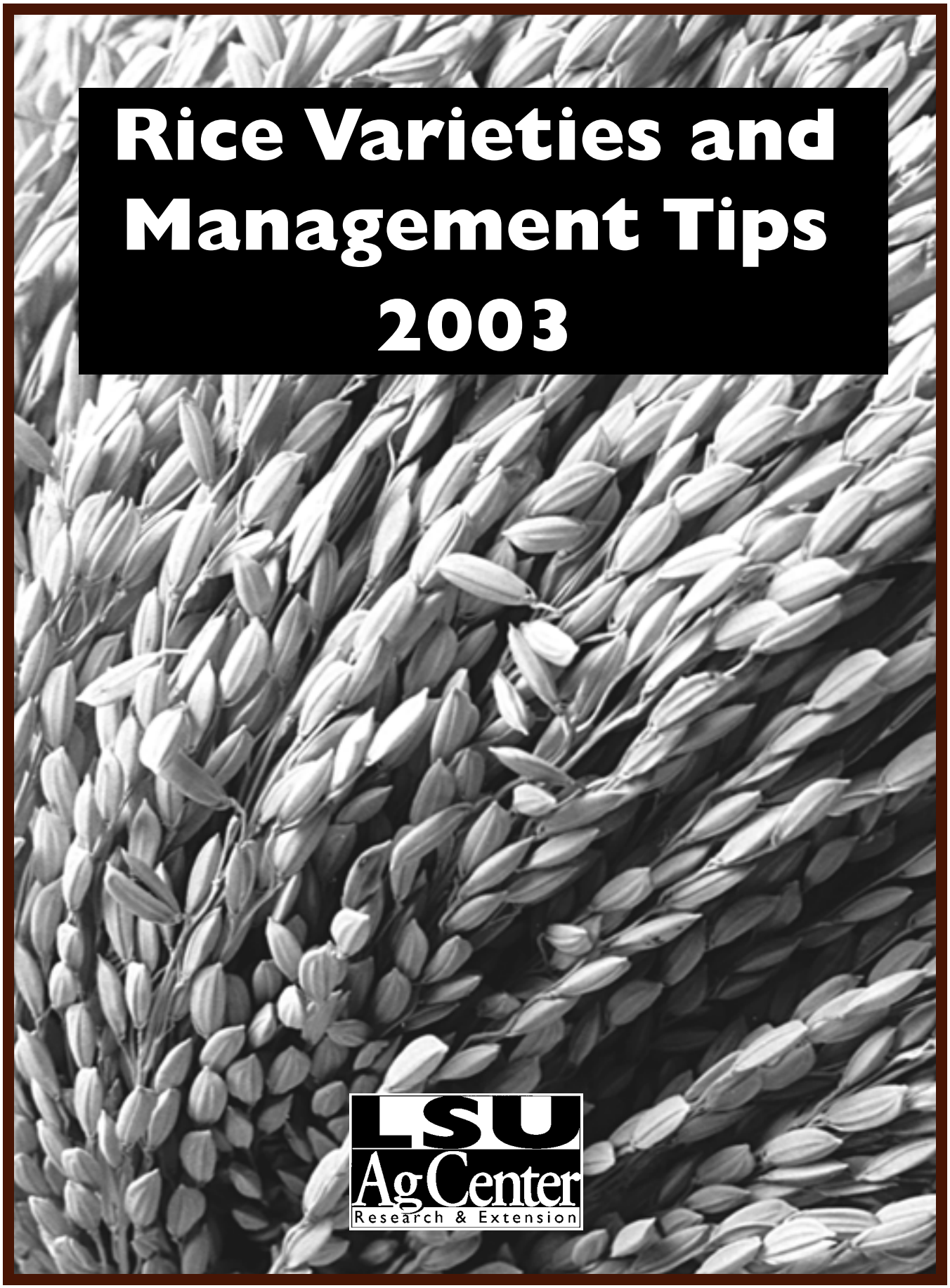
Rice Varieties and Management Tips 2003



LSU AgCenter
Research & Extension

Rice Varieties and Management Tips 2003

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

The varieties are grouped on the basis of grain type (long or medium). After each variety name are letters in parentheses to indicate the state of origin of the variety. The long-grains are divided into two groups based on relative maturity. A brief description of the agronomic characteristics of each of the recommended varieties is provided. In addition to recommended varieties, descriptions of other varieties may be included for the various maturity groups. These are varieties which are not recommended but may be grown on limited acreage.

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

www.lsuagcenter.com/subjects/rice/ricehome.htm

Data were generated at six research locations. These include the Rice Research Station at Crowley and off-station locations in Acadia, East Carroll, Jefferson Davis, Morehouse and Vermilion parishes. The following information is included:

Yield: Dry weight, lb/A

Milling:

a) Head - % of whole kernels after milling

b) Total - % of all kernels (whole and broken) after milling

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

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

Recommended Long-grain Rice Varieties

CL121, CL141 and CL161 are Newpath-resistant rice varieties that have been developed for use in the Clearfield system for the control of red rice. This system is discussed in the Weed Control section of this publication.

CL121: (LA) – CL121 is a very early, semidwarf, long-grain rice variety. It has averaged four to five days earlier than Cocodrie in days to 50 percent heading, making it similar to Jefferson. The variety has displayed good milling yield and milling quality. It is highly resistant to lodging. CL121 has shown good second crop potential in limited testing. The variety is rated moderately susceptible to blast and susceptible to sheath blight.

CL141: (LA) – CL141 is a tall, early long-grain rice variety. It is similar in height to Drew and rated as moderately susceptible to lodging. It is similar to Cocodrie in maturity and has shown good second crop potential in limited testing. Grain yield is good, and grain quality and appearance are very good. CL141 is rated susceptible to sheath blight and susceptible to blast.

CL161: (LA) – CL161 is a high yielding, high quality, long-grain rice variety. It is very similar to Cypress in appearance and maturity but averages two to three days later in days to 50 percent heading. The variety is also very similar to Cypress in yield and milling potential, but grain size is smaller. The variety is rated susceptible to sheath blight and moderately susceptible to blast.

Cocodrie: (LA) – Cocodrie is a very early, semidwarf long-grain variety that has displayed excellent yield potential. It is about the same height as Cypress but has displayed somewhat better resistance to lodging. Cocodrie averages four to five fewer days to 50 percent heading than Cypress. The new variety has displayed good second crop potential. It has displayed good milling characteristics and good seedling vigor. Cocodrie is susceptible to sheath

Table 1. Agronomic Characteristics and Yields of Recommended Rice Varieties (2001-2002) in Louisiana

Variety	Seedling Vigor	Lodging	Days To 50% Heading	Plant Height (in)	Milling % (Whole-Total) 2001	2002	Mean	Grain Yield 2001	2002	Mean*
Long Grain										
Cocodrie	G	MR	81	35	64 - 69	64 - 69	64 - 69	7297	7709	7487
Cypress	VG	MS	84	36	67 - 70	67 - 71	67 - 70	6812	6766	6791
Francis	VG	MS	82	40	62 - 69	61 - 68	62 - 69	8569	7800	8214
Jefferson	F	HR	76	34	64 - 70	66 - 71	65 - 71	6939	7110	7075
Wells	VG	MS	83	41	63 - 70	62 - 70	63 - 70	7901	7616	7769
Clearfield Long Grain										
CL 121	G	HR	79	33	66 - 71	62 - 70	64 - 71	6891	6789	6844
CL 141	G	S	81	44	65 - 70	65 - 68	65 - 69	6717	6968	6833
CL 161	VG	MS	85	38	66 - 70	67 - 71	66 - 70	6892	7272	7067
Medium Grain										
Bengal	G	MR	83	37	65 - 68	66 - 70	66 - 69	7604	7702	7649
Earl	G	S	82	40	65 - 69	67 - 70	66 - 70	8310	8005	8169

* Mean is the average of 13 yield trials conducted over the 2-year period. Mean is not the average of the two years (2001-2002) since there were different numbers of trials each year. These means represent only two years instead of the normal three, because not all entries were included in all tests in 2000.

