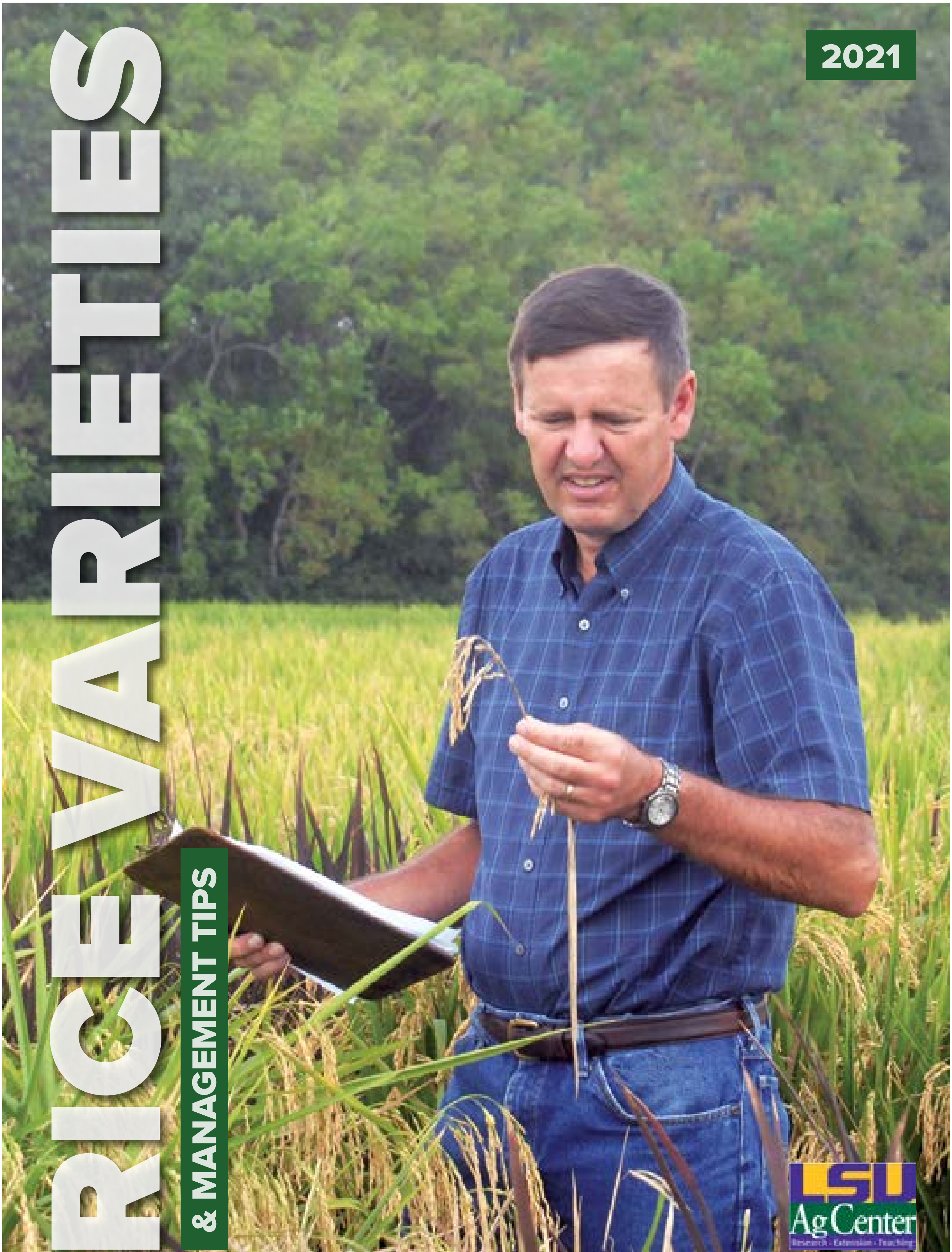
RICE VARIETIES

& MANAGEMENT TIPS

2021



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2021 RICE VARIETIES & MANAGEMENT TIPS

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. Projected cost and return information are also very important in management decisions. Additional information can be found in the Crop Enterprise Budgets publication, which can be accessed on the LSU AgCenter's rice webpage.

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 based on grain type (long or medium/short) and use (special purpose).

Clearfield (CL) varieties are resistant to Newpath and Beyond herbicides for use in the Clearfield production system. Provisia (PV) varieties are resistant to the Provisia herbicide. All rice varieties, including CL and PV herbicide resistant varieties, are non-GMO and developed from traditional breeding approaches. 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 three years required for recommendation.

The 2021 Rice Varieties and Management Tips is available through the LSU AgCenter's rice webpage at www.lsuagcenter.com/topics/crops/rice. Additional rice production information can also be found in the Louisiana Rice Production Handbook, which is also available through the LSU AgCenter rice webpage.

Data were generated in seven research trials at the North and South Units of the H. Rouse Caffey Rice Research Station in Crowley and off-station locations in Acadia, Evangeline and St. Landry parishes.

The following information is included:

Yield: Dry weight, lb/A

Milling:

a. Head — percentage of whole kernels after milling
b. Total — percentage of all kernels (whole and broken) after milling

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

Days to 50% Heading: Average number of days from emergence to 50% heading. This occurs when half of the flag leaf sheaths have panicles emerging from them. Most varieties will reach harvest maturity (20% grain moisture) within 30 to 40 days after heading under normal conditions. Medium grains normally require five to seven days longer after heading to reach harvest maturity than do long grains under similar environmental conditions.

RICE VARIETIES

Cheniere (LA): An early, high-yielding, high-quality, long-grain rice variety with very good yield potential, good lodging resistance and moderate resistance to straighthead. It is moderately susceptible to blast and bacterial panicle blight and susceptible to sheath blight and Cercospora. The variety displays excellent grain quality characteristics, has a higher amylose content and cooks less sticky than typical U.S. long grains.

CL111 (LA): A very early, short-stature, long-grain, Clearfield rice variety with very good yield potential. It averages four to seven days earlier maturity than other varieties. CL111 has good lodging resistance and blast resistance. It is susceptible to Cercospora and very susceptible to sheath blight and bacterial panicle blight. It has excellent seedling vigor and very good second crop potential.

CL151 (LA): An early, semidwarf, long-grain, Clearfield rice variety that displays excellent yield potential. The variety is rated very susceptible to blast, bacterial panicle blight and straighthead and susceptible to sheath blight and Cercospora. CL151 has consistently shown 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 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.

CL153 (LA): An early, semidwarf, long-grain, Clearfield rice variety that displays excellent yield potential. CL153 has shown very good head rice yields and has low chalk. The variety is rated as moderately susceptible to blast, Cercospora, bacterial panicle blight, and straighthead. It is susceptible to sheath blight. CL153 has shown yield potential comparable to or slightly lower than CL151. CL153 is similar in maturity and plant height to CL151 but has improved lodging resistance. The variety has good seedling vigor and has shown good second-crop yield potential.

CL163 (MS): A good-yielding, long-grain, Clearfield rice variety that possesses extra high amylose that is favored by some processors. It has very good grain appearance and high head rice yields. It has shown to be very susceptible to blast in Louisiana.

CLJ01 (LA): A Clearfield, aromatic, long-grain Jasmine type with low gel temp and low amylose. It has low chalk and very good milling. It is short, early maturing and offers excellent yield potential for a specialty variety. Agronomically similar to CL153 and CL151. Moderately resistant to blast and Cercospora, moderately susceptible to sheath blight and susceptible to bacterial panicle blight.

CLL15 (AR): An early, long-grain, Clearfield rice variety with excellent yield potential and vigor. It is similar in height and maturity to CL153. CLL15 contains the Pita blast resistance gene and is resistant to blast. It is susceptible to sheath blight and very susceptible to panicle blight.

CLL16 (AR): A long-grain, Clearfield rice variety with excellent yield potential and vigor. CLL16 is a few inches taller than typical Clearfield varieties but appears to be moderately resistant to lodging. CLL16 contains the Pita blast resistance gene and is resistant to blast. It also contains the Cercospora resistance gene, CRSP2.1, and is resistant to Cercospora. It is moderately susceptible to sheath blight and bacterial panicle blight.

CLL17 (LA): An early, long-grain, Clearfield rice variety with excellent yield potential and vigor. It is typically a couple inches taller and one to two days earlier than CL153. CLL17 is moderately susceptible to lodging. CLL17 contains the Pita blast resistance gene and is resistant to blast. It also contains the Cercospora resistance gene, CRSP2.1, and is resistant to Cercospora. It is susceptible to sheath blight and moderately resistant to bacterial panicle blight.

CLM04 (AR): A Clearfield, short-stature, medium- grain rice variety with very good yield potential, having yielded comparably to Jupiter and CL272. The variety is 2 to 3 inches taller than Jupiter and has shown very good milling and grain quality. CLM04 is similar to Jupiter in days to 50% heading and is one week later than Titan.

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, resistant to blast and moderately susceptible to bacterial panicle blight and Cercospora. The variety has shown good ratoon potential in limited testing.

DG-263L (Nutrien Dyna-Gro): A long-grain inbred variety with excellent yield potential and stable yields across trials. DG263L has a maturity between CL111 and CL153 and is similar in height to CL153. It is moderately resistant to lodging. The grain has low chalk, and the grain length is similar to PVL02 and CL151. Milling was below average 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 resistant to blast.

Jewel (AR): A conventional-height, early, long-grain rice variety that has shown good yield potential. Similar to Cheniere, Jewel has a higher amylose content and cooks less sticky than typical U.S. long grains.

Jupiter (LA): A high-yielding, semidwarf, medium-grain variety. Jupiter is susceptible to blast, moderately susceptible to sheath blight, moderately resistant to bacterial panicle blight and straighthead and resistant to Cercospora. It has shown good seedling vigor and milling quality.

