

2026

RICE VARIETIES

& MANAGEMENT TIPS



2026 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, long-grain rice semidwarf variety with very good yield potential. It has shown very good lodging resistance and excellent ratoon potential. Avant is the earliest days to heading variety available, five to 10 days earlier to 50% heading than Cheniere but is slower to dry down at harvest than typical varieties. 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. It does not contain the Pita blast resistance gene.

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. It does not contain the Pita blast resistance gene.

CLHA03 (LA): A high amylose, intermediate gel temp variety with nonsticky cooking qualities similar to an Addi Jo-type. It is an early, semidwarf, long-grain variety with higher yield potential than Addi Jo and similar yield to CL153. CLHA03 contains the Pita blast resistance gene and very good blast resistance. It is rated as susceptible to sheath blight and moderately susceptible for narrow brown leaf spot.

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. CLJ01 is moderately resistant to blast and *Cercospora*, moderately susceptible to sheath blight and susceptible to bacterial panicle blight. It does not contain the Pita blast resistance gene.

CLL16 (AR): A long-grain, conventional height, Clearfield rice variety with excellent yield potential and stability and maintains strong yield potential with later planting dates. It has excellent seedling vigor. CLL16 is a few inches taller than typical Louisiana Clearfield varieties but is moderately resistant to lodging. Milling yields and ratoon potential 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.

CLL18 (AR): A long-grain, conventional height, Clearfield rice variety with excellent yield potential and stability and maintains strong yield potential with later planting dates.

It has excellent seedling vigor. CLL18 is a few inches taller than typical Louisiana Clearfield varieties but is moderately resistant to lodging. Milling yields are observed to be lower than other Clearfield varieties. CLL18 does not contain the Pita blast resistance gene and is moderately susceptible to blast. It 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.

CLL19 (LA): A long-grain, Clearfield rice variety with excellent yield potential and stability. It has very good seedling vigor. CLL19 is semidwarf, a few inches shorter than CLL16 and CLL18, and is moderately resistant to lodging. It is very early with a heading date similar to CL111 and is four to eight days earlier than CLL18 and CLL16, respectively. CLL19 has demonstrated very good milling potential and ratoon capacity. It contains the Pita blast resistance gene and has good blast resistance. 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.

CLM04 (AR): A Clearfield, short-stature, medium-grain rice variety with very good yield potential. 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.

CLM05 (AR): A Clearfield, short-stature, medium-grain rice variety with excellent yield potential. It is similar in height to Jupiter and has very good milling potential. Days to 50% heading is six days later than Titan and two days earlier than Jupiter. The grain is longer than other medium grains, approximately 6.2 mm and about 0.5 mm longer than Jupiter.

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. It does not contain the Pita blast resistance gene.

Fitzgerald (LA): A Jasmine-type, aromatic, long-grain variety with similar grain quality attributes as Jazzman and CLJ01. It has improved yield potential over other Jazzman varieties. Its aroma, flavor and cooking characteristics are similar to that of other Jazzman (Jasmine) products. Fitzgerald is a few days earlier than Jazzman and CLJ01 and one inch shorter than CLJ01. It contains the Pita blast resistant gene, conferring broad-spectrum blast resistance. It is rate as susceptible to sheath blight and bacterial panicle blight.

Jupiter (LA): A high-yielding, semidwarf, medium-grain variety. Jupiter is susceptible to blast, moderately susceptible to sheath blight, and moderately resistant to

bacterial panicle blight and straighthead. It has shown good seedling vigor and milling quality. The grain is shorter compared to other medium grains.

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 comparable 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. It does not contain the Pita blast resistance gene.

PVL03 (LA): A long-grain, Provisia variety with very good yield potential, but the yield drops off in late plantings. It has good milling potential and excellent grain appearance. PVL03 is resistant to blast and contains the blast resistance gene Pita. It contains the CRSP2.1 gene, which confers resistance to narrow brown leaf spot, but is susceptible to *Cercospora* infection on the stem, especially in later plantings.

PVL05 (LA): A long-grain, Provisia variety with improved yield potential and stability over PVL03. It has similar agronomic properties and grain appearance as PVL03, but is prone to lower milling yields, especially at lower harvest moistures. PVL05 is resistant to blast and contains the blast resistance gene Pita. It contains the CRSP2.1 gene, which confers resistance to narrow brown leaf spot, but is susceptible to *Cercospora* infection on the stem, although it appears to be less susceptible than PVL03. It has a cereal chemistry class like Cheniere.

Taurus (AR): An early, short-stature, medium-grain rice variety that has shown excellent yield potential and stability and has out-yielded Jupiter and Titan in recent years. It is slightly shorter than Jupiter and Titan and has equal or better milling potential.

Titan (AR): A very early, short-stature, medium-grain rice variety that has shown excellent yield potential. 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.

Venus (LA): An early, short-stature, medium-grain rice variety that has shown excellent yield potential. The variety has demonstrated a consistently comparable or better yield potential than Jupiter and Titan. It is four days earlier to heading than Jupiter and similar in plant height and ratoon yield. Milling yields are slightly lower than Jupiter however higher than Titan. Venus has maintained its yield in years when other medium-grain varieties had reduced yield.

Please see Tables 1 and 2 for the agronomic characteristics and yields of the recommended varieties, Tables 3-7 for the results of 2025 variety trials and Table 8 for the stability of yield at different planting dates.

COMMERCIAL SEED PRODUCTS

RiceTec will offer nonherbicide tolerant hybrids RT7301, RT7302 and medium-grain 3202 for the 2026 season in Louisiana. Please consult RiceTec for management guidelines.

The FullPage rice cropping system is the combination of the IMI herbicide tolerance trait exclusive to RiceTec hybrids and the companion IMI herbicides, Preface and Postscript, manufactured by Adama. Two FullPage RiceTec hybrids will be available for the 2026 cropping season. The hybrids will include RT7321 FP and RT7521 FP. 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 RT7331 MA RT7331 MA will be available for the 2026 cropping season. Please consult RiceTec for Max-Ace hybrid management guidelines.

Dyna-Gro rice varieties are available from Nutrien Ag Solutions. Dyna-Gro will offer pure line long-grain varieties DG263L and DG245L, as well as the new DG273L (non-HT). The Provisia herbicide-tolerant variety DG563PVL will also be available for the 2026 growing season in Louisiana. Please consult your local Nutrien Ag Solutions for management guidelines. Always read and follow label instructions. Provisia is a registered trademark of BASF.

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.

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

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

- Southwest Louisiana — Feb. 25 to March 20
- North Louisiana — March 15 to April 15

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. The yield potential of many varieties will decrease significantly with later plantings. Insecticidal seed treatments are less effective in late-planted rice and additional control tactics should be considered. 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 1. Agronomic Characteristics and Yields of Recommended Conventional Rice Varieties (2023-2025) in Louisiana.

Variety	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2023 Milling % (Whole / Total)	2024 Milling % (Whole / Total)	2025 Milling % (Whole / Total)	Mean Milling % (Whole / Total)	2023 Grain Yield (lb/A)	2024 Grain Yield (lb/A)	2025 Grain Yield (lb/A)	Mean Grain Yield (lb/A)
Long Grain													
DG263L (HA)	G	84.0	39.2	19.0	MS	55/68	55/67	60/69	57/68	10,092	9,255	9,806	9,718
Ozark	G	84.3	39.8	26.7	MR	48/68	54/69	58/71	53/69	9,760	8,845	9,088	9,231
Avant	G	76.4	35.6	18.0	MR	59/71	59/70	62/72	60/71	9,252	7,842	8,475	8,523
Mermentau	G	82.4	38.5	21.1	MR	58/69	63/71	65/72	62/71	8,549	7,487	8,540	8,192
Addi Jo (HA)	G	87.6	38.7	15.4	MR	53/69	60/70	64/72	59/70	8,335	7,157	7,834	7,775
Fitzgerald (Jazz)	G	81.5	36.7	8.9	MR	55/70	60/70	63/72	59/71	8,152	6,828	7,764	7,582
Cheniere	G	84.8	37.2	9.5	MR	61/72	65/73	68/74	65/73	7,769	6,598	7,668	7,345
Jazzman (Jazz)	VG	87.2	39.6	9.3	MR	56/69	62/71	65/72	61/71	7,015	6,607	7,222	6,948

CONTINUED | Table 1. Agronomic Characteristics and Yields of Recommended Conventional Rice Varieties (2023-2025) in Louisiana.

Variety	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2023 Milling % (Whole / Total)	2024 Milling % (Whole / Total)	2025 Milling % (Whole / Total)	Mean Milling % (Whole / Total)	2023 Grain Yield (lb/A)	2024 Grain Yield (lb/A)	2025 Grain Yield (lb/A)	Mean Grain Yield (lb/A)
Medium Grain													
Taurus	VG	83.1	34.2	9.3	MR	48/71	50/69	60/72	53/71	8,764	8,721	8,832	8,772
Venus	G	83.0	37.0	12.6	MR	56/69	52/68	62/70	56/69	8,109	8,268	8,276	8,218
Titan	VG	81.2	36.5	11.7	MR	52/69	52/68	59/71	54/69	7,331	7,932	8,352	7,871
DG353M	VG	85.1	36.2	13.7	MR	53/70	53/68	64/71	56/70	6,853	7,416	7,905	7,392
Jupiter	G	88.2	35.5	16.8	MS	54/68	58/68	63/70	59/69	6,710	7,400	7,763	7,291

Abbreviations: (HA) = High Amylose, (Jazz) = Jazzman-type, 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 (2023-2025) in Louisiana.

Variety	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2023 Milling % (Whole / Total)	2024 Milling % (Whole / Total)	2025 Milling % (Whole / Total)	Mean Milling % (Whole / Total)	2023 Grain Yield (lb/A)	2024 Grain Yield (lb/A)	2025 Grain Yield (lb/A)	Mean Grain Yield (lb/A)
Clearfield Long													
CLL18	VG	85.3	41.6	25.3	MR	46/67	54/68	57/70	52/68	10,207	9,218	9,483	9,636
CLL16	VG	87.8	41.3	15.6	MS	51/68	54/68	58/70	54/69	9,175	8,477	9,288	8,980
CLL19	G	80.8	36.8	19.7	MR	53/69	54/69	63/72	56/70	9,338	8,008	9,149	8,832
CLHA03 (HA)	G	83.6	38.2	15.3	MR	58/69	60/69	64/71	61/70	8,456	8,027	8,684	8,389
CL153	G	82.8	38.8	11.6	MR	57/70	61/70	65/72	61/71	8,341	7,409	8,620	8,123
CLJ01 (Jazz)	G	85.8	38.4	5.9	MR	63/71	63/71	68/72	65/71	7,053	6,294	7,725	7,024
Clearfield Medium													
CLM05	G	86.9	37.0	15.9	MR	54/68	54/66	62/69	56/68	9,150	9,181	9,579	9,304
CLM04	G	87.4	40.5	10.4	MS	58/70	59/69	65/71	61/70	8,503	8,611	9,225	8,780
Provisia Long													
PVL03	VG	82.3	40.1	17.6	MR	52/70	55/70	60/72	56/71	9,191	7,981	8,662	8,611
PVL04	G	87.5	40.0	17.3	MR	55/69	58/69	62/72	58/70	7,410	7,325	8,211	7,649
DG563PVL (HA)	G	86.7	38.0	13.3	MR	NA	59/69	63/70	n/a	NA	8,679	8,500	n/a
PVL05	G	84.2	38.9	12.7	MR	NA	53/68	59/72	n/a	NA	7,961	9,216	n/a

Abbreviations: (HA) = High Amylose, (Jazz) = Jazzman-type, 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 3. 2025 Louisiana Variety Test (VT).