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

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

Abbreviations: HR = highly resistant, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, HS = highly susceptible, VG = very good, G = good, F = Fair

Table 2. 2002 Louisiana Rice Commercial Variety Tests; Yields and Agronomic Characteristics

Variety	Grain Type	Days To 50% Heading	Height (in)	Milling %* Whl-Totl	LDG	Grain Yield** RRS	AC	VR	JD	EC	MH	Mean
Ahrent	L	78	39	63 - 67	MS	8104	5299	8180	4023	8273	8671	7092
CL 121	L	79	33	62 - 70	HR	7380	4656	7767	4833	8772	7328	6789
CL 141	L	81	44	65 - 68	S	6978	6049	7619	4337	7850	8973	6968
CL 161	L	85	38	67 - 71	MS	7778	6414	6884	3928	8850	9778	7272
Cocodrie	L	81	35	64 - 69	MR	8298	6454	6498	4778	10251	9978	7709
Cypress	L	84	36	67 - 71	MS	6651	6129	7192	3861	8577	8190	6766
Francis	L	82	40	61 - 68	MS	7148	6533	8605	5623	9393	9499	7800
Jefferson	L	76	34	66 - 71	HR	6340	6202	8404	4179	8638	8896	7110
Lemont	L	86	37	62 - 71	HR	6892	4892	6463	3386	8169	8951	6459
Maybelle	L	75	38	64 - 69	MS	6351	4164	8545	3711	7278	8808	6476
Priscilla	L	83	37	62 - 69	MR	7030	4902	8286	5256	9038	7800	7052
Saber	L	82	38	68 - 70	MS	5476	6606	7995	4483	8032	8384	6829
Wells	L	83	41	62 - 70	MS	6456	5298	8810	4848	9892	10389	7616
XL-7	L	78	41	60 - 69	S	8251	6655	8376	4832	11338	9334	8131
XL-8	L	81	41	62 - 72	S	8231	7475	11163	4579	10285	10043	8629
Earl	M	82	40	67 - 70	S	7133	6222	8837	5578	10837	9421	8005
Bengal	M	83	37	66 - 70	MR	7263	5559	8936	4631	10252	9573	7702

* Milling data - average of RRS, JD and VR

** RRS = Rice Research Station; AC = Acadia Parish, R&Z Farms; VR = Vermilion Parish, Errol Lounsberry Farm; JD = Jeff Davis Parish, Jimmy Hoppe Farm; EC = East Carroll Parish, Buford Perry Farm; MH = Morehouse Parish, Zaunbrecher Farm

blight and straighthead and moderately susceptible to blast.

Cypress: (LA) – Cypress is a semidwarf, long-grain variety. It is slightly taller than Lemont and may be slightly more susceptible to lodging. Cypress has displayed excellent first crop yield potential and has also exhibited good second crop yield potential. It has displayed excellent milling characteristics and extremely good seedling vigor. Cypress is susceptible to sheath blight and susceptible to blast. This variety is also susceptible to panicle blight, a physiological disorder that causes abortion of the developing grain.

Francis: (AR) – Francis is a high yielding, conventional height variety released by Arkansas in 2002. This line has consistently been one of the highest yielding in most Louisiana yield tests over the previous two years. Francis has fair to good milling quality, but should be harvested at optimum grain moisture. The variety is moderately susceptible to lodging. Francis is moderately susceptible to sheath blight and susceptible to blast. The variety is normally one to two days later in maturity than Cocodrie. Francis has demonstrated good ratoon potential.

Jefferson: (TX) – Jefferson is a semidwarf long-grain that is approximately three to four days earlier than Cocodrie. It is about the same height as Lemont and is highly resistant to lodging. Milling yields are good, but seedling vigor is poor. Shallow seeding and/or gibberellic acid seed treatment will enhance establishment. Jefferson is susceptible to sheath blight and moderately susceptible to blast. Because of the larger seed size and lower seedling vigor of this variety, the planting rate should be increased by 15 percent. (See the section on seeding rates for more information.)

Wells: (AR**)** – Wells is a newly released short stature long-grain variety. It has displayed excellent yield potential in tests throughout the rice-growing areas of Louisiana. Milling yields are normally good, but Wells has demonstrated sensitivity to low harvest moisture, resulting in lower milling yields. Seedling vigor is excellent. The variety is similar in maturity to Cypress (one to two days earlier). Wells is 2 to 3 inches taller than Cypress but has good straw strength and stands quite well. The variety is rated as susceptible to blast and sheath blight.

Other Long-grain Varieties

Ahrent: (AR) **–** Ahrent is a very early long-grain variety that is slightly earlier than Cocodrie. It has shown good yield potential and milling quality. Ahrent is similar to Wells in plant height and appears to be similar in lodging susceptibility. The variety is rated resistant to blast and moderately susceptible to sheath blight. Seedling vigor appears to be good.

Maybelle: (TX) – Maybelle is the earliest variety recommended for Louisiana production. Although Maybelle is not a true semidwarf, it is moderately resistant to lodging. It displays very good seedling vigor, especially in a water-seeded system. It has good first crop potential and excellent ratoon yield ability. Maybelle is susceptible to blast and to sheath blight.

Priscilla: (MS) – Priscilla is a semidwarf early long-grain variety that has shown good yield potential. It is approximately the same height as Cypress but is somewhat more resistant to lodging. The variety is slightly earlier than Cypress and slightly later than Cocodrie in maturity. Priscilla is somewhat more resistant to sheath blight than Cypress. Milling yields are fair and seedling vigor is good.

Saber: (TX) – Saber is an early long-grain variety that has been between Cocodrie and Cypress in days to 50 percent heading in Louisiana testing. However, the variety ripens quickly after heading and will reach harvest maturity in about the same period as Cocodrie. Saber has averaged slightly lower than Cypress in grain yield but has displayed excellent milling quality and grain appearance. Saber is rated resistant to blast and moderately susceptible to sheath blight in Louisiana screening. The variety is slightly taller than Cocodrie and Cypress.

XL-7 and XL-8: (RiceTec) – These are rice hybrids developed by Rice Tec, Inc. Hybrids are

produced by crossing selected male and female parents then harvesting the seed from the female parent, thus the seed plant is actually the first filial (F1) generation. In contrast, other commercial varieties of rice are pure lines developed from seed harvested in a later generation such as the F6 generation. Both of these hybrids have displayed very high yield numbers in two years of testing.

