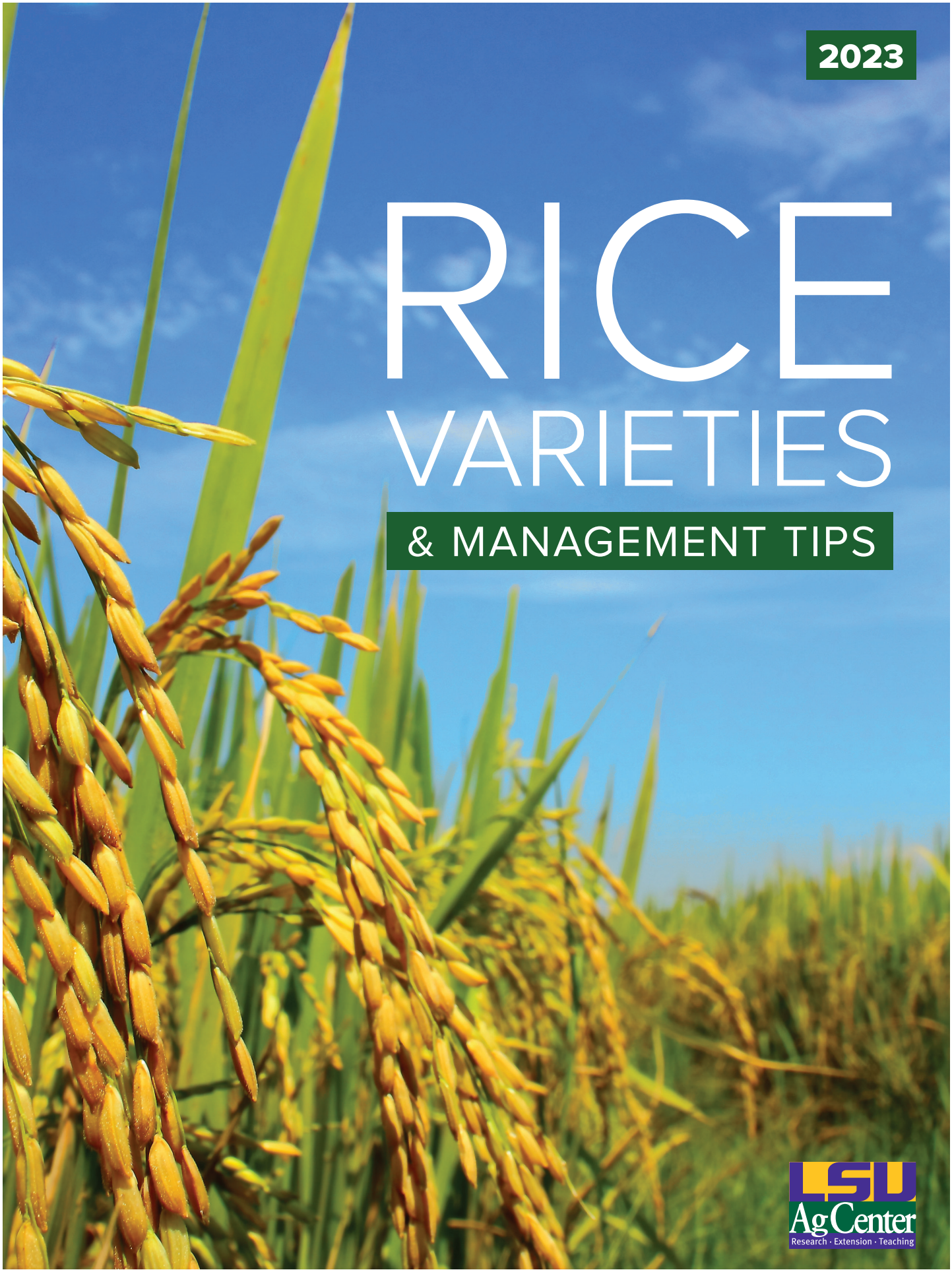
2023
RICE
VARIETIES
& MANAGEMENT TIPS
LSU
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2023 RICE VARIETIES & MANAGEMENT TIPS

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, letters in parentheses 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.

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, St. Landry, Tensas and Vermilion 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

Avant (LA): A very early, high-yielding, long-grain rice semidwarf variety with very good yield potential. It has shown very good lodging resistance and ratoon potential in plot trials. Avant is the earliest variety available, five to 10 days earlier to 50% heading than Cheniere. It has traditional Southern long-grain cooking characteristics, with intermediate amylose and gel temp. Avant contains the CRSP2.1 gene and is resistant to narrow brown leaf spot and moderately susceptible to *Cercospora* infection on the stem. It is rated as susceptible to sheath blight, moderately susceptible to blast and bacterial panicle blight and moderately resistant to false smut.

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.

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. It is agronomically similar to CL153 and CL151. Moderately resistant to blast and *Cercospora*, moderately susceptible to sheath blight and susceptible to bacterial 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. Milling yields are observed to be lower than other Clearfield varieties. CLL16 contains the Pita blast resistance gene and is resistant to blast. It also contains the CRSP2.1 gene and is resistant to narrow brown leaf spot and moderately susceptible to *Cercospora* infection on the stem. 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 a couple inches taller and one to two days earlier than CL153. CLL17 should be planted early, as yields can decrease when planted outside of the recommended planning window. It is susceptible to lodging, especially with higher nitrogen levels. CLL17 is recommend for 120-140 units of nitrogen. CLL17 contains the Pita blast resistance gene and is resistant to blast. It also contains the CRSP2.1 gene and is resistant to narrow brown leaf spot and moderately susceptible to *Cercospora* infection on the stem. 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.

DG263L (Nutrien Dyna-Gro): A long-grain, high amylose, inbred variety with exceptional yield potential and stability across environments. DG263L has a maturity between CL111 and CL153, is similar in height to CL153 and is moderately resistant to lodging. The ratoon potential is lower than other varieties. The grain length is similar to PVL02 and CL151, and milling values tend to be lower than other varieties in research trials.

Frontière (LA): A proprietary low-glycemic index high-protein rice variety developed by the LSU AgCenter. This diabetes friendly and nutritious rice variety has a glycemic index of 41 and 10.4% protein. The combination of these two distinctive traits is the first of its kind to connect rice and positive health outcomes for people with diabetes, obesity or another metabolic syndrome beyond the traditional roles of rice. This U.S. long-grain variety has a good vigor and great adaptability to the Southern rice growing regions. It is very early (85 d to 50% heading), semidwarf (36 inches tall), moderately resistant to lodging, moderately susceptible to rice blast, and susceptible to sheath blight with good yielding potential (6,774 lbs/A). It tastes great and has excellent grain quality characteristics with high amylose content, intermediate gelatinization temperature, and distinctive cooking characteristics due to its low GI and increased protein content. Growers that are interested in seed for this variety can contact the LSU AgCenter Office of Sponsored Programs and Intellectual Property at 225-578-3779 or email: DBenedict@agcenter.lsu.edu.