Lynx (AR): A very high-yielding, semidwarf, medium-grain variety with very good milling. It has demonstrated improved yields and milling over Jupiter. Compared to Jupiter, Lynx is a few days earlier in maturity and a couple inches taller. Lynx appears to have a slightly longer grain when compared to Jupiter.

Mermentau (LA): An early maturing, long-grain rice variety with very good grain and milling yields as well as good grain quality. The variety has displayed grain yields comparably to Cocodrie and Cheniere. Mermentau is rated as susceptible to sheath blight, straighthead and blast and moderately susceptible to bacterial panicle blight and Cercospora. 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.

Presidio (TX): A semidwarf, long-grain variety that has good yield potential. It has displayed excellent milling and grain quality. It has good resistance to lodging and has excellent ratoon potential.

PVL02 (LA): A long-grain Provisia variety that has low chalk and very good milling. The variety has demonstrated a significant yield advantage and improved milling over PVL01. It is about 10 days earlier to 50% heading and is 3 to 4 inches taller than PVL01. It has shown moderate susceptibility to sheath blight, Cercospora, blast, bacterial panicle blight and the physiological disorder straighthead. The grain length of PVL02 is 6.5 mm, similar to CL151, and considerably shorter than PVL01.

PVL03 (LA): A long-grain Provisia variety with very good yield potential, milling and grain appearance. The grain length is 7 mm, in between the grain lengths of PVL01 and PVL02. PVL03 has shown yields equal to or greater than PVL02. It offers a significant improvement in disease resistance compared to PVL01 and PVL02. PVL03 contains the blast resistance gene Pita and the Cercospora resistance gene CRSP2.1. PVL03 is a similar height to PVL01 and CL153. It is a couple days later than PVL02 and is of similar maturity to Mermentau and CL153.

Thad (MS): A midmaturity, long-grain variety with good yield potential. It contains extra high amylose that is favored by some processors. Thad has shown good milling potential and has been observed to be susceptible to blast.

Titan (AR): A very early, short-stature, medium-grain rice variety that has shown excellent yield potential. The variety has consistently shown comparable or better yield potential than CL272 and Jupiter. Titan is similar in height and a week earlier than Jupiter in maturity.

Please see Tables 1 through 3 for the agronomic characteristics and yields of the recommended varieties, Table 4 for the results of 2020 variety trials and Table 5 for the stability of yield at different planting dates.

RICE HYBRIDS

Rice hybrids are available from RiceTec. RiceTec will offer nonherbicide tolerant hybrids XP753, RT 7301, RT 7401 and RT 7501 for the 2021 season in Louisiana. Please consult RiceTec for management guidelines.

The FullPage rice cropping system is the combination of the IMI herbicide tolerance trait exclusive to RiceTec hybrids and the companion IMI herbicides, Preface and Postscript, manufactured by Adama. Two FullPage RiceTec hybrids will be available for the 2021 cropping season. The hybrids will include RT7321 FP and RT7521 FP. Please consult RiceTec for FullPage hybrid management guidelines.

SEEDING DATES

Environmental conditions vary by location and over years; therefore, the optimal seeding time is 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.

Table I. Agronomic Characteristics and Yields of Recommended Rice Varieties (2018-2020) in Louisiana.

Variety	Vigor	Lodging	Days to 50% Heading	Plant Height (in)	% Chalk	2018 Milling % (Whole - Total)	2019 Milling % (Whole - Total)	2020 Milling % (Whole - Total)	Mean Milling % (Whole - Total)	2018 Grain Yield	2019 Grain Yield	2020 Grain Yield	Mean Grain Yield
Long Grain													
Cheniere	G	R	83	39	8.3	61-74	62-71	64-73	62-72	7,923	6,980	8,082	7,662
Mermentau	G	MR	81	40	13.5	61-71	65-71	63-71	63-71	8,506	7,055	8,682	8,081
Medium Grain													
Jupiter	G	MS	85	38	15.5	68-70	65-71	64-69	65-70	8,778	7,964	8,945	8,562
Titan	VG	MR	78	39	11.0	67-72	69-71	58-70	65-70	9,059	7,748	9,149	8,652

Height: Height measured at maturity in inches from soil line to top of the extended panicle.
Lodging: Comparative estimate of resistance to lodging. Most varieties rated as resistant will lodge, especially under excessive levels of nitrogen.
Abbreviations: R = resistant, MR = moderately resistant, MS = moderately susceptible, VG = very good, G = good.

Table 2. Agronomic Characteristics and Yields of Recommended Herbicide-Tolerant Rice Varieties (2018-2020) in Louisiana.

Variety	Grain Type	Seedling Vigor	Lodging	Days to 50% Heading	Plant Height (in)	% Chalk	2018 Milling % (Whole - Total)	2019 Milling % (Whole - Total)	2020 Milling % (Whole - Total)	Mean Milling % (Whole - Total)	2018 Grain Yield	2019 Grain Yield	2020 Grain Yield	Mean Grain Yield
CL111	Long	G	MR	78	40	14.0	59-72	65-71	57-72	60-72	7,642	6,841	8,075	7,519
CL151	Long	G	S	81	40	17.8	63-73	66-72	58-71	62-72	6,812	7,147	8,366	7,442
CL153	Long	G	MR	82	41	14.3	60-71	62-70	63-71	62-71	7,818	7,013	9,103	7,978
CL172	Long	G	MS	81	38	21.6	62-72	65-71	65-71	64-71	8,584	6,847	6,847	7,426
CLL17	Long	G	MS	84	40	14.7	60-68	58-68	56-70	57-69	9,003	7,410	8,670	8,361
CL272	Med.	G	MS	80	40	22.0	64-72	66-71	66-71	65-71	8,357	6,829	6,829	7,338
PVL01	Long	G	MR	89	39	8.2	-	53-65	60-70	57-68	-	7,295	7,355	7,325
PVL02	Long	G	MS	78	44	10.2	-	60-70	58-72	59-71	-	7,688	7,327	7,508
PVL03	Long	G	MR	78	41	8.5	-	62-70	60-72	61-71	-	8,909	8,401	8,655

Height: Height measured at maturity in inches from soil line to top of the extended panicle.
Lodging: Comparative estimate of resistance to lodging. Most varieties rated as resistant will lodge, especially under excessive levels of nitrogen.
Abbreviations: R = resistant, MR = moderately resistant, MS = moderately susceptible, VG = very good, G = good.

Table 3. Agronomic Characteristics and Yields of Recommended Specialty Rice Varieties (2018-2020) in Louisiana.

Variety (long grain)	Herbicide Type	Seedling Vigor	Lodging	Days to 50% Heading	Plant Height (in)	% Chalk	2018 Milling % (Whole - Total)	2019 Milling % (Whole - Total)	2020 Milling % (Whole - Total)	Mean Milling % (Whole - Total)	2018 Grain Yield	2019 Grain Yield	2020 Grain Yield	Mean Grain Yield
CLJ01	CL	VG	MR	88	38	11.3	68-73	67-71	58-69	64-71	6,702	6,792	7,350	6,948
Della-2	CONV	G	MR	85	42	14.5	64-71	64-71	64-71	64-71	6,815	5,892	7,652	6,786
Jazzman	CONV	G	MS	85	40	12.9	66-72	65-71	61-71	64-71	6,986	6,615	7,584	7,062

Height: Height measured at maturity in inches from soil line to top of the extended panicle.
Lodging: Comparative estimate of resistance to lodging. Most varieties rated as resistant will lodge, especially under excessive levels of nitrogen.
Abbreviations: R = resistant, MR = moderately resistant, MS = moderately susceptible, VG = very good, G = good.

Remember: At or below 50 degrees Fahrenheit, rice seed germination is negligible. From 50 to 55 degrees Fahrenheit, germination increases — but not to any great extent — until temperature is above 60 degrees Fahrenheit. Seedling survival is not satisfactory until the average daily temperature is above 65 degrees Fahrenheit.

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:

- Slow emergence and poor growth under colder conditions because of the inherent lack of seedling vigor and cold tolerance of many varieties.
- Increased damage from seedling diseases under cool conditions.
- Increased damage from birds (blackbirds, ducks and geese), which are more numerous in early spring.
- Interactions with herbicides.

Extremely late planting can also be detrimental to yield. Stand establishment can be equally difficult in hot weather. The yield potential of many varieties will decrease significantly with later plantings. 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. Many diseases (especially blast) and insect problems are more severe, and grain quality is often decreased with later-seeded rice.

The first crop should be harvested before mid-August to ensure adequate time for a ratoon crop to develop prior to the onset of cold weather. Rice planted on 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).

Rice in Louisiana is planted in three basic ways: water-seeded (dry or pre-sprouted 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 optimal stand is 10 to 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 Jupiter will contain fewer seeds than 90 pounds of CLL17. For conventional varieties, an ideal plant population is approximately 10 to 15 plants per square foot. Seeding rates of hybrids are much lower than inbred varieties. Growers should consult their hybrid seed representative for guidelines and recommended seeding rates.

Under typical conditions in a drill-seeded system, about half of the seeds survive to produce a plant. Therefore, if the target rice stand is 10 to 15 plants per square foot, approximately 20 to 30 seeds per square foot will have to be planted. Use the information in Table 6 to determine the pounds of seed per acre required to achieve the desired plant population.

When drill seeding, about 50 to 80 pounds of seed per acre are required. When water seeding or dry broadcasting, about 80 to 120 pounds of seed per acre are 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 4. Results of 2020 Louisiana Rice Variety Trials.