XL-8 has shown higher yield potential than XL-7 on average. XL-7 is very early maturing, and XL-8 maturity is similar to that of Cocodrie. Hybrids have shown good results at very low seeding rates (35-40 lb/A) in a drill-seeded system. Milling yields are fair to good; however, it is advisable that these hybrids be harvested as close as possible to optimum harvest moisture (19 percent to 20 percent). As with some varieties, milling yields can be dramatically reduced if harvested at low grain moisture. These hybrids are taller than Cocodrie and Cypress and are more susceptible to lodging. Neither is as susceptible as XL-6, an earlier RiceTec hybrid. Both hybrids have displayed good ratoon potential.

Medium-grain Rice Varieties

Bengal: (LA) – Bengal is a semidwarf variety that has displayed very good yield potential and excellent milling quality. The milled grains are plumper than other commonly grown medium grains in the South, a characteristic favored for some processing uses. Seedling vigor is good, and Bengal has displayed good, but variable, second crop yield potential. It is susceptible to blast and straighthead and moderately susceptible to sheath blight. Bengal has also displayed susceptibility to panicle blight.

Earl: (LA) – Earl is a conventional medium-grain variety that has displayed very high yield potential and fair to good milling and grain appearance quality. The variety is moderately resistant to the predominant races of blast disease. Earl has good seedling vigor and has demonstrated good ratoon potential in limited testing. The variety is taller than most currently grown varieties, and care should be taken to avoid excessive rates of applied nitrogen fertilizer because this could increase the potential for lodging.

Special Purpose Long-grain Varieties

Because of the unique characteristics of these special purpose long-grains, they should not be commingled with standard U.S. long-grain varieties.

Dellrose: (LA) – Dellrose is a Della-type aromatic long-grain variety. It is a semidwarf, early maturing variety that has displayed excellent grain, milling and ratoon yield potentials. Dellrose has good aroma and a slenderer grain shape than Dellmont. Disease reaction of Dellrose is similar to Lemont. It is rated as very susceptible to sheath blight and susceptible to blast and straighthead.

Della: (LA) – Della is an aromatic long-grain that many consumers favor for its unique aroma and taste characteristics. It is grown on limited acreage in Louisiana. Della displays low yield potential when compared to other currently grown varieties. Disease susceptibility is often a problem because Della is susceptible to most major rice diseases. It is tall and is very susceptible to lodging, even under conditions of low yield potential.

Dellmati: (LA) – Dellmati is a very early, tall Basmati-type long-grain. The variety has excellent aroma and grain elongation characteristics and emulates imported Basmati. Dellmati displays fairly low grain and milling yield and fairly good second crop potential.

TORO-2: (LA) - TORO-2 is a special purpose, low amylose (sticky cooking) long-grain, semidwarf. In taste tests, TORO-2 was judged to have acceptable TORO-type cooking and taste characteristics. TORO-2 is resistant to the predominant blast races and moderately susceptible to sheath blight. It is also very susceptible to straighthead.

Seeding Dates

The optimum seeding dates will vary by location as well as from year to year because of environmental conditions. Rice yields may be reduced by planting too early as well as by planting too late. Average daily temperature at seeding is crucial in stand establishment. Average daily temperature is calculated by adding the daily high and low temperatures and dividing by 2. Remember: At or below 50 degrees F, little or no rice seed germination will occur. From 50 to 55 degrees F germination increases, but not to any great extent until temperature is above 60 degrees F. Plant survival is not satisfactory until the average daily temperature is above 65 degrees F.

Based on this information and seeding date research, the optimum planting dates are:

Southwest Louisiana – March 15 - April 20
North Louisiana – April 5 - May 10

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

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

Seeding Rates

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

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

Regardless of the seeding system used, the desired plant stand is constant. The optimum stand is 10-15 plants per square foot; the minimum stand is six to eight plants per square foot. Rice (as most grasses) has the ability to tiller or stool. Several head-producing shoots can be formed from one plant. 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 more severe disease pressure as well as spindly plants that may be more 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.

Based on this, recommendations are:

Planting on the basis of seeds per acre to obtain the desired plant population is more accurate than planting pounds per acre. For example, 125 pounds of Bengal or Jefferson will contain fewer seeds than 125 pounds of Cypress or Cocodrie. An ideal plant population is approximately 10-15 plants per square foot. Under typical conditions, about one-half of the seed survive to produce a plant. Use the information in Table 3 to determine the pounds of seed per acre required to achieve the desired plant population, keeping in mind the considerations listed below.

When water-seeding or dry broadcasting, about 100-150 pounds of seed per acre will be required. When drill-seeding, about 75-100 pounds of seed per acre will be required. Refer to 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 include:

a. Use higher recommended seeding rates when planting early in the season when there is potential for unfavorably cool growing conditions. Cool conditions will favor water mold (seedling disease) in water-seeded rice. This can reduce stands. Varieties also differ in tolerance to cool growing conditions in the seedling stage.
b. Varieties differ considerably in average seed weight. Thus, a variety with a lower average seed weight will have more seed per pound. Table 3 shows seed weight per pound and the average number of seed per square foot at several seeding rates for most of the varieties mentioned in this publication. Producers may want to adjust seeding rates for this factor.
c. Where seed depredation by blackbirds is potentially high, use a higher seeding rate.
d. Where seedbed preparation is difficult and a less than optimum seedbed is prepared, use a higher seeding rate.
e. If it is necessary to use seed of low germination percentage, compensate with increased seeding rates. Always use high germination, certified seed if possible.
f. When water seeding into stale or no-till seedbeds with excessive vegetation, use higher seeding rates.
g. If any other factor exists which may cause stand establishment problems (such as slow flushing capability or saltwater problems), consider it when selecting a seeding rate.
h. Research has shown that the best stands are obtained when planting pre-sprouted fungicide-treated seeds. Pre-sprouted untreated and dry fungicide-treated seeds produce somewhat poorer stands, and dry, untreated seed produce the weakest plant populations.

Plant Growth Regulators

Plant growth regulators have several applications in rice production systems. One type of plant growth regulator can increase seedling emergence and promote shoot elongation. Another type is used to suppress red rice seed production in ***set aside or fallow acreage.*** Because of the specific activity of plant growth regulators, follow label instructions and consult your county agent before application.

Seed treatment with gibberellic acid (1-2 grams per 100 pounds of seed) promotes rapid, uniform emergence in dry-seeded systems. It is especially effective on semidwarf varieties. With gibberellic acid, seeding depth can be increased up to 3 inches to minimize flushing. In drill-seeded rice, the seeding rate can be decreased to 60-70 pounds per acre when planting under warm conditions (daily average temperature higher than 70 degrees F). Under cool conditions (daily average temperature of 60 to 70 degrees F), the higher application rate is recommended.

Gibberellic acid is labeled for foliar application in Louisiana and may be beneficial in certain situations. Consult your county agent for more information, and follow label directions.

ROYAL SLO-GRO (maleic hydrazide) is labeled for red rice seed head suppression on ***set aside or fallow acreage.*** The product should be applied at 1.5 lbs/A.I. per acre (1 gallon ROYAL SLO-GRO per acre) to booting and heading red rice. Read and follow label directions.

Table 3. Seed per pound and average number of seed per square foot for important rice varieties.