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.

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 of 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.

PVL03 (LA): A long-grain Provisia variety with excellent yield potential, milling and grain appearance. The grain length is greater than 7 millimeters. PVL03 is the highest yielding of the Provisia varieties and is very competitive with Clearfield and conventional varieties. It offers a significant improvement in disease resistance compared to PVL01 and PVL02. PVL03 is resistant to blast and contains the blast resistance gene Pita. It contains the CRSP2.1 gene and is resistant to narrow brown leaf spot, but is susceptible to *Cercospora* infection on the stem, especially in later plantings. PVL03 is similar in height to PVL01 and CL153 and has a similar maturity to Mermentau and CL153.

Thad (MS): A mid-maturity, 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 is very 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 Jupiter. Titan is similar in height and a week earlier than Jupiter in maturity. Milling yields have been observed to drop off significantly when harvested at lower moisture.

Please see Tables 1 and 2 for the agronomic characteristics and yields of the recommended varieties, Tables 3-8 for the results of 2022 variety trials and Table 9 for the stability of yield at different planting dates.

RICE HYBRIDS

Rice hybrids are available from RiceTec. RiceTec will offer nonherbicide tolerant hybrids XP753, RT7301, RT7302, RT7401, RT7501, XL723 and RT7801 (high amylose) for the 2023 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. Four FullPage RiceTec hybrids will be available for the 2023 cropping season. The hybrids will include RT7221 FP, RT7321 FP, RT7521 FP, RT7421 and RT7523. Please consult RiceTec for FullPage hybrid management guidelines.

The Max-Ace rice cropping system is the combination of the Max-Ace trait exclusive to RiceTec and the Highcard herbicide specifically designed to be used with Max-Ace Rice Cropping Solution manufactured by Adama. The RiceTec RTv7231 MA variety and hybrid RT7331 MA will be available for the 2023 cropping season. Please consult RiceTec for Max Ace 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.

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.

Table I. Agronomic Characteristics and Yields of Recommended Conventional Rice Varieties (2020-2022) in Louisiana.

Variety	Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2020 Milling % (Whole - Total)	2021 Milling % (Whole - Total)	2022 Milling % (Whole - Total)	Mean Milling % (Whole - Total)	2020 Grain Yield	2021 Grain Yield	2022 Grain Yield	Mean Grain Yield
Long Grain													
AddiJo	G	85	39	12.7	MR	61/70	61/70	59/68	60/69	8,557	7,350	7,931	7,946
Avant	G	78	37	13.3	MR	61/71	64/71	62/68	62/70	8,714	7,370	7,744	7,943
Cheniere	G	84	39	8.1	R	63/72	64/73	64/71	64/72	8,100	6,769	7,993	7,621
DG263L	G	81	39	14.7	MR	47/69	60/68	57/66	55/68	9,867	8,187	8,315	8,790
LA19-2207	G	82	39	13.4	MR	61/72	63/71	62/69	62/71	9,189	6,938	8,786	8,304
Mermentau	G	82	38	13.9	MR	62/71	63/70	61/67	62/69	8,681	7,453	7,848	7,994
Medium Grain													
Jupiter	G	88	37	18.0	MS	64/69	63/67	63/67	63/68	9,047	8,169	7,591	8,269
Titan	VG	81	38	12.8	MR	58/70	62/68	61/67	60/68	9,035	7,666	7,686	8,129

Abbreviations: VG = very good, G = good, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparative estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.

Table 2. Agronomic Characteristics and Yields of Recommended Herbicide-Tolerant Rice Varieties (2020-2022) in Louisiana.

Variety	Grain Type	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2020 Milling % (Whole - Total)	2021 Milling % (Whole - Total)	2022 Milling % (Whole - Total)	Mean Milling % (Whole - Total)	2020 Grain Yield	2021 Grain Yield	2022 Grain Yield	Mean Grain Yield
Clearfield														
CL111	Long	G	81	41	14.2	MR	57/72	66/71	65/70	63/71	7,879	7,089	7,726	7,565
CL151	Long	G	82	40	19.2	S	58/71	66/70	62/69	62/70	8,363	7,150	7,779	7,764
CL153	Long	G	83	40	13.1	MR	63/71	65/70	63/69	64/70	8,965	7,175	8,370	8,170
CLL16	Long	G	87	43	16.1	R	61/71	58/67	54/65	58/68	9,494	8,041	9,461	8,998
CLL17	Long	G	82	40	15.0	S	56/70	64/69	61/67	60/69	8,465	6,098	7,959	7,507
CLL19	Long	G	80	38	20.1	MR	65/72	64/70	60/67	63/70	8,928	7,456	8,651	8,345
CLM04	Med.	G	87	42	12.8	MR	66/71	64/68	63/68	64/69	9,455	8,009	8,612	8,692
Provisia														
PVL02	Long	G	78	45	9.6	S	58/72	64/72	63/70	62/71	7,115	6,012	7,062	6,729
PVL03	Long	G	80	41	8.8	MR	60/72	62/70	59/69	60/70	8,388	7,497	8,562	8,149

Abbreviations: VG = very good, G = good, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.

Table 3. 2022 Louisiana Variety Test (VT).

