2025 RICE VARIETIES & MANAGEMENT TIPS

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2025 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

AddiJo (LA): A high amylose, intermediate gel temp variety with nonsticky cooking qualities and good yield potential. This variety is intended for specific quality markets. It has excellent grain and cooking quality desired by key Latin American export markets. It has good ratoon potential, lodging resistance and milling properties. AddiJo contains the Pita blast resistance gene and very good blast resistance. 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 rated as susceptible to sheath blight, moderately susceptible to blast and bacterial panicle blight and moderately resistant to false smut.**

Avant (LA): A very early, high-yielding, long-grain rice semidwarf variety with very good yield potential. It has shown very good lodging resistance and excellent ratoon potential. Avant is the earliest 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

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

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

CL153 (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. The variety is rated as moderately susceptible to blast, *Cercospora*, bacterial panicle blight and straighthead. It is susceptible to sheath blight. CL153 has shown yield potential comparable to or slightly lower than CL151. CL153 is similar in maturity and plant height to

CL151 but has improved lodging resistance. The variety has good seedling vigor and has shown good second-crop yield potential.

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. Moderately resistant to blast and *Cercospora*, moderately susceptible to sheath blight and susceptible to bacterial panicle blight.

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 and has 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, having yielded comparably to Jupiter and CL272. The variety is 2 to 3 inches taller than Jupiter and has shown very good milling and grain quality. CLM04 is similar to Jupiter in days to 50% heading and is one week later than Titan.

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

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 soft-cooking characteristics are similar to that of imported Thai Jasmine. 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.

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

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

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.

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

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. The variety has consistently shown comparable or better yield potential than Jupiter. Titan is similar in height and a week earlier than Jupiter in maturity. Milling yields have been observed to drop off significantly when harvested at lower moisture.

Please see Tables 1 and 2 for the agronomic characteristics and yields of the recommended varieties, Tables 3-8 for the results of 2024 variety trials and Table 9 for the stability of yield at different planting dates.

COMMERCIAL SEED PRODUCTS

RiceTec will offer nonherbicide tolerant hybrids XP753, RT7302 and medium-grain 3202 for the 2025 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. Three FullPage RiceTec hybrids will be available for the 2025 cropping season. The hybrids will include RT7321 FP, RT7421 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 RTv7231 MA variety, RT7431 MA and hybrid RT7331 MA will be available for the 2025 cropping season. Please consult RiceTec for Max Ace hybrid management guidelines.

DynaGro rice varieties are available from Nutrien Ag Solutions. Dyna-Gro will offer pure line varieties DG263L, DG245L and medium-grain DG353M, as well as the new Provisia herbicide tolerant variety, DG563PVL, for the 2025 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 I. Agronomic Characteristics and Yields of Recommended Conventional Rice Varieties (2022-2024) in Louisiana.

Variety	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2022 Milling % (Whole / Total)	2023 Milling % (Whole / Total)	2024 Milling % (Whole / Total)	Mean Milling % (Whole / Total)	2022 Grain Yield (lb/A)	2023 Grain Yield (lb/A)	2024 Grain Yield (lb/A)	Mean Grain Yield (lb/A)
Long Grain													
DG263L (HA)	G	84	38.3	25.9	MS	57/66	55/68	55/67	**55/67**	8,481	9,432	9,255	**9,056**
Avant	G	77	35.5	23.3	MR	62/68	59/71	59/70	**59/70**	8,025	8,766	7,842	**8,211**
Addi Jo (HA)	VG	89	38.4	23.1	MR	59/68	53/69	60/70	**57/69**	8,063	8,142	7,157	**7,787**
Mermentau	G	83	38.0	27.6	MR	61/67	58/69	63/71	**60/70**	7,806	7,869	7,487	**7,721**

CONTINUED | Table I. Agronomic Characteristics and Yields of Recommended Conventional Rice Varieties (2022-2024) in Louisiana.

Variety	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2022 Milling % (Whole / Total)	2023 Milling % (Whole / Total)	2024 Milling % (Whole / Total)	Mean Milling % (Whole / Total)	2022 Grain Yield (lb/A)	2023 Grain Yield (lb/A)	2024 Grain Yield (lb/A)	Mean Grain Yield (lb/A)
Long Grain													
Cheniere	G	85	37.3	14.8	MR	64/71	61/72	65/73	**63/72**	8,100	7,356	6,598	**7,351**
Ozark	VG	87	39.5	35.2	MR	n/a	48/68	54/69	**51/69**	n/a	9,538	8,845	**n/a**
Medium Grain													
Taurus	G	85	33.8	19.0	MR	60/68	48/71	50/69	**52/69**	8,282	8,764	8,808	**8,618**
Venus (LA21-2070)	G	84	36.6	24.0	MR	64/68	56/69	52/68	**57/68**	8,154	8,109	8,393	**8,219**
Titan	VG	83	35.9	23.3	MR	61/66	52/69	52/68	**55/68**	7,436	7,331	8,036	**7,601**
Jupiter	G	90	35.1	28.2	MS	61/67	54/68	58/68	**58/68**	7,570	6,710	7,550	**7,277**

Abbreviations: (HA) = High Amylose, 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 (2022-2024) in Louisiana.

Variety	Seedling Vigor	Days to 50% Heading	Plant Height (in)	% Chalk	Lodging	2022 Milling % (Whole / Total)	2023 Milling % (Whole / Total)	2024 Milling % (Whole / Total)	Mean Milling % (Whole / Total)	2022 Grain Yield (lb/A)	2023 Grain Yield (lb/A)	2024 Grain Yield (lb/A)	Mean Grain Yield (lb/A)
Clearfield Long													
CLL18	VG	85	43.0	24.0	MR	54/65	47/67	53/68	**51/67**	9,356	10,189	9,218	**9,588**
CLL16	VG	88	43.0	15.0	MR	54/65	51/68	53/67	**53/67**	9,509	9,147	8,476	**9,044**
CLL19	G	80	38.0	17.0	MR	61/67	53/69	54/69	**56/68**	9,002	9,274	8,007	**8,761**
CL153	G	83	39.0	10.0	MR	64/69	58/70	61/70	**61/70**	8,601	8,326	7,409	**8,112**
CL111	G	82	41.0	14.0	R	64/69	n/a	n/a	**n/a**	7,643	n/a	n/a	**n/a**
Clearfield Medium													
CLM04	G	89	41.0	14.0	MR	63/67	60/70	60/68	**61/68**	8,703	8,510	8,856	**8,690**
Provisia Long													
213L1140	G	87	39.4	18.0	MR	52/69	52/70	51/67	**52/69**	9,162	8,975	8,423	**8,853**
PVL03	G	85	40.9	20.0	MR	59/70	55/72	55/69	**56/69**	8,356	8,591	8,100	**8,349**
PVL04	G	90	40.9	18.0	MR	n/a	57/70	59/70	**n/a**	n/a	7,654	7,704	**n/a**

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

Table 3. 2024 Louisiana Variety Test (VT).

Variety	Herbi-cide Type	Days to 50% Heading	Height (in)	Mill-ing % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodg-ing % Observed	RRS-SF 2/29	RRS 3/13	LK 4/1	MW 4/1	PL 4/4	WB 4/4	MM 4/5	SJ 5/28	VT Avg. Yield (lb/A)
Aromatic																
Fitzgerald	CN	85	37.4	59/70	8.6	6.7	0.5	8,948	5,873	7,415	6,811	6,794	6,871	7,882	4,034	**6,828**
Jazzman	CN	89	40.6	61/70	8.7	6.7	4.8	8,532	7,175	5,350	6,288	5,755	6,215	8,466	5,078	**6,607**
ARoma22	CN	89	43.9	59/69	6.6	6.8	0.5	7,879	6,705	5,918	5,505	6,240	6,572	6,908	4,747	**6,309**
CLJ01	CL	89	38.2	63/71	6.1	6.8	1.0	8,334	6,727	5,912	5,929	6,426	5,240	7,251	4,532	**6,294**

CONTINUED | Table 3. 2024 Louisiana Variety Test (VT).