Variety	Herbi- cide Type	Days to 50% Heading	Height (in)	Mill- ing % (Whole / Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/10	RRS- SF 3/11	LK 3/14	MW 3/18	MM 3/21	RRS-L 4/9	WB 4/17	SJ 5/20	VT Avg. Yield (lb/A)
Aromatic																
211L1331 (Della)	CN	84.7	40.1	64/71	11.0	6.7	0.0	8,397	10,181	8,009	7,522	8,261	7,254	9,973	5,391	8,124
Fitzgerald (Jazz)	CN	78.3	35.9	64/72	6.2	6.7	0.6	9,805	10,293	8,172	6,463	8,034	6,177	10,202	3,047	7,774
CLJ01 (Jazz)	CL	82.4	38.5	68/73	4.8	6.7	0.5	8,383	8,943	8,550	7,286	7,727	6,328	9,468	5,077	7,720
Della2 (Della)	CN	83.6	39.8	62/70	8.8	6.8	0.0	8,601	9,213	7,404	6,319	7,249	5,551	8,652	4,929	7,240
Jazzman (Jazz)	CN	83.2	39.7	66/72	6.6	6.7	0.5	7,916	9,640	8,015	5,315	7,480	5,530	9,720	4,273	7,236

CONTINUED | Table 3. 2025 Louisiana Variety Test (VT).

Variety	Herbi- cide Type	Days to 50% Heading	Height (in)	Mill- ing % (Whole / Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/10	RRS- SF 3/11	LK 3/14	MW 3/18	MM 3/21	RRS-L 4/9	WB 4/17	SJ 5/20	VT Avg. Yield (lb/A)
Long Grain																
DG263L (HA)	CN	81.3	40.6	62/70	15.1	6.3	0.0	10,982	11,554	9,585	9,237	10,229	9,168	11,070	6,665	9,811
222L1082	CL	77.9	41.1	65/72	11.1	6.8	2.3	10,979	11,346	9,818	8,161	10,196	8,864	11,336	6,909	9,701
PVL06	PV	80.0	39.4	57/70	19.6	6.7	1.5	10,308	11,457	10,259	7,818	10,065	7,957	12,226	6,323	9,551
CLL18	CL	81.2	41.2	58/70	21.4	6.7	0.6	10,410	11,935	10,621	8,593	9,595	7,849	10,400	6,423	9,478
23DGL070 (HA)	CN	77.0	38.2	63/71	6.6	6.9	0.0	10,855	10,922	9,381	8,475	8,936	9,260	10,823	6,683	9,417
CLL16	CL	82.5	40.4	59/71	13.7	6.7	0.5	10,105	12,053	9,984	7,919	10,022	7,731	10,123	6,556	9,312
PVL05	PV	80.4	38.7	59/72	11.6	7.0	0.6	8,734	10,984	10,382	9,081	9,989	7,217	11,247	6,258	9,236
CLL19	CL	77.6	36.9	64/72	18.0	6.7	3.4	10,573	9,377	9,748	8,088	8,634	7,945	11,572	7,018	9,119
Ozark	CN	79.9	40.2	57/71	23.3	6.6	0.0	10,751	11,022	9,534	7,815	9,558	8,057	10,560	5,510	9,101
201L1251	CN	82.2	37.4	59/71	13.8	6.7	0.6	10,602	11,236	9,886	6,850	9,205	7,005	11,293	5,404	8,935
19T-029-4	CL	78.0	39.6	65/73	9.357	6.4	4.4	10,417	9,905	10,184	7,679	7,861	8,070	10,906	6,117	8,892
RU1902034	CL	78.8	37.8	64/72	19.8	6.7	6.9	10,291	8,876	9,657	7,854	8,441	7,824	10,523	6,784	8,781
211L1008	CN	75.9	37.6	66/72	16.0	6.6	3.2	9,984	10,149	8,475	7,791	7,755	7,848	11,882	6,006	8,736
MP6_295	CN	80.7	38.0	61/71	20.8	6.8	1.0	9,471	10,781	8,560	8,483	8,537	7,783	10,458	5,588	8,708
CLHA03 (HA)	CL	80.6	38.4	65/71	10.7	6.6	0.6	10,086	9,782	9,205	7,613	8,128	7,955	9,926	6,540	8,654
PVL03	PV	78.5	39.9	62/72	12.9	6.9	1.0	10,136	11,007	9,135	7,732	8,423	7,004	10,406	5,320	8,645
CL153	CL	78.7	39.6	66/72	9.2	6.7	6.1	10,244	8,735	9,042	7,961	8,720	7,497	9,959	6,774	8,616
DG245L	CN	79.7	37.3	67/73	10.0	6.5	0.0	9,206	11,282	9,565	7,493	9,005	6,399	10,520	5,349	8,602
DG563PVL (HA)	PV	84.7	37.5	63/70	12.2	6.3	0.0	8,827	10,479	9,598	6,023	10,299	8,138	9,999	5,238	8,575
Mermentau	CN	78.8	38.1	65/72	18.7	6.6	0.0	9,297	10,498	10,102	7,961	8,668	7,092	10,765	3,925	8,538
RU2102222	CL	80.7	35.7	65/72	11.9	6.9	0.0	9,358	10,337	8,384	7,031	8,446	7,699	10,453	6,116	8,478
Avant	CN	73.0	35.7	65/72	16.2	6.8	1.1	9,634	9,758	8,833	7,723	6,202	7,898	10,983	5,959	8,374
PVL04	PV	83.1	39.9	62/72	15.3	7.0	1.4	9,613	8,450	9,133	7,346	10,173	6,876	8,793	5,919	8,288
Addi Jo (HA)	CN	82.7	38.6	64/72	12.1	6.8	2.2	9,705	10,316	8,269	6,648	8,425	7,085	9,450	2,952	7,856
23DGL-001PV (HA)	PV	74.5	34.7	63/72	12.1	6.4	1.1	9,238	8,987	7,883	7,335	7,704	7,178	9,490	4,894	7,839
Cheniere	CN	81.9	37.0	68/74	7.0	6.7	0.0	8,068	10,421	8,302	6,687	7,766	6,590	9,289	4,238	7,670
Hybrid																
RT7421FP	FP	81.3	46.3	62/72	16.5	6.65	3.0	11,010	12,916	11,642	10,019	12,699	11,442	12,406	9,177	11,414
RT7301	CN	76.7	42.1	63/73	16.8	6.60	0.9	12,029	14,084	11,821	10,693	9,518	10,828	13,747	7,963	11,336
RT7331MA	MA	76.0	42.9	64/73	16.2	6.72	0.0	12,735	13,565	11,024	10,701	8,807	10,275	13,012	8,989	11,138
RT3202 (HA)	CN	74.8	42.9	65/72	11.2	5.99	0.0	13,351	13,731	11,601	8,791	10,446	10,324	12,118	7,027	10,924
RT7521FP	FP	79.1	45.4	62/72	19.1	6.58	8.9	13,103	9,475	12,307	11,988	3,331	11,721	13,172	9,335	10,554
Medium Grain																
CLM05	CL	82.9	36.9	65/70	12.0	6.28	0.0	9,930	11,860	10,494	9,181	10,159	8,052	10,739	6,315	9,591
222M1096	CL	83.7	37.8	69/73	6.8	6.06	0.0	10,692	11,682	9,701	7,873	8,799	8,385	10,565	6,550	9,281
CLM04	CL	83.2	40.4	66/72	8.0	5.84	2.6	8,873	11,652	10,532	9,069	9,396	8,257	10,307	5,676	9,220
Taurus	CN	79.8	34.8	63/72	6.1	5.77	0.0	10,969	10,565	10,301	8,391	9,560	8,385	10,005	4,374	9,069
Titan	CN	77.0	37.5	64/72	7.0	5.95	0.0	9,543	11,587	9,163	7,693	8,322	7,782	9,629	3,035	8,344
Venus	CN	79.8	37.5	64/71	8.2	5.97	0.0	10,469	11,597	9,189	7,138	6,883	7,556	9,980	2,897	8,213
DG353M	CN	82.1	36.7	67/72	8.8	5.91	0.0	8,701	10,600	9,086	6,429	9,412	5,879	9,916	3,712	7,967
Jupiter	CN	84.4	36.3	64/70	11.5	5.74	0.0	8,144	10,571	8,992	7,193	8,233	7,046	9,359	2,688	7,778

Abbreviations: (Della) = Della-type, (Jazz) = Jazzman-type, (HA) = High Amylose, CL = Clearfield, CN = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia.

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

Chalk: Percentage of chalky grains as determined by SeedCount image analyzer.

Lodging: Overall average percentage of lodging observed across all trials.

Louisiana locations include: LK (Lake Arthur), MM (Mamou), MW (Mowata), RRS (Crowley), RRS-L (Crowley, late planting), RRS-SF (Crowley, South Farm), SJ (St. Joseph), WB (Winnsboro).

Planting date listed under location of trial; month/day of 2025.

Table 4. 2025 Pre-Commercial (PC) Trial (Louisiana).