Variety	Herbicide Type	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging	RRS-SF 3/14	RRS 3/17	LK 3/18	MW 3/21	MM 3/29	PL 3/29	WB 4/11	VT Avg. Yield (lb/A)
Aromatic															
CLJ01	CL	83	38	65/68	4.8	6.8	MR	7,524	10,056	6,818	7,735	9,354	7,042	6,829	7,908
Della2	CONV	82	38	60/66	14.4	6.8	R	10,365	9,811	6,666	7,795	9,507	7,023	5,841	8,144
Jazzman	CONV	82	40	64/67	12.5	6.8	R	10,184	8,646	6,225	7,227	8,437	7,560	6,200	7,783
LA20-2166	CONV	80	37	63/68	11.0	6.8	MR	9,630	10,174	7,207	7,946	10,194	7,037	7,801	8,570
LSU_Basmati	CONV	80	39	59/68	12.3	7.0	MR	7,355	7,948	5,721	6,798	7,537	6,773	6,646	6,968
Long Grain															
CL111	CL	80	41	64/69	21.1	6.8	R	10,148	10,497	7,034	8,147	8,896	6,823	6,763	8,330
CL151	CL	80	38	63/68	27.4	6.7	S	8,777	11,853	5,522	5,633	10,486	9,560	7,751	8,512
CL153	CL	80	38	65/69	16.0	6.8	MR	9,327	11,458	8,005	7,489	10,335	8,312	6,837	8,823
CLHA02	CL	81	37	61/67	19.4	6.5	MR	10,193	11,066	7,659	8,702	10,583	9,264	7,013	9,211
CLL16	CL	86	41	56/66	18.8	6.8	MR	12,176	10,134	7,556	9,391	11,799	9,495	9,050	9,943
CLL17	CL	81	39	62/66	18.7	6.6	S	6,046	11,259	8,090	7,778	9,661	8,264	7,454	8,365
CLL18	CL	83	41	55/65	29.9	6.7	MR	10,981	10,786	7,209	8,423	12,666	8,728	7,937	9,533
CLL19	CL	78	36	61/67	25.3	6.7	MS	9,532	12,188	8,317	8,349	10,852	8,710	7,002	9,279
LA21-2217	CL	78	35	57/69	25.3	6.9	MR	10,990	11,831	9,288	8,498	11,342	9,203	6,991	9,735
LA21-2222	CL	80	35	63/69	13.7	6.7	R	10,915	10,695	7,707	8,757	10,079	9,048	8,073	9,325
AddiJo	CONV	84	38	58/67	21.6	6.8	MR	10,188	9,677	6,845	8,323	9,446	8,125	7,932	8,648
Avant	CONV	75	35	63/68	21.8	6.8	R	7,999	9,944	6,281	7,660	9,723	8,058	7,309	8,139
Cheniere	CONV	81	38	64/70	15.1	6.8	MR	9,773	9,847	6,682	8,079	9,775	8,041	7,689	8,555
DG263L	CONV	79	38	56/66	20.0	6.2	MR	9,596	9,880	8,112	7,967	9,995	8,695	7,120	8,766
DGL037	CONV	84	39	60/66	8.0	6.2	MR	10,424	8,470	6,186	7,415	9,761	9,003	8,790	8,578
DGL2065	CONV	80	37	64/69	20.2	6.6	R	10,116	10,651	7,035	8,546	10,153	8,299	6,433	8,748
DGL293	CONV	88	37	63/67	13.0	6.5	R	9,680	6,942	6,493	7,560	9,772	8,735	6,817	8,000
DGL294	CONV	88	37	63/67	11.6	6.6	R	9,148	6,257	6,375	7,834	9,410	8,447	6,956	7,775
LA19-2207	CONV	79	38	62/69	36.4	6.8	R	11,095	10,395	8,309	8,630	10,698	8,145	8,367	9,377
Mermentau	CONV	79	37	62/67	22.8	6.7	R	7,910	9,444	7,147	7,940	11,102	8,052	7,296	8,413
RU1601010	CONV	79	40	55/67	20.8	6.4	MS	9,930	10,073	6,651	7,756	11,605	7,919	8,563	8,928
XP778	CONV	79	43	61/69	20.6	6.7	S	12,615	14,008	11,245	9,464	14,453	10,802	8,659	11,607
XP780	CONV	83	44	60/69	15.3	7.0	MR	13,791	12,614	11,403	11,673	13,010	10,990	11,755	12,177
RT7421FP	FP	80	46	59/68	20.6	6.7	MS	13,606	14,195	9,992	10,192	13,424	9,830	11,211	11,778
RT7331MA	MA	79	42	62/69	23.8	6.7	MS	13,151	12,613	10,646	11,156	12,972	10,024	9,982	11,506
RTv7231MA	MA	77	38	57/67	13.3	6.7	S	8,466	12,429	9,084	8,286	9,741	9,584	7,527	9,302
LA21-2186	PV	79	39	57/68	18.1	6.9	MR	10,689	10,795	8,035	7,993	10,641	7,960	7,523	9,091
PVL02	PV	78	43	64/69	14.2	6.4	VS	5,143	9,434	7,043	6,100	8,382	6,892	7,712	7,244
PVL03	PV	80	40	62/70	16.9	7.0	MR	10,259	10,680	7,808	7,976	10,384	8,332	8,153	9,084
Medium Grain															
CLM04	CL	85	41	64/66	12.5	5.9	MR	11,857	9,174	6,844	8,032	10,285	9,767	8,578	9,219
DGM004	CONV	81	34	65/68	17.0	5.9	R	9,728	8,448	5,647	8,083	9,104	6,894	7,423	7,904
Jupiter	CONV	86	35	61/65	23.4	5.9	R	10,319	6,812	6,010	8,284	9,082	8,395	7,491	8,056
LAH200	CONV	82	47	63/67	15.3	6.4	MR	11,310	10,909	8,719	8,949	10,140	9,266	9,121	9,774
Taurus	CONV	79	33	65/69	12.7	6.0	R	9,806	9,550	6,363	8,182	10,486	5,837	7,524	8,250
Titan	CONV	79	35	64/67	15.1	6.1	R	9,958	7,752	5,141	8,049	10,267	8,068	7,948	8,169

Abbreviatons: CL = Clearfield, CONV = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

Height: Height maturity in inches from soil line to extended panicle.

Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.

Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.

RRS-SF: Crowley, LA South Farm; RRS: Crowley, LA; LK: Lake Arthur, LA; MW: Mowata, LA; MM: Mamou, LA; PL: Palmetto, LA; WB: Winnsboro, LA.

Table 4. 2022 Pre-Commercial (PC) Trial (SW LA/TX).

Variety	Herbicide Type	Days to 50% Heading	Height (in)	Milling % (Whole/ Total)	Chalk (%)	Grain Length (mm)	Lodging	LK 3/18	MM 3/29	MW 3/21	RRS 3/4	RRS_2 3/17	RRSL 4/8	RRS- SF 3/14	TX-BCTY 4/4	TX-NAS 3/29	TX-WRRS 4/11	PC Avg. Yield (lb/A)
Long Grain																		
CLL16	CL	87	41	54/66	20.9	6.8	MR	6,881	10,977	9,913	10,458	9,897	10,230	11,875	10,592	11,310	9,882	10,201
CLL18	CL	84	41	54/66	27.5	6.7	R	7,014	12,307	9,446	10,934	10,862	9,522	10,910	11,658	9,358	10,133	10,215
CLL19	CL	80	36	61/69	26.7	6.8	MR	8,296	11,236	8,913	10,496	11,433	10,488	10,012	10,365	10,361	7,819	9,942
LA21-2150	CL	82	37	62/68	21.3	6.7	MR	7,300	10,413	9,151	10,039	11,208	9,064	10,413	10,422	10,446	8,696	9,715
LA21-2217	CL	79	35	55/69	26.6	7.0	MR	9,142	11,042	9,229	10,751	11,220	10,438	11,311	9,576	10,001	8,897	10,161
LA21-2222	CL	83	35	63/71	17.0	7.0	R	7,809	10,243	8,206	10,075	9,578	10,272	11,340	10,976	10,519	10,338	9,936
RU2004071	CL	88	40	60/68	20.0	6.7	R	6,010	10,307	9,111	9,198	9,165	9,291	10,054	8,961	10,224	7,540	8,986
AddiJo	CONV	86	38	58/69	20.0	6.9	R	6,962	9,425	8,268	9,132	8,838	10,202	10,676	9,614	9,580	8,916	9,161
DG263L	CONV	81	38	57/66	20.9	6.3	MR	8,990	10,425	8,695	9,163	9,236	8,880	10,172	11,385	11,452	7,996	9,639
DG3H20004	CONV	85	42	56/66	24.2	6.7	R	10,522	14,277	10,757	10,660	12,012	10,956	11,804	11,819	12,062	x	11,652
DG3H20363	CONV	85	41	58/67	25.9	6.7	R	10,851	14,082	9,788	11,365	11,687	11,272	12,587	12,285	10,989	x	11,656
DG3H20408	CONV	83	41	53/67	21.0	7.1	R	9,981	12,601	9,268	11,045	12,275	11,241	12,708	13,081	11,699	9,738	11,364
DGL2065	CONV	81	37	65/70	20.4	6.7	R	7,190	9,889	7,583	10,809	10,337	9,889	10,810	10,139	10,802	9,251	9,670
Ozark	CONV	84	40	54/68	28.9	6.6	R	7,002	11,257	9,194	10,128	8,719	9,537	9,749	10,317	10,171	8,753	9,482
RU2102037	CONV	84	36	61/68	26.8	6.5	R	7,689	10,624	7,764	9,624	9,662	8,872	10,600	9,168	9,817	8,675	9,249
XP753	CONV	80	43	59/69	26.6	6.9	MR	9,853	13,462	11,251	11,449	12,976	11,997	12,512	11,303	11,538	9,221	11,556
LA21-2186	PV	81	39	56/69	19.3	7.0	MR	8,158	10,744	8,063	10,097	9,834	9,401	10,197	9,726	10,016	8,477	9,471
PVL03	PV	82	40	61/70	16.8	7.0	R	8,762	11,115	8,127	10,319	10,245	9,738	11,447	9,836	8,845	7,311	9,574
Medium Grain																		
DGM004	CONV	84	35	64/69	18.7	6.0	R	5,207	8,849	9,594	8,564	7,762	8,809	9,128	8,963	10,084	8,594	8,555
Jupiter	CONV	87	35	62/66	26.1	5.8	R	5,810	8,398	8,096	7,824	6,577	9,163	10,108	8,136	8,775	9,181	8,207
Taurus	CONV	82	33	62/68	13.7	5.9	R	6,319	10,808	9,196	9,982	8,996	8,980	10,304	10,283	10,046	9,142	9,406

