher, Foundation Seed Program

This publication is available through the LSU AgCenter's rice Web page at:
www.lsuagcenter.com/en/crops_livestock/crops/rice/Publications/

Visit our website:
www.LSUAgCenter.com

William B. Richardson, LSU Vice President for Agriculture
Louisiana State University Agricultural Center
Louisiana Agricultural Experiment Station
Louisiana Cooperative Extension Service
LSU College of Agriculture

Pub. 2270 (1.5 M) 11/14 Rev.