Entry	50%* Head	Height (in)	Milling % (Whole - Total)	% Chalk	LDG	URN** RRS**	RRS** (CA)	AD** (CA)	EV** (CA)	RRSL** (CA)	STL** (CA)	RRS-SF** (CA)	Mean
Long Grain													
CL111	79	41	56.5-71.7	14.0	MR	8,898	9,498	7,258	9,331	8,193	5,866	7,480	7,938
CL151	83	39	57.5-71.2	17.8	S	-	10,860	7,864	7,712	8,198	7,611	7,947	8,366
CL153	84	39	62.6-71.2	14.3	MR	9,844	10,878	7,358	9,446	10,586	7,495	8,115	8,979
CLH161	80	47	59.0-71.0	14.5	MS	-	9,181	8,493	10,054	10,974	7,843	9,001	9,258
CLL15	83	38	57.7-70.2	14.4	MR	10,181	9,515	7,944	8,637	10,268	6,744	7,156	8,377
CLL16	88	42	58.0-70.3	14.2	MR	9,605	10,972	8,315	9,347	10,712	8,890	8,386	9,437
CLL17	83	39	56.2-69.7	14.7	MS	8,872	8,120	8,031	9,601	9,957	8,439	7,668	8,636
CLXL745	76	44	54.0-71.7	17.3	MS	-	9,434	8,961	9,694	12,074	9,590	8,818	9,762
LA2026	83	38	60.6-71.2	19.7	MR	10,736	11,369	6,146	9,792	10,212	7,796	7,453	8,794
LA2034	82	39	58.8-70.8	19.1	MR	10,421	11,232	6,544	10,108	10,596	6,534	7,872	8,814
Cheniere	85	39	63.8-72.6	8.3	R	9,021	9,904	5,826	7,815	9,127	7,499	7,380	7,925
DG-263L	81	40	46.6-69.5	12.4	MR	-	11,292	9,225	10,106	11,224	7,632	8,944	9,737
Jewel	84	42	58.6-70.7	12.5	MR	9,735	10,650	7,114	8,390	9,766	8,839	7,644	8,734
LAH169	78	46	57.0-71.3	15.1	MS	10,098	10,400	8,308	9,155	11,486	7,272	8,653	9,212
Mermentau	83	39	62.6-71.2	13.5	MR	-	10,869	7,871	8,644	8,886	7,589	8,231	8,682
RT 7301	80	41	52.7-71.9	20.1	MS	-	12,833	9,716	11,619	13,696	11,212	9,388	11,411
LA2207	84	39	63.1-72.8	14.2	MR	9,196	10,959	7,398	9,451	10,871	7,693	7,465	8,973
LA2212	79	38	61.5-71.5	12.9	MR	9,450	10,884	7,331	9,332	8,158	8,454	8,053	8,702
PVL01	92	40	59.8-70.2	8.2	MR	7,364	8,985	6,343	7,831	7,563	6,909	6,489	7,353
PVL02	82	44	58.2-71.5	10.2	MS	7,819	8,445	7,161	6,933	8,469	4,455	8,009	7,245
PVL03	83	40	60.2-71.5	9.2	MR	9,499	10,112	6,378	9,029	9,184	7,271	7,335	8,218
Specialty Grain													
CLJ01	86	38	60.5-71.4	3.7	MR	-	9,095	6,656	7,890	8,530	6,487	6,847	7,584
Jazzman	87	40	63.9-71.3	6.6	MR	-	9,367	5,839	7,659	8,211	7,743	7,090	7,652
Della-2	86	40	57.6-69.0	9.3	MR	-	9,680	6,552	6,181	9,023	6,103	6,559	7,350
Medium Grain													
CLM04	88	42	66.0-70.9	11.2	MR	10,028	10,927	8,582	7,774	10,080	9,062	9,029	9,243
Lynx	86	40	62.9-70.7	14.7	MR	10,670	10,662	9,560	9,711	10,157	8,839	9,320	9,708
Titan	81	40	58.2-70.2	11.1	MR	9,990	11,522	7,384	8,839	9,071	8,751	8,486	9,009
Jupiter	88	37	64.3-69.3	15.5	MS	8,861	10,835	7,074	8,305	10,419	8,889	8,234	8,959

* *Heading, height and grain quality traits — Average of Commercial Advanced RRS, RRS2 and RRS-SF locations.*

** *RRS = H. Rouse Caffey Rice Research Station; EV = Evangeline Parish, Beiber Farm; RRSL - Rice Station, late planting; AD= Acadia Parish, R&Z Farms; STL= St. Landry Parish, Sunland Properties; RRS-SF - Rice Station, south farm; URN=Uniform Rice Regional Nursery.*

Abbreviations: CL = Clearfield, CONV = conventional, PV = Provisia, aro = aromatic, L = long, M = medium, S = susceptible, MR = moderately resistant, R = resistant.

Table 5. Results of 2020 Date of Planting Trial.

Variety	Vigor	50% Heading	Height (in)	Milling % (Whole - Total)	% Chalk	DP1 (March 1)	DP2 (March 15)	DP3 (March 27)	DP4 (April 10)	DP5 (April 24)	DP6 (March 8)	DP7 (March 27)	DP8 (June 4)	DP1-5^
CLM04	2.9	87	41.1	65-69	10	12,132	11,600	10,465	8,805	7,275	8,012	8,479	7,944	10,055
CLL17	2.5	85	40.6	58-69	17	11,025	10,602	9,765	10,269	6,688	6,609	7,701	5,011	9,670
Lynx	3.1	85	39.4	63-68	15	11,453	11,711	10,124	7,344	5,544	7,190	8,811	7,686	9,235
CL153	3.1	86	38.8	63-70	13	9,570	11,190	10,109	8,313	6,044	6,546	8,073	7,012	9,045
CLL16	2.7	90	41.3	55-66	14	9,747	9,470	9,852	8,638	5,898	10,068	7,727	7,877	8,721
Jupiter	4.4	88	37.0	60-66	17	10,466	9,504	9,021	5,785	8,606	9,267	8,089	4,996	8,677
CL111	2.8	83	40.3	61-71	16	9,748	10,892	9,581	7,749	4,654	4,910	6,078	6,897	8,525
1902202	2.9	82	36.8	59-69	23	10,789	10,514	9,561	5,662	5,870	7,117	7,648	6,146	8,479
PVL02	2.9	84	43.2	60-72	10	9,486	9,849	8,900	7,641	3,682	3,594	5,170	5,468	7,912
Cheniere	3.5	85	37.1	64-72	10	9,915	9,575	8,683	5,795	5,499	8,094	6,853	5,758	7,893
LA2140	3.2	83	38.5	59-70	15	9,730	9,409	8,716	5,590	4,749	5,190	6,170	6,314	7,639
PVL01	3.2	95	38.8	57-68	7	7,513	8,489	6,991	5,652	4,664	5,415	5,442	3,345	6,662

^Average of tests planted during the months of March and April (DP1-DP5).
DP=Date of Planting, denotes the individual planting date tests. Abbreviations: VG = very good, G = good, CL = Clearfield, CONV = conventional, PV = Provisia.
Vigor ratings based on 1-9 scale, lower ratings are more vigorous.

CONSIDERATIONS

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, which 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 seeds 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 and consider using a bird-repellent seed treatment.

d. Where seedbed preparation is difficult and a less than optimal seedbed is prepared, use a higher seeding rate.

e. If it is necessary to use seed with 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 pre-sprouted seeds. Pre-sprouted seed typically will lead to better stands than dry (non-pre-sprouted) seeds.

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 1.5 inches. In drill-seeded rice varieties, the seeding rate can be decreased by 10% when planting under warm conditions (daily average temperature higher than 70 degrees Fahrenheit). Under cool conditions (daily average temperature of 60 to 70 degrees Fahrenheit), the higher rates are recommended.

RICE FERTILIZATION

Fertilizer nutrients are most efficiently used by rice when applied immediately before plant demand. In general, applications of phosphorus, potassium, zinc and sulfur are best utilized when applied during the window from just before planting until the 4-leaf stage of development. There are situations when fall application of some nutrients may be a suitable alternative. For more details, consult the Louisiana Rice Production Handbook, publication No. 2321.

Table 6. Seed per Pound and Average Number of Seed per Square Foot for Important Rice Varieties and Hybrids.

Variety	Seed/ lb*	Seeding Rate 20 (lb/A)	Seeding Rate 25 (lb/A)	Seeding Rate 30 (lb/A)	Seeding Rate 40 (lb/A)	Seeding Rate 50 (lb/A)	Seeding Rate 60 (lb/A)	Seeding Rate 70 (lb/A)	Seeding Rate 80 (lb/A)	Seeding Rate 90 (lb/A)	Seeding Rate 100 (lb/A)	Seeding Rate 110 (lb/A)	Seeding Rate 120 (lb/A)
		-------------------------seed/ft²-------------------------											
Cheniere	19,657				18	23	27	32	36	41	45	50	54
CL111	18,301				17	21	25	29	34	38	42	46	50
CL151	19,307				18	22	27	31	35	40	44	49	53
CL153	18,933				17	22	26	30	35	39	43	48	52
CL163	18,429				17	21	25	30	34	38	42	47	51
CLJ01	19,595				18	22	27	31	36	40	45	49	54
CLL15	18,565				17	21	26	30	34	38	43	47	51
CLL16	17,468				16	20	24	28	32	36	40	44	48
CLL17	19,871				18	23	27	32	36	41	46	50	55
CLM04	18,630				17	21	26	30	34	38	43	47	51
Della-2	17,551				16	20	24	28	32	36	40	44	48
DG-263L	18,688				17	21	26	30	34	39	43	47	51
Jazzman	17,932				16	21	25	29	33	37	41	45	49
Jewel	19,722				18	23	27	32	36	41	45	50	54
Jupiter	17,319				16	20	24	28	32	36	40	44	48
Lynx	16,246				15	19	22	26	30	34	37	41	45
Mermentau	20,015				18	23	28	32	37	41	46	51	55
Presidio	18,839				17	22	26	30	35	39	43	48	52
PVL02	20,771				19	24	29	33	38	43	48	52	57
PVL03	18,169				17	21	25	29	33	38	42	46	50
RT 7301	19,557	9	11	13									
RT 7501	19,183	9	11	13									
RT 7321 FP	18,405	8	11	13									
RT 7521 FP	18,584	9	11	13									
Thad	19,624				18	23	27	32	36	41	45	50	54
Titan	16,544				15	19	23	27	30	34	38	42	46
XP753	20,604	9	12	14									

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

Phosphorus and potassium should be applied according to soil test recommendations. 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 phosphorus and/or potassium will need an additional 30 pounds of phosphorus (as P_2O_5) and/or potassium (as K_2O) to maximize ratoon yields. The additional phosphorus and potassium fertilizer can be applied in the first crop or can be applied after first-crop harvest prior to reflooding.