Abbreviatons: CL = Clearfield, CONV = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

Height: Height maturity in inches from soil line to extended panicle.

Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.

Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.

LK: Lake Arthur, LA; MM: Mamou, LA; MW: Mowata, LA; RRS: Crowley, LA; RRS_2: Crowley, LA 2nd planting; RRSL: Crowley, LA Late; RRS-SF: Crowley, LA South Farm; TX-BCTY: Texas, Bay City; TX-NAS: Nutrien Rice Breeding Station; TX-WRRS: Texas, Wintermann Rice Research Station.

Table 5. 2022 Pre-Commercial (PC) Trial (NW LA/AR).

Variety	Herbicide Type	Days to 50% Heading	Height (in)	Lodging	PL 3/29	WB 4/11	SJ 5/5	AR-RREC 1 3/29	AR-RREC 2 4/11	AR-NERice 4/28	AR-PTRS 1 5/5	AR-PTRS 2 5/9	AR-LAW 5/10	AR-RREC 3 5/10	AR-DES 5/20	AR-NEREC 5/18	PC Avg. Yield (lb/A)
Long Grain																	
CLL16	CL	87	43	MR	9,122	8,252	8,036	9,040	8,577	8,321	8,058	8,115	7,721	8,522	6,842	8,866	8,289
CLL18	CL	85	42	MR	9,709	8,286	9,153	8,634	10,634	8,229	8,943	8,165	8,460	9,337	7,035	9,376	8,830
CLL19	CL	80	37	MR	8,120	6,834	7,623	9,658	10,071	8,519	9,643	8,443	8,345	8,712	7,888	9,333	8,599
LA21-2150	CL	82	40	MR	7,973	7,253	7,265	9,274	9,731	7,983	8,705	7,817	7,752	7,854	7,337	8,719	8,139
LA21-2217	CL	79	38	MR	8,864	8,006	7,648	9,322	10,201	9,137	9,598	8,630	8,279	9,366	6,845	10,309	8,850
LA21-2222	CL	82	37	R	9,205	7,724	8,053	9,902	9,547	8,712	8,089	7,512	7,508	7,674	7,246	9,345	8,376
RU2004071	CL	90	42	R	8,949	6,349	8,300	6,446	8,375	7,442	6,764	6,995	5,983	6,761	5,966	7,202	7,128
AddiJo	CONV	90	39	R	7,851	6,277	6,144	8,028	7,895	6,872	5,914	6,858	6,137	6,164	6,610	5,689	6,703
DG263L	CONV	78	40	MR	8,649	8,392	7,587	9,343	8,558	8,775	9,534	9,394	8,451	8,012	7,922	11,674	8,858
DG3H20004	CONV	83	44	MR	10,787	9,865	10,872	9,467	10,444	9,988	10,708	9,535	10,514	10,237	9,763	11,079	10,271
DG3H20363	CONV	82	43	MR	10,276	10,773	9,015	9,565	11,685	9,814	11,109	9,410	9,992	10,597	9,597	11,561	10,283
DG3H20408	CONV	86	43	R	10,167	9,462	9,988	9,456	11,749	9,451	11,691	9,703	10,033	12,743	9,906	12,537	10,574
DGL2065	CONV	82	38	R	7,618	6,547	7,164	8,965	8,816	7,294	8,999	7,562	7,354	7,376	7,202	8,355	7,771
LA21-2037	CONV	85	37	R	7,951	7,700	6,605	9,262	8,838	8,375	8,524	7,757	7,243	7,336	7,712	9,198	8,042
Ozark	CONV	85	40	R	8,103	7,810	7,174	9,940	10,906	8,818	9,925	8,420	8,704	9,721	7,056	9,928	8,875
XP753	CONV	79	45	MR	10,176	9,602	9,309	9,877	13,049	9,803	12,614	9,260	9,917	12,364	8,521	12,110	10,550
LA21-2186	PV	82	41	MR	7,274	7,516	7,028	8,489	9,344	7,837	7,754	7,486	7,212	7,569	7,568	8,289	7,781
PVL03	PV	83	42	MR	7,870	7,468	7,014	8,894	9,154	7,631	8,102	7,727	6,563	7,883	7,140	8,212	7,805
Medium Grain																	
DGM004	CONV	84	37	R	8,354	7,325	5,701	7,623	8,888	7,925	7,854	7,173	7,267	6,702	6,674	8,317	7,484
Jupiter	CONV	85	37	R	8,486	6,464	5,160	7,772	8,999	7,715	7,297	5,957	6,621	5,688	5,652	7,970	6,982
Taurus	CONV	80	36	R	6,847	7,453	6,597	9,000	11,094	8,779	9,388	7,632	8,784	9,267	7,678	10,125	8,554

Abbreviatons: CL = Clearfield, CONV = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.
PL: Palmetto, LA; WB: Winnsboro, LA; SJ: St. Joseph, LA; AR-RREC 1: First test Stuttgart, AR; AR-RREC 2: Second test Stuttgart, AR; AR-RREC 3: Third test Stuttgart, AR; AR-PTRS 1: First test Pine Tree, AR; AR-PTRS 2: Second test Pine Tree, AR; AR-DES: Desha County, AR; AR-LAW: Lawrence County, AR; AR-NERice: Northeast Rice Research and Extension Center; AR-NEREC: Northeast Research and Extension Center, AR.