Variety	Herbi-cide Type	Days to 50% Heading	Height (in)	Mill-ing % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodg-ing % Observed	RRS-SF 2/29	RRS 3/13	LK 4/1	MW 4/1	PL 4/4	WB 4/4	MM 4/5	SJ 5/28	VT Avg. Yield (lb/A)
Long Grain																
23DGL070	CN	86	38.9	60/68	7.7	6.9	3.3	11,008	10,516	8,218	9,394	9,220	9,120	11,091	7,575	**9,518**
DG263L (HA)	CN	86	39.0	56/68	15.4	6.3	5.2	10,570	10,235	7,767	9,640	8,006	9,341	11,181	7,298	**9,255**
CLL18	CL	88	43.1	54/68	21.6	6.7	1.0	12,446	9,913	8,224	9,120	8,682	8,660	10,574	6,128	**9,218**
Ozark	CN	88	40.6	53/69	25.8	6.6	0.5	10,963	8,551	7,638	9,079	8,723	8,916	9,929	6,961	**8,845**
DG563L (HA)	PV	90	38.4	59/69	15.7	6.4	5.2	9,270	9,631	7,916	9,366	8,149	8,004	10,542	6,553	**8,679**
CLL16	CL	92	42.8	54/68	13.1	6.8	5.7	11,108	8,144	7,860	8,971	7,957	7,292	10,414	6,068	**8,477**
23DGL078	CN	89	38.1	57/68	17.4	6.5	5.7	9,890	6,559	7,308	9,332	8,053	8,971	9,768	7,325	**8,401**
201L1251	CN	89	38.5	56/70	15.3	6.7	1.4	10,410	8,347	7,564	8,208	8,410	8,551	9,391	5,545	**8,303**
RU2102217	CL	81	35.5	51/68	23.4	6.7	3.3	9,533	9,807	6,982	6,417	9,419	9,090	8,301	5,595	**8,143**
211L1008	CN	82	38.9	61/71	17.6	6.6	1.4	9,418	8,384	7,747	7,222	8,139	8,437	9,039	6,349	**8,092**
CLHA03 (HA)	CL	87	38.2	60/69	14.6	6.5	1.4	8,743	8,784	7,358	7,656	8,623	8,282	8,953	5,818	**8,027**
CLL19	CL	84	37.5	54/69	16.7	6.6	5.2	8,883	8,567	7,845	6,747	8,766	7,710	9,125	6,422	**8,008**
PVL03	PV	85	40.4	56/70	14.4	6.9	2.4	9,635	7,834	7,854	8,416	9,062	8,442	7,985	4,622	**7,981**
213L1130	PV	90	38.3	58/69	16.3	7.2	1.9	9,635	6,682	7,882	8,263	7,517	8,917	9,856	4,998	**7,969**
213L1140	PV	89	38.9	54/68	15.3	7.0	2.4	10,649	6,575	8,228	8,218	7,067	8,213	9,545	5,196	**7,961**
RU1902034	CL	83	38.0	54/69	18.7	6.6	10.0	9,383	8,913	7,341	6,992	8,393	7,920	8,726	5,562	**7,904**
DG245L	CN	86	37.4	62/71	11.5	6.6	1.0	9,502	8,012	8,519	8,170	7,531	7,446	8,774	5,253	**7,901**
Avant	CN	77	36.1	60/71	15.2	6.7	0.5	9,730	8,486	7,162	6,886	7,741	8,191	8,876	5,661	**7,842**
RU2102222	CL	89	35.4	62/71	12.7	6.9	0.0	10,246	8,442	6,387	6,512	7,844	8,068	8,276	4,672	**7,556**
Mermentau	CN	85	39.0	62/71	17.4	6.6	0.0	10,522	7,118	7,720	6,411	7,195	8,145	7,693	5,094	**7,487**
CL153	CL	87	38.5	62/70	9.6	6.7	2.4	9,080	8,099	7,392	7,488	8,260	6,161	7,698	5,094	**7,409**
PVL04	PV	93	41.0	57/69	14.8	7.0	1.0	10,752	6,458	7,091	6,341	7,160	6,291	10,033	4,132	**7,282**
Addi Jo (HA)	CN	91	39.1	60/70	11.5	6.8	5.2	9,252	7,729	6,870	7,084	6,740	7,679	7,656	4,244	**7,157**
Cheniere	CN	86	37.2	66/73	6.5	6.7	0.5	9,681	6,259	6,348	5,556	6,189	8,293	5,857	4,601	**6,598**
Hybrid																
RT7302 (HA)	CN	83	43.3	55/70	24.7	6.9	2.9	12,393	13,745	10,736	12,965	13,675	11,419	14,362	7,888	**12,148**
RT7421FP	FP	88	47.2	56/69	21.1	6.7	1.4	13,624	13,842	10,346	12,271	13,157	10,452	14,487	7,251	**11,929**
DG3H2007	CN	87	42.8	53/68	28.3	6.7	0.5	13,363	12,333	10,820	12,154	13,137	10,737	13,051	8,045	**11,705**
RT7401	CN	86	42.7	55/69	15.0	6.6	0.0	12,655	12,314	10,176	12,613	12,823	10,981	13,452	6,552	**11,446**
XP753	CN	82	43.7	51/70	23.7	6.7	0.0	11,736	12,867	10,017	11,661	12,450	11,802	12,418	7,541	**11,311**
RT7331MA	MA	82	43.0	54/71	23.4	6.7	0.0	11,624	12,914	9,177	11,483	12,333	10,708	13,725	7,116	**11,135**
DG3H2004	CN	89	42.6	55/68	25.6	6.6	0.0	12,580	11,943	10,340	10,575	12,477	9,463	13,347	8,345	**11,134**
Medium Grain																
RT3202	CN	77	43.4	53/69	17.9	6.0	1.4	11,868	12,532	9,303	11,464	11,247	10,487	13,297	8,056	**11,032**
CLM05	CL	90	37.1	56/67	13.7	6.3	2.9	11,356	10,035	8,124	9,536	8,757	8,548	10,066	7,029	**9,181**
Taurus	CN	86	34.7	51/70	7.9	5.7	0.0	11,259	9,468	7,880	7,923	8,107	9,445	9,583	6,099	**8,721**
CLM04	CL	91	41.5	61/69	10.3	5.9	9.0	10,316	9,670	8,577	8,812	7,865	7,826	10,214	5,612	**8,611**
Venus (LA21-2070)	CN	86	37.8	56/69	12.0	6.0	0.5	10,255	8,412	7,584	8,801	7,584	7,984	9,693	5,833	**8,268**
Titan	CN	84	37.5	55/68	10.7	6.0	1.0	10,867	8,067	6,852	7,709	6,810	8,450	9,077	5,624	**7,932**
RU2102066	CN	88	35.5	59/69	13.0	5.7	0.0	11,440	8,121	7,498	7,627	7,146	7,990	7,432	5,784	**7,880**
DG353M	CN	88	36.3	57/69	12.7	5.9	0.0	10,616	8,320	6,564	6,965	6,152	8,263	7,469	5,284	**7,454**
Jupiter	CN	91	36.5	59/68	14.6	5.8	0.5	10,958	7,557	6,629	7,073	6,972	6,750	8,185	5,077	**7,400**

Abbreviations: (H) = Hybrid, (HA) = High Amylose, (A) = Aromatic, CL = Clearfield, CONV = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia.
Height: Height maturity in inches from soil line to extended panicle.
Chalk: Total percentage area of grain with chalk as determined by SeedCount image analyzer.
Lodging: Comparitive estimate of resistance to lodging. Most varieties rated as resistant can lodge, especially under excessive levels of nitrogen.
RRS-SF: Crowley, Louisiana, South Farm; RRS: Crowley, Louisiana; MM: Mamou, Louisiana; MW: Mowata, Louisiana; LK: Lake Arthur, Louisiana; PL: Palmetto, Louisiana; SJ: St. Joseph, Louisiana; WB: Winnsboro, Louisiana.
Planting date listed under location of trial; month/day of 2024.

Table 4. 2024 Pre-Commercial (PC) Trial (Louisiana).