		Average number of seed/ft^2 at selected seeding rates			
Variety	Seed/lb*	75 lbs/A	100 lbs/A	125 lbs/A	150 lbs/A
Ahrent	20734	36	48	59	71
Bengal	15272	26	35	44	53
CL121	19290	33	44	55	66
CL141	18392	32	42	53	63
CL161	20244	35	47	58	70
Cocodrie	18045	31	41	52	62
Cypress	18151	31	42	52	63
Della	21429	37	49	61	74
Dellrose	18564	32	43	53	64
Dixiebelle	21919	38	50	63	75
Drew	21043	36	48	60	72
Earl	17048	29	39	49	59
Francis	20353	35	47	58	70
Jackson	18607	32	43	53	64
Jasmine-85	18088	31	42	52	62
Jefferson	16158	28	37	46	56
LaGrue	18088	31	42	52	62
Lemont	17322	30	40	50	60
Maybelle	18996	33	44	55	65
Priscilla	16122	28	37	46	56
Saber	20580	35	47	59	71
TORO-2	17869	31	41	51	62
Wells	17824	31	41	51	61
XL-7	21545	**	**	**	**
XL-8	21279	**	**	**	**

* These numbers may vary, depending upon year and seed source.

** The company does not recommend these seeding rates.

Rice Fertilization

Generally lime is not recommended for rice production unless the pH of the soil is 4.9 or lower. Crops grown in rotation with rice such as cotton, soybeans and other pH sensitive crops may benefit from liming. The pH of the soil should not be increased to more than 5.8 for rice production. Overliming can induce zinc deficiency in rice.

Phosphorus and potassium should be applied according to soil test recommendations. On soils where phosphorus and potassium are needed, apply preplant or before first flood. Potassium deficiency has been associated with increase in disease incidence and severity.

Fertilizer nutrients are most efficiently used by rice when applied immediately before permanent flood establishment. There are situations when fall application of some nutrients may be a suitable alternative. However, neither nitrogen nor zinc should be applied in the fall. For more details, consult the Louisiana Rice Production Handbook (Pub. No. 2321).

Rice seedlings usually show nitrogen deficiency within 15-25 days after seeding, especially in soils low in organic matter. A preplant application of 15-30 pounds of nitrogen per acre is usually needed to meet the seedling nitrogen requirement before permanent flood.

All or most of the nitrogen can be applied preplant in a water-seeded pinpoint flood system. In a drill-seeded, dry broadcast or water-seeded delayed flood system, all or part of the nitrogen may be applied immediately before permanent flood. The balance of the nitrogen can be applied when deficiency symptoms occur or anytime up to the panicle differentiation (2 mm panicle) growth stage. Avoid applying nitrogen-containing fertilizers more than seven days before planting.

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

Varieties vary in their nitrogen needs as follows. These recommendations are based on multi-year, multi-location research throughout Louisiana. These rates assume proper timing.

Varieties	N rate (lbs/A)
CL 121, Dellrose, Jefferson	120-180
Ahrent, Bengal, CL161, Cocodrie, Cypress, Francis, Priscilla, Saber, Wells	120-165
CL141, Earl, Maybelle, TORO-2, XL7, XL8	100-140
Della	70-100
Saturn, Dellmati	60-90

Ratoon or second crop rice should be fertilized with 45-75 pounds of nitrogen per acre when first crop harvest is before August 15. When first crop harvest is after August 15, fertilize with 30-45 pounds of nitrogen per acre. When conditions appear favorable for good second crop production (minimal field rutting, little or no red rice, healthy stubble), apply the higher rate of nitrogen. Apply nitrogen and establish a shallow flood within five days after harvest. When the main crop is harvested after August 15, the potential for profitable second crop production is reduced because of the increased likelihood of unfavorable weather.

On soil with a history of zinc deficiency, or where soil tests indicate a need for zinc, a soil application of 7-8 pounds of zinc from an inorganic source (zinc sulfate) or 1-2 pounds of zinc per acre as a chelate should be made. Zinc can be applied foliarly at the rate of 0.5-1.0 pound per acre as a chelate.

Sulfur may be needed at a rate of 20-25 pounds per acre where large amounts of soil have been moved in land leveling. Sulfur deficiencies resemble nitrogen deficiencies, producing pale yellow plants which grow slowly. 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.

Additional information on rice fertilization is in LCES Publication 2418, "Fertilization of Louisiana Rice," available in your county agent's office.

DD-50 Rice Management Program

The DD-50 Rice Management Program is a computer-based management tool offered to the Louisiana rice industry by the Louisiana Cooperative Extension Service. It provides producers with growth stage predictions and management suggestions based on emergence dates of individual rice fields. It is only a tool and is not a substitute for regular monitoring of fields. Its accuracy may be influenced by unusual weather, plant stress and other factors. For more information on the program, contact your county agent.

Rice Insects

The major insect pests of rice in Louisiana are the rice water weevil and the rice stink bug. In addition, rice stem borers, rice leaf miners and rice seed midges have become increasingly important rice pests. Under high infestation levels, yield can be severely decreased by all of these pests. Identification and scouting information for these pests is presented. If you suspect insect injury in your field(s), contact your county agent for verification and help with damage assessment.

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

All commonly grown rice varieties are susceptible to the rice water weevil. Recent research, however, indicates there are some varietal differences in susceptibility. The medium-grain varieties appear to be more susceptible to infestation than long-grain varieties.

Infestations of rice water weevil also tend to be more severe in late-planted rice than in early-planted rice.

Management of the Rice Water Weevil with Karate or Fury. Karate and Fury are insecticides with similar characteristics; however, use rates for Fury are somewhat higher than Karate. Timing of Karate or Fury for management of rice water weevil is crucial. Karate or Fury kills adult weevils only, **not** eggs or larvae. Scouting for adult weevils is important and may begin at any time after emergence of rice, but efficacy of Karate or Fury is maximized when adults are controlled just before oviposition (egg laying). Oviposition is possible when the field has been saturated by rainfall or flushing or when permanent flood has been established. In most fields, the majority of oviposition is likely to occur after the establishment of permanent flood. Check at least five to 10 locations per field for the presence of

adults or their feeding scars. Treat when adult weevils or their scars are observed **and** conditions for egg laying are favorable as described above. Applications made 24 hours before initiation of permanent flood can be effective when adults are present. More than one application may be required. Once fields have been treated, begin sampling again after seven days.

Karate or Fury kills adult weevils, but **not** eggs and larvae. Egg laying (oviposition) must be prevented. Once eggs are laid in rice stems or larvae are in the roots, Karate or Fury will **not** be effective. Applications of Karate or Fury for eggs or larvae are a waste of money in addition to the loss caused by weevils. Work on managing rice water weevil using foliar insecticides is ongoing. Recommendations for the management of the rice water weevil with foliar insecticides may change.

Karate or Fury also is effective against several minor pests of rice including fall armyworm and chinch bugs.

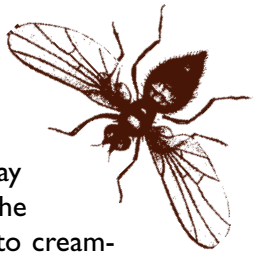
Management of the Rice Water Weevil with Dimilin. Dimilin kills the eggs of rice water weevils, not adults or larvae. Dimilin should be applied to fields only after permanent flood is established and if adults are present. Begin scouting as soon as, or just prior to, permanent flood establishment. Scout fields every three to four days until treatment is required or rice reaches internode elongation (green ring). Seven days after the first treatment with Dimilin, resume scouting as described above. More than one application may be required.