Table 6. 2022 Conventional Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging	RRS 3/3	RRSL 3/9	RRS-SF 3/14	LK 3/18	PL 3/29	WB 4/11	AYT Avg. Yield (lb/A)
Aromatic													
LA20-2166	79	37	60/68	13.5	6.9	MR	8,932	8,321	8,863	6,459	7,356	7,472	7,901
Long Grain													
201L1148	84	38	56/67	24.8	6.7	MR	10,864	10,306	10,393	7,687	8,704	8,881	9,473
201L1251	83	37	58/68	20.8	6.8	MR	9,914	9,785	10,671	7,553	9,204	9,121	9,375
AddiJo	85	38	55/66	17.3	6.9	MR	8,700	8,947	9,905	6,617	7,657	7,250	8,179
Avant	77	36	59/68	20.7	6.9	R	9,610	9,265	7,856	6,481	8,034	8,792	8,340
Cheniere	83	38	62/70	13.0	6.9	MR	8,328	9,071	8,807	6,631	8,642	8,191	8,278
DG263L	82	38	56/65	18.6	6.2	MR	8,694	8,821	9,687	8,702	9,288	9,665	9,143
LA21-2037	83	36	61/68	24.6	6.4	R	9,450	9,168	10,305	7,822	8,458	8,666	8,978
Mermentau	81	37	60/68	23.4	6.7	R	9,019	8,481	8,832	6,384	8,232	8,174	8,187
Medium Grain													
Jupiter	87	35	62/66	21.0	5.9	MR	8,398	7,104	8,954	6,635	8,362	7,924	7,896
LA21-2066	82	35	63/67	23.4	5.9	R	8,441	7,422	10,002	7,186	9,061	8,672	8,464
LA21-2070	82	35	64/68	22.2	6.0	R	8,100	7,873	9,971	6,871	9,528	8,865	8,535
Titan	79	36	60/66	28.0	6.1	R	9,307	7,272	8,515	5,886	8,160	8,090	7,872

Abbreviatons: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.
RRS: Crowley, LA; RRSL: Crowly, LA Late; RRS-SF: Crowley, LA South Farm; LK: Lake Arthur, LA; PL: Palmetto, LA; WB: Winnsboro, LA.

Table 7. 2022 Clearfield Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging	RRS 3/2	RRS-SF 3/14	LK 3/18	MM 3/29	PL 3/29	RRSL 4/19	AYT Yield Avg. (lb/A)
Long Grain													
CL153	80	39	62/69	16.4	6.7	MR	9,876	8,710	6,600	10,431	8,417	9,189	8,870
CLL16	84	41	54/65	16.0	6.8	R	9,330	10,190	7,378	11,167	10,041	8,911	9,503
CLL17	79	38	60/67	16.3	6.6	MS	9,704	3,791	6,430	10,492	8,745	9,368	8,088
CLL19	77	37	60/67	22.3	6.7	MR	10,027	7,417	6,733	11,280	8,692	9,995	9,024
LA19-2034	78	39	60/68	22.6	6.7	MR	10,186	8,473	7,670	10,920	8,446	9,670	9,228
LA21-2150	80	38	61/68	17.6	6.6	MR	9,857	9,035	6,766	10,655	9,094	9,396	9,134
LA21-2217	78	36	56/68	23.7	7.0	R	10,685	9,495	7,264	10,732	9,268	10,072	9,586
LA21-2222	80	36	63/70	14.4	7.0	R	9,795	9,874	6,672	10,108	8,710	9,387	9,091
Medium Grain													
CLM04	84	40	62/66	12.5	6.0	R	8,580	8,587	6,228	9,310	9,970	8,479	8,526
LA22-2037	80	37	63/67	14.3	5.9	R	10,006	8,983	4,568	10,452	9,398	8,295	8,617

Abbreviatons: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.
RRS: Crowley, LA; RRSL: Crowly, LA Late; RRS-SF: Crowley, LA South Farm; LK: Lake Arthur, LA; PL: Palmetto, LA; MM: Mamou, LA.

Table 8. 2022 Provisia Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole/ Total)	Chalk (%)	Grain Length (mm)	Lodging	RRS 3/4	RRS-SF 3/14	LK 3/18	PL 3/29	RRSL 4/4	SJ 5/5	AYT Yield Avg. (lb/A)
Long Grain													
203L1104	86	39	58/66	18.7	7.0	R	6,616	9,618	7,796	7,906	8,850	8,662	8,241
LA20-2070	84	39	57/68	10.4	7.0	R	7,431	11,090	6,208	7,947	7,451	8,294	8,070
LA20-2174	81	41	59/69	10.1	7.0	MR	6,216	10,279	6,892	7,223	7,039	7,469	7,520
LA21-2186	79	39	56/68	15.9	7.0	MR	8,172	10,330	7,943	7,622	8,313	6,093	8,079
PVL02	79	42	62/70	15.3	6.5	S	7,527	5,859	6,742	5,742	3,936	6,528	6,056
PVL03	80	40	58/69	17.4	7.0	MR	7,291	10,886	7,650	7,598	8,303	6,452	8,030

Abbreviatons: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.
RRS: Crowley, LA; RRS-SF: Crowley, LA South Farm; LK: Lake Arthur, LA; PL: Palmetto, LA; RRSL: Crowly, LA Late; SJ: St. Joseph, LA.

Table 9. 2022 Date of Planting (DOP) Trial.