Variety	Herbicide Type	Days to 50% Heading	Height (in)	Milling % (Whole/ Total)	Chalk (%)	Grain Length (mm)	Lodging % Observed	RRS 2/26	RRS-SF 2/29	P1S2 (Pathology) 3/13	LK 4/1	RRSL 4/2	PL 4/4	WB 4/4	MM 4/5	McN 4/16	P2S2 (Pathology) 4/23	RIC 5/28	SJ 5/28	PC Avg. Yield (lb/A)
Long Grain																				
XP753 (H)	CN	81	44.8	48/70	26.0	6.7	10.5	12,375	11,356	10,256	10,524	14,033	12,995	11,602	13,739	8,993	9,921	7,172	9,286	11,021
CLL18	CL	87	41.4	54/68	22.5	6.7	9.1	12,079	11,366	9,535	8,962	11,077	9,262	9,041	10,511	8,087	7,413	6,077	7,510	9,243
23DGL070	CN	85	41.7	58/68	10.9	6.9	5.2	10,029	9,977	9,457	8,701	11,891	9,905	9,002	11,134	6,971	6,810	6,358	8,840	9,089
23AR2134	PV	85	39.3	55/68	23.5	6.8	14.8	10,686	10,921	7,971	8,231	10,962	8,557	9,371	10,289	7,722	7,989	7,571	7,525	8,983
23AR2133	PV	86	38.0	57/69	26.4	6.7	4.8	11,065	11,152	8,015	8,569	11,065	8,513	8,368	10,329	7,941	7,490	6,627	7,545	8,890
RU2301045	CN	87	38.6	57/69	16.8	6.8	2.9	11,214	10,977	8,752	8,010	11,360	8,125	9,029	10,408	8,363	7,509	5,921	6,364	8,836
RU2301024	CL	83	37.2	49/68	17.9	6.7	5.2	11,147	11,286	9,170	7,901	10,698	9,023	9,459	9,559	7,910	7,207	5,068	6,952	8,782
DG263L (HA)	CN	84	37.0	55/67	18.3	6.2	4.3	10,363	10,111	7,772	8,546	10,032	9,208	9,307	11,077	6,576	5,586	6,876	8,606	8,672
23AR2114	PV	85	39.0	50/68	13.3	6.8	15.2	11,270	10,770	7,901	8,254	11,293	8,816	8,959	10,092	7,181	5,876	5,576	6,089	8,506
213L1140	PV	87	41.9	51/68	16.8	7.0	3.3	10,460	10,700	7,536	9,114	10,467	7,962	9,335	9,653	6,741	6,643	5,979	5,007	8,300
DG563L (HA)	PV	89	39.2	58/69	17.2	6.4	25.2	10,582	9,029	8,247	8,352	9,969	8,172	7,935	9,883	5,668	6,067	7,669	7,508	8,257
23DGL078	CN	85	38.7	55/67	22.2	6.5	19.5	9,438	9,139	7,995	7,604	9,761	8,761	9,039	9,929	6,178	5,414	6,757	8,548	8,214
211L1008	CN	81	43.2	59/70	20.5	6.7	9.5	9,912	9,401	7,214	7,685	10,014	7,733	8,689	9,588	6,630	6,831	5,508	7,049	8,021
RU2102222	CL	85	38.3	61/71	11.6	7.0	2.9	10,457	9,630	8,154	7,506	9,566	8,053	9,083	7,739	7,165	7,020	4,565	7,182	8,010
RU1902034	CL	84	40.9	58/70	20.6	6.7	10.5	10,874	9,435	5,816	7,432	9,431	8,928	8,686	8,322	7,430	6,841	4,401	5,252	7,737
PVL03	PV	85	38.7	53/69	16.4	6.9	8.6	10,371	8,595	7,550	7,765	8,817	8,749	9,116	9,117	6,778	6,407	3,786	5,633	7,724
213L1041	PV	83	36.8	54/70	16.4	6.8	6.7	10,160	9,411	7,712	7,886	9,242	8,342	7,572	8,266	7,166	6,594	5,390	4,514	7,688
23DGL-008PV	PV	85	43.6	58/69	17.8	6.4	2.4	10,939	8,609	7,589	8,196	9,411	6,801	7,862	9,236	4,858	5,045	6,564	6,620	7,644
213L1130	PV	84	41.7	53/68	14.4	7.1	1.0	9,242	9,264	7,842	8,052	9,095	7,571	8,544	8,462	7,046	6,913	3,712	4,993	7,561
24DGL-4530PV	PV	89	43.6	57/70	16.3	7.0	4.8	9,618	10,010	5,951	8,171	9,989	6,380	8,411	7,753	5,623	5,708	5,142	6,025	7,398
Medium Grain																				
23AR2205	PV	89	40.5	61/67	20.1	6.0	9.5	10,969	11,401	9,324	8,648	11,440	9,095	8,542	10,458	7,514	6,568	n/a	7,110	9,188
Taurus	CN	84	36.3	54/69	10.6	5.7	1.0	11,794	10,771	8,921	8,632	10,150	7,491	10,040	9,481	7,967	6,935	4,977	6,075	8,603
212M1144	CL	88	42.1	55/69	20.8	5.9	18.1	11,113	9,708	8,640	7,306	10,579	8,332	8,988	9,333	7,360	6,732	n/a	6,505	8,600
Venus (LA21-2070)	CN	84	39.2	52/68	13.5	5.9	0.5	10,988	11,194	7,908	7,316	10,573	8,246	9,073	9,796	7,578	6,215	4,639	7,744	8,439
21AR1217	CL	90	35.7	53/68	11.8	5.9	0.0	9,220	10,111	9,011	7,878	10,390	7,873	8,874	7,336	7,595	7,149	4,106	6,405	7,996

Abbreviations: (H) = Hybrid, (HA) = High Amylose, (A) = Aromatic, CL = Clearfield, CN = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia.
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: Overall average percentage of lodging observed across all trials.
LK: LLake Arthur, Louisiana; McN: McNeese State University, Lake Charles, Louisiana; MM: Mamou, Louisiana; RRS: Crowley, Louisiana; RRSL: Crowley, Louisiana, late planting; RRS-SF: Crowley, Louisiana, South Farm; PL: Palmetto, Louisiana; WB: Winnsboro, Louisiana; SJ: St. Joseph, Louisiana; RIC: Richland Parish, Louisiana; P1S2 and P2S2 (Pathology): Crowley, Louisiana.
Planting date listed under location of trial; month/day of 2024.
Pathology trails were innoculated with sheath blight.

Table 5. 2024 Pre-Commercial (PC) Trial (AR, MO, MS and TX).