Variety	Herbicide Type	Days to 50% Heading	Height (in)	Milling % (Whole/Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/3	SF 3/11	LK 3/14	MM 3/21	RRS-L 4/9	WB 4/17	RIC 5/19	SJ 5/20	PC Avg. Yield (lb/A)
Long Grain																
222L1082	CL	76.7	42.4	65/72	9.3	6.8	0.6	11,446	11,280	9,849	10,222	9,127	10,001	9,826	7,273	9,878
DG263L (HA)	CN	78.7	40.4	61/69	14.0	6.3	0.1	11,820	11,545	10,129	10,621	8,848	9,581	9,192	7,034	9,846
PVL06	PV	78.9	39.3	57/70	19.9	6.7	1.4	11,377	11,203	10,345	9,454	8,677	10,373	10,069	6,549	9,756
24AR1111	CL	80.8	40.1	56/71	11.3	6.8	0.1	10,666	11,676	10,047	9,591	8,847	10,582	10,021	6,197	9,703
CLL18	CL	81.3	41.5	58/70	20.4	6.8	0.1	11,730	12,059	10,250	10,813	8,632	9,894	7,605	6,415	9,675
RU2301045	CN	81.3	39.8	58/71	14.6	6.8	0.3	11,350	11,418	10,505	9,374	8,426	11,436	8,548	5,642	9,587
23CL1303	CL	67.1	42.7	57/70	14.8	6.8	0.1	11,014	11,727	9,470	10,316	8,543	9,768	9,471	6,342	9,581
23AR148	CN	79.0	39.0	55/71	14.9	6.7	0.1	11,534	11,507	10,147	9,114	7,175	10,580	9,449	6,121	9,453
24AR2139	PV	81.8	41.3	59/71	15.3	6.8	0.6	11,182	11,027	10,047	9,553	7,801	10,758	9,517	5,435	9,415
PVL05	PV	81.3	39.2	59/72	11.3	7.1	0.1	10,100	10,732	10,413	9,562	8,451	9,861	9,617	6,562	9,412
23DGL070 (HA)	CN	77.0	38.1	62/70	6.0	6.9	0.1	10,709	11,829	9,025	9,367	9,302	9,265	9,011	6,597	9,388
24DGL0631 (HA)	CN	77.7	38.0	62/70	12.0	6.3	3.9	11,045	10,201	9,781	10,314	8,233	8,921	8,466	6,929	9,236
24AR1134	CL	82.9	40.8	61/71	15.6	6.6	0.1	11,154	11,216	10,416	9,296	7,680	10,022	7,881	6,127	9,224
201L1251	CN	82.1	37.1	59/71	11.7	6.8	0.1	10,940	10,903	9,746	9,422	7,315	10,340	9,369	5,012	9,131
223L1139	PV	82.6	39.7	66/73	12.2	6.8	0.1	10,180	10,830	10,229	9,925	7,884	9,287	8,977	5,534	9,106
24AR2134	PV	83.1	39.4	61/70	19.0	6.5	5.5	11,495	11,454	10,065	9,360	7,410	10,079	7,262	5,581	9,088
DG563PVL (HA)	PV	84.6	38.1	62/70	12.3	6.4	0.6	10,114	10,496	10,171	10,097	7,959	9,384	8,443	5,951	9,077
CLL19	CL	76.1	36.6	63/71	17.2	6.7	6.8	10,023	8,853	9,790	9,308	8,175	9,648	8,796	6,935	8,941
RU2102222	CL	79.3	35.3	65/72	9.7	6.9	0.1	10,313	10,133	8,757	9,244	8,152	9,732	8,858	6,174	8,920
PVL03	PV	78.8	40.7	62/72	12.4	7.0	2.2	10,244	10,244	9,304	8,966	7,761	9,166	8,784	5,978	8,806
23DGL-002PV-10 (HA)	PV	80.3	37.5	63/70	14.0	6.5	0.6	10,573	10,232	9,965	9,925	7,568	7,615	8,076	5,945	8,737
21L1008	CN	75.1	39.9	66/72	15.3	6.6	3.1	10,344	9,999	8,873	7,995	8,496	9,777	8,266	5,937	8,711
PVL04	PV	84.3	39.7	62/71	13.0	7.0	1.8	10,202	9,357	9,612	9,895	7,391	8,111	9,245	5,736	8,694
223L1236	PV	76.9	40.9	58/71	13.1	7.1	4.3	10,352	10,026	9,038	8,396	8,042	8,430	8,473	5,218	8,497
23DGL-001PV (HA)	PV	75.0	35.1	62/71	12.1	6.4	7.2	9,927	9,360	7,815	6,134	6,703	8,288	5,514	5,120	7,358

Abbreviations: (HA) = High Amylose, CL = Clearfield, CN = Conventional, PV = Provisia.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Percentage of chalky grains as determined by SeedCount image analyzer.
Lodging: Overall average percentage of lodging observed across all trials.
Louisiana locations include: LK (Lake Arthur), MM (Mamou), RIC (Richland Parish), RRS (Crowley), RRS-L (Crowley, late planting), RRS-SF (Crowley, South Farm), SJ (St. Joseph), WB (Winnsboro).
Planting date listed under location of trial; month/day of 2025.

Table 5. 2025 Conventional Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole/Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/3	RPS-SF 3/11	LK 3/14	MM 3/21	RRS-L 4/9	McN 4/14	WB 4/17	AYT Avg. Yield (lb/A)
Long Grain														
DG263L (HA)	78.1	38.7	57/68	11.8	6.0	0.2	10,507	9,826	9,588	9,922	8,698	8,020	11,183	9,678
231L1243	80.4	39.8	62/72	11.5	6.4	2.1	9,760	10,244	9,801	9,875	8,552	7,207	11,259	9,528
231L1241	78.4	38.1	61/72	12.7	6.4	0.2	9,226	10,438	10,395	9,687	8,098	6,969	11,363	9,454
19T-238-62	80.9	42.0	58/71	17.9	6.3	0.2	9,997	10,618	9,262	9,481	7,739	8,038	10,699	9,405
19T-238-13	80.8	38.8	61/72	16.3	6.1	0.0	10,386	10,986	10,318	9,236	7,870	5,689	11,305	9,399
231L1261	79.2	39.9	59/71	12.3	6.4	1.2	9,386	10,493	10,254	9,743	8,021	6,944	10,315	9,308
231L1085	77.0	39.0	64/73	9.5	6.7	3.1	9,900	9,677	9,827	8,080	8,807	7,277	10,963	9,219
201L1251	83.0	36.9	54/70	13.0	6.4	0.2	9,322	9,132	9,701	9,727	7,490	6,484	11,374	9,033
MP6_295	81.3	37.9	56/70	21.7	6.6	2.1	9,533	8,921	8,826	9,818	7,813	6,524	10,614	8,864
211L1008	77.3	39.7	62/71	15.2	6.4	2.1	9,394	9,386	9,054	7,876	8,536	6,486	10,998	8,819
Avant	74.2	36.0	62/71	16.1	6.5	0.7	9,561	9,648	8,972	6,200	8,448	5,719	11,037	8,512
211L1331 (Della)	85.1	39.7	60/71	11.1	6.4	0.7	8,446	9,340	7,756	8,553	7,690	6,725	9,780	8,327
Cheniere	82.2	37.0	65/73	7.2	6.5	0.0	8,914	9,437	8,504	8,678	6,822	5,048	8,722	8,018
Medium Grain														
19T-176-CONV-36	80.7	41.0	56/71	5.7	5.3	0.7	9,866	10,372	9,950	10,033	8,929	8,718	10,523	9,770
Taurus	79.9	34.4	58/71	5.8	5.5	0.0	10,639	11,050	10,081	10,297	8,430	7,748	9,602	9,692
231M1103	79.8	39.6	60/70	10.4	5.5	3.1	9,869	10,877	9,786	10,014	8,317	8,557	10,424	9,692
231M1076	84.1	39.0	60/70	5.7	5.7	0.0	11,025	11,353	9,777	8,492	8,114	7,328	10,634	9,532
Jupiter	85.2	37.6	60/69	11.8	5.5	0.0	10,277	9,739	9,572	9,400	7,855	6,500	9,302	8,949
Venus	80.7	38.8	61/70	8.1	5.7	0.0	9,824	10,465	9,596	6,780	7,860	7,010	10,001	8,791
Titan	77.9	38.4	58/70	7.1	5.7	0.0	9,452	10,835	8,257	7,453	7,966	7,195	9,789	8,707

Abbreviations: (HA) = High Amylose, (Della) = Della-type.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Percentage of chalky grains as determined by SeedCount image analyzer.
Lodging: Overall average percentage of lodging observed across all trials.
Louisiana locations include: LK (Lake Arthur), McN (McNeese State University, Lake Charles), MM (Mamou), RRS (Crowley), RRS-L (Crowley, late planting), RRS-SF (Crowley, South Farm), SJ (St. Joeshph), WB (Winnsboro).
Planting date listed under location of trial; month/day of 2025.

Table 6. 2025 Clearfield Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/3	RRS-SF 3/11	LK 3/14	RRS-L 4/9	McN 4/14	WB 4/17	AYT Avg. Yield (lb/A)
Aromatic													
222A2014 (Jazz)	75.7	42.7	64/72	9.5	6.5	12.8	9,030	7,988	7,793	8,794	6,399	10,244	8,375
CLJ01 (Jazz)	81.4	38.8	65/72	3.6	6.5	0.0	8,657	9,232	8,692	7,297	5,184	8,828	7,982
212L2252 (Jazz)	80.1	38.4	64/72	7.5	6.7	4.5	8,537	7,911	8,306	7,439	6,012	9,229	7,906
Long Grain													
CLL18	80.5	42.5	55/68	18.7	6.5	0.0	10,739	10,946	11,908	9,449	10,789	7,437	10,211
MP8_379	75.3	37.0	56/71	17.6	6.2	0.0	10,133	10,581	10,406	8,896	11,093	7,241	9,725
222L1082	75.1	42.1	62/72	9.9	6.6	2.8	9,864	10,089	10,313	9,130	11,070	7,157	9,604
232L1170	79.6	41.5	62/71	10.3	6.7	1.7	10,615	9,491	10,750	8,726	10,550	6,842	9,496
232L1171	79.7	39.8	62/71	8.4	6.5	0.6	10,169	10,185	11,339	8,112	10,116	6,929	9,475
RU2102222	80.7	37.3	63/72	11.0	6.8	0.0	9,755	9,638	9,936	8,222	9,855	7,495	9,150
CLL19	75.7	37.2	58/70	18.7	6.4	5.6	9,062	9,178	8,842	8,198	10,632	5,992	8,651
CL153	79.1	39.2	62/71	9.6	6.4	2.8	9,631	9,185	9,234	7,858	9,402	5,825	8,523
Medium Grain													
19T-179-23	82.6	41.7	62/70	11.3	5.8	5.6	11,063	11,186	11,472	9,497	11,466	8,444	10,521
19T-176-CONV-38	80.8	41.6	62/71	5.2	5.6	0.0	10,846	10,719	11,375	9,024	11,131	8,763	10,310
232M1114	80.8	41.3	62/70	8.1	5.6	0.0	10,849	10,668	11,726	9,394	11,067	8,039	10,291
19T-176-CONV-10	79.0	41.4	59/71	7.4	5.5	0.0	10,737	9,478	11,205	9,574	11,235	8,645	10,146
CLM05	82.4	38.1	63/69	11.1	6.1	0.6	10,521	10,761	11,068	9,381	10,137	8,276	10,024
CLM04	82.1	42.4	64/70	6.3	5.6	3.4	10,534	10,454	11,230	8,751	9,707	8,102	9,796
222M1096	84.0	39.5	65/71	6.9	5.8	0.0	9,813	9,906	10,642	9,015	10,387	7,605	9,561

Abbreviations: (Jazz) = Jazzman-type.