Lime is not recommended for rice production unless the pH of the soil falls below 5.5. Soybeans grown in rotation with rice 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. Lime should be applied in the fall after rice harvest.

In a water-seeded pinpoint flood system, one-third of the crop's nitrogen fertilizer needs should be applied during the brief drain period between planting and reflooding. If urea is the fertilizer source, it should be treated with a urease inhibitor product containing the active ingredient N-(n-butyl) thiophosphoric triamide (NBPT), N-(n-propyl) thiophosphoric triamide (NPPT) or Duromide. The second third of the nitrogen 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, two-thirds of the nitrogen should be applied immediately before permanent flood. In order to maximize nitrogen efficiency, the application should be made on dry ground, and the field should be flooded as soon as possible after the application. The balance of the nitrogen should be applied 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 NBPT, NPPT or Duromide, can be applied to the surface of urea fertilizer to slow down its breakdown and reduce ammonia volatilization. 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 or if the soil is moist (without standing water) prior to application. It is not recommended if urea is applied into standing water.

The recommended seasonal nitrogen rate range for each commonly grown rice variety is presented in Table 7. Rice varieties may differ in their nitrogen requirements by location. Native soil fertility, soil type and other factors affect nitrogen fertilizer efficiency. Rice growers should determine the nitrogen rate that provides optimal grain yield on their soil and production system. The higher nitrogen rates within the recommended range for each variety are generally required on clay soils in central and northeast Louisiana. Avoid nitrogen deficiency and excessive nitrogen fertilization.

Table 7. Nitrogen Recommendations for Rice Varieties.

Varieties	N rate (lb/A)
CL151, Jupiter, CLL17*	90-130
Cheniere, CL111, CL153, CL163, CLJ01, CLL15, CLL16, CLM04, Della-2, DG-263L, Jazzman, Jewel, Lynx, Mermentau, Presidio, PVL02, PVL03, Thad, Titan	120-160

**Only a limited amount of data on the response of CLL17 to nitrogen was observed in 2020. In all cases, maximum yield was achieved in the 90-130 lb N per acre range. This, coupled with the variety's moderately susceptible to lodging rating, it is advisable not to push this variety with high N rates on its first year of availability until more information on its lodging potential is available.*

Furrow-irrigated rice (FIR), also known as row rice, often requires 30 to 50 pounds more nitrogen as compared to delayed flood rice due to the reduced nitrogen fertilizer efficiency caused by the frequent wetting and drying of the soil. Nitrogen application in FIR should utilize multiple smaller applications to improve fertilizer efficiency. This fertilization method is often referred to as spoon-feeding rice. Research evaluating the optimal application timings for nitrogen in FIR is currently ongoing; however, preliminary research has shown that nitrogen fertilizer applied in three (spaced 10 to 14 days apart) or four split applications (spaced seven to 10 days apart) with the final application occurring at green ring have both been successful. Urea and nitrification inhibitors may be beneficial in FIR in some situations.

Zinc 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 zinc using the Mehlich-3 soil test, it is considered deficient in zinc. Soil pH is also an important factor in determining the potential for zinc deficiency in rice because as soil pH increases above 6, the solubility of zinc begins to decrease. This relationship can cause zinc to become unavailable for plant uptake even when soil test levels exceed 1 ppm. Therefore, both soil pH and the Mehlich-3 soil test are used to determine zinc fertilizer needs in rice. See Table D for zinc fertilizer recommendations. Zinc fertilizer recommendations are based on using a granular zinc sulfate. Other zinc sources can be used; however, inorganic zinc sources should be greater than 50% water soluble. Liquid inorganic or chelated zinc fertilizers can be soil applied at lower rates as compared with granular sources, generally between 2.5 to 5 pounds, because they can be applied more uniformly. When zinc 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 zinc application can be applied to rice at rates between 1 and 2 pounds of zinc per acre. Granular zinc applications at this time have also shown to be equally effective. Application of nitrogen

LSU AGCENTER SOIL TESTING TABLES

Soil testing is a 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 (ppm)	Low (ppm)	Medium (ppm)	High (ppm)	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		60 lb K_2O / A	40 lb K_2O / A	20 lb K_2O / A	0 lb K_2O / A	0 lb K_2O / A

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

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

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

	Low (ppm)	Medium (ppm)	High (ppm)
Soil Test Ratings	<12	12 - 16	≥16
Fertilizer Recommendation	40 lb / A	20 lb / A	0 lb / A

Application of 100 pounds of ammonium sulfate will provide 21 pounds of nitrogen and 24 pounds of sulfur.

Table D. Zinc Fertilizer Recommendations and Soil Test Ratings Based on the Mehlich-3 Soil Test Extraction[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% water-soluble 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 nitrogen application using 50 to 100 pounds of ammonium sulfate.

fertilizer should also be applied prior to reflooding to account for the nitrogen losses associated with draining. Ammonium sulfate is generally the preferred nitrogen source in this situation.

Sulfur should be applied according to soil test recommendations. Sulfur deficiencies often show up where large amounts of soil have been moved in land leveling. Sulfur deficiencies resemble nitrogen deficiencies, producing pale yellow plants, which grow slowly. Sulfur deficiency symptoms in rice generally begin with the newest leaf becoming yellow first, while nitrogen 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 nitrogen and 24 pounds of sulfur per acre.

RATOON MANAGEMENT

Ratoon, or second-crop rice, should be fertilized with 90 pounds of nitrogen per acre when the first crop is harvested before Aug. 15. Apply nitrogen and establish a very shallow flood as soon as possible after the first-crop harvest to maximize second-crop yields. Deep initial floods, which can reduce ratoon regrowth, should be avoided. Many growers have found success by harvesting, implementing their preferred stubble management practice, flushing and then applying the nitrogen fertilizer on dry ground followed by establishing a shallow flood. When the main crop is not harvested before Aug. 15, the potential for profitable second-crop production is reduced because of the probable delay in maturity, especially at higher nitrogen rates and the increased likelihood of unfavorable weather. Days to ratoon maturity increase with increasing nitrogen fertilization rates. Therefore, when the first crop is not harvested before Aug. 15, lower nitrogen rates are recommended. A good rule of thumb is to reduce nitrogen by 5 to 6 pounds per day after Aug. 15. Nitrogen fertilizer is not recommended after Sept. 1.

As stated in the fertility section, currently LSU AgCenter soil test-based phosphorus and potassium recommendations do not consider the ratoon rice crop. Recent research has shown that rice grown on soils that test very low, low or medium in soil test phosphorus or potassium will need an additional 30 pounds of phosphorus (as P_2O5) or K (as K_2O) to maximize ratoon yields. The additional phosphorus and potassium fertilizer can be applied with phosphorus and potassium in the first crop or can be applied after first-crop harvest.

Stubble management practices, such as post-harvest mowing of the stubble to approximately 8 inches or post-harvest rolling of the stubble, have shown to increase ratoon yields significantly. Additional benefits of post-harvest stubble management of the rice straw include even maturity of the grain, reduced incidence of disease and increased grain quality. However, it should be noted that post-harvest stubble management practices do delay maturity by approximately two weeks and should be avoided if the main crop is harvested after Sept. 1.

RICE INSECTS

The major insect pests of rice in Louisiana are the rice water weevil, the rice stink bug and a complex of stem-boring moths. Armyworms, billbugs, chinch bugs, colaspis, rice leafminer, rice seed midges, the South American rice miner and sugarcane beetles can cause crop injury in some years. Under high infestation levels, yield can be reduced by all of these pests. Identification and management information for these pests is presented in this section, and more detailed descriptions can be found in the LSU AgCenter Louisiana Rice Production Handbook, publication No. 2321. If you suspect insect injury in your field, contact your parish agent for verification and help with damage assessment and insect management. Before applying any insecticides, check the label for potential changes. Detection of residues of unlabeled pesticides including acephate disrupts rice exports.

RICE WATER WEEVIL

The rice water weevil is the most economically important pest of rice in the United States. Adults are grayish-brown (one-eighth of an inch long) 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 yield reduction. Females lay eggs in the leaf sheath at or below the water line beginning soon after permanent flood is applied. The larvae are white, legless grubs (less than one-quarter of an inch in size) with brown heads that feed on the roots, reducing plant growth and rice yields.

Adult rice water weevil

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 damaging infestations only occur once rice is flooded, and that water-seeded and early flooded rice are the most susceptible to yield losses. Delaying application of a permanent flood to rice can reduce yield losses from weevils but may not be compatible with other agronomic practices, particularly weed management. Another key to managing this insect is early planting. 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 does not begin until early

Table 8. Summary of Insecticidal Seed Treatment Characteristics.