Variety	Herbicide Type	Days to 50% Heading	Height (in)	TX NAS 3/11	AR RREC1 4/1	AR GRE 4/3	TX BC 4/3	AR JAC 4/4	AR NERICE 4/15	MO MRRMC 4/15	AR LAW 4/16	MO TS 4/16	MS WN 4/17	AR PTRS 4/23	TX WRRS 4/23	AR RREC2 5/10	AR DREW 5/21	AR NEREC 5/29	PC Avg. Yield (lb/A)
Long Grain																			
XP753 (H)	CN	83	42.7	5,664	12,622	8,594	9,541	10,629	8,158	8,494	9,852	10,718	12,780	11,173	9,105	10,791	9,518	6,692	9,622
DG263L (HA)	CN	82	39.1	5,918	8,970	8,968	9,316	9,638	7,604	9,531	9,730	9,306	12,238	9,351	7,966	10,459	9,447	7,670	9,074
23DGL070	CN	82	37.9	4,960	9,430	8,536	9,012	9,488	8,410	9,443	9,123	8,745	12,417	9,637	7,808	10,088	9,440	8,045	8,972
DG563L (HA)	PV	85	38.1	6,220	9,329	8,788	8,859	9,745	7,547	9,753	6,417	10,911	11,763	9,643	8,771	9,436	8,677	7,041	8,860
CLL18	CL	86	41.7	5,098	9,994	8,439	8,890	8,697	8,573	9,336	8,291	9,363	12,728	9,144	8,589	9,452	8,898	7,221	8,848
RU2301045	CN	86	39.6	5,024	10,284	7,994	7,151	9,395	6,976	8,461	8,060	10,550	11,961	8,929	8,124	9,904	7,764	7,353	8,529
23DGL-008PV	PV	85	37.3	5,277	8,097	8,283	8,741	9,140	7,001	9,000	8,735	8,992	12,474	8,668	7,106	9,117	9,022	7,464	8,474
23AR2114	PV	85	42.8	5,201	9,879	7,849	8,262	8,858	8,619	8,227	8,215	8,798	12,147	8,595	8,515	8,537	8,392	5,290	8,359
23AR2134	PV	86	39.3	5,104	10,491	8,365	6,729	9,328	6,772	8,754	8,283	7,864	11,439	9,165	8,207	9,468	8,029	7,279	8,352
RU2301024	CL	83	40.8	4,852	10,306	8,373	8,246	8,136	6,896	8,896	8,336	8,970	11,723	8,704	8,460	9,171	8,084	5,995	8,343
23DGL078	CN	84	37.1	5,787	9,243	8,429	8,685	9,337	6,713	8,352	5,165	8,542	11,950	8,694	6,007	9,796	10,132	7,295	8,275
23AR2133	PV	87	40.8	4,217	9,968	8,037	7,517	9,175	7,605	9,023	7,398	8,212	11,534	8,790	6,215	9,797	7,788	7,007	8,152
RU1902034	CL	85	37.3	4,660	9,492	7,169	8,272	8,967	8,207	7,535	7,799	8,483	12,251	7,987	8,647	7,628	7,934	4,022	7,937
RU2102222	CL	87	32.9	4,823	8,858	6,434	7,950	9,124	7,330	8,842	8,529	8,558	11,623	8,266	5,304	8,598	7,577	7,055	7,925
211L1008	CN	84	36.7	4,997	8,681	7,141	7,407	9,035	8,167	7,209	7,794	7,699	12,176	7,946	7,329	7,880	7,845	5,700	7,800
24DGL-4530PV	PV	88	35.6	5,484	9,082	6,246	7,024	8,824	7,551	7,736	7,179	5,968	12,176	7,807	8,542	8,366	7,772	6,754	7,767
213L1130	PV	88	36.8	5,448	9,305	6,656	7,084	9,273	8,056	8,422	7,477	6,766	11,423	7,285	8,261	6,726	7,763	5,331	7,685
213L1140	PV	88	37.0	5,770	8,887	6,353	7,804	8,582	8,883	8,056	6,990	5,777	12,049	6,675	8,443	7,046	8,315	5,471	7,673
PVL03	PV	85	38.6	4,240	9,282	6,808	7,638	8,204	6,815	7,816	6,370	7,438	11,913	7,124	7,236	6,905	7,901	3,873	7,304
213L1041	PV	85	40.4	5,443	9,379	6,457	7,588	7,576	5,765	7,531	6,511	6,434	11,720	7,147	7,076	6,883	7,659	3,463	7,109
Medium Grain																			
23AR2205	PV	87	41.0	5,893	9,515	8,384	8,313	8,815	8,258	8,606	7,606	11,568	12,848	9,226	10,186	9,186	8,205	6,296	8,860
Taurus	CN	85	35.5	5,917	10,293	9,569	6,457	9,314	7,799	8,342	8,978	10,759	10,774	8,741	9,025	9,055	8,492	7,199	8,714
21AR1217	CL	87	35.1	5,218	9,375	7,964	7,831	8,168	7,572	8,596	9,109	9,955	11,952	9,004	8,868	9,517	9,059	8,012	8,680
212M1144	CL	89	41.6	4,997	9,245	8,812	7,564	9,031	7,954	8,907	7,314	11,888	12,485	9,156	9,191	8,349	8,210	5,495	8,573
Venus (LA21-2070)	CN	84	38.0	5,174	8,541	7,914	8,060	8,938	7,656	8,341	7,856	11,428	12,292	8,824	7,772	8,933	8,013	7,318	8,471

Abbreviations: (H) = Hybrid, (HA) = High Amylose, (A) = Aromatic, CL = Clearfield, CN = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia.
Height: Height maturity in inches from soil line to extended panicle.
Lodging: Overall average percentage of lodging observed across all trials.
AR-RREC 1: First test Stuttgart, Arkansas; AR-RREC 2: Second test Stuttgart, Arkansas; AR-PTRS, Pine Tree Research Station, Arkansas; AR-DES: Desha County, Arkansas; AR-GRE: Green County, Arkansas; AR-JAC: Jackson County, Arkansas; AR-LAW: Lawrence County, Arkansas; AR-NERICE: Northeast Rice Research and Extension Center, Arkansas; AR-NEREC: Northeast Research and Extension Center, Arkansas; MS-WN: Winterville, Mississippi; MO-MRRMC: Missouri Rice Research Farm, Missouri; MO-TS: Tanner Seed, Bernie, Missouri; TX-BC: Bay City, Texas; TX-NAS: Nutrien Ag Solutions Rice Breeding Station, El Campo, Texas; TX-WRRS: Wintermann Rice Research Station, Texas.
Planting date listed under location of trial; month/day of 2024.

Table 6. 2024 Conventional Advanced Yield Trial (AYT).

Variety	Days to 50% Head-ing	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging % Observed	RRS 2/27	RRS-SF 2/29	LK 4/1	RRSL 4/2	PL 4/4	WB 4/4	McN 4/16	SJ 4/26	AYT Avg. Yield (lb/A)
Long Grain															
DG263L (HA)	85	39.5	54/66	18.4	6.2	21.9	9,342	9,290	7,972	10,300	8,452	9,010	6,254	8,364	**8,623**
MP6_295	86	38.8	55/69	23.2	6.8	15.7	10,024	9,799	7,936	9,592	8,468	8,638	7,326	6,952	**8,592**
201L1251	88	38.9	56/69	18.6	6.8	8.1	9,357	10,020	7,774	9,543	9,226	8,754	6,768	6,902	**8,543**
19T-238-13	85	41.0	60/70	27.2	6.5	4.8	9,974	10,203	6,706	9,206	9,382	8,689	7,079	5,128	**8,296**
221L1002	85	42.2	59/70	19.7	6.8	5.7	9,458	10,554	6,814	9,606	8,463	8,236	7,352	4,624	**8,138**
211L1008	81	39.6	62/70	19.7	6.7	8.6	9,132	9,542	7,875	10,198	8,370	8,108	6,216	4,929	**8,046**
211L1331	90	40.8	60/69	13.5	6.8	4.8	9,125	9,015	6,863	8,869	7,753	7,032	6,501	6,866	**7,753**
Avant	79	37.4	60/70	19.1	6.8	0.5	8,760	9,471	7,058	10,018	7,758	7,961	6,320	4,636	**7,748**
Fitzgerald (A)	83	37.9	61/71	8.4	6.8	4.8	9,419	9,332	6,791	8,877	7,217	6,899	5,427	4,553	**7,314**
Cheniere	87	38.9	64/72	10.0	6.7	2.4	8,788	9,589	6,257	7,574	6,503	7,842	5,934	5,991	**7,310**
Della 2	89	40.9	58/68	11.2	6.8	0.0	8,562	8,482	6,510	8,267	7,218	7,088	5,746	5,946	**7,227**
Medium Grain															
19T-176-CONV-38	87	41.3	58/69	12.2	5.9	1.0	10,310	10,695	7,920	11,183	9,666	9,357	8,021	6,785	**9,242**
Taurus	85	36.1	55/70	12.7	5.7	3.9	9,335	11,523	7,346	11,057	9,217	9,180	6,811	n/a	**9,210**
19T-176-CONV-36	88	44.6	56/69	11.1	5.6	3.3	9,773	10,251	7,681	10,499	8,208	9,316	8,076	6,855	**8,832**
Venus (LA21-2070)	85	39.0	57/68	15.2	5.9	2.9	10,427	10,641	7,200	10,638	8,655	9,177	6,985	5,860	**8,698**
Jupiter	90	37.4	60/68	20.4	5.8	0.0	8,399	10,548	6,639	9,989	6,894	6,689	5,840	5,795	**7,599**

Abbreviatons: (HA) = High Amylose; (A) = Aromatic.
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: Overall average percentage of lodging observed across all trials.
RRS: Crowley, Louisiana; RRSL: Crowly, Louisiana, late planting; RRS-SF: Crowley, Louisiana, South Farm; LK: Lake Arthur, Louisiana; McN: McNeese State University, Lake Charles, Louisiana; PL: Palmetto, Louisiana; SJ: St. Joesph, Louisiana; WB: Winnsboro, Louisiana.
Planting date listed under location of trial; month/day of 2024.