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

Chalk: Percentage of chalky grains as determined by SeedCount image analyzer.

Lodging: Overall average percentage of lodging observed across all trials.

Louisiana locations include: LK (Lake Arthur), McN (McNeese State University, Lake Charles), RRS (Crowley), RRS-L (Crowley, late planting) RRS-SF (Crowley, South Farm), WB (Winnsboro).

Planting date listed under location of trial; month/day of 2025.

Table 7. 2025 Provisia Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole/ Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/3	RRS-SF 3/11	LK 3/14	McN 3/14	RRS-L 4/4	WB 4/17	AYT Yield Avg. (lb/A)
Long Grain													
DG263L-PV-010-LSU	83.0	40.5	56/67	10.9	6.0	9.2	11,227	11,811	10,002	7,501	7,391	10,310	9,707
PVL05	84.0	38.6	51/68	11.7	6.8	1.9	8,687	11,559	9,941	7,208	5,692	8,819	8,651
DG563PVL (HA)	87.2	38.2	58/69	12.2	6.1	1.8	10,113	10,753	9,127	6,815	4,990	9,707	8,584
233L1081	80.9	39.5	59/70	11.3	6.5	1.9	10,612	11,494	9,692	6,920	4,281	8,295	8,549
233L1268	80.0	40.4	60/71	12.6	6.5	1.8	9,890	11,005	9,312	6,810	5,223	8,874	8,519
233L1089	81.4	38.9	61/71	9.4	6.7	2.2	9,206	11,051	9,627	5,920	5,444	8,860	8,351
233L1095	78.2	39.1	55/71	9.1	6.5	1.5	9,926	10,891	9,052	5,572	5,914	8,720	8,346
233L1063	85.9	39.7	53/67	19.4	6.5	1.6	9,939	10,046	8,505	5,885	6,027	9,512	8,319
233L1085	78.6	40.5	58/71	11.2	6.6	9.3	10,233	11,252	7,244	5,782	5,581	9,730	8,304
223L1139	87.0	40.0	60/69	10.9	6.5	1.9	8,882	11,340	9,271	6,911	2,976	9,510	8,148
PVL03	80.9	41.1	56/70	13.2	6.7	3.3	9,718	10,668	8,968	6,113	5,120	7,942	8,088
PVL04	86.7	41.0	56/68	13.1	6.7	6.8	7,763	9,820	8,409	6,592	4,404	8,944	7,655

CONTINUED | Table 7. 2025 Provisia Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole/Total)	% Chalk	Grain Length (mm)	Lodging % Observed	RRS 3/3	RRS-SF 3/11	LK 3/14	McN 3/14	RRS-L 4/4	WB 4/17	AYT Yield Avg. (lb/A)
Medium Grain													
23AR2205	85.8	39.9	61/68	14.4	5.7	2.2	9,458	10,941	9,797	8,118	4,795	8,982	8,682
191M1192-PV-002-bulk	81.1	41.3	63/70	7.5	5.8	1.9	9,475	10,113	8,512	6,710	3,955	7,930	7,783
RU1902227-PV-001-bulk	85.0	36.9	62/70	6.3	5.5	3.5	9,506	9,650	8,555	6,659	3,572	8,066	7,668

Abbreviations: (HA) = High Amylose.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Percentage of chalky grains as determined by SeedCount image analyzer.
Lodging: Overall average percentage of lodging observed across all trials.
Louisiana locations include: LK (Lake Arthur), McN (McNeese State University, Lake Charles), RRS (Crowley), RRS-L (Crowly, late planting), RRS-SF (Crowley, South Farm), WB (Winnsboro).
Planting date listed under location of trial; month/day of 2025.

Table 8. 2025 Date of Planting (DOP) Trial.

Variety	Herbicide Type	Days to 50% Heading	Height (in)	Milling % (Whole/Total)	% Chalk	Grain Length (mm)	Lodging % Observed	DOP 1 2/11	DOP 2 3/6	DOP 3 4/9	DOP 4 4/30	DOP 5 5/23	DOP 1 - DOP 5 Avg. (lb/A)
Aromatic													
211L1331 (Della)	CN	81.1	40.0	61/69	12.8	6.5	0.0	9,893	10,498	6,588	5,823	6,273	7,815
Fitzgerald (Jazz)	CN	82.2	35.5	63/70	7.3	6.6	0.0	10,079	10,796	6,080	3,240	4,378	6,915
Long Grain													
DG263L (HA)	CN	77.6	39.7	58/68	14.1	6.0	0.0	11,523	11,454	10,081	6,025	7,130	9,243
222L1082	CL	75.6	40.9	63/71	12.5	6.6	0.0	11,166	12,036	9,262	5,990	7,360	9,163
23DGL070 (HA)	CN	72.8	36.9	57/67	6.3	6.6	0.0	11,493	11,791	9,596	6,058	6,770	9,142
RU2102222	CL	78.1	35.6	66/71	10.3	6.9	0.0	11,688	11,543	7,806	6,636	7,044	8,943
19T-029-4	CL	76.9	39.6	64/71	10.6	6.3	1.0	11,052	11,265	8,038	6,881	7,471	8,941
CLL18	CL	77.9	40.8	54/67	22.2	6.5	0.0	11,730	12,361	7,474	5,203	7,130	8,780
PVL06	PV	78.3	39.3	55/68	20.1	6.6	0.0	11,193	11,721	7,790	5,205	7,374	8,657
201L1251	CN	80.1	36.8	59/70	15.6	6.6	0.0	11,648	12,014	7,203	6,074	6,110	8,610
CLL19	CL	79.1	37.2	61/70	18.2	6.5	0.0	9,952	11,443	8,338	6,185	6,948	8,573
CLHA03 (HA)	CL	77.1	37.9	64/70	10.9	6.4	0.0	10,667	11,351	7,607	6,135	6,925	8,537
211L1008	CN	73.7	37.9	63/70	17.4	6.5	0.0	10,306	10,733	8,339	5,585	6,668	8,326
DG563PVL (HA)	PV	79.3	36.1	60/68	11.9	6.2	0.0	10,260	11,205	8,132	5,162	6,317	8,215
PVL04	PV	77.2	39.3	58/69	17.2	6.7	0.0	10,801	10,717	7,632	4,780	6,489	8,084
PVL05	PV	80.8	37.3	55/70	15.0	6.9	0.0	10,245	11,136	7,678	5,023	6,232	8,063
MP6_295	CN	80.6	36.4	58/69	23.2	6.7	0.0	10,247	10,830	7,355	5,092	6,599	8,025
DG245L	CN	80.5	36.3	66/72	12.2	6.4	0.0	10,507	10,947	7,027	5,105	6,017	7,921
PVL03	PV	78.8	39.2	61/71	16.9	6.8	0.0	9,902	10,632	6,595	4,622	6,015	7,553
23DGL-001PV (HA)	PV	78.1	33.4	58/69	13.1	6.1	0.0	10,161	10,230	7,847	3,212	4,525	7,195
Medium Grain													
CLM05	CL	75.6	35.7	63/69	12.5	6.1	0.0	12,068	12,571	9,068	5,770	6,735	9,242
Taurus	CN	77.3	33.0	62/71	4.8	5.6	0.0	11,581	12,453	7,480	4,225	6,248	8,398
Jupiter	CN	76.2	34.0	62/69	13.4	5.6	0.0	11,328	11,182	6,370	3,015	4,780	7,335
Venus	CN	77.8	33.8	64/70	9.8	5.8	0.0	10,395	11,103	6,704	2,187	4,638	7,005

Abbreviations: (Della) = Della-type, (Jazz) = Jazzman-type, (HA) = High Amylose, CL = Clearfield, CN = Conventional, PV = Provisia.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Percentage of chalky grains as determined by SeedCount image analyzer.
Lodging: Overall average percentage of lodging observed across all trials.
Grain traits: Average across trials.
Planting date listed under location of trial; month/day of 2025.

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 Mermentau. 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 10 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

- 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.
- Varieties differ considerably in average seed weight.

Thus, a variety with a lower average seed weight will have more seed per pound. Table 10 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.

- Where seed depredation by blackbirds is potentially high, use a higher seeding rate and consider using a bird-repellent seed treatment.
- Where seedbed preparation is difficult and a less-than-optimal seedbed is prepared, use a higher seeding rate.
- If it is necessary to use seed with low-germination percentage, compensate with increased seeding rates. Always use high-germination, certified seed if possible.
- When water-seeding into stale or no-till seedbeds with excessive vegetation, use higher seeding rates.
- 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.
- 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.
- Per acre rates of the insecticidal seed treatments Cruiser, NipsIt and Fortenza vary with seeding rates, and efficacy is reduced at lower rates.

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 F). Under cool conditions (daily average temperature of 60 F to 70 F), the higher rates are recommended.

RICE GROWTH AND DEVELOPMENT

Rice seed is mostly carbohydrates stored in tissue called endosperm. The embryo makes up most of the rest of the seed. Germination begins with imbibition of water. The seed swells, gains weight, conversion of carbohydrates to sugars begins and the embryo is activated. Nutrition from the endosperm can supply the growing embryo for about three weeks.

In the embryo, two primary structures grow and elongate: the radicle (first root) and coleoptile (protective covering enveloping the shoot). As the radicle and coleoptile grow, they apply pressure to the inside of the

hull. Eventually, the hull weakens under the pressure, and the pointed, slender radicle and coleoptile emerge. The appearance of the radicle and coleoptile loosely defines the completion of germination.

Seedling development begins when the primary leaf appears shortly after the coleoptile is exposed to light and splits open at the end. The primary leaf elongates through and above the coleoptile. The primary leaf is not a typical leaf blade. The primary leaf acts as a protective covering for the next developing leaf. As the seedling grows, the next leaf elongates through and past the tip of the primary leaf. Continuing to grow and develop, the leaf differentiates into three distinct parts: the sheath, collar, and blade. Since growth and development are continuous, by the time the first complete leaf blade has expanded, the tip of the second complete leaf blade is usually already protruding through the top of the sheath of the first complete leaf. The second leaf grows and develops in the same manner as the first. When the second collar is visible above the collar of the first leaf, it is called two-leaf rice.



First emerging rice leaves

Subsequent leaves develop in the same manner, with the number of fully developed leaves being used to describe the seedling stage of growth. This trend is noted for each subsequent leaf until about the ninth complete leaf, after which leaf size either remains constant or decreases. Although a rice plant can produce many (about 15) leaves, as new leaves are produced, older leaves senesce (die and drop off), resulting in a somewhat constant four to five green leaves per shoot at nearly all times in the life of the plant.



