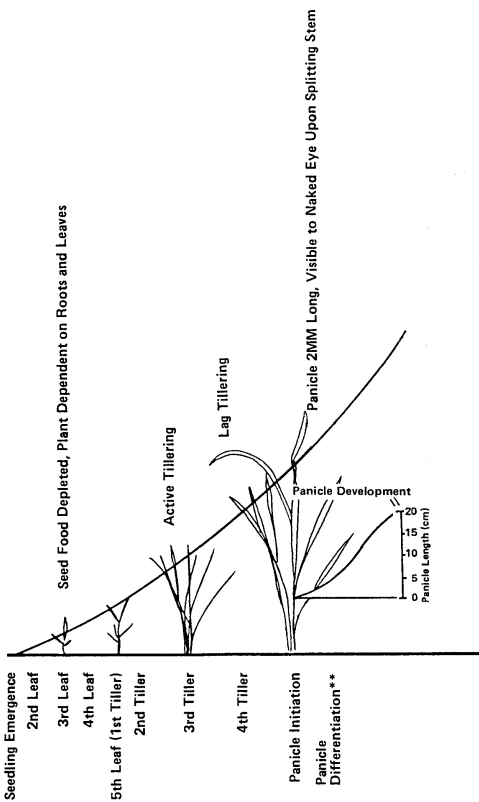


Agronomics



Coleoptile and Radicle Development



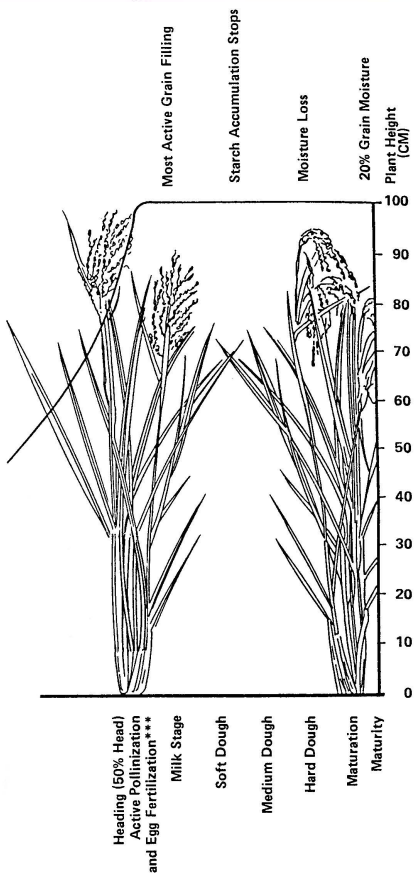
5-20 Days*	15 to 25 Days*	24 to 42 Days*	Variable ****	†	19 to 25 Days*
STAGE I VEGETATIVE					STAGE II REPRODUCTIVE

† 3 to 5 days

* Under warm conditions, use the lower number of days, and for cool conditions, use the larger number of days.

** The reproductive stage begins with panicle initiation.

Visible to Naked Eye Upon Splitting Stem



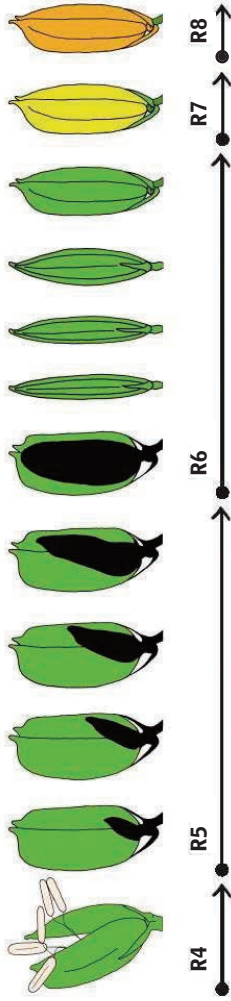
Variable ****	†	19 to 25 Days*	30 to 45 Days*
		STAGE II REPRODUCTIVE	STAGE III GRAIN FILLING & MATURATION

*** Stage II begins when 50% of the florets are pollinated.

**** Variable time – 0 to 25 days (dependent upon variety).

Individual Grain Development

The development of the individual rice grain from anthesis through grain dry-down.