Table 7. 2024 Clearfield Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging % Observed	RRS 2/26	RRS-SF 2/29	LK 4/1	RRSL 4/3	PL 4/4	WB 4/4	McN 4/16	SJ 4/26	AYT Yield Avg. (lb/A)
Aromatic															
212L2252	84	38.3	63/70	7.5	7.0	6.7	9,158	8,449	6,698	8,407	7,058	6,592	6,623	3,620	**7,076**
CLJ01	89	39.8	67/71	3.8	6.8	10.5	9,075	7,972	6,153	6,269	6,710	5,393	6,642	4,424	**6,580**
Long Grain															
222L1082	85	42.2	60/68	10.6	6.8	12.9	10,831	10,644	8,025	8,676	9,909	8,091	7,503	6,812	**8,811**
CLL18	88	42.7	54/67	32.2	6.6	14.3	8,994	13,481	8,348	10,142	8,957	8,305	7,066	5,162	**8,807**
RU2102222	86	37.3	61/70	14.4	7.0	2.4	10,075	10,737	6,355	8,728	7,921	8,317	7,728	6,512	**8,297**
RU2102217	82	36.9	50/68	29.8	6.9	6.7	10,737	10,030	7,044	9,172	8,964	8,331	7,134	3,994	**8,176**
222L1147	86	40.3	52/69	15.7	6.9	25.2	11,426	9,918	6,360	9,325	8,860	8,305	6,827	3,732	**8,094**
CLL19	83	38.3	56/67	20.7	6.6	9.5	10,374	8,632	7,760	8,646	8,841	8,201	7,125	4,129	**7,963**
CL153	86	40.3	62/69	10.8	6.7	4.8	10,306	8,999	7,295	8,569	8,457	6,862	7,400	5,411	**7,912**
RU1902034	85	39.4	54/67	20.0	6.6	16.2	10,516	8,402	7,229	8,586	8,897	7,483	7,543	4,562	**7,902**
CLHA03 (HA)	86	39.3	62/69	15.0	6.6	13.3	9,494	9,363	7,392	8,260	8,556	6,923	6,208	5,232	**7,679**

CONTINUED | Table 7. 2024 Clearfield Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging % Observed	RRS 2/26	RRS-SF 2/29	LK 4/1	RRSL 4/3	PL 4/4	WB 4/4	McN 4/16	SJ 4/26	AYT Yield Avg. (lb/A)
Medium Grain															
19T-183-CL-1	88	41.5	58/67	23.5	5.8	20.0	11,590	9,619	6,841	9,380	9,657	8,884	7,325	n/a	**9,042**
222M1096	91	39.8	64/68	8.8	5.9	0.5	11,417	9,820	7,383	10,027	9,445	8,586	7,636	7,374	**8,961**
CLM05	89	39.9	60/67	14.6	6.2	9.0	11,299	11,607	8,269	10,100	7,963	7,972	7,578	6,539	**8,916**
19T-183-CL-6	85	39.7	59/68	20.5	5.9	2.4	11,814	9,707	7,668	9,806	8,541	8,716	7,257	5,602	**8,639**
CLM04	89	41.8	64/69	13.0	5.9	18.6	10,915	11,612	7,660	9,220	8,041	7,371	7,545	4,293	**8,332**

Abbreviations: (HA) = High Amylose.
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: Overall average percentage of lodging observed across all trials.
RRS: Crowley, Louisiana; RRSL: Crowly, Louisiana, late planting; RRS-SF: Crowley, Louisiana, South Farm; LK: Lake Arthur, Louisiana; PL: Palmetto, Louisiana; McN: McNeese State University, Lake Charles, Louisiana; SJ: St. Joseph, Louisiana; WB: Winnsboro, Louisiana.
Planting date listed under location of trial; month/day of 2024.

Table 8. 2024 Provisia Advanced Yield Trial (AYT).

Variety	Days to 50% Heading	Height (in)	Milling % (Whole / Total)	Chalk (%)	Grain Length (mm)	Lodging % Observed	RRS 2/27	RRS-SF 2/29	RRSL 3/28	LK 4/1	PL 4/4	WB 4/4	MM 4/5	SJ 4/26	AYT Yield Avg. (lb/A)
Long Grain															
223L1065	85	38.6	60/71	19.4	6.9	11.9	9,915	10,058	8,799	8,156	8,161	7,980	8,310	8,729	**8,764**
213L1140	88	39.6	54/69	17.6	7.1	7.6	9,420	10,562	10,430	8,297	8,440	7,913	9,556	5,163	**8,723**
223L1139	89	39.5	61/71	17.3	6.8	13.8	9,122	10,086	9,062	7,990	8,799	7,888	9,304	6,446	**8,587**
223L1216	84	38.3	62/71	19.8	6.7	1.9	9,672	9,867	9,177	8,106	9,203	7,758	9,061	5,306	**8,519**
PVL03	87	41.1	59/71	17.3	7.0	6.2	9,877	9,495	8,783	7,793	9,608	7,711	8,654	5,677	**8,450**
223L1213	81	42.4	58/71	28.7	6.8	13.8	10,311	9,301	9,690	8,600	8,790	7,357	9,270	3,905	**8,403**
213L1130	87	39.8	58/70	16.2	7.1	1.4	8,932	9,710	8,923	7,610	8,384	7,557	8,718	5,215	**8,131**
PVL04	92	41.6	61/70	17.4	7.1	1.9	8,763	9,719	8,935	7,725	7,919	789	9,832	8,270	**7,744**

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: Overall average percentage of lodging observed across all trials.
RRS: Crowley, Louisiana; RRSL: Crowly, Louisiana, late planting; RRS-SF: Crowley, Louisiana, South Farm; LK: Lake Arthur, Louisiana; PL: Palmetto, Louisiana; MM: Mamou, Louisiana; SJ: St. Joseph, Louisiana; WB: Winnsboro, Louisiana.
Planting date listed under location of trial; month/day of 2024.

Table 9. 2024 Date of Planting (DOP) Trial.

Variety	Herbicide Type	Grain Type	Days to 50% Heading	Height (in)	Milling % (Whole/Total)	Chalk (%)	Grain Length (mm)	Lodging % Observed	DOP 1 2/15	DOP 2 3/4	DOP 3 3/14	DOP 4 3/28	DOP 5 4/15	DOP 6 5/8	DOP 7 5/21	DOP 8 6/7	DOP 1 -DOP 8 Avg. (lb/A)	DOP 1 - DOP 5 Avg. (lb/A)
CLL18	CL	Long	81	42.7	55/67	29.7	6.7	0.0	11,088	11,715	10,749	10,835	10,039	4,992	4,934	6,189	8,818	10,885
Taurus	CN	Med	78	35.8	52/68	13.1	5.8	0.0	9,522	10,433	10,811	10,849	10,306	4,464	2,901	3,561	7,856	10,384
CLM05	CL	Med	83	39.2	53/65	19.6	6.3	0.0	10,865	10,823	10,367	9,722	9,463	5,727	3,256	3,649	7,984	10,248
CLL19	CL	Long	76	37.8	56/68	22.7	6.7	0.0	10,261	11,073	10,184	9,983	9,001	4,368	4,753	4,823	8,056	10,101
211L1008	CN	Long	76	39.1	63/70	21.1	6.7	0.0	10,292	9,772	9,753	10,410	9,561	4,280	4,343	3,918	7,791	9,958
213L1130	PV	Long	80	39.7	57/69	21.5	7.2	0.0	10,357	10,447	9,945	9,542	9,482	4,740	3,895	5,422	7,979	9,954
Venus (LA21-2070)	CN	Med	79	37.0	52/66	17.0	6.0	0.0	10,209	10,061	10,257	9,485	9,537	1,925	2,318	3,610	7,175	9,910
213L1140	PV	Long	79	39.8	50/67	21.9	7.1	0.0	10,143	9,838	9,368	9,761	9,647	3,982	3,300	3,826	7,483	9,751
PVL04	PV	Long	83	41.2	60/70	19.7	6.9	0.0	9,516	9,397	9,109	9,717	8,752	3,929	3,596	4,119	7,267	9,298
CLHA03 (HA)	CL	Long	80	39.2	61/69	20.3	6.6	0.0	9,138	9,511	9,284	8,912	9,298	4,009	4,165	5,077	7,424	9,229
PVL03	PV	Long	78	41.0	56/69	21.1	7.0	0.0	10,036	9,099	8,874	8,704	8,980	3,695	3,459	4,136	7,123	9,139
Fitzgerald (A)	CN	Aro	77	39.1	66/72	10.1	6.8	0.0	9,217	9,564	8,990	9,299	8,328	2,930	2,708	4,438	6,934	9,079

Abbreviations: (HA) = High Amylose, CL = Clearfield, CONV = Conventional, FP = FullPage, MA = Max-Ace, PV = Provisia, Med = Medium, (A) = Aromatic.
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: Overall average percentage of lodging observed across all trials.
Grain Traits: Average across trials
DOP 1 - DOP 4 Average represents plantings in recommended planting window.
DOP 6 - DOP 8 damaged by herbicide drift.
Planting date listed under location of trial; month/day of 2024.