Variety	Herbicide Type	Grain Type	Days to 50% Heading	Height (in)	Milling % (Whole/ Total)	Chalk (%)	Grain Length (mm)	Lodging	DOP 1 2/15	DOP 2 3/4	DOP 3 3/21	DOP 4 4/4	DOP 5 4/19	DOP 6 5/3	DOP 7 5/16	DOP 8 5/31	DOP 1 -DOP 8 Avg.	DOP 1 - DOP 4 Avg.
CLL17	CL	Long	80	39	63/68	15.5	6.8	S	10,549	10,214	11,539	7,303	9,931	7,344	5,736	5,771	8,548	9,901
CLL19	CL	Long	78	38	61/68	23.3	6.9	MR	11,782	11,517	12,077	10,364	8,661	7,670	5,271	5,998	9,167	11,435
AddiJo	CONV	Long	83	40	58/67	16.3	7.1	MR	10,211	10,610	10,399	9,352	6,049	5,507	5,300	5,157	7,823	10,143
Avant	CONV	Long	75	37	62/69	22.9	7.0	MR	8,895	10,336	11,008	9,850	8,558	5,535	5,139	4,607	7,991	10,022
DG263L	CONV	Long	80	38	55/66	19.2	6.4	MR	9,832	12,213	10,126	9,983	8,976	6,202	3,244	3,544	8,015	10,539
DGL2065	CONV	Long	79	38	65/70	16.6	6.8	MR	9,646	10,309	11,821	10,276	8,407	4,966	5,663	5,415	8,313	10,513
LA20-2182	CONV	Long	77	39	60/68	24.9	7.0	MR	9,846	12,124	10,079	9,725	6,939	5,281	5,036	4,890	7,990	10,443
RT7331MA	MA	Long	78	42	63/71	25.5	7.0	MR	11,609	10,867	12,628	13,452	10,486	8,599	6,124	7,225	10,124	12,139
RTv7231MA	MA	Long	75	39	60/69	12.7	6.9	MR	10,818	10,650	11,979	9,200	9,236	7,334	4,095	4,823	8,517	10,662
203L1104	PV	Long	86	38	62/69	15.0	7.2	R	8,409	9,835	11,250	10,881	8,891	5,960	5,829	4,835	8,236	10,094
LA21-2186	PV	Long	79	39	58/69	16.1	7.2	MR	9,251	12,125	11,114	9,694	8,053	5,255	3,805	4,588	7,986	10,546
PVL03	PV	Long	79	40	62/70	15.8	7.2	MR	10,629	10,737	10,731	10,087	8,277	5,544	3,945	4,398	8,043	10,546

Abbreviatons: CL = Clearfield, CONV = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.
Grain Traits: Average from DOP 1 - DOP 4.
DOP 1 - DOP 4 Average represents plantings in recommended planting window.

SEEDING RATES

Establishing a satisfactory stand is an essential first step in a successful rice production program. The number 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 11 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.

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 11 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 four-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.

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 10. 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.

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. Urease inhibitors 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 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.

Table 10. Nitrogen Recommendations for Rice Varieties.

Varieties	N rate (lb/A)
CLL17, CL151, Jupiter, Avant, AddiJo	90-130
Cheniere, CL111, CL153, CLJ01, CLL16, CLM04, Della-2, DG263L, Jazzman, Jewel, Lynx, Mermentau, PVL03, Thad, Titan, CL119	120-160

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.

Table 11. Seed per Pound and Average Number of Seed per Square Foot for Important Rice Varieties, Hybrids and Selected Experimentals.

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/ft^2----------											
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
CLJ01	19,595				18	22	27	31	36	40	45	49	54
CLL16	17,588				16	20	24	28	32	36	40	44	48
CLL17	19,742				18	23	27	32	36	41	45	50	54
CLM04	18,630				17	21	26	30	34	38	43	47	51
Della-2	17,553				16	20	24	28	32	36	40	44	48
DG263L	18,642				17	21	26	30	34	39	43	47	51
Jazzman	18,117				17	21	25	29	33	37	42	46	50
Jewel	18,771				17	22	26	30	34	39	43	47	52
Jupiter	17,316				16	20	24	28	32	36	40	44	48
Lynx	16,246				15	19	22	26	30	34	37	41	45
Mermentau	20,067				18	23	28	32	37	41	46	51	55
PVL03	17,512				16	20	24	28	32	36	40	44	48
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									
RTv 7231 MA	20,491				19	24	28	33	38	42	47	52	56
Thad	19,624				18	23	27	32	36	41	45	50	54
Titan	16,676				15	19	23	27	31	34	38	42	46
XP753	20,604	9	12	14									
Avant	19,165				18	22	26	31	35	40	44	48	53
AddiJo	18,307				17	21	25	29	34	38	42	46	50
CLL19	19,035				17	22	26	31	35	39	44	48	52

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

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	10 - 20	21 - 35	≥35
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	7.0 - 6.0	< 6	≥ 7	< 7
Granular Fertilizer Recommendation[2]	15 lb/A	10 lb/A	10 lb/A	5 lb/A	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.*

Table 12. 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 pounds of seed per acre.*
*** Research into pest control spectrum is ongoing.*

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_2O_5) 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 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 fields 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 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 12). The active ingredients of NipsIt INSIDE and Cruiser 5FS are also available in combination with fungicide treatments.

Seed treated with Dermacor X-100 or Fortenza may be used in either dry- or water-seeding practices. 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 such as foliar insecticide applications should be considered 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.

Adult stink bug

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.

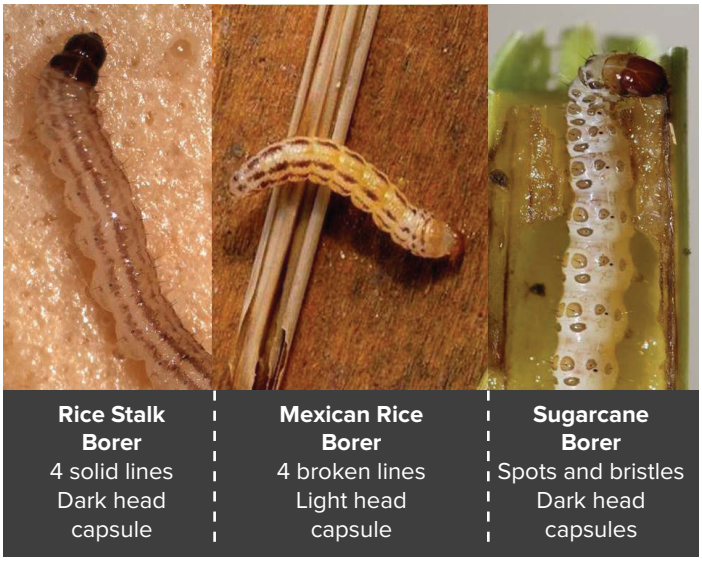
Rice stink bug nymph

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. In regions where rice stink bugs are regularly sprayed, control failures with pyrethroids have been reported indicating insecticide resistance may be developing. 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.



Stem borer larvae

Although larvae of each species resemble each other, distinguishing characteristics are present. Larvae of the sugarcane borer are cream-colored with a series 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 spaghettilike tubes. Larvae injure water-seeded rice by feeding on the embryo of germinating seeds or on the developing roots and seeds of very young seedlings. The potential for midge injury increases when fields are flooded far in advance of water-seeding rice. Water-seeded fields should be scouted for midge injury, checking for hollowed-out 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.

Rice seed midge tunnels in soil

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

Leaf pulled back to expose rice leafminer maggot

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.

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.

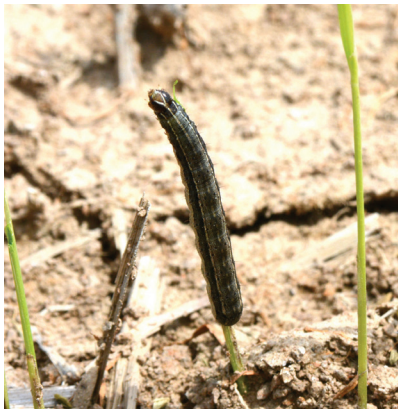
Colaspis larva in soil

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.