Seed Treatment	Active Ingredient	Application Rate	Rice Water Weevil	Stem Borers	Fall Armyworm	Colaspis	Chinch Bugs	Thrips	Aphids	Fungal Pathogens
Dermacor X-100	Chlorantraniliprole	1.5 fl oz/acre	√	√	√	×	×	×	×	×
Cruiser 5FS	Thiamethoxam	3.8 fl oz/cwt*	√	×	×	√	√	√	√	×
CruiserMaxx	Thiamethoxam + 3 fungicides	7.0 fl oz/cwt*	√	×	×	√	√	√	√	√
Fortenza**	Cyantraniliprole	3.47 fl oz/cwt*	√	×	×	×	×	×	×	×
NipsIt INSIDE	Clothianidin	1.9 fl oz/cwt	√	×	×	√	√	√	√	×
NipsIt Suite	Clothianidin + 2 fungicides	1.9 fl oz/cwt	√	×	×	√	√	√	√	√

** Not to exceed 120 lb seed per acre.*
*** Research into pest control spectrum is ongoing.*

April and is not complete until May. Additionally, yield losses from weevil feeding tend to be lower in early planted rice than in late-planted rice because more mature plants are less susceptible to impacts of root feeding. Seeding conventional rice at low rates (e.g., 20 to 50 pounds 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. Hybrid rice varieties tend to suffer less yield loss than conventional cultivars under comparable infestation levels. Nonetheless, no commercially available varieties possess high enough levels of resistance to eliminate the need for insecticides.

Management of the rice water weevil with seed treatments: Dermacor X-100, Fortenza, Cruiser 5FS and NipsIt INSIDE are insecticidal seed treatments that are applied by the seed dealer. Rates, costs and the spectrum of pests controlled vary between treatments (Table 8). The active ingredients of NipsIt INSIDE and Cruiser 5FS are also available in combination with fungicide treatments. Seed treated with Dermacor X-100 may be used in either dry- or water-seeding practices. Fortenza, Cruiser 5FS and NipsIt INSIDE can only be used in rice that is drilled into a dry seedbed. RiceTec hybrid seed often comes pre-treated with one or more of the labeled seed treatments. Check with seed dealers to ensure you know what the rice seed has been treated with. Generally, populations of rice water weevils in southwest Louisiana are high enough that seed treatments are warranted in most fields. Under typical conditions, the cost of seed treatments is offset by the protection of yield from losses due to weevil damage.

Weevil management is greatest with Dermacor X-100, which typically exceeds 80% control. Fortenza provides satisfactory control but only achieves 80% control when used in combination with an additional insecticidal seed treatment. Cruiser 5FS and NipsIt INSIDE are less effective (40% to 60% control), and damaging infestations may occur when these products are used under high pest pressure. The spectrum of pests controlled should be a major factor in selecting seed treatments. In southwest Louisiana, where economically damaging infestations of stem borers are prevalent, Dermacor X-100 is recommended. If preventative seed treatments are used, there is little need to scout for rice water weevil adults.

Seeding at low rates (30 to 50 pounds of seed per acre) may compromise the effectiveness of Cruiser 5FS and NipsIt INSIDE seed treatments. If Cruiser 5FS or NipsIt INSIDE are used in fields seeded at low rates, additional management practices should be considered, such as early planting or foliar insecticide applications, if heavy infestations of rice water weevil adults are found.

Management of the rice water weevil with foliar applications of pyrethroid or neonicotinoid insecticides: Multiple pyrethroid insecticides are labeled for use in rice under variable trade names and formulations. Active ingredients available include: lambda-cyhalothrin, zeta-cypermethrin, gamma-cyhalothrin and alpha-cypermethrin. Trebon (etofenprox) is a granular insecticide with a chemistry similar to the pyrethroids. Belay (clothianidin) is an insecticide that belongs to the neonicotinoid class of insecticides. The pyrethroids are extremely toxic to crawfish, and drift into crawfish ponds must be avoided.

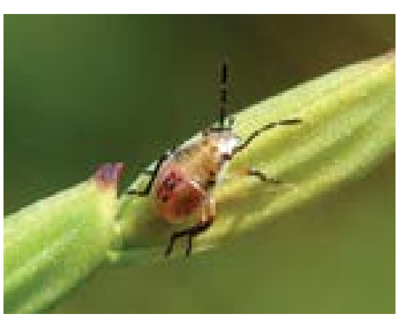
Belay is also toxic to crawfish; however, the acute toxicity of Belay is much lower than that of pyrethroids.

All these foliar insecticides only kill adult weevils, not eggs or larvae, so timing of applications is crucial for management. 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. 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. Oviposition is possible any time water is present in the field, but it is most 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 feeding 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 because of the movement of the granules when flood water is applied. More than one application of pyrethroids may be required, especially in late-planted rice. Once fields have been treated, begin scouting again after seven days.

RICE STINK BUG

Rice stink bugs are the greatest threat to headed rice and can reduce yields as well as grain quality. These tan and golden bugs (about one-half of an 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 reddish-black just before hatching. Nymphs (immatures) are black with red marks on the abdomen. Older nymphs resemble adults. Nymphs and adults feed on the rice florets and suck the sap from developing rice grains. Feeding on florets and on grains in the early milk stage can reduce rough rice yields; however, most economic losses arise from reductions in grain quality that result from stink bugs feeding on developing kernels. Pathogens enter the grain at the feeding spot, and the infection and stink bug feeding together cause discolored and pecky rice kernels. Discolored or pecky rice kernels have lower grades and poor milling quality.

Adult stink bug



Rice stink bug nymph

To scout for rice stink bugs in the field, use a 15-inch diameter sweep net and take 10 sweeps at 10 different areas within each field. Count the number of adults and nymphs collected after every 10 sweeps. In the first two weeks of heading, treat fields when there are 30 or more bugs per 100 sweeps. Insecticides that can be used include a variety of pyrethroids. The neonicotinoid Tenchu (dinotefuran) can also be used, but this insecticide cannot be applied when rice is flowering because of potential effects on bees. More mature grain is less susceptible to stink bug damage. From the hard dough stage until two weeks before harvest, treat fields only when there are more than 100 bugs per 100 sweeps. When approaching two weeks before harvest, you can treat with any of the chemicals listed above except for lambda-cyhalothrin and gamma-cyhalothrin, which have 21-day pre-harvest intervals. If pyrethroids fail to provide satisfactory control of stink bugs, switch to another mode of action.

RICE STEM BORERS

The sugarcane borer, rice stalk borer and Mexican rice borer are important pests of rice in some regions in Louisiana. All three species attack rice in southwest Louisiana, but only the sugarcane borer is considered a pest in northeastern Louisiana. The invasive Mexican rice borer is becoming increasingly damaging in southwestern rice areas. All borer species overwinter as mature larvae in the stalks of rice and other host plants. These larvae then pupate, and adult moths emerge in the spring. Detailed descriptions of the identification, biology and behavior of these stem borers can be found in the Louisiana Rice Production Handbook, publication No. 2321. Although larvae of each species resemble each other, distinguishing characteristics are present. Larvae of the sugarcane borer are cream-colored with a series

Stem borer larvae

of brown spots on the back, black bristles and a dark-colored head capsule. Mexican rice borer larvae are white to honey colored with two pairs of dark brown to purple-colored sporadic stripes running the length of the body. Rice stalk borer larvae have four solid lines down the body and a dark head capsule.

Larvae can attack all stages of rice, but damaging infestations generally occur when rice is in reproductive stages. Larvae emerge within four to five days of egg laying and begin 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. Pupation occurs inside the stem. The pupae are brown, about one-half of an inch long and cylindrical.

Early infestations by borers are noticed when the youngest 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 a whitehead. Severe infestations cause stalk breakage and plant lodging above the water surface.

The insecticidal seed treatment Dermacor X-100 has been shown to provide control of stem borers, with reductions in whitehead densities of greater than 70% compared to untreated fields. Use of this product is recommended where rice water weevils are a problem, and problems with stem borers are anticipated.

Scouting for borers should start at green ring and must be intensified as plants reach early boot stages. Look for feeding lesions on the inside surface of the leaf sheath, which are caused by larvae that feed underneath the leaf sheath before boring into the stem. These feeding lesions are easily observed, but care must be taken to avoid confusing these lesions with those caused by sheath blight. Peel back the leaf sheath to expose feeding larvae or the presence of powdery frass to ensure it is a stem borer. Applications of foliar insecticides must coincide with larval emergence so small larvae are killed before they enter the stems. Once larvae enter the stems, insecticides are ineffective. Pyrethroids are labeled for stem borer control in rice, but no economic thresholds have been developed.

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, sugarcane and grain sorghum, and move to rice plants later in the season. Destruction of rice stubble and weedy grasses 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, 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.

Rice seed midge tunnels in soil

Water-seeded fields should be scouted for midge injury, checking for hollowed-out seeds 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 the rice seed midge by applying a pyrethroid insecticide 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 (fewer than 15 plants per square foot).

RICE LEAFMINER

Adult flies are metallic, blue-green and less than one-quarter of an inch long. 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 injure the plant by tunneling between the layers of the leaf, attacking and killing leaves closest to the water before moving up the plant and killing additional leaves. Under heavy infestations the entire plant may die. Rice is attacked in the early spring, and infestations usually occur in continuously flooded rice on the upper side of leaves where water is deepest. Scout for rice leafminer larvae by pulling a rice leaf gently between the thumb and forefinger and 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 fewer than 15 plants per square foot, chemical control may be necessary. Insecticide efficacy is not well documented, but pyrethroids will likely provide sufficient control.