Early emerging leaves of rice

Tillers (stools) first appear as the tips of leaf blades emerging from the tops of sheaths of completely developed leaves on the main shoot. This gives the appearance of a complete leaf that is producing more than one blade. This occurs because tillers originate inside the sheath of a leaf just above the point where the sheath attaches at the base of the plant. If the leaf sheath is removed, the bud of a beginning tiller will appear as a small green triangular growth at the base of the leaf. This bud is called an axillary bud. Tillers that originate on the main shoot in this manner are primary tillers.

If a second tiller appears, it usually emerges from the sheath of the second complete leaf and so on. Consequently, tillers develop on the main shoot in an

alternate fashion like the leaves. When the second primary tiller appears, it is called two-tiller rice. The appearance of tillers in this manner usually continues through about fourth or fifth primary tiller.

Tillers grow and develop in much the same manner as the main shoot, but they lag behind the main shoot in their development. This lag is directly related to the time a tiller first appears. It usually results in tillers producing fewer leaves and having less height and maturing slightly later than the main shoot. The lowest leaves senesce first with the process continuing from the bottom up or from oldest to youngest leaves. From this point on, there is simultaneous senescence of older leaves and production of new leaves. The stem node forms above the uppermost crown node, and a stem internode begins to form between the two nodes. As the stem internode begins to form, chlorophyll accumulates in the tissue below the stem node. This produces green color in that tissue. Cutting the stem lengthwise usually reveals this chlorophyll accumulation as a band or ring. This is commonly called "green ring" and indicates the onset of internode elongation.

The number of internodes that form in the main stem is relatively constant for a variety. Varieties now being grown have five to six internodes above the crown in the main stem. In tillers, fewer internodes may form than in the main stem. The number is highly variable and depends on how much the tiller lags behind the main stem in growth and development.

The time between seeding and internode formation depends primarily on the maturity of the variety, which is normally controlled by heat unit exposure. It also can be influenced by planting date, plant population, soil fertility, flood depth and weed competition. In general, varieties classified as very early season maturity (head 75 to 79 days after planting) reach first internode about six weeks after planting. Varieties classified as early season maturity (head 80 to 84 days after planting) reach first internode about seven weeks after planting, and varieties classified as midseason maturity (head 85 to 90 days after planting) reach first internode about eight weeks after planting.



Rice tiller



Example of "green ring" in early crops

The sheath of the flag leaf, known as the boot, encloses the panicle during the elongation of the last two internodes. Not only is the flag leaf the last formed and uppermost leaf on a mature stem, it is also considered to be the most important leaf because the products of photosynthesis from it are most responsible for grain development.

When cells first begin actively dividing in the growing point or apical meristem, the process is called panicle initiation (PI). In very early season varieties, PI and internode elongation (green ring) occur at about the same time. About seven to 10 days after the beginning of active cell division at the growing point, an immature panicle about 1/8 inch long and 1/16 inch in diameter can be seen. At this point, the panicle can be seen inside the stem, resembling a small tuft of fuzz. This is referred to as panicle differentiation (PD) or 2-mm panicle. The panicle, although small, already has begun to differentiate into distinct parts. Under a microscope or good hand lens, the beginnings of panicle branches and florets are recognizable.



2 mm and 4 mm panicles

Booting is the period during which growth and development of a panicle and its constituent parts are completed inside the sheath of the flag leaf. The sheath of the flag leaf is the boot. For convenience, it is divided into three stages: early, middle and late boot.

Heading refers to the extension of the panicle through the sheath of the flag leaf on the main stem. This process is brought about mainly by the gradual and continuous elongation of the uppermost internode. Once the uppermost internode completes elongation, the full length of the panicle and a portion of the uppermost internode are exposed above the collar of the flag leaf. This stem is now fully headed.

As heading progresses, flowering begins. Flowering, followed by grain fill, begins at the tip of the panicle then progress to the base. During the middle hours of the day, mature florets open, exposing both the stigmas and anthers to air. Pollen is shed as the anthers dry, split open and spill the pollen. The pollen then is carried by wind to the stigmas of the same or nearby plants. Special cells of the pollen grain join special cells within the pistil, completing fertilization and initiating grain formation.



Early stage boot

The primary source of the carbohydrate is from photosynthesis occurring in the uppermost three to four leaves and the stem. The carbohydrate that accumulates in grain is stored in the form of starch. Initially, the starch is white and milky inside florets on the main stem, and this is called the milk stage. Since the florets that accumulate carbohydrate first are located near the tip of the panicle, the panicle begins to lean and eventually will turn down. The milky consistency of the starch in the endosperm changes as it loses moisture. When the texture of the carbohydrate of the first florets pollinated on the main stem is like bread dough or firmer, this stage of growth is referred to as the dough stage.



Late stage boot

When the physiological processes associated with grain filling cease and the collective moisture content of the grain on the main stem is 25% to 30%, the plant has reached physiological maturity. At this time, the endosperm of all grains on the panicle of a main stem is firm.

Most grains are some shades of brown and the grains in the lower quarter of the panicle are the only ones with a greenish tint. As maturity progresses and moisture is lost, the greenish tint of the hulls fades, and the endosperm of all grains becomes uniformly hard and translucent. Once the average moisture content of the grains on the main stem is 15% to 18% (crop grain moisture, 18% to 21%), the plant has reached harvest maturity.



Rice anthesis

Second crop growth first appears as leaves originating from the crown or a leaf emerging through the sheath of a leaf from the first crop that remains attached to stubble. This usually occurs within five days after harvest, depending on first crop maturity at harvest.

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 P²O⁵) and/or potassium (as K²O) 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).

Table 9. Nitrogen Recommendations for Rice Varieties.

Varieties	N rate (lb/A)	OR	Urea (lb/A)
Addi Jo, Avant, Cheniere, CL153, CLHA03, CLJ01, CLL16*, CLL18*, CLL19, CLM04, CLM05, Della-2, Fitzgerald, Jupiter*, Mermentau, PVL03, PVL05, Taurus, Titan, Venus	135-180		300-400

**Lodging was observed at 180 lb N/A (400 lb urea/A) in some locations.*

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 9. 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. Late application of high nitrogen rate can reduce grain yield.

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.

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

Variety	Seed/ lb*	Seeding Rate 20 (lb/A)	Seeding Rate 25 (lb/A)	Seeding Rate 30 (lb/A)	Seeding Rate 40 (lb/A)	Seeding Rate 50 (lb/A)	Seeding Rate 60 (lb/A)	Seeding Rate 70 (lb/A)	Seeding Rate 80 (lb/A)	Seeding Rate 90 (lb/A)	Seeding Rate 100 (lb/A)	Seeding Rate 110 (lb/A)	Seeding Rate 120 (lb/A)
-----seed/ft ² -----													
Addi Jo	18,307				17	21	25	29	34	38	42	46	50
Avant	19,165				18	22	26	31	35	40	44	48	53
Cheniere	19,657				18	23	27	32	36	41	45	50	54
CL153	18,933				17	22	26	30	35	39	43	48	52
CLHA03	18,496				17	21	25	30	34	38	42	47	51
CLJ01	19,595				18	22	27	31	36	40	45	49	54
CLL16	17,588				16	20	24	28	32	36	40	44	48
CLL18	19,010				17	22	26	31	35	39	44	48	52
CLL19	19,035				17	22	26	31	35	39	44	48	52
CLM04	18,630				17	21	26	30	34	38	43	47	51
CLM05	15,100				14	17	21	24	28	31	35	38	42
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
Fitzgerald	19,893				18	23	27	32	37	41	46	50	55
Jupiter	17,316				16	20	24	28	32	36	40	44	48
Mermentau	20,067				18	23	28	32	37	41	46	51	55
PVL03	17,512				16	20	24	28	32	36	40	44	48
PVL04	18,714				17	21	26	30	34	39	43	47	52
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
Taurus	19,443				18	22	27	31	36	40	45	49	54
Titan	16,676				15	19	23	27	31	34	38	42	46
Venus	15,926				17	18	22	26	29	33	37	40	44
XP753	20,604	9	12	14									

*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 Extraction¹.

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 11. 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	1.75 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 P₂O₅) or K (as K₂O) 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 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.

Ratoon rice in Southwest Louisiana is prone to high levels of stem borer infestation. Seed treatments do not provide benefit to ratoon rice and additional control strategies such as foliar insecticides maybe needed to prevent yield losses. See stem borer management guidelines below.

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. Widely used insecticidal seed treatments have lost efficacy in recent years and additional controls may be needed. 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 1/4 inch in size) with brown heads that feed on the roots, reducing plant growth and rice yields.

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.



Adult rice water weevil

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. Although infestations in rice planted mid-March tend to be comparable to those in later-plantings, yield loss from weevils is reduced as the on-set of infestation is delayed in earlier plantings. 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 11). 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 pretreated 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. In the past, the Dermacor X-100 seed treatment provided approximately 80% control of rice water weevil. In recent years, control has been substantially reduced, especially in late-planted rice. Fortenza, Cruiser 5FS and NipsIt INSIDE also only achieve partial control (40% to 60% control), and damaging infestations may occur when any of the seed treatments are used under high pest pressure. Growers with a history of heavy weevil infestations should consider using multiple seed treatments or supplementing control with foliar applied insecticides.

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

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

All these foliar insecticides only kill adult weevils, not eggs or larvae, so timing of applications is crucial for management. Egg laying (oviposition) must be prevented. Once eggs are laid in rice stems or larvae are in the roots, these insecticides will not be effective. Scouting for adult weevils is important and may begin at any time after emergence of rice, but efficacy of these insecticides

is maximized when adults are controlled just before oviposition. Oviposition is possible any time water is present in the field, but it is most likely to occur after the establishment of permanent flood. Check at least five to 10 locations per field for the presence of adults or their feeding scars. Treat when adult weevils or their feeding scars are observed and conditions for egg laying are favorable as described above. Applications made up to 24 hours before initiation of permanent flood can be effective when adults are present; pre-flood applications appear to be more effective than post-flood applications for Belay. Trebon should not be applied pre-flood because of the movement of the granules when flood water is applied. More than one application of pyrethroids may be required, especially in late-planted rice. Once fields have been treated, begin scouting again after seven days.

RICE STINK BUG

Rice stink bugs are the greatest threat to headed rice and can reduce yields as well as grain quality. These tan and golden bugs (about 1/2 inch long) feed on rice when it begins to head. Females lay light-green, cylinder-shaped eggs in two-row clusters on leaves, stems and panicles.

Eggs turn 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.

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



Adult stink bug



Rice stink bug nymph

a variety of pyrethroids and a neonicotinoid (Tenchu, dinotefuran). 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 preharvest intervals. Pyrethroid resistance has been detected in rice stink bug populations in some regions of the state. If pyrethroids fail to provide satisfactory control of stink bugs, switch to another mode of action.