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



Fall armyworm larva

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.

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 to 10 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

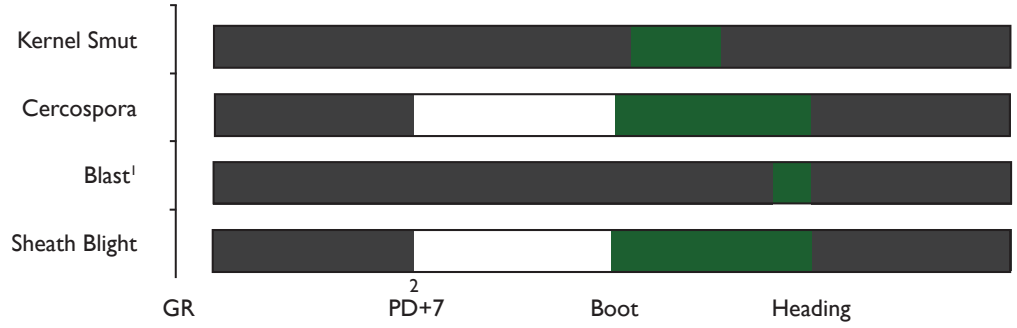
Apple snail eggs

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 Management Guide, at www.lsuagcenter.com/laplantdiseasemanagementguide or see our webpage, www.lsuagcenter.com/ricediseases.

Fungicide timing is critical for disease control (Table 13 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 fungicide resistance, multiple diseases requiring different timings for effective control and multiple applications being warranted. Rice producers are encouraged to use full labeled rates, rotate modes of actions and use multiple fungicide applications when justified to effectively and economically manage rice diseases.

Figure 1. Rice Fungicide Timing.



[1] *A boot application followed by another at heading may be necessary with high disease pressure and susceptible variety.*
[2] *An early application may be necessary if sheath blight appears prior to the boot to heading application.*

Table 13. 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 Others	9-15.5	G	VG	P	P	P
	Trifloxystrobin	Flint Extra	3.1-4.7	VG	G	P	NL	NL
Carboxamides Group 7	Flutolanil	Elegia 3.8 F	12-32	NL	G	G	NL	NL
	Fluxapyroxad	Sercadis 2.47 SC	4.5-6.8	NL	G	G	NL	NL
Demethylation Inhibitors (DMI) Group 3	Propiconazole	Tilt 3.6 EC Others	6-10	NL	F	F	G	G
Mixed[4]	Azoxystrobin, Propiconazole	Quilt Xcel 2.2 SE Others	14-27	G	VG	P	G	G
	Azoxystrobin, Difenoconazole	Amistar Top Other	10-15	G	VG	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.*

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, survive in the soil and live as an epiphytic population on the leaves and leaf sheaths following the canopy up.

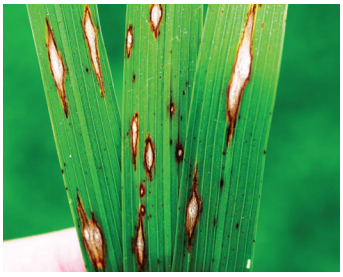
Bacterial panicle blight

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.



Leaf blast

Node blast

Collar blast

Rotten-neck blast

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 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, fungicide 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 13 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.

***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 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 13 and Figure 1). The later the rice is planted, the earlier the fungicide must be applied.

Cercospora

False Smut: The false smut fungus, *Ustilaginoidea virens*, infects rice at flowering. The disease is characterized by large orange to olive-green spore masses 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. A fungicide seed treatment 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 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 that 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, weakening them and causing tillers to lodge.

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. Disease severity can be reduced by integrating several management practices. Dense stands and excessive use of nitrogen fertilizer both tend to increase sheath blight damage. Rotation with soybeans or continuous rice increases the amount of inoculum in soils. Fungicides are available for managing sheath blight.

Avoid late application beyond 50% to 70% heading (Table 13 and Figure 1). In some areas of south Louisiana, the fungus has developed resistance to the strobilurin fungicides, and other modes of action must be used.

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 nonemerged 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

Sheath rot

Table 14. Rice Variety Reactions to Common Diseases in Louisiana.

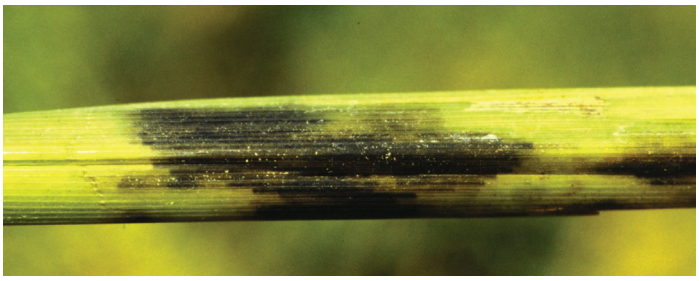
"VS" = very susceptible, "S" = susceptible, "MS" = moderately susceptible, "MR" = moderately resistant, "R" = resistant and "–" = unknown. Varieties labeled "S" or "VS" for a given disease may be severely damaged under conditions favoring disease or disorder development.

Variety	Blast	Sheath Blight	Cercospora	Bacterial Panicle Blight	Straighthead
Cheniere	MS	S	S	MS	MS
CL111	MR[1]	VS	S	VS	MS
CL151	VS	S	S	VS	VS
CL153	MR[1]	S	MS	MS	MS
CL163	VS	S	R[2]	MS	VS
CLJ01	MR	MS	MR	S	MR
CLL15	R	S	-	VS	R
CLL16	R[1]	MS	-[2]	MS	R
CLL17	R[1]	S	-[2]	MR	R
CLM04	S	MS	-[2]	MR	S
Della-2	R	S	MS	MS	R
DG-263L	-	S	-[2]	MR	-
Jazzman	R	MS	S	S	R
Jewel	R	MS	-[2]	S	R
Jupiter	S	MS	R[2]	MR	S
Lynx	S	VS	-[2]	S	S
Mermentau	S	S	MS	MS	S
PVL01	VS	S	MR	S	VS
PVL02	MS	MS	MS	S	MS
PVL03	MR[1]	MS	-[2]	MR	MR
Titan	MS	S	MR[2]	MS	MS
RT7301[3]	R	MR	MR	MR	R
RT7321 FP[3]	R	MR	-	MR	R
RT7521 FP[3]	R	MS	-	MR	R

[1]*Varieties with Pita-2 gene, known to confer resistance to most common blast races.*
[2]*Varieties with CRSP2.1 gene, which confers resistance to foliar symptoms of Cercospora, but infections on sheath and panicle can still occur.*
[3]*Marker data not available for RiceTec products.*

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 unfilled. Some varietal resistance is available. The disease is usually minor, affecting scattered tillers in a field and plants along levees. Occasionally, large areas may have significant damage. No control measures are currently recommended.

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, contact plants, germinate and infect the tissues near the water surface.