Management of the Rice Water Weevil with Icon. The decision to treat for rice water weevils with Icon must be made before planting because Icon is registered only as a seed treatment in Louisiana. Icon-treated seed is available only from seed dealers approved by the manufacturer. Icon can be used with both pre-sprouted and dry seed in water-seeded systems or with dry seed on dry-seeded systems. Consult Table 7 to determine rates of Icon on a per acre basis under several seeding rates and several seed treatment rates. Refer to the product label for additional information.

Icon kills larvae of the rice water weevil but will have no effect on adult weevils. The presence of adults in Icon-treated fields does not indicate the failure of Icon.

Rice Stink Bug: These tan and gold bugs (about 1/2" long) feed on rice when it begins to head. Females lay light-green, cylinder-shaped eggs in two-row clusters on leaves and stems. Eggs turn red-black just before larval emergence. Nymphs (immatures) are black with red marks on the abdomen. Older nymphs resemble adults. Nymphs and adults suck the sap from developing rice grains. During the flowering and milk stages, this causes empty grains and reduces yield. During the soft-dough stage, diseases enter the grain at the feeding spot and cause pecky rice.

Using a 15" diameter sweepnet, take 10 sweeps at 10 different areas around each field. Count the number of bugs collected after every 10 sweeps. In the first two weeks of heading, treat fields when there are 30 or more bugs per 100 sweeps. From the dough stage until two weeks before harvest, treat fields when there are 100 bugs per 100 sweeps.



Rice Leaf Miner: Adult flies are less than 1/4" long, with a metallic blue-green to gray thorax and clear wings, and they lay eggs on rice leaves as they lie on the water. The larvae are transparent to cream-colored after hatching but become yellow to light green within a few days. Larvae tunnel between the layers of the leaf, attacking and killing leaves closest to the water. Larvae move up the plant, killing additional leaves, and, under heavy infestations, the entire plant may die.

Rice is attacked in the early spring, and infestations usually occur on the upper side of levees where water is deepest. Rice leaf miner is not usually a problem in water 4 to 6 inches deep. Leaf miner problems are more severe in continuously flooded rice than in periodically flooded rice. Leaf miners appear to attack rice fields in the same vicinity from one year to the next.

Check for rice leaf miner larvae by pulling a rice leaf gently between the thumb and forefinger. If larvae or pupae are there, a bump can be felt in the leaf blade. The larvae or pupae can be found by

separating the layers of the leaf. If plant populations are being reduced to less than optimum stands (10-15 plants per square foot), chemical control may be necessary.

Rice Seed Midge: Adult midges resemble small mosquitos and swarm over rice fields, rice levees, roadside ditches and other bodies of water. Elongate eggs are laid on the surface of open water in strings. Larvae live on the bottom of flooded rice fields in spaghetti-like tubes. Larvae injure rice by feeding on the embryo of germinating seeds or on the developing roots and seeds of very young seedlings. Midge injury occurs in water-seeded rice and is usually not important once seedlings are several inches long. The potential for midge injury increases when fields are flooded far in advance of water seeding rice.

Water-seeded fields should be scouted for midge injury, checking for hollowed out seed within five to seven days after seeding. Injury from the midge can be insignificant (not economically important) to very severe. Injury can also be very localized, making damage assessment difficult. In some instances, whole fields may need to be replanted. In other instances, only parts of fields may require reseeding. Monitor fields until rice seedlings are several inches tall.

Rice Stem Borers: The sugarcane borer and the rice stalk borer are increasingly important pests of rice in Louisiana. Both species overwinter as last instar larvae in the stalks of rice and other host plants. These larvae pupate in the spring, and adult moths emerge during early May. Adult sugarcane borers are straw-colored moths about 1 inch long with a series of black dots, arranged in a V-shaped pattern, on the front wings. Adult rice stalk borers are also 1 inch long with pale white fore and hind wings tinged on the edges with metallic gold scales. Front wings are peppered with small black dots.

Egg-laying of both species on rice can begin as early as May, but economically damaging infestations generally do not occur until July through September. Eggs are flat, oval, cream-colored, and positioned like fish scales in clusters of two to 100 eggs. Larvae emerge in four to five days. Young larvae crawl to the base of the leaf while feeding on the leaf surface for a few days, leaving small streaks or feeding scars on the leaf. A few days after, larvae feed on the inside of the leaf sheath before boring into the stem. They feed inside the stem for three or four weeks. Mature larvae of both species may reach 1 inch in length.

Larvae of the sugarcane borer are cream-colored, with a series of brown spots on the back. Larvae of the rice stalk borer are cream-colored but lack the brown spots on the back. Instead, they have two pairs of dark stripes running the entire length of the body. Pupation occurs inside the stem. The pupae are brown, about ½ inch long and cylindrical. The pupal stage lasts seven to 10 days. Early infestations by both species 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 the whitehead condition. Severe infestations cause stalk breakage and plant lodging above the water surface.

Scouting for stem borers should start at green ring to detect adults, egg masses or fresh feeding scars on the leaves. Chemical applications must coincide with larval emergence so small larvae are killed before they enter the rice stalks. Once larvae enter the stalks, pesticides are not effective.

No insecticides are labeled specifically for stem borer control in rice, and no economic thresholds have been developed for these insects in rice in Louisiana. LSU AgCenter personnel have not conducted studies with Karate and Fury against stem borers. However, recent studies in Texas and Arkansas indicated that Icon seed treatment reduces whitehead incidence by 40 percent to 60 percent in drill-seeded rice. In addition, early planting allows the rice crop to avoid high population levels of stem borers, especially where populations of the sugarcane borer increase in host plants such as corn and grain sorghum and move to rice plants later in the season.

Rice Diseases

Since the list of labeled fungicides may change, check with your county agent for current recommendations. For more information, consult publication number 2321, "Louisiana Rice Production Handbook," available in your county agent's office.

Blast: Blast can be found from the seedling stage to near maturity. The leaf blast phase occurs between the seedling and late tillering stages. Spots on leaves start as small white, gray or blue-tinged spots. Spots 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. Lesions on resistant plants are small brown specks that do not enlarge.

Rotten neck symptoms appear at the base of the panicle, starting at the node. The tissue turns brown to chocolate brown and shrivels, causing the stem to snap and lodge. If the panicle does not fall off, it may turn white to gray, or the florets that do not fill will turn gray. Panicle branches and stems of florets also have gray-brown lesions.

Scouting for blast should begin early in the season during the vegetative phase and continue through the season to heading. Leaf blast will usually appear in the high areas of the field where the flood has been lost or is shallow. Areas of heavy nitrogen fertilization and edges of the fields are also potential sites. If leaf blast is in the field or has been reported in the same general area, and if the variety is susceptible, fungicidal applications are advisable to reduce rotten neck blast.

Sheath Blight: Sheath blight is characterized by large oval spots on the leaf sheaths and irregular spots on leaf blades. Infections usually begin during the late tillering-joint elongation stages of growth. The fungus survives between crops as structures called sclerotia or as hyphae in plant debris. Sclerotia or plant debris floating on the surface or irrigation water serve as sources of inoculum that attack and infect lower sheaths of rice plants at the waterline. Fungus mycelium grows up the leaf sheath, forms infection structures, infects and causes new lesions. The infection can spread to leaf blade. After the panicle emerges from the boot, the disease progresses rapidly to the flag leaf on susceptible varieties. With very susceptible varieties, the fungus will spread into the culm from early sheath infections. Infected culms are weakened, and the tillers may lodge or collapse.