Leaf pulled back to expose rice leafminer maggot

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 production regions. Small gray flies (about one-tenth of an inch long) deposit individual eggs on the upper surface of rice leaves near the leaf margins.

South American rice miner pupa (top) and larva (bottom)

Larvae are small white or yellowish legless maggots about one-quarter of an 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. In most years, this insect is more of a problem in late-planted rice, but heavy infestations have been observed in rice planted in March and April in southwest Louisiana. Injury from the larvae (maggot) 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, display a ragged appearance or have a withered tip. The maggot continues to feed on the whorl tissue and enters the stem of developing plants. Affected seedlings are 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. If the infestation is not too severe and occurs in the tillering stage, rice appears to be able to tolerate some injury without a loss in yield.

No chemicals are currently registered to control SARM. Dermacor X-100 appears to provide some level of protection, but injury to seedlings may still occur. The only recommendation available at this time is to avoid late planting. If you suspect a SARM infestation, contact your parish agent for damage assessment and to obtain the latest developments on this insect pest.

COLASPIS

Colaspis larvae can be found damaging fields of dry-seeded rice in a soybean-rice or 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. Colaspis larvae 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. The larvae pupate in the soil and emerge as adult beetles. Oval-shaped, golden-colored adults have tan stripes running the length of the body and are about one-quarter of an 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. Cruiser 5FS and NipsIt INSIDE seed treatments have shown some ability to control Colaspis in drilled rice. When rice is planted following soybeans or pasture, treating seed with Cruiser 5FS or NipsIt INSIDE may be justified. No foliar insecticides are labeled to control colaspis in Louisiana rice. Applying permanent flood as soon as possible will help control colaspis but may exacerbate weevil damage. Early flooding is only recommended if weevils are controlled. Colaspis larvae are not aquatic, and application of water will decrease feeding injury and eventually cause death of the larvae.

Colaspis larva in soil

FALL ARMYWORM

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 a pyrethroid when there is an average of one armyworm per two plants. Because adults lay eggs on grasses in and around rice fields, larval infestations can be reduced by effective management of weedy 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.

Fall armyworm larvae

CHINCH BUG

Chinch bugs are piercing-sucking insects that can damage young rice crops. Damage from chinch bugs appears as withering and yellowing of rice leaves, particularly at leaf tips, and resemble drought stress. Severe infestations can kill plants and reduce rice stand. Infestations are typically clumped and concentrated on field edges. Chinch bug infestations are most common in drill-seeded rice before the application of permanent flood. Chinch bugs feed on weedy grasses, and delayed herbicide application can cause infestations to move from weeds into rice fields. Pyrethroids are labeled for control of chinch bugs, but economic thresholds have not been established. Scout for chinch bugs prior to establishment of the permanent flood and consider treatment if high populations are observed killing rice plants. Flooding may reduce the need for insecticide applications and should be considered if the rice is mature enough to tolerate it.

Chinch bug adults (black and white) and nymphs (red and black) feeding on rice

BILL BUGS

Bill bugs are emerging as pests of furrow-irrigated row rice. Larvae are cream-colored grubs with reddish-brown head capsules, which reach a maximum size of approximately one-half inch. Larvae feed in the base of the plants where stems meet with the soil surface as well as in root masses. Powdery frass is present in stems and roots where feeding has occurred. Feeding causes the appearance of a whitehead similar to those resulting from stem borers. Once whiteheads are present, controls are not likely to protect yields. Preliminary investigations suggest bill bugs can cause yield loss of more than 10% in row rice if unmanaged. Registered insecticidal seed treatments are not effective against this pest. Foliar application of Belay (clothianidin, 4 fl oz/acre) at approximately green ring stage can reduce whitehead incidence and protected yields. Scouting procedures and thresholds for this pest have not yet been established.

Bill bug larva

APPLE SNAILS

Although they are not insects, invasive apple snails are potential pests of seedling rice. The large snails have recently appeared in a small percentage of rice fields in southwestern Louisiana, but expansion into new regions is anticipated. Irrigation with surface water from snail-infested canals is thought to be the primary method of introduction into new fields. Impacts to drill-seeded rice have not been reported, but severe stand reduction can occur when water seeding into fields with heavy snail infestations. Treatment of snail infestations with copper sulfate prior to water seeding can protect seedling rice. Applications must consider estimated water volume and calculate rates to obtain 5 parts per million copper sulfate.

Apple snails can be highly detrimental to crawfish production. Care should be taken to avoid introduction of the snails into rice/crawfish production systems through stocking ponds with infested crawfish sources or other means unintended introduction. Copper sulfate cannot be used for control of snails in these systems because of the risk of harming crawfish. Consumption of apple snails and handling of pink egg masses pose human health risks.

Apple snail

Apple snail eggs

RICE DISEASES

Because the list of labeled fungicides may change, check with your cooperative extension agent for current recommendations. For more information, consult publication No. 1802, Louisiana Plant Disease Guide, at www.lsuagcenter.com/laplantdiseasemanagementguide or see our webpage, www.lsuagcenter.com/ricediseases.

Fungicide timing is critical for disease control (Table 9 and Figure 1). Sheath blight should be treated between early boot (2- to 4-inch panicle) and heading growth stage but not beyond 50% to 70% of heads emerging (any part of the head exposed). Blast must be treated at the 50% to 70% heading growth stage. Kernel smut must be treated at mid-boot growth stage (4- to 6-inch panicle in the boot) for best activity. Yield and grain quality increase with disease control but quickly decrease if fungicides are applied after 70% heading. Remember, growth stages are very hard to detect and anticipate, so it is important to scout for the rice growth stage at the same time you scout for disease. Rice disease control using a single fungicide application is becoming more difficult because of fungal resistance to fungicides, multiple diseases requiring different timings for effective control and higher multiple applications being warranted. Rice producers are encouraged to use full label rates, rotate modes of actions and use multiple fungicide applications when justified to effectively and economically manage rice diseases.

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 on the leaves and leaf sheaths and follow the canopy up.

Bacterial pinacle blight

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.

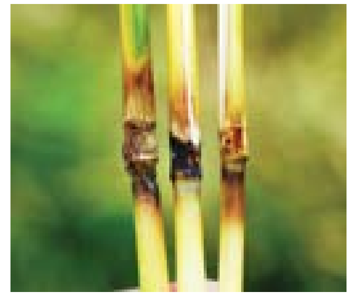
The stem below the infected grain remains green. Pollination occurs, but the grain aborts sometime after grain filling begins. The disease tends to develop in circular patterns with the most severely affected panicles in the center remaining upright because of grains not filling. No chemical control measures are recommended. Some varieties have more resistance than others. Rice planted later in the season and fertilized with high nitrogen rates tends to have more disease.

Blast: Blast is caused by the fungus *Pyricularia grisea*. The leaf blast phase occurs between the seedling and late tillering stages. Leaf spots begin as small white-, gray- or blue-tinged spots 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 9 and Figure 1). If a single fungicide application is used to control blast, it should be applied when 50% to 70% 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% to 70% heading, may be needed to effectively suppress blast.

Leaf blast

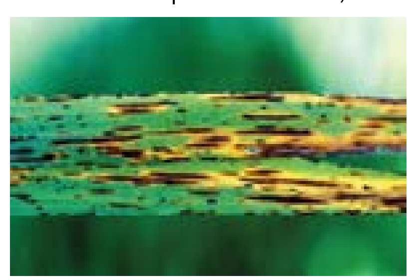


Node blast

Collar blast

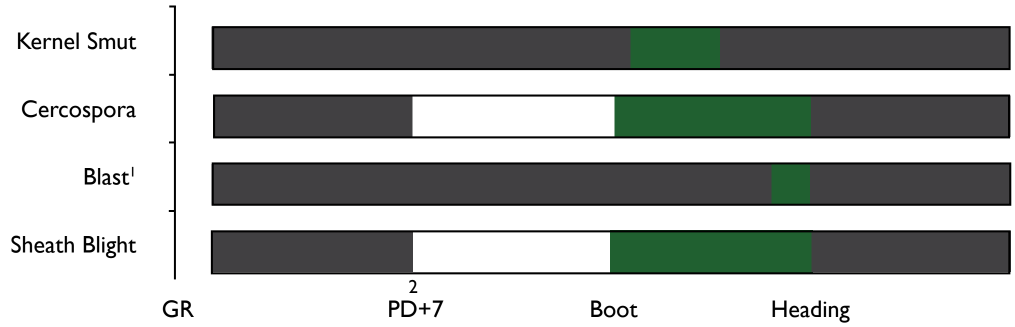
Rotten-neck blast

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. 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



Cercospora

Figure 1. Rice Fungicide Timing.



[1] A boot application followed by the heading spray may be necessary if disease pressure is high and the variety is susceptible.
[2] An early application may be necessary if sheath blight appears early and is severe followed by the boot to heading application.

Do not apply | Application may be needed | Best application timing

Table 9. Efficacy of Fungicides in Managing Rice Diseases.
Efficacy categories: P = Poor; F = Fair; G = Good; VG = Very Good; NL = Not Labeled for use against this disease.