Stem rot

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 as the fungus penetrates the inner sheaths and the culm. These become discolored and have black or dark brown lesions. At maturity, the softened culm breaks, plants lodge and numerous small, round, black sclerotia develop in the dead tissues. The fungus can continue to develop in the stubble after harvest, and numerous sclerotia are produced. Control measures

include burning or cultivating stubble after harvest to destroy sclerotia, using crop rotation when possible, applying potassium fertilizer and avoiding excessive nitrogen rates. Fungicide applications used against other fungal diseases may reduce stem rot damage.

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 unfilled and upright at maturity or not emerged 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 confused with herbicide damage. Management is accomplished by using resistant varieties and draining the field approximately 10 days before internode elongation (green ring), 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

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 13 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:

- The history of the field.
- Whether the variety is susceptible.
- Yield potential.
- Application cost and expected crop price
- If the rice is being grown for seed.
- If the rice is planted late, as late-planted rice is more likely to encounter foliar disease problems.
- If a ratoon crop is planned because 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 of 5% to 10% if the tillers are infected during vegetative stages. For moderately susceptible cultivars, the level is 15%. At these levels, consider using a fungicide. Fields with historical of problems of sheath blight, under rice-soybean, or rice-rice rotation have a higher risk of developing severe epidemics. 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 14.

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 15. The effectiveness of selected burndown herbicides on common winter vegetation is presented in Table 16. The activity of selective herbicide programs for perennial grass control is presented in Table 17. Information about rice herbicide use in crawfish production can be found in Table 18.

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 four-leaf to panicle initiation (green ring) plus 14 days for Clearfield varieties, and Beyond/Postscript can be applied from four-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 two- to three-leaf stage. For water-seeded rice, apply after rice is in the two-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 five-leaf rice in dry-seeded rice and two- to five-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 two- to four-leaf stages. Clincher has activity as a post-flood treatment on four-leaf to two-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 one- to two-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 one- to two-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.

Fall applications of Command have proved to be effective in controlling Italian ryegrass and rates are dependent on the soil type. A 24(c) special local need label has been issued for herbicide resistant Italian ryegrass management in fallow fields and states that Command can be applied between Oct. 1 and Nov. 30. See label for more instructions.

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 two-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 one- to three-leaf stage and three- to six-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 two- to three-leaf to one-half-inch internode growth stages. In water-seeded production, apply to rice in the three- to four-leaf to half-inch internode growth stages. Do not apply more than 22 ounces per acre per year.

Highcard (Postemergence) – Apply only Highcard to Max-Ace varieties and hybrids. Highcard contains a safener to minimize the amount of injury to Max-Ace varieties and hybrids. In Max-Ace rice, non-safened quizalofop can result in high levels of crop injury and in some cases extensive crop loss. Highcard controls red rice, weedy rice, and annual grasses. Apply two applications of Highcard at 13-15.5 ounces per acre between the two- to three-leaf rice stage and panicle initiation. Do not apply more than 31 ounces per acre per year in Max-Ace rice.

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 two-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 three- to five-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 three- to five-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 two- to five-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. Provisia can be applied in a two-application or three-application system. In the two-application system, the first application to Provisia rice should be applied at 13 to 15.5 ounces per acre. Adequate soil moisture is required for optimum herbicide activity. A second application of Provisia must be applied prior to panicle initiation. In the three-application system, Provisia can be applied at 10 ounces per acre three times between the one-leaf rice stage but no later than panicle initiation or two times between the one-leaf rice stage and panicle initiation and one application to the ratoon crop. In either system, do not apply more than 31 ounces 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 three-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 three-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 two- to three-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 emergence) – 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.

Rogue (Postflood) – Rogue is labelled for use in both drill- and water-seeded rice and should only be applied once a stable permanent flood has been established. In water-seeded rice, Rogue can be applied from pegging rice up until the rice reaches two tillers. In drill-seeded rice, Rogue can be applied between the four-leaf and two-

tiller rice growth stage. Rogue can be surface-coated on fertilizer when the rice canopy will inhibit a liquid spray from reaching the water surface. Rogue controls sprangletop, rice flatsedge, and ducksalad and has activity on several other weed species. The use rate of Rogue ranges from 8.4 to 12.6 ounces per acre.

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 two- to three-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 XT2 (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 15. 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	Fimbristylis
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	9
Aim[4]	8	6	0	0	0	0	0	5	5	4	6	9	7	6	8	5	6	5
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	7[3]
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	0
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	0
Facet L	8	9	9	0	0	9	5[2]	4	6	3	3	8	3	8	0	3	6	0
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	0
Grandstand	9	8	0	0	0	0	0	5	7	3	9	7	8	8	7	6	9	8
Grasp	3	7	9	0	3	3	3	8	7	8	8	9	7	7	8	7	6	2
Grasp Xtra	9	8	9	0	3	3	3	8	7	8	9	9	8	8	8	7	9	7
League	8	8	0	0	0	0	0	8	6	7	8	9	-	8	-	8	8	0
Londax	5	8	0	0	0	0	0	8	7	9	9	6	9	6	6	8	8	0
Loyant	9	9	6[4]	0	6[4]	6[4]	6[4]	8	9	9	8	9	8	9	9	8	4	0
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	0
Permit/Halomax	7[4]	8	0	0	0	0	0	9	4	5	8	9	4	9	4	8	7[4]	0
Permit/Halomax + Londax	7[4]	8	0	0	0	0	0	9	7	9	9	9	9	9	6	8	8	0
Permit Plus	7[4]	9	0	0	0	0	0	9	6	7	9	9	6	9	8	8	7[4]	0
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	4[3]
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	0
RebelEX	3	7	9[2]	0	9[2]	9[2]	8[2]	8	7	8	8	9	7	7	8	7	6	0
Regiment	8	6	9	0	3	3	0	7[3]	7	8[2]	8	8	7	8	7	7	8	7
Ricestar HT	0	0	9	0	8	9	7[2]	0	0	0	0	0	0	0	0	0	0	0
Rogue[2]	-	-	5[4]	0[5]	9	-	-	9[6]	3	9	0	3	7	2	-	4	5	8
Sharpen	8	8	0	0	6[2]	5[2]	6[2]	6[3]	7	8	9	8	-	9	7	7	8[4]	4[3]
Strada	7	8	0	0	0	0	0	8	5	7	9	9	8	9	6	9	6	0
Strada PRO	7	8	0	0	0	0	0	9	5	7	9	9	8	9	6	9	6	0
Strada XT2	8	9	9	0	0	9	5[2]	8	6	7	8	9	8	9	6	9	4	0

[1] Annual sedge suppression. [2] With proper water management. [3] Weeds must be <4 inches tall. [4] Controlled only when small (< 2 leaf). [5] Possible weedy rice suppression. [6] Annual sedge control only.

Table 16. Effectiveness of Selected Burndown Herbicides.

		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
Preplant Burndown	**Rice Plant Back (Days)**	**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 17. 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 18. 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.
Rogue	Do not fish or commercially grow fish, shellfish or crustaceans on treated acres during the year of treatment.
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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