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Cultivar Characteristics

Brief description of commonly grown conventional, Clearfield and hybrid rice cultivars

Cultivar	Year Released and State	Highlights
Antonio	2012 – TX	Short season, semi-dwarf LG variety with good yield potential and milling quality. Similar to Cocodrie in characteristics.
Caffey	2011 – LA	Semi-dwarf, short-season, MG variety with excellent yield potential and milling quality. MS to sheath blight, blast.
Cheniere	2003 – LA	Semi-dwarf, short-season, LG variety with good yield potential, less oil in bran than Cocodrie and better straighthead tolerance.
CL111	2009 – BASF, Horizon Ag	Very short-season, semi-dwarf LG Clearfield variety with good yield potential. VS to sheath blight and S to blast, straighthead.
CL151	2008 – BASF, Horizon Ag	Short-season, semi-dwarf LG Clearfield variety with excellent yield potential. VS to sheath blight, S to blast, straighthead.
CL152	2011 – BASF, Horizon Ag	Short-season, semi-dwarf LG Clearfield variety. Good yield potential and milling. S to sheath blight, MS to blast, straighthead.
CL XL729	2006 – RiceTec, Inc.	Short-season LG Clearfield hybrid with excellent yield potential, good milling yield potential and good disease resistance.
CL XL745	2007 – RiceTec, Inc.	Short-season LG Clearfield hybrid w/ excellent yield potential, good milling yield potential and good disease resistance.

Cocodrie	1997 – Louisiana	Short-season, semi-dwarf LG variety with good yield potential and milling quality.
Francis	2002 – Arkansas	Very short-season LG variety with excellent yield potential, VS to blast.
Jupiter	2005 – Louisiana	Mid-season MG variety with excellent yield potential, good milling quality and R to bacterial panicle blight.
LaKast	2014 – Arkansas	Short-season LG variety with excellent yield potential and good milling yield. S to blast, sheath blight.
Roy J	2010 – Arkansas	Mid-season, standard-statured LG variety with excellent yield potential and very strong straw. S to blast, MS to sheath blight.
Taggart	2009 – Arkansas	Mid-season, standard-statured LG variety with good yield potential and large kernel size.
Wells	1999 – Arkansas	Short-season LG variety with excellent yield potential and S to blast.
XL723	2004 – RiceTec, Inc.	Very short-season LG hybrid with good yield potential, average milling quality. R to blast, MR to sheath blight.
XL753	2011 – RiceTec, Inc.	Short-season LG hybrid with excellent yield potential, good milling.

LG = long-grain; MG = medium-grain

R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible

Seeding Rates

Seeding rates for different seeds per square foot based on seed weight

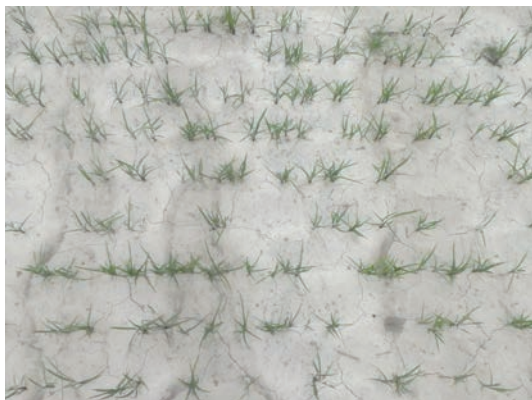
Cultivar	Seed Weight ¹	Seeds/lb	Number of Seed/Square Foot									
			10	15	20	25	30	35	40	45		
			Seeding Rate, lb/A									
Antonio	21.9	20,731	--	--	42	53	63	74	84	95		
Caffey	28.7	15,813	--	--	55	69	83	96	110	124		
Cheniere	21.8	20,826	--	--	42	52	63	73	84	94		
CL111	26.0	17,462	--	--	50	62	75	87	100	112		
CL151	23.3	19,485	--	--	45	56	67	78	89	101		
CL152	20.5	22,190	--	--	39	49	59	69	79	88		
CL163	24.0	18,940	--	--	46	57	69	80	92	103		
CL172	24.0	18,893	--	--	46	58	69	81	92	104		
CL261	24.6	18,455	--	--	47	59	71	83	94	106		
CL271	25.9	17,529	--	--	50	62	75	87	99	112		