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 11 to determine the pounds of seed per acre required to achieve the desired plant population.

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

CONSIDERATIONS

- 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 11 shows seed weight per pound and the average number of seeds per square foot at several seeding rates for most of the varieties mentioned in this publication. Producers may want to adjust seeding rates for this factor.
- 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.

Rice 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.

Example of "green ring" in early crops

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.

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.

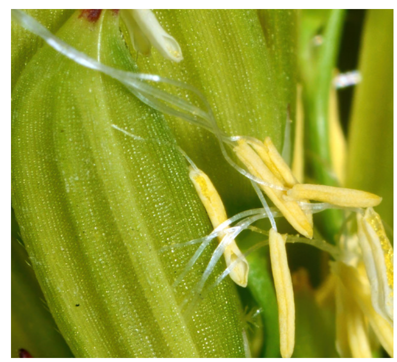
As heading progresses, flowering begins. Flowering, followed by grain fill, begins at the tip of the panicle then progress to the base. During the middle hours of the day, mature florets open, exposing both the stigmas and anthers to air. Pollen is shed as the anthers dry, split open and spill the pollen. 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.



Rice anthesis

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.

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 P_2O_5) and/or potassium (as K_2O) to maximize ratoon yields. The additional phosphorus and potassium fertilizer can be applied in the first crop or can be applied after first-crop harvest prior to reflooding.

Lime is not recommended for rice production unless the pH of the soil falls below 5.5. Soybeans grown in rotation with rice may benefit from liming. The pH of the soil should not be increased to more than 6.2 for rice production.

Over-liming can induce zinc deficiency in rice. Lime should be applied in the fall after rice harvest.

In a water-seeded pinpoint flood system, one-third of the crop's nitrogen fertilizer needs should be applied during the brief drain period between planting and reflooding. If urea is the fertilizer source, it should be treated with a urease inhibitor product containing the active ingredient N-(n-butyl) thiophosphoric triamide (NBPT), N-(n-propyl) thiophosphoric triamide (NPPT) or Duromide. The second third of the nitrogen fertilizer should be applied one to two weeks later and the final third by internode elongation (green ring).

In a drill-seeded, dry broadcast or water-seeded delayed flood system, two-thirds of the nitrogen should be applied immediately before permanent flood. In order to maximize nitrogen efficiency, the application should be made on dry ground, and the field should be flooded as soon as possible after the application. The balance of the nitrogen should be applied at internode elongation (green ring) or earlier if deficiency symptoms occur.

Nitrogen fertilizer applied as urea is prone to loss through ammonia volatilization. A urease inhibitor, which contains the active ingredient NBPT, NPPT or Duromide, can be applied to the surface of urea fertilizer to slow down its breakdown and reduce ammonia volatilization. Use of a urease inhibitor is recommended to reduce volatilization losses when applied urea is expected to remain on the soil surface for longer than three days prior to flood establishment or if the soil is moist (without standing water) prior to application. It is not recommended if urea is applied into standing water.

The recommended seasonal nitrogen rate range for each commonly grown rice variety is presented in Table 10. Rice varieties may differ in their nitrogen requirements by location. Native soil fertility, soil type and other factors affect nitrogen fertilizer efficiency. Rice growers should determine the nitrogen rate that provides optimal grain yield on their soil and production system. The higher nitrogen rates within the recommended range for each variety are generally required on clay soils in central and northeast Louisiana. Avoid nitrogen deficiency and excessive nitrogen fertilization.

Table 10. Nitrogen Recommendations for Rice Varieties.

Varieties	N rate (lb/A) OR	Urea (lb/A)
Addi Jo, Avant, Jupiter	90-135	200-300
Cheniere, CL111, CL153, CLHA03, CLJ01, CLL16*, CLL18*, CLL19, CLM04, Della-2, Fitzgerald, Frontiere, Jazzman, Jewel, Mermentau, PVL03, Taurus, Titan	115-180	250-400

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

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 11. 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
CL111	18,301				17	21	25	29	34	38	42	46	50
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
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
Jazzman	18,117				17	21	25	29	33	37	42	46	50
Jewel	18,771				17	22	26	30	34	39	43	47	52
Jupiter	17,316				16	20	24	28	32	36	40	44	48
Mermentau	20,067				18	23	28	32	37	41	46	51	55
PVL03	17,512				16	20	24	28	32	36	40	44	48
RT 7301	19,557	9	11	13									
RT 7501	19,183	9	11	13									
RT 7321 FP	18,405	8	11	13									
RT 7521 FP	18,584	9	11	13									
RTv 7231 MA	20,491				19	24	28	33	38	42	47	52	56
Taurus	19,443				18	22	27	31	36	40	45	49	54
Titan	16,676				15	19	23	27	31	34	38	42	46
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 Extraction[1].

Soil Test	≤ 1 ppm		1 - 1.5 ppm			1.6 - 2 ppm	
pH	≥ 7	< 7	> 7	7.0 - 6.0	< 6	≥ 7	< 7
Granular Fertilizer Recommendation[2]	15 lb/A	10 lb/A	10 lb/A	5 lb/A	None	5 lb/A	None

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

Table 12. Summary of Insecticidal Seed Treatment Characteristics.

Seed Treatment	Active Ingredient	Application Rate	Rice Water Weevil	Stem Borers	Fall Armyworm	Colaspis	Chinch Bugs	Thrips	Aphids	Fungal Pathogens
Dermacor X-100	Chlorantraniliprole	1.75 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 P_2O_5) or K (as K_2O) to maximize ratoon yields. The additional phosphorus and potassium fertilizer can be applied with phosphorus and potassium in the first crop or can be applied after first-crop harvest.

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

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

Adult 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.

One key to developing an effective management program for this insect is to remember that damaging infestations only occur once rice is flooded, and that water-seeded and early flooded rice fields are the most susceptible to yield losses. Delaying application of a permanent flood to rice can reduce yield losses from weevils but may not be compatible with other agronomic practices, particularly weed management. Another key to managing this insect is early planting. Weevil infestations tend to be less severe in rice planted in mid-to-late March than in later-planted rice because emergence of adults from overwintering sites does not begin until early April and is not complete until May. Additionally, yield losses from weevil feeding tend to be lower in early-planted rice than in late-planted rice because more mature plants are less susceptible to impacts of root feeding. Seeding conventional rice at low rates (e.g., 20 to 50 pounds per acre in drill-seeded rice) can make rice more susceptible to infestation and yield losses from the rice water weevil.

All currently grown rice varieties and hybrids are susceptible to the rice water weevil. Recent research, however, indicates some differences in susceptibility.

For example, medium-grain varieties appear to be more susceptible to infestation than long-grain varieties. Hybrid rice varieties tend to suffer less yield loss than conventional cultivars under comparable infestation levels. Nonetheless, no commercially available varieties possess high enough levels of resistance to eliminate the need for insecticides.

Management of the rice water weevil with seed treatments: Dermacor X-100, Fortenza, Cruiser 5FS and NipsIt INSIDE are insecticidal seed treatments that are applied by the seed dealer. Rates, costs, and the spectrum of pests controlled vary between treatments (Table 12). The active ingredients of NipsIt INSIDE and Cruiser 5FS are also available in combination with fungicide treatments.