RICE STEM BORERS

The sugarcane borer, rice stalk borer and Mexican rice borer are important pests of rice in some regions in Louisiana. All three species attack rice in southwest Louisiana, but only the sugarcane borer is considered a pest in northeastern Louisiana. The invasive Mexican rice borer is becoming increasingly damaging in southwestern rice areas. All borer species overwinter as mature larvae in the stalks of rice and other host plants. These larvae then pupate, and adult moths emerge in the spring.

Detailed descriptions of the identification, biology and behavior of these stem borers can be found in the Louisiana Rice Production Handbook, publication No. 2321. Although larvae of each species resemble each other, distinguishing characteristics are present. Larvae of the sugarcane borer are cream-colored with a series 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 dashed 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



Rice Stalk Borer	Mexican Rice Borer	Sugarcane Borer
4 solid lines	4 broken lines	Spots and bristles
Dark head capsule	Light head capsule	Dark head capsules

Stem borer larvae

is in early 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 1/2 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.

In recent years, none of the insecticidal seed treatments have provided control of stem borers. Heavy infestations have been reported in both late-planted and ratoon rice regardless of seed treatment usage. Foliar applied insecticides will be needed to reduce losses in those fields. These include several pyrethroids, though these are not compatible with the crawfish rotation. Check with extension agents for the most up-to-date information on product registration.

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. Properly timed insecticides are effective in rice, but no economic thresholds for stem borers have been developed. Early planting allows the rice crop to avoid severe infestations of stem borers, especially where populations of the stem borers 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 varieties differ in susceptibility to stem borers. Provisia varieties including PVL03 and PVL03 are among the most susceptible to stem borers. Chenier, Addi Jo, Fitzgerald and Jazzman varieties are more resistant and often don't require insecticidal protection.

RICE SEED MIDGE

Adult midges resemble small mosquitoes and swarm over rice fields, levees, roadside ditches and other bodies of water. Elongated eggs are laid on the surface of open water in strings. Larvae live on the bottom of flooded rice fields in spaghetti-like tubes. Larvae injure water-seeded rice by feeding on the embryo of germinating seeds or on

the developing roots and seeds of very young seedlings. The potential for midge injury increases when fields are flooded far in advance of water-seeding rice. Water-seeded fields should be scouted for midge injury, checking for hollowed-out seeds within five to seven days after seeding. Monitor fields until rice seedlings are several inches tall. Depending on the severity of injury, whole fields may need to be replanted, while in some cases, only a portion of the field may require reseeding.

Control the rice seed midge by applying a pyrethroid insecticide if a large number of hollowed-out seeds are observed in the first week after planting or stands are being reduced significantly during the first two weeks after planting (fewer than 15 plants per square foot).



Rice seed midge tunnels in soil

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



Leaf pulled back to expose rice leafminer maggot

continuously flooded rice on the upper side of leaves where water is deepest. Scout for rice leafminer larvae by pulling a rice leaf gently between the thumb and forefinger and feeling for the presence of a bump in the leaf. If a bump is detected, the larvae or pupae can be found by separating the layers of the leaf. If plant populations are being reduced to fewer than 15 plants per square foot, chemical control may be necessary. Insecticide efficacy is not well documented, but pyrethroids will likely provide sufficient control.

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 1/10 inch long) deposit individual eggs on the upper surface of rice leaves near the leaf margins.

Larvae are small white or yellowish legless maggots about 1/4 inch long. The brown puparium is elongated and tapered at both ends. Economic injury to rice plants tends to occur in young rice from emergence until the tillering stages. In most years, this insect is more of a problem in late-planted rice,



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

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. The only recommendation available at this time is to avoid late planting. If you suspect a SARM infestation, contact your parish agent for damage assessment and to obtain the latest developments on this insect pest.

COLASPIS

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

To scout for this pest, locate plants that are stunted, withering, dying and surrounded by declining plants. Dig around the base of the plants, carefully peeling back the soil and looking for white grubs with brown heads that are a little larger than rice water weevil larvae. Cruiser 5FS and NipsIt INSIDE seed treatments have shown some ability to control Colaspis in drilled rice. When rice is planted following soybeans or pasture, treating seed with Cruiser 5FS or NipsIt INSIDE may be justified. No foliar insecticides are labeled to control colaspis in Louisiana rice.



Colaspis larva in soil

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. Dermacor seed treatment reduces the severity of early-season armyworm feeding. To scout for fall armyworms in young rice, begin scouting after germination of seedlings and continue to scout fields weekly for the presence of larvae on plants. Sample plants every 10 feet along a line across the field and repeat this process in a second and third area of the field. Treat with a pyrethroid when there is an average of one armyworm per two plants. Because adults lay eggs on grasses in and around rice fields, larval infestations can be reduced by effective management of weedy grasses. Cultural control consists of flooding



Fall armyworm larva

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 1/2 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 fluid ounces per 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 10 parts per million copper sulfate.



Apple snail



Apple snail eggs

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.**

RICE DELPHACID

The rice delphacid, *Tagosodes orizicolus*, is a small brown/tan planthopper with nymphs identified by two brown stripes down the length of the body. The delphacid has occurred sporadically in Louisiana including widespread outbreaks in the 1950s and 1960s as well in 2025. The insect has occurred in rice in late-summer and fall in Texas since 2015, and movement into Louisiana may become more common in coming years. Factors contributing to outbreaks are unknown. Suspected detection of delphacid in Louisiana rice should be reported to AgCenter Extension personnel immediately.

Delphacids can infest any stage of rice, and populations can rapidly build to damaging levels. Localized patches of necrotic rice called hopper burn are common under high infestation levels. The insects can be scouted for with a sweep net or by parting the canopy to look for adults and nymphs feeding on stems near the water line.



Rice delphacid adult



Rice delphacid nymph



Hopper burn

Management research for delphacid is still in its early stages, and highly effective controls have not been identified. Currently registered insecticides provide only limited control, and observations suggest that some products may increase or flare infestations. Exercise caution when considering treatment and consult extension professionals for the latest recommendations.

RICE DISEASES

Best results in disease management are achieved when an integrated pest management (IPM) strategy is used. The combination of host resistance, cultural practices and reasonable use of fungicides offers better disease control than these methods applied isolated. Overall, varieties with some levels of disease resistance are available for most of the relevant rice diseases, and their use is encouraged. Unbalanced mineral fertilization and late planting are frequently associated with severe disease epidemics for most diseases. Because the list of labeled fungicides may change, check with your cooperative extension agent for current recommendations, Table 12 shows the currently active ingredients labeled to rice and assessed at LSU Rice Research Station. Fungicide timing is critical for disease control. Figure 1 provides application timings for the most common diseases in Louisiana.

Bacterial Panicle Blight (BPB): Bacterial panicle blight, caused by two bacteria species, *Burkholderia glumae* and *B. gladioli*, is one of the most important rice diseases in the South. The disease is associated with warm temperatures (day and night) and moisture. Losses include reduced yields and poor milling. The bacteria are seed-borne, survive in the soil, and live on the surface of the leaves and leaf sheaths following the canopy up.

The bacteria infect the grain at flowering and cause grain abortion and rotting during grain filling. The disease is first detected as a light- to medium-brown discoloration of the hulls' lower third to half shortly after emergence.

The stem below the infected grain remains green. Pollination occurs, but the grain aborts sometime after grain filling begins.

Rain splashes can disperse the bacteria on the plant surface to other plants, developing a circular pattern in the field with the most severely affected panicles in the center remaining upright because of grains not filling.

No chemical control measures are recommended. Fungicide applications will not control or prevent BPB. 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 oryzae*. 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



Bacterial panicle blight



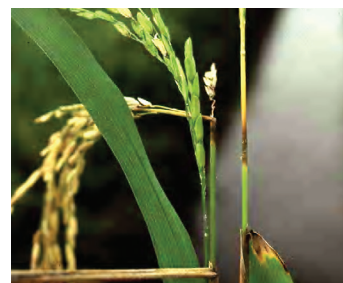
Leaf blast



Node blast

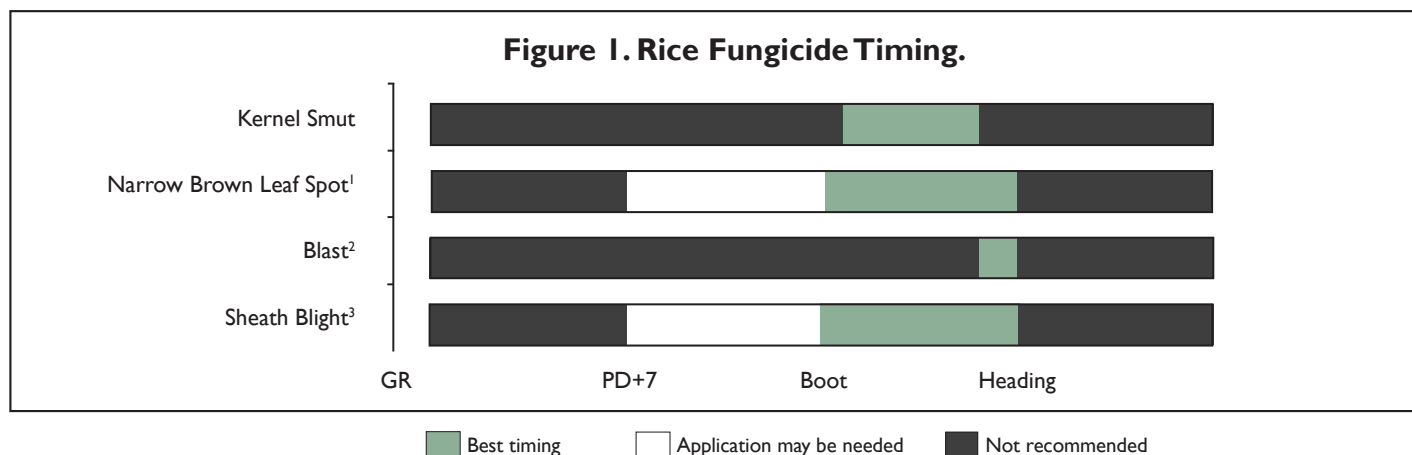


Collar blast



Rotten-neck blast

Continued on page 25



¹Application for the foliar symptoms (narrow brown leaf spot), not sheath or panicle (see text). Late planting may require early application.

²Susceptible varieties under high disease pressure may require an application at the boot stage followed by 50-70% heading.

³An early application may be necessary if a sheath blight appears before the boot stage.

Table 12. 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.