Cocodrie	25.6	17,734	--	--	49	61	74	86	98	111
Francis	22.8	19,912	--	--	44	55	66	77	88	98
Jazzman	25.2	18,016	--	--	48	60	73	85	97	109
Jazzman-2	22.4	20,295	--	--	43	54	64	75	86	97
Jupiter	25.8	17,597	--	--	50	62	74	87	99	111
LaKast	25.2	18,045	--	--	48	60	72	84	97	109
Mermentau	23.3	19,460	--	--	45	56	67	78	90	101
RT CL XL729	21.8	20,835	21	31	42	--	--	--	--	--
RT CL XL745	21.7	20,922	21	31	42	--	--	--	--	--
RT XL723	21.1	21,476	20	30	41	--	--	--	--	--
RT XL753	20.5	22,146	20	30	39	--	--	--	--	--
Roy J	22.9	19,825	--	--	44	55	66	77	88	99
Taggart	27.4	16,569	--	--	53	66	79	92	105	118
Wells	25.2	18,016	--	--	48	60	73	85	97	109

¹Grams per 1,000 grains or milligrams per seed.

Seed Spacing for Drill Calibration

Seeds Per Row Foot (Varieties)			Seeds Per Row Foot (Hybrids)			
Seeds Per Sq Ft	Row Spacing in Inches		Seeds Per Sq Ft	Row Spacing in Inches		
	6	7.5		8	6	7.5
24	12.0	15.0	8	4.0	5.0	
27	13.5	16.9	9	4.5	5.6	
30	15.0	18.8	10	5.0	6.3	
33	16.5	20.6	11	5.5	6.9	
36	18.0	22.5	12	6.0	7.5	
39	19.5	24.4				
42	21.0	26.3				
45	22.5	28.1				
48	24.0	30.0				
	24.0	30.0	32.0	6.0	7.5	8.0



Example of plant stand from low seeding rate.



Example of plant stand from high seeding rate.

Fungicide Seed Treatments

(apply with commercial seed-treating equipment)

Disease	Fungicide	Active Ingredient	Rate/cwt seed
Pythium diseases	Allegiance FL (Apron)	metalaxyl	0.75-1.5 fl oz
	Apron XL LS ¹	mefenoxam	0.32-0.64 fl oz
	EverGol Energy ²	prothioconazole + penflufen + metalaxyl	1-2 fl oz
Rhizoctonia seedling diseases, general seed rots	RTU-Vitavax-Thiram ³	carboxin + thiram	5.0-6.8 fl oz
	Maxim 4FS ⁴	fludioxonil	0.08-0.16 fl oz
	EverGol Energy ²	prothioconazole + penflufen + metalaxyl	1-2 fl oz
Pythium, Rhizoctonia, general seed rot	RTU-Vitavax-Thiram ³	carboxin + thiram	5.0-6.8 fl oz
	Allegiance FL or Apron XL	metalaxyl or mefenoxam	0.75-1.5 fl oz or 0.32-0.64 fl oz

Pythium, Rhizoctonia, general seed rot	Apron XL LS + Maxim 4FS ¹	mefenoxam + fludioxonil	0.32-0.64 fl oz + 0.08-0.16 fl oz
	Dynasty ⁵	azoxystrobin	0.153-1.53 fl oz
	Trilex 2000	trifloxystrobin + metalaxyl	1-2 fl oz
	EverGol Energy ²	prothioconazole + penflufen + metalaxyl	1-2 fl oz

Read and follow all label directions when using these products.

¹Use higher rates for early planting or other severe disease situations.

²Must use high rate for moderate to high seedling disease pressure.