Seed treated with Dermacor X-100 or Fortenza may be used in either dry- or water-seeding practices. Cruiser 5FS and NipsIt INSIDE can only be used in rice that is drilled into a dry seedbed. RiceTec hybrid seed often comes pre-treated with one or more of the labeled seed treatments. Check with seed dealers to ensure you know what the rice seed has been treated with. Generally, populations of rice water weevils in southwest Louisiana are high enough that seed treatments are warranted in most fields. Under typical conditions, the cost of seed treatments is offset by the protection of yield from losses due to weevil damage. 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.

Adult stink bug

Rice stink bug nymph

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 and the include a variety of pyrethroids neonicotinoid (dinotefuran). TenchuMore mature grain is less susceptible to stink bug damage. From the hard dough stage until two weeks before harvest, treat fields only when there are more than 100 bugs per 100 sweeps. When approaching two weeks before harvest, you can treat with any of the chemicals listed above except for lambda-cyhalothrin and gamma-cyhalothrin, which have 21-day pre-harvest intervals. If pyrethroids fail to provide satisfactory control of stink bugs, switch to another mode of action.

RICE STEM BORERS

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

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

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

Stem borer larvae

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

Rice stalk borer larvae have four solid lines down the body and a dark head capsule. Larvae can attack all stages of rice, but damaging infestations generally occur when rice is in reproductive stages. Larvae emerge within four to five days of egg laying and begin feeding on the inside of the leaf sheath. Depending on the species, larvae will bore into the stem from one to seven days after emergence. They will then continue to feed within the stem for three or four weeks. Mature larvae of all borer species may reach 1 inch in length. Pupation occurs inside the stem. The pupae are brown, about 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.

Scouting for borers should start at green ring and must be intensified as plants reach early boot stages. Look for feeding lesions on the inside surface of the leaf sheath, which are caused by larvae that feed underneath the leaf sheath before boring into the stem. These feeding lesions are easily observed, but care must be taken to avoid confusing these lesions with those caused by sheath blight. Peel back the leaf sheath to expose feeding larvae or the presence of powdery frass to ensure it is a stem borer.

Applications of foliar insecticides must coincide with larval emergence so small larvae are killed before they enter the stems. Once larvae enter the stems, insecticides are ineffective. Pyrethroids are labeled for stem borer control in rice, but no economic thresholds have been developed. Early planting allows the rice crop to avoid severe infestations of stem borers, especially where populations of the sugarcane borer increase in host plants, such as corn, sugarcane and grain sorghum, and move to rice plants later in the season. Destruction of rice stubble and weedy grasses after harvest will also help in borer management by eliminating overwintering populations.

RICE SEED MIDGE

Adult midges resemble small mosquitoes and swarm over rice fields, levees, roadside ditches and other bodies of water. Elongated eggs are laid on the surface of open water in strings. Larvae live on the bottom of flooded rice fields in spaghettilike tubes. Larvae injure water-seeded rice by feeding on the embryo of germinating seeds or on the developing roots and seeds of very young seedlings. The potential for midge injury increases when fields are flooded far in advance of water-seeding rice. Water-seeded fields should be scouted for midge injury, checking for hollowed-out seeds within five to seven days after seeding. Monitor fields until rice seedlings are several inches tall. Depending on the severity of injury, whole fields may need to be replanted, while in some cases, only a portion of the field may require reseeding.

Rice seed midge tunnels in soil

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

RICE LEAFMINER

Adult flies are metallic, blue-green and less than 1/4 of an inch long. They lay eggs on rice leaves as they lie on the water. The larvae are transparent to cream- colored after hatching but become yellow to light green within a few days. Larvae injure the plant by tunneling between the layers of the leaf, attacking and killing leaves closest to the water before moving up the plant and killing additional leaves. Under heavy infestations the entire plant may die. Rice is attacked in the early spring, and infestations usually occur in continuously flooded rice on the upper side of leaves where water is deepest. Scout for rice leafminer larvae by pulling a rice leaf gently between the thumb and forefinger and feeling for the presence of a bump in the leaf. If a bump is detected, the larvae or pupae can be found by separating the layers of the leaf. If plant populations are being reduced to fewer than 15 plants per square foot, chemical control may be necessary. Insecticide efficacy is not well documented, but pyrethroids will likely provide sufficient control.

Leaf pulled back to expose rice leafminer maggot

SOUTH AMERICAN RICE MINER

The South American rice miner (SARM) is a sporadic invasive insect pest of rice in the United States. It is a close relative of the rice leafminer, which is widely distributed across U.S. rice production regions. Small gray flies (about 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, 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.

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

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 1/4 of an inch in length with long antennae.

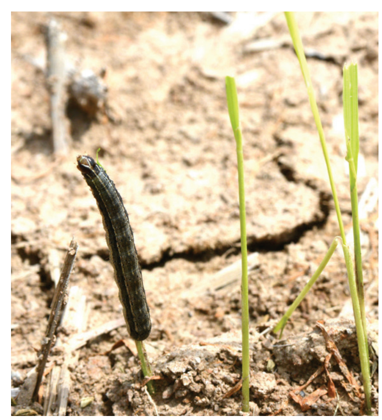
To scout for this pest, locate plants that are stunted, withering, dying and surrounded by declining plants. Dig around the base of the plants, carefully peeling back the soil and looking for white grubs with brown heads that are a little larger than rice water weevil larvae. Cruiser 5FS and NipsIt INSIDE seed treatments have shown some ability to control Colaspis in drilled rice. When rice is planted following soybeans or pasture, treating seed with Cruiser 5FS or NipsIt INSIDE may be justified. No foliar insecticides are labeled to control colaspis in Louisiana rice. Applying permanent flood as soon as possible will help control colaspis but may exacerbate weevil damage. Early flooding is only recommended if weevils are controlled. Colaspis larvae are not aquatic, and application of water will decrease feeding injury and eventually cause death of the larvae.

Colaspis larva in soil

FALL ARMYWORM

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

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



Fall armyworm larva

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 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.**

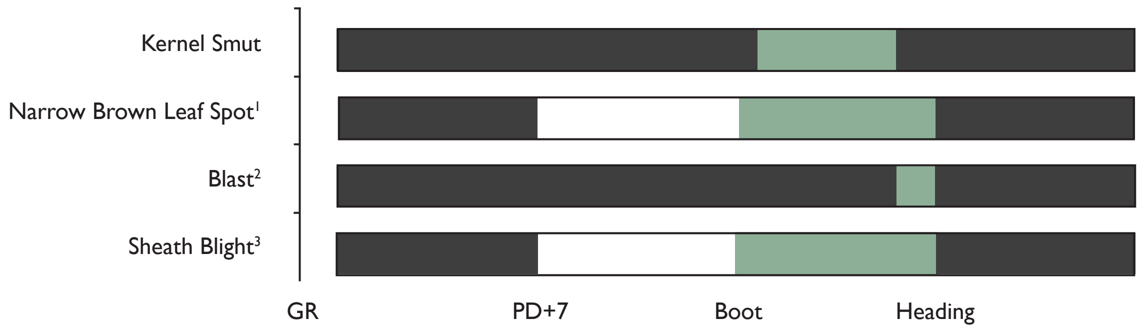
Apple snail

Apple snail eggs

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 13 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

Figure 1. Rice Fungicide Timing.



[1]Application for the foliar symptoms (narrow brown leaf spot), not sheath or panicle (see text). Late planting may require early application.
[2]Suscetible varieties under high disease pressure may require an application at the boot stage followed by 50%-70% heading.
[3] An early application may be necessary if a sheath blight appears before the boot stage.

Not recommended | Application may be needed | Best timing

Table 13. Efficacy of Fungicides in Managing Rice Diseases.
Efficacy categories: P = Poor; F = Fair; G = Good; VG = Very Good; NL = Not Labeled for use against this disease.

Fungicide Class and FRAC Group[1]	Active Ingredient	Product(s)[2]	Rate[3] (fl oz)	Pre-Harvest Interval (DaysQ)	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
Mixed[4] FRAC 3+11	Azoxystrobin, Propiconazole	Quilt Xcel 2.2 SE Others	14-27	35	G	VG	G	F
	Azoxystrobin, Difenoconazole	Amistar Top Other	10-15	28	G	VG	G	F

[1]Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).
[2]Reference to commercial or trade names is made with the understanding that no discrimination is intended nor endorsement of a particular product by LSU or the LSU AgCenter is implied. Many products have specific use restrictions about the amount of active 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.
[3]Rates are the amount of formulation (product) per acre unless otherwise indicated.
[4]Refer to product label for the fungicide class and mode of action group.
[5]For fields with population of Rhizoctonia solani (sheath blight) resistant to strobilurins, only carboxamides fungicides (FRAC 7) will provide Good efficacy.
[6]These 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.