Fungicide Class and FRAC Group ¹	Active Ingredient	Product(s) ²	Rate ³ (fl oz)	Pre-Harvest Interval (Days0)	Blast	Sheath Blight ⁵	Narrow Brown Leaf Spot ⁶	Kernel Smut
Strobilurins (Qol) FRAC Group 11	Azoxystrobin	Quadris 2.08 SC Others	9-15.5	28	G	G	P	P
	Trifloxystrobin	Flint Extra	3.1-4.7	35	VG	G	NL	NL
Carboxamides FRAC Group 7	Flutolanil	Elegia 3.8 F	12 - 32	30	NL	G	NL	NL
	Fluxapyroxad	Sercadis	4.5 - 6.8	28	NL	G	NL	NL
Triazoles (DMI) FRAC Group 3	Propiconazole	Tilt 3.6 EC Others	6-10	35	NL	F	G	F
	Prothioconazole ⁷	Prozio SC	4.5	40	NL	F	G	-
Mixed ⁴ FRAC 3+11	Azoxystrobin + Propiconazole	Quilt Xcel 2.2 SE Others	14-27	35	G	G	G	F
	Azoxystrobin + Difenoconazole	Amistar Top Other	10-15	28	G	G	G	F
	Azoxystrobin + Prothioconazole ⁷	Kojami	14.8	40	G	G	G	-

¹Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

²Reference 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 ingredients 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. Members or participants in the CDWG assume no liability resulting from the use of these products.

³Rates are the amount of formulation (product) per acre unless otherwise indicated.

⁴Refer to product label for the fungicide class and mode of action group.

⁵For fields with population of *Rhizoctonia solani* (sheath blight) resistant to strobilurins, only carboxamides fungicides (FRAC 7) will provide good efficacy.

⁶These efficacy performance refers only to the leaf symptoms (narrow brown leaf spot), not to the symptoms on the sheath or panicle, *Cercospora* net blotch and *Cercospora* panicle blight, respectively.

⁷Performance based on limited data.

Continued from page 23

narrow brown borders. Leaves and whole plants are often killed under severe conditions. Rotten-neck symptoms appear at the base of the panicle, starting at the node soon after heading. The tissue turns brown to chocolate-brown and shrivels, causing the stem to snap and lodge. Panicle branches and stems of florets also have gray brown lesions.

Varieties with good resistance are available, although new races can develop fast and overcome genetic resistance. Scouting for blast should begin early in the season, and 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 12 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 control this disease well. 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 consider the chances of poor weather conditions. Under heavy blast pressure and conducive weather conditions, two applications, one at boot and one at 50% to 70% heading, may be needed to suppress blast effectively.

Cercospora: This disease is caused by the fungus *Cercospora janseana*, and symptoms can develop on the leaf, sheath, panicle, and grains. Similarly to blast, different names are now used to describe this disease depending on the infected site. When symptoms occur in the leaf, the disease is referred to as **narrow brown leaf spot (NBLS)**, with linear and reddish-brown lesions along the leaf blade as the classic symptoms of NBLS. Some variation of the disease symptoms can be observed depending on the cultivar's resistance, with more susceptible varieties having wider, more numerous, and lighter brown with gray necrotic centers. Spots usually appear near or after heading growth stage, but both young and old leaves are susceptible. When symptoms develop on the sheath, the disease is called **Cercospora net-blotch (CNB)** due to the brown cell walls and the tan-to-yellow intracellular areas forming a netlike pattern. When infection occurs in the panicle, it can be referred to as **Cercospora panicle blight (CPB)**, where branches of the seed heads can become infected, causing premature ripening and unfilled grains. Symptoms of CPB can be confused with blast rotten-neck and panicle blast lesions, but CPB symptoms usually are darker brown and develop in the internodal area of the neck. Glumes can also be infected, causing significant discoloration and necrosis, and grain infected appears as a diffused brown discoloration. The distinction between NBLS, CNB and CPB is important because some varieties can have genetic

resistance to NBLS, such as those with CRPS2.1 gene, but not to CNB and CPB. In recent years, reports of severe yield loss due to CNB and CPB were frequently observed, with most of the yield loss observed on crops that received extended periods of rain and warm temperatures during and after grain filling. During this stage, rice plants are especially susceptible to this disease development.

The disease's intensity is intermittent between years but is often severe on late planting fields and in the second crop. Warm, rain, and conditions that prolong leaf moisture favor the disease infection and development. However, it can take up to 30 days from the infection to the development of visible symptoms on the leaf. The best fungicide timing for NBLS is between early boot to heading growth stages (Table 12 and Figure 1). However, the later the rice is planted, the earlier the fungicide must be applied. Triazoles fungicides, such as propiconazole and difenoconazole, provide the best efficacy. Applications of fungicide from the strobilurin group are expected to have limited efficacy, as local *C. janseana* population contains a high frequency of a mutation that confer strong resistance to this fungicides class. Carboxamides are not label to control *Cercospora*, as this fungicides class has limited action to fungus from the *Cercospora* group. Recently studies showed that fungicide applications for CNB and CPB cause no or limited yield return from applications made from panicle differentiation to heading. More studies are being conducted to improve the fungicide efficacy for CNB and CPB, including alternative timing and use of biological control. Growers are encouraged to harvest the crop as early as possible to avoid yield loss due CPB, especially on late planting rice.



Narrow brown leaf spot



Cercospora net-blotch



Cercospora panicle blight

False Smut: The false smut fungus, *Ustilaginoidea virens*, infects rice at flowering stage. The disease is characterized by large orange to olive-green spore masses that replace one or more grains on the panicle. 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. 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. The 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



False smut

applications of demethylation inhibitors (propiconazole and difenoconazole) reduce damage significantly. Applications after boot split have little, if any, activity.

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 complex disorder in rice 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 seed's endosperm. 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 the soil of affected fields and seeds. Significant yield reductions are possible, but usually, the damage is limited to grain quality. High nitrogen rates favor disease development. Research results indicate that 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 the leaf blades. Infections usually begin during the late tillering/joint-elongation stages of growth. The fungus, *Rhizoctonia solani* AG-1, survives between crops as structures called sclerotia or as hyphae in plant debris.

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.



Sheath blight

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. The same pathogen also causes aerial blight on soybeans. Therefore, rotation with soybeans or continuous rice increases the amount of inoculum in soil and should be avoided when possible. Fungicides are available for managing sheath blight. Avoid late application beyond 50% to 70% heading (Table 12 and Figure 1). In some areas of south Louisiana, the fungus has developed resistance to the strobilurin fungicides (e.g., azoxystrobin), and the use of other modes of action, such as carboxamides (e.g., flutolanil), is recommended where fungicide resistance was detected.

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 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.



Sheath rot

Table 13. Rice Variety Reactions to Common Diseases in Louisiana.

¹“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.

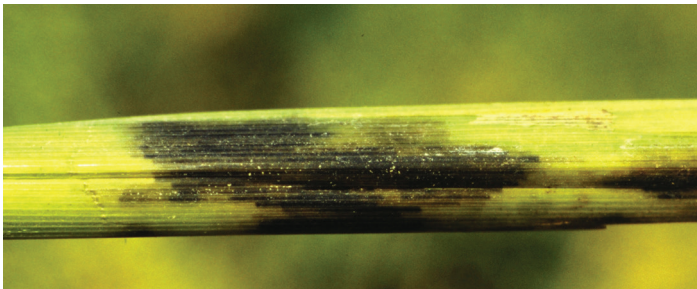
Variety	Blast	Sheath Blight	Narrow Brown Leaf Spot ¹	Bacterial Panicle Blight	Straighthead
Addi Jo	R	S	MR	MR	MR
Aroma22	S	MS	MR	MS	MS
Avant	S	S	MR	S	MR
Cheniere	MS	S	S	MS	MS
CL111	R ²	VS	S	VS	MS
CL153	R ²	S	MS	MS	MS
CLJ01	MS	MS	MS	S	MS
CLL16	R ²	S	MR	S	MR
CLL18	MS	MS	MR	-	MR
CLL19	R ²	S	MS	S	S
CLHA03	R ²	S	MS	-	-
CLM04	MS	MS	MR	MR	S
Della-2	MS	S	MS	MS	R
DG-263L	MR	S	R	MS	MR
Frontiere	S	S	S	-	S
Fitzgerald	R ²	MS	-	S	-
Jazzman	MR	MS	S	S	MS
Jupiter	S	MS	S	MR	S
Mermentau	S	S	S	S	S
PVL03	R ²	S	MS	MR	MR
PVL04	R ²	S	MR	-	S
PVL05	R ²	MS	MR	-	S
RT 7321 FP ³	MR	MR	-	-	-
RT7302 ³	-	MR	MR	-	MR
RT7331 MA ³	-	MR	MR	-	MR
RT7421 FP ³	-	MR	MR	-	MR
RT7431 MA ³	-	MR	MR	-	MR
RT 7521 FP ³	MR	MS	MR	MR	R
Taurus	S	MS	MS	S	MS
Titan	S	S	MS	MS	S
XP753 ³	MR	MR	-	-	-
Venus	S	S	S	MS	-

¹Classification based on the leaf symptoms only.

²Varieties with Pita gene, known to confer resistance to most common blast races.

³Marker data not available for RiceTec products.

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 has also 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 floats to the surface, contact plants, germinate, and infects 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 do not emerge from the flag leaf sheath. Hulls may be distorted and discolored, with portions missing or reduced in size. Distorted florets with a hook on the end are called “parrot beak” and are typical of straighthead. Plants are darker green or blue-green and often produce new shoots and adventitious roots from the lower nodes. These symptoms can be confused with herbicide damage. Management is accomplished by using resistant varieties and draining the field approximately ten days before internode elongation (green ring), allowing the soil to dry until it cracks. This



Straighthead

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 ten days away. It is important that the flood be established again by internode elongation.

Hoja Blanca: It is a viral disease transmitted by the rice delphacid (*Tagosodes orizicolus*), endemic to South and Central America. It recently reemerged in Texas after being absent from the U.S. since the 1960s. Currently, **the disease has not been reported in Louisiana.** However, the widespread presence of the vector during the 2025 season and the high incidence of the disease in Texas increase the risk of an imminent introduction into Louisiana. Infected delphacids can transmit the virus to rice within hours of feeding. Symptoms appear five to 30 days post-infection, depending on the rice growth stage and variety. These include chlorotic to bleached leaves, stunted growth, reduced root development and deformed tillers, especially in plants infected during vegetative development. Later infections may cause panicle sterility or be asymptomatic



Hoja blanca



Hoja blanca

if they occur during grain filling. In other countries, outbreaks are erratic, with yield losses ranging from no impact to up to 75%. In Texas, where the disease was first reported in 2024, yield reduction was more closely linked to delphacid damage than to the virus itself. Disease control relies primarily on resistant varieties and vector management. Some varieties with partial resistance have been identified and developed in other countries, but the response of U.S. cultivars remains unknown. No specific control is currently advised, but growers are encouraged to scout fields and report suspected cases to LSU AgCenter personnel.