Class and Mode of Action Group[1]	Active Ingredient	Product(s)[2]	Rate[3] (fl oz)	Blast	Sheath Blight	QoI Resistant Sheath Blight	Cercospora	Kernel Smut
QoI Strobilurins Group 11	Azoxystrobin	Quadris 2.08 SC Equation 2.08 SC Others	9-15.5	G	VG	P	P	P
	Trifloxystrobin	Flint Extra	3.1-4.7	VG	G	P	P	P
Carboxamides Group 7	Flutolanil	Elegia 3.8 F	16-32	NL	G	G	NL	NL
	Fluxapyroxad	Sercadis 2.47 SC	4.5-6.8	NL	G	G	NL	NL
Demethylation Inhibitors (DMI) Group 3	Propoconazole	Tilt 3.6 EC Bumper PropiMax Others	6-10 6-10 6-10	NL	F	F	G	G
Mixed[4]	Azoxystrobin, Propiconazole	Quilt 200 SC	14-34.5	G	VG	P	G	G
	Azoxystrobin, Propiconazole	Quilt Xcel 2.2 SE	15.8-27	G	VG	P	G	G
	Azoxystrobin, Difenoconazole	Amistar Top	10-15	G	VG	G	G	G
	Flutolanil Propiconazole	Artisan	40	NL	G	G	G	G

[1] Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).
[2] Reference to commercial or trade names is made with the understanding that no discrimination is intended nor endorsement of a particular product by LSU or the LSU AgCenter is implied. Many products have specific use restrictions about the amount of active ingredient that can be applied within a period of time or the amount of sequential applications that can occur. Please read and follow all specific use restrictions prior to fungicide use. This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. Participants in the Rice Varieties and Management Tips publication assume no liability resulting from the use of these products.
[3] Rates are the amount of formulation (product) per acre unless otherwise indicated.
[4] Refer to product label for the fungicide class and mode of action group.

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 and high nitrogen rates appear to favor disease development. The best timing against all stages of this disease is between panicle differentiation and boot growth stages (Table 9 and Figure 1). The later the rice is planted, the earlier the fungicide must be applied.

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. Research results indicate the 2- to 4-inch panicle in the boot applications of Demethylation inhibitors (Propiconazole and Difenoconazole) reduce damage significantly. Applications after boot split have little if any activity.

False smut

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.

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 indicate the 2- to 4-inch panicle in the boot applications of Demethylation inhibitors (Propiconazole and Difenoconazole) reduce damage significantly. Applications after boot split have little if any activity.

Kernel smut

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.

Sheath blight

Sclerotia on 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.

Avoid late application beyond 50% to 70% heading (Table 9 and Figure 1). 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.

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 irregular 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 reddish-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 to 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 black angular lesion on leaf sheaths near the waterline 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.

Stem rot

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 because of stem rot.

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) as well as 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. It is important that the flood be established again by internode elongation.

Straighthead

Table 10. Rice Variety Reactions to Common Diseases in Louisiana.

"VS" = very susceptible reaction, "S" = susceptible reaction, "MS" = moderately susceptible reaction, "MR" = moderately resistant reaction, "R" = resistant reaction and "–" = reaction is not known. Varieties labeled "S" or "VS" for a given disease may be severely damaged under conditions favoring disease development.

Variety	Blast	Sheath Blight	Cercospora	Bacterial Panicle Blight	Straighthead	Blast Resistance Spectrum*	Cercospora CRSP2.1#
Cheniere	MS	S	S	MS	MS	Minimal	Absent
CL111	MS	VS	S	VS	MS	Broad	Absent
CL151	VS	S	S	VS	VS	Limited	Absent
CL153	MS	S	MS	MS	MS	Broad	Absent
CL163	VS	S	R	MS	VS	Limited	Present
CLJ01	MR	MS	MR	S	MR	Unknown	Absent
CLL15	R	S	-	VS	R	Broad	Absent
CLL16	R	MS	-	MS	R	Broad	Present
CLL17	R	S	-	MR	R	Broad	Present
CLM04	S	MS	-	MR	S	Intermediate	Present
Della-2	R	S	MS	MS	R	Unknown	Absent
DG-263L	-	S	-	MR	-	Unknown	Present
Jazzman	R	MS	S	S	R	Unknown	Absent
Jewel	R	MS	-	S	R	Broad	Present
Jupiter	S	MS	R	MR	S	Minimal	Present
Lynx	S	VS	-	S	S	Limited	Present
Mermentau	S	S	NS	MS	S	Limited	Absent
PVL01	VS	S	MR	S	VS	Limited	Absent
PVL02	MS	MS	MS	S	MS	Limited	Absent
PVL03	MR	MS	-	MR	MR	Broad	Present
Titan	MS	S	MR	MS	MS	Intermediate	Present
RT7301	R	MR	MR	MR	R	n/a**	n/a**
RT7321 FP	R	MR	-	MR	R	n/a**	n/a**
RT7521 FP	R	MS	-	MR	R	n/a**	n/a**

**Blast Resistance Spectrum Characterization*
- *Broad: Contains blast resistance gene(s) known to give resistance across most common blast races.*
- *Intermediate: Contains blast resistance gene(s) known to give resistance to some common blast races.*
- *Limited: Contains blast resistance gene(s) that gives resistance to few of the common blast races.*
- *Minimal: Contain blast resistance gene(s) that gives resistance to uncommon blast races.*
- *Unknown: Does not contain any of the common blast genes but demonstrates phenotype resistance, so expected to contain an undetermined blast resistance gene.*

***n/a: Marker data not available for RiceTec products.*

#Cercospora gene (CRPS2.1) confers resistance to Cercospora when present. Varieties that are denoted as "absent" can still demonstrate resistance due to other genetic factors.

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 9 and Figure 1). Sheath blight should be treated between early boot and heading but not beyond 50% to 70% heading. Blast must be treated at the 50% to 70% heading growth stage. Yield and grain quality increase as a result of disease control and quickly decrease if fungicide is applied after 70% 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:

- The field has a history of disease.
- The variety is susceptible.
- The yield potential is good.
- The rice is being grown for seed.
- The rice was planted late (late-planted rice is more likely to encounter foliar disease problems than early planted rice).
- 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, cultivars that are very susceptible to susceptible will experience an economic loss if 5% to 10% of the tillers are infected during vegetative stages. For moderately susceptible cultivars, the level is 15%. At these levels, consider using a fungicide. For blast control, apply a foliar fungicide at early heading (50% to 70% 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. Most may not be applied to the second or ratoon crop. For reaction of rice varieties to major diseases, see Table 10.

Additional information on rice disease control can be obtained at www.lsuagcenter.com/ricediseases.

WEED MANAGEMENT IN RICE

Management of weeds is critical for optimal 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. 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.

The effectiveness of selected rice herbicides on common rice weeds is presented in Table 11. The effectiveness of selected burndown herbicides on common winter vegetation is presented in Table 12. The activity of selective herbicide programs for perennial grass control is presented in Table 13. Information about rice herbicide use in crawfish production can be found in Table 14.

HERBICIDE OPTIONS FOR WEED CONTROL

2,4-D (Burndown and postemergence) – 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 (Postemergence) – 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.

Basagran (Postemergence) – 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 or Postscript (Postemergence) – Apply Beyond to Clearfield rice varieties and Clearfield hybrids. Apply Postscript to FullPage hybrids. Beyond/Postscript selectively controls red rice, annual grasses and broadleaf weeds. The application must be made after an application of Newpath/Preface or Clearpath. Beyond can be applied from 4-leaf to panicle initiation (green ring) plus 14 days for Clearfield varieties, and Beyond/Postscript can be applied from 4-leaf to panicle initiation (green ring) for Clearfield/FullPage hybrids. Beyond/PostScript 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 (Preemergence and postemergence) – Controls barnyardgrass, sprangletop, annual sedges and suppresses some aquatic weeds. The herbicide should be applied preemergence to dry-seeded rice after soil has been sealed by irrigation or rainfall. Apply postemergence 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 postemergence 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 (Postemergence) – A prepackaged mixture of quinclorac plus carfentrazone (Aim) for control of broadleaf weeds and grasses. Quinclorac provides both residual and postemergence activity, and carfentrazone provides only postemergence activity. The product is labeled as preplant, preemergence and postemergence to rice, but it has a better fit as a postemergence herbicide. Rice should have at least two leaves before Broadhead is applied postemergence.

Clearpath (Preemergence and postemergence) – 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 preemergence and postemergence up to 5-leaf rice in dry-seeded rice and 2- to 5-leaf rice in water- seeded rice. Apply at a rate of one-half of a pound per acre, which is the equivalent of 4 ounces per acre of Newpath and 0.4 of a pound per acre of Facet.

Clincher (Postemergence) – 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.

Command (Preemergence, postemergence 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 postemergence treatment to rice at the 1- to 2-leaf growth stage. Early postemergence 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 reflooding for at least 48 hours.

Facet (Preemergence and postemergence) – Provides preemergence and postemergence control of barnyardgrass, hemp sesbania, broadleaf signalgrass and morningglory. The herbicide does not control sprangletop or nutsedge. Preemergence applications are restricted to drill-seeded rice only. Rainfall or surface irrigation is necessary for herbicide activation. Postemergence applications should be applied after rice is in the 2-leaf stage. One-half of a 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 preemergence and postemergence) – 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 preemergence application.

Gambit (Burndown, preemergence and postemergence) – Gambit is a prepackage mixture of halosulfuron plus prosulfuron. Apply as a burndown with glyphosate or as a preemergence with a herbicide with residual activity on grasses. Gambit should be applied at a rate of 1 to 2 ounces per acre under dry or flooded conditions. Do not apply more than 2 ounces per acre per year. Refer to label for approved adjuvants. Gambit controls broadleaf weeds and sedges. Apply to actively growing weeds in the 1- to 3-leaf stage and 3- to 6-leaf stage for sedges. If applied under flooded conditions, weeds should be exposed above the flood 70% to 80%. Do not flush or flood within 48 to 72 hours after application. Hold flood water for 14 days after application, and do not apply within 48 days of harvest.

Grandstand (Postemergence) – Controls alligator weed, 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 postemergence herbicide.

Grasp (Preemergence and postemergence) – 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, the plant normally recovers within two to three weeks. Refer to label for approved surfactants and tank mixes.