The lesions have grayish-white or light green centers with a brown or reddish-brown margin. As lesions coalesce on the sheath, the blades turn yellow-orange and eventually die. As areas in the field with dead tillers and plants enlarge, they may coalesce with other affected areas to cause large areas of lodged, dead and dying plants. Damage is usually most common where wind-blown, floating debris accumulates in the corners of cuts when seedbeds are prepared in the water.

Disease severity can be reduced by integrating several management practices. Dense stands and excessive use of fertilizer both tend to increase the damage caused by this disease. Broadcast seeding tends to increase stand and canopy density. Rotation with soybeans or continuous rice increases the amount of inoculum in field soils. Fungicides are available for reducing sheath blight.

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

The pathogen over winters as sclerotia in the top 2 to 4 inches of soil and in plant debris. After a permanent flood is established, the sclerotia float to the surface, come in contact with the plant, germinate and infect the tissues near the water surface. The first symptom is irregular black angular lesions on leaf sheaths near the water line at tillering or later growth stages. As lesions develop, the outer sheath may die, and the fungus penetrates into the inner sheaths and culm. These become discolored and have black or dark brown lesions.

The fungus then penetrates the inner sheaths and culm, often killing the tissues. The fungus can

continue to develop in the stubble after harvest, and numerous sclerotia are produced. At maturity the softened culm breaks over, infected plants lodge, and numerous small, round black sclerotia develop in the dead tissues.

Suggested control measures include using early maturing varieties, avoiding very susceptible varieties, burning or cultivating stubble after harvest to destroy sclerotia, using crop rotation when possible, applying potassium fertilizer, avoiding excessive nitrogen rates and using foliar fungicides recommended by the LSU AgCenter.

Grain and Head Disorders

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

Panicle Blight: Panicle blight or grain blight was recently identified as being caused by the bacterium *Burkholderia glumae*. The bacterium is seedborne and can cause a seedling blight that can thin stands significantly. The bacterial population appears to follow the growing plant as an epiphytic population on the foliage. This population infects the grain at flowering and causes grain abortion and grain rotting soon after pollination. Loss estimates vary from a trace to 50 percent reduction in yield and quality.

Initial symptoms of grain infection appear as a gray discoloration of the glumes. Infected grains can be unevenly distributed on the panicle. In severe infections, all of the seed can be damaged. Diagnosis is difficult because of other causes of seed infection and sterility producing similar symptoms and masking panicle blight symptoms after lesion maturity. A key diagnostic characteristic is that the stem stays green up to the seed.

High temperatures favor the disease. The disease usually develops in a circular pattern in the field with severely affected plants in the center and less affected plants around the edge. Infected heads can be confused with straighthead because of their upright stature. No parrot beaks are present. Some varieties are less susceptible than others are. Chemical control measures are being developed. Seed treatments have shown some activity in reducing seedborne pathogen populations and subsequent head severity.

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

Kernel smut: Symptoms from this fungal disease appear just before maturity. A black mass of smut spores replaces all or some of the endosperm of the seed. Often the spores ooze out of the grain, leaving a black mass along the seam of the hulls. The fungus infects immature, developing grain. The fungus overwinters as spores in soil of affected fields and in seed. Significant quality and yield reductions are possible. It has been reported, from other states, that boot applications of propiconazole containing fungicides reduce damage significantly.

Straighthead: This physiological disorder is associated with sandy soils, fields with arsenic residues or fields having anaerobic decomposition of large amounts of organic matter incorporated into the soil before flooding. Panicles are upright at maturity because the grain does not fill or panicles do not emerge from the flag leaf sheath. Hulls may be distorted and discolored, with portions missing or reduced in size.

Distorted florets with a hook on the end are called "parrot beak" and are typical of straighthead. Plants are darker green or blue-green and often produce new shoots and adventitious roots from the lower nodes. These symptoms can be mimicked by

herbicide damage. Management is by using resistant varieties and draining the field approximately 10 days before internode elongation (green ring) and allowing the soil to dry until it cracks. This growth stage can be determined by slicing the crown of the plant lengthwise and counting the nodes. When three nodes are distinctly visible, internode elongation is approximately 10 days away. The DD-50 Rice Management Program may also be consulted to determine the correct drain tine. It is important that the flood be established again by internode elongation.

Sheath Rot: Sheath rot is caused by the fungal pathogen *Sarocladium oryzae*. Symptoms are most severe on the uppermost leaf sheaths that enclose the young panicle during the boot stage. Lesions may be oblong or irregularly oval spots with gray or light-brown centers and a dark reddish-brown diffuse margin. Early or severe infections may affect the panicle so that it only partially emerges. The unemerged portion of the panicle rots, with florets turning red-brown to dark brown. A powdery white growth consisting of spores and hyphae of the pathogen may be observed on the inside of affected leaves. Insect or mite damage to the boot or leaf sheaths increases the damage from this disease. Emerged panicles may be damaged with florets discolored reddish-brown to dark brown and grain not filling.

Some varietial resistance is available. The disease is usually minor, affecting scattered tillers in a field and plants along the levee. Occasionally large areas of a field may have significant damage. No control measures are recommended. Fungicidal sprays used in a general disease control program may reduce damage.

Rice Disease Management

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

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

The use of foliar fungicides is justified in many cases. Some factors to consider in making this decision are whether or not: a) the field has a history of disease, b) the variety is susceptible, c) the yield potential is good, d) the rice is being grown for seed, e) the rice was planted late (Late-planted rice is more likely to encounter foliar disease problems than early-planted rice.) or f) a second crop is planned. (Disease not suppressed in the first crop may cause significant damage in the second crop.)

Scouting for diseases should begin early in the season. For sheath blight, very susceptible to susceptible cultivars will experience an economic loss if 5 percent to 10 percent of the tillers are infected during vegetative stages. For moderately susceptible cultivars, the level is 15 percent. At these levels, consider using a fungicide.

Apply a foliar fungicide at early boot when leaf blast symptoms are present. Leaf blast does not always precede rotten neck blast, but preventive applications of a fungicide are warranted if a blast-susceptible variety is grown. The incidence and severity of blast increase when rice plants are stressed (loss of flood, fertility imbalance, etc.). Draining for straighthead and/or water weevil control may increase incidence and severity of blast. Also, blast is normally worse on later planted rice.

For reaction of rice varieties to major diseases, disorders and insects, see Table 4 on page 19.

Weed Management in Rice

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

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

nance of a sufficient flood over these weeds can enhance control.

Herbicide Options for Weed Control

Preemergence

Command – 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 to ***dry-seeded rice only.*** Early postemergence applications with Command usually include a postemergence herbicide such as propanil or Arrosolo to control emerged grasses and broadleaves. Command rates are soil texture dependent, and applications to light textured soils are prohibited. Because of off-site movement of spray drift, the herbicide must be applied by ground equipment. **Aerial applications are restricted**.