RICE DISEASE MANAGEMENT

The yield potential of any rice variety can be severely reduced under high disease levels. Management strategies with integrated pest management have a higher chance of successfully maintaining the disease below economic damage levels. It is important to have a comprehensive understanding of the field's history and variety's disease resistance package to plan the disease management strategy. Avoid scenarios that can increase the risk for multiple diseases. For example, late planting with a susceptible variety for sheath blight and blast in a field with historical problems for sheath blight may require multiple fungicide applications with uncertain control efficacy or investment return. For overall disease management, consider the following:

- The field's disease history from pathogens that can survive in the soil (e.g., kernel smut). Also, consider crop rotation that can host rice pathogens, such as soybean aerial blight and rice sheath blight.
- Choose varieties with some level of genetic resistance.
- Avoid late planting as rice is more likely to encounter foliar disease problems.
- Maintain proper fertility levels.
- Maintain adequate irrigation flood, especially for varieties susceptible to blast.
- Use fungicides at the correct growth stage when necessary.

- Consider the yield potential, cost application, and overall disease intensity and risk for fungicide application.
- Rice cultivated for seed production purposes should have the minimum disease risk tolerance.
- If a ratoon crop is planned, disease not suppressed in the first crop may cause significant damage in the second crop.
- Plan to scout the fields frequently to assess the disease intensity, especially if the weather is conducive to disease development.
- Make the best effort to have equipment ready to harvest as soon as crop and field conditions allow.

Rice disease control using a single fungicide application can be difficult because of fungicide resistance and multiple diseases requiring different timings for effective control. Rice producers are encouraged to use full labeled rates, rotate modes of action when possible, and use multiple fungicide applications when justified to manage rice diseases effectively and economically.

Fungicide timing is critical for disease control (Table 12 and Figure 1). Some growth stages are difficult to detect, and plant development may be uneven in the field, so scouting for disease and growth stages should be done frequently and throughout the entire field. Also, consider the logistics for fungicide application. Allow time to obtain a fungicide, schedule the application, and the chances for poor weather conditions that can prevent the application at the correct time.

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 14. The effectiveness of selected burndown herbicides on common winter vegetation is presented in Table 15. The activity of selective herbicide programs for perennial grass control is presented in Tables 16, 17 and 18. Information about rice herbicide use in crawfish production can be found in Table 19.

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 Xtra or Postscript (Postemergence) – Apply Beyond Xtra to Clearfield rice varieties. Apply Postscript to FullPage hybrids. Beyond Xtra/Postscript selectively controls red rice, annual grasses and broadleaf weeds. The application must be made after an application of Newpath/Preface or Clearpath. Beyond Xtra can be applied from four-leaf to panicle initiation (green ring) plus 14 days for Clearfield varieties, and Postscript can be applied from four-leaf to panicle initiation (green ring) for FullPage hybrids. Beyond Xtra/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. Beyond Xtra is a new label that combines the Beyond and Raptor labels into one label. There are no changes to the herbicide formulation.

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.

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 0.5 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. A 0.5 pound per acre rate of Facet DF is equivalent to 32 ounces per acre of the Facet L. Follow the label concerning the addition of crop oil or surfactants. Tomatoes and cotton are sensitive to Facet drift.

Facet + Pendimethalin (Delayed 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.

Fullscript (Postemergence) – Fullscript is a prepackaged mixture of Postscript and quinclorac (Facet) and is labeled for use in Fullpage rice. Fullscript can be applied at 13-20 fluid ounces per acre to Fullpage rice from one-leaf rice through panicle initiation plus 14 days. Fullscript provides control of annual grasses, including red rice, and several broadleaf weeds. For optimal performance use a crop oil concentrate at 1% v/v.

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 duckweed. 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 to 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, duckweed, 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. 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.

Novixid (Postemergence) – Novixid is a prepackaged mixture of Loyant and Grasp that provides broad spectrum weed control. Similar to Loyant, Novixid requires high levels of soil moisture and performs best when applied immediately prior to or after permanent flood establishment. Novixid should be applied at 27.4 fluid ounces per acre which is equivalent to 12.9 fluid ounces per acre of Loyant and 2.3 fluid ounces per acre of Grasp. For optimal performance use an MSO at 0.5% v/v.

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 ounce per acre, and the rate should not be reduced as is often done with Permit. The 0.75 ounce per acre rate provides 0.5 ounce per acre of Permit and 0.06 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 two- to three-leaf rice stage but no later than panicle initiation or two times between the two- to three-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.

Prowl (Delayed Preemergence) – Pendimethalin is sold under several different trade names, including Prowl. Prowl is used for the control of several grass species and some small-seeded broadleaf weeds. In drill-seeded rice, it can be used as a delay preemergence or early postemergence application in rice. Prior to application, the rice must imbibe water and begin germination to reduce stand loss or Prowl can be applied 4 to 9 days after planting to soil that has been sealed by a rain or flush. In water-seeded rice, Prowl cannot be sprayed prior to the 4-leaf rice growth stage or until the rice is well-rooted/pegged. The rice must be standing upright, and the water must be removed prior to application.

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/Arroz (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.

Rindé (Postemergence) – Rindé is a liquid prepackaged mixture of quinclorac (Facet) and bispyribac-sodium (Regiment) for the control of barnyardgrass, other annual grasses and broadleaf weeds in rice. Rindé can be applied to drill-seeded and water-seeded rice from 3-leaf to green ring rice from 22 to 36 fluid ounces per acre. Rindé should be applied with an adjuvant and a nitrogen fertilizer source to achieve optimal weed control. See the Rindé Approved Surfactants bulletin for a list of approved surfactants and use rates.

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 duckweed 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.



Table 14. Effectiveness of Selected Preplant and Preemergence Rice Herbicides on Certain Weeds.

	Palmleaf Morningglory	Eclipta	Barnyardgrass	Red Rice	Sprangletop	Signalgrass	Fall Panicum	Sedge	Alligatorweed	Duckweed	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	8
Bolero PRE/DPRE	5	8	8	0	8	5	7	5	4	8	8	6	8	5	5	8	6	8
Clearpath	8	8	9	8	8	9	5	9	6	8	8	7	6	7	6	7	8	5
Command	0	0	9	0	8	8	9	0	0	7	0	0	0	0	2	7	0	0
Facet L	8	8	9	0	0	9	5	2	4	3	4	7	6	7	0	5	4	5
Gambit	4	7	0	0	0	0	0	9	8	8 ⁴	7	7	6	7	6	8	8	1
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	5
Pendimethalin + Facet (DPRE)	8	8	9	0	9	8	5	6 ¹	6	3	2	8	4	7	0	3	6	7
RiceOne	0	0	9	0	8	9	9	0	0	7	0	0	0	5	2	7	0	7
Sharpen	8	7	4	0	4	4	6	6	4	4	6	7	6	7	6	7	7	6
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 Xtra 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	-
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	4 ³
Fullscript	8	9	9	9	7	9	7	8	6	3	8	8	3	8	3	6	7	-
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
Highcard	0	0	9 ³	9 ³	9 ³	9 ³	3	0	0	0	0	0	0	0	0	0	0	0
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	-
Novoxid	9	9	9	0	6 ⁴	6 ⁴	6 ⁴	8	9	9	8	9	8	9	9	8	6	7
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	4 ³
Propanil + Permit/Halomax	9	9	9	0	7 ²	9	8 ²	9	5	5	8	9	9	9	5	8	8 ⁴	4 ³
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	4 ³
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 or Arroz	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 ⁴	0	8	9	7 ²	0	0	0	0	0	0	0	0	0	0	0
Rinde	8	9	9	0	3	9	5 ⁴	7 ¹	7	8 ⁴	8	9	7	9	7	7	8	7
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

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 15. 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	10 Months	8	9	–	–	9	9	9	–	–	9	9	9	–	–	–
Sharpen + Glyphosate	0	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 16. (Preliminary) Activity of Conventional Herbicide Programs for Perennial Grass Control¹.

Herbicide Program	Brook Paspalum	Water Paspalum	Creeping Rivergrass ²	Southern Watergrass	Rice Cutgrass
Clincher	5	8	5	5	0
Ricestar	0	7	5	0	0
Loyant	4	1	8	0	0
Facet	0	1	1	0	0
Grasp	3	1	8	0	0
Regiment	0	1	7	0	0
Clincher + Loyant	3	9	9	6	0
Clincher + Facet	0	7	1	1	0
Clincher + Grasp	2	8	8	3	0
Clincher + Regiment	1	7	9	2	0
Ricestar + Loyant	1	7	6	0	0
Ricestar + Facet	1	8	2	0	2
Ricestar + Grasp	5	4	8	0	0
Ricestar + Regiment	1	7	8	0	0
Loyant + Grasp	9	1	9	0	0
Loyant + Regiment	7	1	9	0	0
Facet + Grasp	1	2	7	0	0
Facet + Regiment	1	1	7	0	0
Rogue	1	1	0	3	0

¹Control rating is based on herbicides applied to actively growing plant segments. ²Also referred to as perennial barnyardgrass.

Table 17. (Preliminary) Activity of Clearfield Herbicide Programs for Perennial Grass Control¹.

Herbicide Program	Brook Paspalum	Water Paspalum	Creeping Rivergrass ²	Southern Watergrass	Rice Cutgrass
Beyond Xtra	0	8	8	0	0
Beyond Xtra + Clincher	1	9	9	4	5
Beyond Xtra + Ricestar	0	9	9	0	0
Beyond Xtra + Loyant	9	9	9	0	0
Beyond Xtra + Facet	1	9	8	0	2
Beyond Xtra + Grasp	7	9	9	0	0
Beyond Xtra + Regiment	0	9	9	4	0
Newpath fb Beyond Xtra	3	9	9	0	0

¹Control rating is based on herbicides applied to actively growing plant segments. ²Also referred to as perennial barnyardgrass.

Table 18. (Preliminary) Activity of Provisia Herbicide Programs for Perennial Grass Control¹.

Herbicide Program	Brook Paspalum	Water Paspalum	Creeping Rivergrass ²	Southern Watergrass	Rice Cutgrass
Provisia 10 ³	0	9	5	0	3
Provisia 10 fb Provisia 10 ⁴	6	9	7	4	9
Provisia 10 fb Provisia 10 fb Provisia 10	7	9	8	4	9
Provisia 15.5	0	9	6	0	6
Provisia 15.5 fb Provisia 15.5	7	9	8	7	9

¹ Control rating is based on herbicides applied to actively growing plant segments. ² Also referred to as perennial barnyardgrass.

³ Herbicide rates in fl oz/A. ⁴ Sequential Provisia applications were applied 10-14 days after the prior application.

Table 19. 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.
Fullscript:	.Do not use treated fields for the aquaculture of edible fish and crustaceans (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.
Highcard:	.Crawfish not specifically mentioned; however, do not allow Max-Ace rice go to seed in a non-rice year. This includes any fallow or crawfish production fields.
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.
Novixid:	.Novixid can be applied to rice fields used for crawfish production.
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.
2,4-D	.May be toxic to aquatic invertebrates.

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