Grasp Xtra (Postemergence) – 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 one-half-inch internode growth stages. In water-seeded production, apply to rice in the 3- to 4-leaf to half-inch internode growth stages. Do not apply more than 22 ounces per acre per year.

League (Preemergence and postemergence) – Controls grasses, sedges, hemp sesbania, jointvetch and Texasweed. League can be applied from 3 to 6 ounces per acre. League should be applied at 5 to 6 ounces per acre when applied preemergence. Postemergence applications should be applied at 3 to 4 ounces per acre. The 4 ounces per acre rate can provide some residual activity. Significant injury can occur on long-, medium- and short-grain rice when applied preemergence. Refer to the label for tank mixes and recommended adjuvants.

Londax (Postemergence) – 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 broadleaf weed control in areas where 2,4-D is prohibited.

Loyant (Postemergence) – Loyant can be applied to both drill- and water-seeded rice in the 2-leaf stage at a rate of 1 pint per acre. A methylated seed oil (MSO) at 0.5 pint per acre is required. Wait at least 14 days between Loyant applications, and do not apply more than 2 pints per acre per year. Loyant controls most broadleaf and sedge weeds found in rice, including many aquatic broadleaf weeds. Loyant has no activity on Texasweed. Loyant has activity on small barnyardgrass, broadleaf signalgrass, junglerice and Amazon sprangletop no larger than 3- to 5-leaf. Apply to small, actively growing weeds. If the flood is not present at application, establish permanent flood within three days. If the permanent flood is present at application, make sure weeds are exposed 70% above flood level and wait three hours before adding additional water. Loyant has no residual activity on weeds that have yet to emerge. Avoid the use of Loyant on freshly cut or leveled ground, except water-leveled fields. Loyant has auxin activity similar to 2,4-D or Grandstand; therefore, caution should be taken to avoid drift to neighboring soybean and other broadleaf crops.

Newpath or Preface (Preemergence and postemergence) – Apply Newpath to Clearfield rice varieties and Clearfield hybrids. Apply Preface to FullPage hybrids. Newpath/Preface controls red rice, sedges and annual grasses. The first application to Clearfield rice should be Newpath or Clearpath for red rice control, and the first application of FullPage should be Preface. Each herbicide is weak on hemp sesbania and jointvetch. A total postemergence program is more effective. Adequate soil moisture is required for optimum herbicide residual activity. Newpath/Preface should 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 (Preemergence and postemergence) – Obey is a prepackage mixture of Command plus quinclorac. The mixture provides both broadleaf and grass control. Obey controls barnyardgrass, broadleaf signalgrass, sprangletop, jointvetch and hemp sesbania. Apply postemergence 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 (Preemergence and postemergence) – Controls annual and perennial sedges, hemp sesbania and jointvetch. Permit/Halomax may be mixed with other postemergence 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 (Preemergence and postemergence) – 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 of an ounce per acre, and the rate should not be reduced as is often done with Permit. The 0.75 of an ounces per acre rate provides half of an ounce per acre of Permit and 0.06 of an ounce per acre of thifensulfuron. A reduction in rate will reduce the benefit of the thifensulfuron in the mix. It also can be used as a salvage treatment 48 days prior to harvest, but crop maturity may be delayed and result in a yield reduction.

Propanil (Postemergence) – 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.

Provisia (Postemergence) – Apply only to Provisia rice varieties. Provisia controls red rice, weedy rice and annual and perennial grass weeds commonly found in rice fields. The first application to Provisia rice should be applied at 13 to 18 ounces per acre. Adequate soil moisture is required for optimum herbicide activity. A second application of Provisia must be applied prior to panicle initiation. Do not apply more than 31 ounces per acre per year. Applications of Provisia to Provisia rice can cause injury, and it is usually in the form of yellow foliage often referred to as a "yellow flash." Caution should be taken to avoid spray overlap. When Provisia is mixed with other herbicides, antagonism can occur. Refer to Provisia label for approved mixtures.

RebelEX (Postemergence) – 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% exposed for Grasp activity.

Regiment (Postemergence) – 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 Indian toothcup adjuvants and herbicide mixes.

RiceBeaux (Postemergence) – A prepackaged mixture of Bolero (thiobencarb) plus propanil for control of broadleaf and grass weeds. Provides control of barnyardgrass, sprangletop and broadleaf aquatic weeds.

Ricestar HT (Postemergence) – Controls barnyardgrass, broadleaf signalgrass and sprangletop. Ricestar HT 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 is 24 ounces per acre. Refer to label for approved tank mixes.

RiceOne (Delayed preemergence or early postemergence) – RiceOne is a prepackage mixture of clomazone and pendimethalin. Because of the presence of pendimethalin in the mixture, this herbicide cannot be applied as a preemergence treatment immediately after planting. The mixture controls annual barnyardgrass, broadleaf signalgrass, sprangletop, fall panicum and small-seeded broadleaf weeds when applied prior to weed emergence. RiceOne may be applied as a surface broadcast application as a delayed preemergence application or as an early postemergence treatment to rice. Early postemergence applications will need another herbicide to control emerged weeds. RiceOne rates are soil-texture dependent; therefore, refer to the RiceOne label for proper rates. Do not apply to water-seeded rice.

Sharpen (Preemergence and postemergence) – When used as a preemergence, apply 2 ounces per acre. Do not apply more than 1 ounce per acre when applying postemergence. Controls many broadleaf weeds and grasses less than 2- to 3-leaf. Suppression is observed on aquatic weeds. Excessive injury can occur under saturated conditions. Refer to label for appropriate surfactants.

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

Strada PRO (Postemergence) – 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% wettable granule. Apply 2.08 to 2.5 ounces per acre prior to rice emergence through permanent flood. Do not apply after the half-inch internode stage.

Strada XT (Postemergence) – A prepackaged mixture of Strada plus quinclorac. The mixture provides both broadleaf and grass control. It is formulated as a 70% 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.

Table 11. Effectiveness of Selected Preplant and Preemergence Rice Herbicides on Certain Weeds.

	Palmleaf Morningglory	Eclipta	Barnyardgrass	Red Rice	Sprangletop	Signalgrass	Fall Panicum	Sedge	Alligatorweed	Ducksalad	Redstem	Hemp Sesbania	Waterhyssop	Jointvetch	Smartweed	Dayflower	Texasweed
Preplant Incorporated, Preplant, Preemergence or Delayed Preemergence	----- 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
Gambit	4	7	0	0	0	0	0	9	8	8[4]	7	7	6	7	6	8	8
Newpath or Preface (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	6[1]	6	3	2	8	4	7	0	3	6
RiceOne	0	0	9	0	8	9	9	0	0	7	0	0	0	5	2	7	0
Sharpen	8	7	4	0	4	4	6	6	4	4	6	7	6	7	6	7	7
Effectiveness of Selected Postemergence Rice Herbicides on Certain Weeds																	
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]	4	8	9	4	8	3	7[2]	9	2
Beyond or Postscript	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
Gambit	9	9	0	0	0	0	0	9	8	9[4]	9	9	7	9	9	8	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
Loyant	9	9	6[4]	0	6[4]	6[4]	6[4]	8	9	9	8	9	8	9	9	8	4
Newpath or Preface	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
Provisia	0	0	9	9	9	9	9	0	0	0	0	0	0	0	0	0	0
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	0	6[2]	5[2]	6[2]	6[3]	7	8	9	8	-	9	7	7	8[4]
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] Annual sedge suppression. [2] With proper water management. [3] Weeds must be <4 inches tall. [4] Controlled only when small (< 2 leaf).

Table 12. Effectiveness of Selected Burndown Herbicides.

Preplant 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	Shepherd'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
Gambit + glyphosate	0	7	9	9	9	9	8	9	8	9	9	9	9	8	9	9
Glyphosate	0	7	9	9	9	6	5	9	5	6	9	9	7	7	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
Leadoff	pH<6.5; 60 pH>6.5; 90	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	7	9	9	9	9	8	9	6	8	9	9	9	8	9	9

Table 13. Activity of Selective Herbicide Programs for Perennial Grass Control[1].

Herbicide Program	Brook Paspalum	Knotgrass	Creeping Rivergrass[3]	Water Paspalum	Nealley's Sprangletop
Clincher fb Clincher[1]	7	9	8	9	6
Command PRE[2]	4	5	4	5	5
Command PRE fb Clincher[1]	5	9	8	8	6
Command + Facet PRE[2]	4	5	4	5	6
Command + Facet PRE[2] 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
Loyant	4	6	6	5	6
Newpath fb Beyond[1]	7	9	8	8	6
Newpath fb Newpath[1]	7	9	8	8	6
Propanil[1]	2	3	3	2	5
Provisia fb Provisia	5	9	7	9	9
Regiment fb Regiment[1]	3	2	7	2	4
Ricestar HT fb Ricestar HT[1]	3	4	6	5	8

[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 14. 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 where the commercial cultivation of crawfish is practiced.
Beyond/Postscript	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 the 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.
Gambit	Do not commercially grow fish, shellfish or crustaceans on treated acres during the year of treatment.
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 three 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.
Loyant	Except for crawfish, do not fish or commercially grow fish, shellfish or crustaceans on treated acres during the year of Loyant treatment.
Newpath/Preface	Crawfish production not specifically mentioned.
Obey	Do not apply on rice fields in which concurrent crawfish 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.
Provisia	Crawfish not specifically mentioned; however, do not allow Provisia rice go to seed in a nonrice year. This includes any fallow or crawfish production fields.
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/crawfish farming is practiced and draining water from treated fields into areas where catfish farming is practiced is prohibited for 12 months following treatment. Do not use adjacent to catfish/crawfish ponds.
RiceOne	Do not apply on rice fields in which concurrent crawfish farming is included in the cultural practices.
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 crawfish) 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.

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