Facet – Facet provides both preemergence and postemergence control of annual barnyardgrass, hemp sesbania, signalgrass and morningglory. The herbicide does not control sprangletop or nutsedge. Preemergence applications are restricted to ***drill-seeded rice only.*** Rainfall or flushing is necessary for herbicide activation. Tomatoes and cotton are extremely sensitive to Facet drift.

Newpath – Apply only to Clearfield (imidazolinone-tolerant rice) varieties that have been dry seeded or drill planted. Newpath selectively controls red rice and annual grasses. The herbicide is weak on broadleaf weeds such as hemp sesbania and jointvetch. For complete red rice control with Newpath, two applications are required. The herbicide must be applied preplant incorporated or preemergence and postemergence prior to permanent flood. Adequate soil moisture is required for optimum herbicide activation for all methods of soil application. Newpath must be applied preflood when rice is in the three- to five-leaf growth stage. Permanent flood should be initiated within two days after postemergence applications.

Delayed Preemergence

Prowl + Facet – Tank-mix controls most 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.

Bolero – Bolero controls barnyardgrass, sprangletop, annual sedges and suppresses some aquatic broadleaf weeds. The herbicide should be applied post plant to dry seeded rice after soil has been sealed by flushing or rainfall. Residual control usually will not exceed three weeks.

Pegging

Command Impregnated on Fertilizer – Command impregnated on fertilizer may be applied by air to water-seeded rice. Applications are restricted to selected parishes (consult label for specific parishes in Louisiana). Use a minimum of 150 pounds of dry fertilizer per acre. Apply Command impregnated fertilizer at pegging when rice is in the one- to two-leaf stage. Field must be drained prior to application. Delay reflooding for at least 48 hours.

Postemergence

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

Arrosolo – Herbicide is a mixture of propanil and molinate. Expect similar control to propanil. Arrosolo, however, may be more active on larger grasses than propanil when compared at an equivalent rate and provides up to one week of residual control.

Basagran – Herbicide controls annual and yellow nutsedge plus 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.

Bolero – For dry-seeded rice, apply 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 is usually tank-mixed with a postemergence herbicide and flushed or flooded within three days. Do not submerge rice when applying permanent flood. Residual control usually will not exceed three weeks.

Clincher – A contact grass herbicide that 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 stage. 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.

Facet – Herbicide will control barnyardgrass, signalgrass, jointvetch and hemp sesbania. Follow the label concerning the addition of crop oil or surfactants. Apply herbicide after rice is in the two-leaf stage. Do not apply to rice in spiking stage.

Grandstand – Grandstand controls alligatorweed, hemp sesbania, texasweed, jointvetch and other broadleaf weeds. It does not control ducksalad. Do not overlap swaths or dress ends during application. Grandstand may be applied to ratoon rice.

Hi-Dep 2,4-D – 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. Hi-Dep is the only formulation of 2,4-D that is labeled for ratoon rice.

Londax – Londax controls ducksalad, pickeralweed and other aquatic broadleaf weeds and sedges. The herbicide is most effective when applied one to seven days after the permanent flood is established to submerged weeds. 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 cannot be used.

Ordram 15 G – Ordram controls barnyardgrass, seedling yellow nutsedge, fimbrystilis and spike rush. Apply to flooded field only. Successful grass control with Ordram can be accomplished if grass is at least two-thirds submerged at the time of application.

Permit – Permit is very effective on annual and perennial sedges and hemp sesbania and jointvetch. Permit may be tank-mixed with other post-emergence herbicides to broaden weed control spectrum. Label prohibits post-flood applications.

Propanil (common name of a herbicide sold under several trade names) – Propanil is a contact herbicide that controls annual grasses, some sedges and broadleaf weeds in the seedling stage. Best control is achieved when applied 10-14 days after seeding. Propanil is often tank-mixed with a residual herbicide such as Command, Prowl or Bolero.

Regiment – 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 surfactants and tank-mixes.

Ricestar – A contact grass herbicide that controls barnyardgrass, broadleaf signalgrass, and sprangletop. Ricestar has no activity on broadleaf weeds. Apply to small actively growing grasses in the two- to three-leaf stage. Ricestar works best under saturated soil conditions. Refer to label for approved tank-mixes.

Table 4. Reaction of Rice Varieties to Major Diseases, Disorders and Insects

Variety	Blast	Sheath Blight	Narrow Brown Leaf Spot	Brown Leaf Spot	Leaf Smut	Straight-head	Rice Water Weevil Larvae	Rice Stink Bug
Long Grain								
Ahrent	R	S	S	MS	S	MR	S	S
CL161	S	S	MS	MS	MS	MR	S	S
CL121	S	S	MR	MS	MS	MS	S	S
CL141	VS	S	S	MS	S	S	S	S
Cocodrie	MS	VS	MR	MR	MS	S	S	S
Cypress	S	S	MR	MR	MS	MR	S	S
Della	S	MS	MR	S	MS	S	S	S
Dellrose	S	S	MR	S	MS	MR	S	S
Dixiebelle	MS	S	MR	MS	MR	VS	S	S
Drew	MR	MS	MR	MR	MR	MS	S	S
Francis	S	MS	MR	MS	MS	MR	S	S
Jackson	S	S	MR	MS	MR	MR	S	S
Jasmine 85	R	R	MS-S	R	R	VS	S	S
Jefferson	MS	S	MR	MR	MR	MS	S	S
LaGrue	VS	MS	R-MR	R	R	S	S	S
Lemont	S	VS	MS-S	S	S	MR	S	S
Maybelle	VS	VS	S	S	S	MR	S	S
Priscilla	MS	MS	MR	MR	MR	MS	S	S
Saber	R	S	R	MR	MR	R	S	S
TORO-2	R	MS-S	MR-MS	MS	MR-MS	VS	S	S
Wells	S	MS	R	MR	MS	MR	S	S
XL6	R	MR	R	MS	R	VS	S	S
XL7	R	MS	R	S	R	MR	S	S
XL8	R	MS	R	S	R	MR	S	S
Medium Grains								
Bengal	S	MS	MS	MR	MS	VS	VS	VS
Earl	MR	MS	R	MS	MR	VS	VS	S
Mars	S	MS	MS	MR	MS	VS	VS	S
Rico 1	S	MS	S	MS	MS	MR	S	S
Saturn	MR	MS-S	MS	S	S	S	S	S

R=Resistant, MR= Moderately resistant, MS=Moderately susceptible, S=Susceptible and VS=Very susceptible. Varieties labeled S or VS for a given disease may be severely damaged under conditions favoring disease development.