Bacterial Panicle Blight (BPB): Bacterial panicle blight, caused by the bacteria *Burkholderia glumae* and *B. gladioli*, and 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.

Bacterial panicle blight

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

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 13 and Figure 1). If a single fungicide application is used to control blast, it should be applied when 50% to 70% of the heads have begun to emerge. Application before or after this growth stage will not 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

Leaf blast

Node blast

Collar blast

Rotten-neck blast

Narrow brown leaf spot

Cercospora net-blotch

Cercospora panicle blight

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 13 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 frequence 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.

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


False smut

Grain and Head Disorders: Many fungi and bacteria infect developing grain and cause spots and discoloration on the hulls or kernels. Damage by the rice stink bug also causes discoloration of the kernel. Kernels discolored by fungal infections or insect damage are commonly called pecky rice. This 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

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

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

Variety	Blast	Sheath Blight	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
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
XP753[3]	MR	MR	-	-	-
Taurus	S	MS	MS	S	MS
Titan	S	S	MS	MS	S

[1]Classification based on the leaf symptoms only.
[2]Varieties with Pita-2 gene, known to confer resistance to most common blast races.
[3]Marker data not available for RiceTec products.

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

Sheath blight

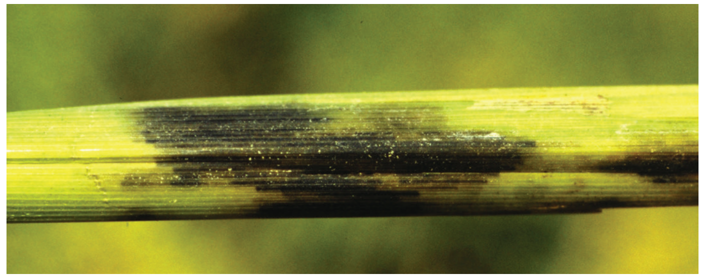
rapidly to the flag leaf on susceptible varieties. With very susceptible varieties, the fungus will spread into the culm from early sheath infections, weakening them and causing tillers to lodge.

As lesions coalesce on the sheath, the blades turn yellow-orange and eventually die. Damage is usually most common where wind-blown, floating debris accumulates. Disease severity can be reduced by integrating several management practices. Dense stands and excessive use of nitrogen fertilizer both tend to increase sheath blight damage. The same pathogen also causes aerial blight on soybeans. Therefore, rotation with soybeans or continuous rice increases the amount of inoculum in soils and should be avoided when possible. Fungicides are available for managing sheath blight. Avoid late application beyond 50% to 70% heading (Table 13 and Figure 1). In some areas of south Louisiana, the fungus has developed resistance to the strobilurin fungicides (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

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.

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 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.

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

HERBICIDE OPTIONS FOR WEED CONTROL

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

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

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

Beyond 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 ducksalad. Do not overlap swaths or dress ends during application. Grandstand may be applied to ratoon rice. Grandstand works better in a herbicide mixture with propanil or another postemergence herbicide.

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

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

Highcard (Postemergence) – Apply only Highcard to Max-Ace varieties and hybrids. Highcard contains a safener to minimize the amount of injury to Max-Ace varieties and hybrids. In Max-Ace rice, non-safened quizalofop can result in high levels of crop injury and in some cases extensive crop loss. Highcard controls red rice, weedy rice, and annual grasses. Apply two applications of Highcard at 13 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, ducksalad, pickerelweed and other aquatic broadleaf weeds and sedges. The herbicide is most effective when applied to submerged weeds one to seven days after the permanent flood is established. When applied before permanent flood, tank-mix with propanil to broaden weed control spectrum. Londax may be used for aquatic broadleaf weed control in areas where 2,4-D is prohibited.

Loyant (Postemergence) – Loyant can be applied to both drill- and water-seeded rice in the two-leaf stage at a rate of 1 pint per acre. A methylated seed oil (MSO) at 0.5 pint per acre is required. Wait at least 14 days between Loyant applications, and do not apply more than 2 pints per acre per year. Loyant controls most broadleaf and sedge weeds found in rice, including many aquatic broadleaf weeds.

Loyant has no activity on Texasweed. Loyant has activity on small barnyardgrass, broadleaf signalgrass, junglerice and Amazon sprangletop no larger than three- to five-leaf. Apply to small, actively growing weeds. If the flood is not present at application, establish permanent flood within three days.

If the permanent flood is present at application, make sure weeds are exposed 70% above flood level and wait three hours before adding additional water. Loyant has no residual activity on weeds that have yet to emerge. Avoid the use of Loyant on freshly cut or leveled ground, except water-leveled fields. Loyant has auxin activity similar to 2,4-D or Grandstand; therefore, caution should be taken to avoid drift to neighboring soybean and other broadleaf crops.

Newpath or Preface (Preemergence and postemergence) – Apply Newpath to Clearfield rice varieties. 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 four to nine 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 four-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 three-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 ducksalad and has activity on several other weed species. The use rate of Rogue ranges from 8.4 to 12.6 ounces per acre.

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

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

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

Table 15. Effectiveness of Selected Preplant and Preemergence Rice Herbicides on Certain Weeds.

	Palmleaf Morningglory	Eclipta	Barnyardgrass	Red Rice	Sprangletop	Signalgrass	Fall Panicum	Sedge	Alligatorweed	Ducksalad	Redstem	Hemp Sesbania	Waterhyssop	Jointvetch	Smartweed	Dayflower	Texasweed	Fimbristylis
Preplant Incorporated, Preplant, Preemergence or Delayed Preemergence ----- Weed-Control Ratings -----																		
Bolero PPS	4	0	8	8	8	7	6	5	4	7	3	0	6	4	5	7	5	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
Aim4	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]	-
Novixid	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
Rogue2	-	-	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 16. Effectiveness of Selected Burndown Herbicides.

Preplant Burndown	Rice Plant Back (Days)	Annual Ryegrass	Annual Bluegrass	Carolina Foxtail	Little Barley	Henbit	Cutleaf Evening Primrose	Chickweed	Geranium spp.	Curly Dock	Buttercup spp.	Mare's Tail	Smartweed	Swinecress	Shepherd's Purse	Bittercress
		Weed-Control Ratings														
2,4-D	30; 1-Inch Rain	0	0	0	0	5	9	3	6	7	9	6	6	6	9	7
FirstShot + Glyphosate	0	7	9	9	9	9	7	9	8	9	9	9	9	9	9	9
Gambit + Glyphosate	0	7	9	9	9	9	8	9	8	9	9	9	9	8	9	9
Glyphosate	0	7	9	9	9	6	5	9	5	6	9	9	7	7	9	9
Gramoxone XL	0	4	9	8	9	8	4	9	9	4	9	5	4	2	9	9
Grandstand + Glyphosate	21 Dry-Seed/14 Water-Seed	7	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Leadoff	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 17. Activity of Selective Herbicide Programs for Perennial Grass Control[1].

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

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

Table 18. Crawfish Production and Rice Herbicides.

Aim	Commercial crawfish not specifically mentioned; however, herbicide is moderately toxic to fish.
Basagran	Do not use Basagran on rice fields where the commercial cultivation of crawfish is practiced.
Beyond/Postscript	Crawfish production not specifically mentioned.
Blazer	Do not harvest crawfish from treated rice areas for food.
Bolero	Crawfish production not specifically mentioned. Toxic to shrimp.
Broadhead	Do not use treated rice fields for the aquaculture of edible fish and crustaceans.
Clearpath	Do not use treated rice fields for the aquaculture of edible fish and crustaceans.
Clincher	Do not fish or commercially grow fish, shellfish or crustaceans on treated acres during the year of treatment.
Command	Do not apply on rice fields in which concurrent crawfish farming is included in the cultural practices.
Duet	Do not apply to fields where commercial crawfish farming is practiced.
Facet	Do not use treated fields for aquaculture of edible fish or crawfish.
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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