Table 5. Effectiveness of selected rice herbicides

Herbicide	palmleaf morningglory	eclipta	barnyardgrass	red rice	sprangletop	signalgrass	fall panicum	sedge	alligatorweed	ducksalad	redstem	hemp sesbania	waterhyssop	jointvetch	smartweed	dayflower	texasweed
PREPLANT BURNDOWN																	
2,4-D	9	9	0	0	0	0	0	5	8	8	9	9	9	8	5	7	9
Gramoxone Extra	8	9	9	8	9	9	9	5[3]	6	7	9	9	7	8	4	7	9
Grandstand	9	8	0	0	0	0	0	5	9	7	9	9	8	8	-	7	9
Roundup	7	8	9	7	9	9	9	7	7	7	9	7	7	7	6	6	9
PREPLANT INCORPORATED OR PREEMERGENCE																	
Newpath	8	7	8	8	8	9	5	9	6	8	8	4	6	4	6	7	8
PREEMERGENCE																	
Bolero PPS	4	0	8	8	8	7	-	5	4	7	3	0	6	4	-	7	5
Bolero (Delayed)	5	8	8	0	8	5	-	5	4	8	8	6	8	5	5	8	6
Command	0	0	9	0	8	8	-	0	0	7	0	0	-	0	-	7	0
Facet (Drill seeded)	8	8	9	0	0	9	5	2	4	3	4	7	6	7	0	5	4
Ordram (PPI)	4	2	8	8[1]	5	7	6	4	0	0	0	2	2	0	5	3	0
Prowl (delayed drill seeded)	0	0	8	0	8	8	7	0	0	0	0	0	0	0	0	0	0
POSTEMERGENCE																	
2,4-D Amine	9	9	0	0	0	0	0	2[3]	8	9	9	9	9	5	6	8	9
Aim[4]	8	6	0	0	0	0	0	5	5	4	6	9	-	9	-	5	-
Aim + Grandstand	9	8	0	0	0	0	0	5	8	6	9	9	8	9	-	6	9
Arrosolo	6	9	9	0	8[2]	9	8[2]	5[3]	5	8[2]	7[2]	9	9	9[2]	6[2]	8[2]	8
Basagran	8	8	0	0	0	0	0	8	4	8	9	4	8	3	7[2]	9	2
Blazer	5	4	0	0	0	0	0	0	4	3	9	9	0	0	0	0	5
Bolero + Propanil	5	9	9	0	9	9	-	7	5	7[2]	7[2]	9	9	8[2]	6[2]	8[2]	8
Clincher	0	0	9	0	9	9	8	0	0	0	0	0	0	0	0	0	0
Facet	8	9	9	0	0	9	5[2]	4	6	3	3	8	3	8	0	3	6
Facet + Propanil	8	9	9	0	7[2]	9	8[2]	5[3]	6	7[2]	7[2]	9	8	9[2]	6[2]	7[2]	8
Grandstand	9	8	0	0	0	0	0	5	8	6	9	9	8	8	-	6	9
HiDep 2,4-D	9	9	0	0	0	0	0	2[3]	8	9	9	9	9	5	6	8	9
Londax	5	8	0	0	0	0	0	8	7	9	9	6	9	6	6	8	8
Newpath	8	6	8	8	6	9	4	8	3	2	8	3	6	3	4	6	7[4]
Ordram	0	5	9	0	5	7	-	5	0	0	0	2	2	0	4	6	2
Permit	-	-	0	0	0	0	0	9	4	5	-	9	-	9	-	8	-
Permit + Londax	5	8	0	0	0	0	0	9	7	9	9	9	9	9	-	8	8
Propanil	5	8	9	0	7[2]	9	8[2]	4[3]	5	6[2]	7[2]	7	8	8[2]	6[2]	6[2]	6
Propanil + Aim	9	8	9	0	7	9	8[2]	6	5	6	7	9	8	9	8[2]	6	6
Propanil + Londax	9	9	9	0	7[2]	9	8[2]	9	7	7	9	9	8	9[2]	8	8[2]	9
Prowl & Facet	8	8	9	0	8	9	5[2]	4	6	3	2	8	4	7	0	3	6
Prowl + Propanil	5	9	9	0	9	9	8[2]	5	5	7	9	9	8[2]	8[2]	6[2]	7	6
Regiment	8	6	9	0	3	3	0	7[3]	7	8[2]	8	8	7	8	7	7	8[4]
Ricestar	0	0	9	0	8	9	7[2]	0	0	0	0	0	0	0	0	0	0

[1]With proper water management
[2]Controlled only when small (less than two-leaf)
[3]Annual sedge suppression
[4]Weeds must be less than 4 inches tall
[5]Soil-applied preplant incorporated or preemergence only, with no activity applied postemergence.

Table 6. Crawfish Production and Rice Herbicide Guidelines

Aim	Commercial crawfish not specifically mentioned; however, herbicide is moderately toxic to fish.
Arrosolo	Commercial crawfish production not specifically mentioned; however, herbicide is considered extremely toxic to fish, and drift and runoff may be hazardous to aquatic organisms in neighboring areas.
Basagran	Do not use Basagran on rice fields in which the commercial cultivation of crawfish is practiced.
Blazer	Do not harvest crawfish from treated rice areas for food.
Bolero	Crawfish production not specifically mentioned. Toxic to shrimp.
Command	Do not apply on rice fields in which concurrent crawfish farming is included in the cultural practices.
Duet	Do not apply to fields where commercial crawfish farming is practiced.
Facet	Do not use treated fields for aquaculture of edible fish or crawfish.
Grandstand	Do not grow shellfish or crustaceans commercially on treated acres during the year of treatment.
Hi-Dep	Commercial crawfish production is not specifically mentioned; however, the label states product is toxic to aquatic invertebrates.
Londax	Do not harvest crawfish prior to harvesting rice.
Ordram 15G	Crawfish not specifically mentioned. Product is extremely toxic to fish, however.
Permit	Crawfish production not specifically mentioned in restrictions.
Prowl	Crawfish not specifically mentioned. Product may be hazardous to aquatic animals.
Ricestar	Ricestar must not be applied to fields where crawfish are commercially cultured.
Roundup Ultra Max	Crawfish production not mentioned in restrictions. Herbicide cannot be applied to areas where surface water is present.
Stam	Crawfish not specifically mentioned in restrictions. Commercial catfish production prohibited.
Storm	Do not use Storm on rice fields where commercial crawfish production is practiced.
2,4-D (UAP)	Commercial crawfish production not specifically mentioned. May be toxic to aquatic invertebrates.
Whip	Do not apply in areas where crawfish are commercially cultivated.

Table 7. Icon† Insecticide Rates as Influenced by Seed Treatment and Planting Rate

Pounds of Active Ingredient per Acre

Rate of Icon† per 100 lbs. of Seed (fl. oz.)	Rough Rice Seeding Rates (lbs. per acre)								
	80	90	100	110	120	125	130	140	150
0.35	0.014	0.016	0.017	0.019	0.021	0.022	0.022	0.024	0.026
0.40	0.016	0.018	0.020	0.022	0.024	0.025	0.026	0.028	0.030
0.50	0.020	0.022	0.025	0.027	0.030	0.031	0.032	0.034	0.037
0.60	0.024	0.027	0.030	0.032	0.035	0.037	0.038	0.041	0.044
0.70	0.028	0.031	0.034	0.038	0.041	0.043	0.045	0.048	0.052
0.80	0.032	0.035	0.039	0.043	0.047	0.049	0.051	0.055	0.059
0.90	0.035	0.040	0.044	0.049	0.053	0.055	0.058	0.062	0.066
1.00	0.039	0.044	0.049	0.054	0.059	0.062	0.064	0.069	0.074
1.10	0.043	0.049	0.054	0.060	0.065	0.068	0.070	0.076	0.081
1.20	0.047	0.053	0.059	0.065	0.071	0.074	0.077	0.083	0.089
1.25	0.049	0.055	0.062	0.068	0.074	0.077	0.080	0.086	0.092

- Active ingredient is not within label limits on a per acre basis

- Active ingredient is within label limits on a per acre basis

Summary

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