³Apply with commercial seed-treating equipment or use as a pour-on hopper box treatment.

⁴Use higher rate for severe disease situations.

⁵Usually sold with Apron XL and Maxim on rice to improve seedling disease control. To reduce seedborne blast, use rates above 0.75 fl oz per cwt.

Insecticide Seed Treatments

(apply with commercial seed-treating equipment)

Insecticide	Active Ingredient	Rate/cwt Seed ¹	Comments ²
Dermacor X-100 ³	chlorantraniliprole	1.5-6.0 fl oz	Control of RWW larvae; fall armyworm and true armyworm larvae. Suppression of GC larvae.
NipsIt INSIDE 5 FS	clothianidin	1.92 fl oz	Control of RWW and GC larvae; chinch bug nymphs and adults. Use only on dry-seeded rice. DO NOT spray crop with neonicotinoid insecticide after using NipsIt INSIDE. DO NOT use near fish or crawfish farms.
CruiserMaxx Rice	thiamethoxam	7.0 fl oz	Control of RWW and GC larvae; chinch bug nymphs and adults. DO NOT plant by aerial application, use treated fields for aquaculture, or exceed 120 lb seed per acre. NOT labeled for water-seeded rice.

Read and follow all label directions when using these products.

¹ See label for details on rates and restrictions.

² RWW = rice water weevil; GC = grape colaspis.

³ 24C Special Local Need label for use in water-seeded rice until June 5, 2018.

Results of 2014 Planting Dates Studies

Cultivar	Mar 26	Apr 18	May 2	May 21	Jun 5	Jun 18	MEAN
Antonio	197	192	177	174	122	132	166
Caffey	249	231	157	207	132	147	187
CL151	225	232	191	181	140	151	186
CL152	220	209	174	173	139	143	176
CL163	216	206	173	171	107	138	168
CL172	235	213	183	182	137	141	182
CL271	218	219	153	174	136	136	173
Jupiter	258	269	195	223	133	154	205
LaKast	242	255	203	199	131	147	196
Mermentau	194	210	185	173	139	136	173
RT CL XL729	244	242	213	211	166	187	210
RT CL XL745	207	229	207	190	160	160	192
RT XL753	221	253	240	240	189	180	221
Roy J	245	224	163	170	130	140	179
Wells	239	225	187	179	133	158	187

Results of 2012-2014 Arkansas Rice Performance Trials

Cultivar	Grain		50% Hdg	Height in	Milling HR-TR	Yield (bu/A)			
	Size	Straw Rating				DAE	2012	2013	2014
Antonio	L	2.0	83	37	65-71	187	176	164	176
Caffey	M	2.2	85	38	58-68	197	198	202	199
CL111	L	2.1	81	38	63-70	169	162	170	167
CL151	L	1.6	83	39	64-71	191	169	190	184
CL152	L	1.7	85	37	65-71	179	153	144	158
CL172	L	1.0	84	35	64-71	214	174	165	184
Jupiter	M	2.9	86	38	60-67	197	178	196	190
LaKast	L	2.5	83	42	62-71	196	186	193	192
Mermentau	L	1.4	83	37	65-70	199	173	168	180
RT CL XL729	L	3.9	83	43	61-70	184	188	191	188
RT CL XL745	L	4.1	80	43	60-71	185	165	193	181
RT XL753	L	2.5	81	42	58-71	229	225	246	233
Roy J	L	1.0	88	41	63-71	219	188	192	200
Taggart	L	1.8	87	44	59-70	187	186	187	186
Wells	L	2.1	85	41	58-70	194	178	182	185

Soil Temperature

Minimum, maximum and mean undisturbed soil temperatures at a 4-inch depth for selected dates at three locations in Arkansas

Location	Rohwer, SEREC ¹			Stuttgart, RREC ²			Keiser, NEREC ¹		
Latitude	33.45 N			34.49 N			35.68 N		
Soil Texture	Perry Clay			DeWitt Silt Loam			Sharkey Clay		
Daily Temperature	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Date	4-inch undisturbed soil temperature, °F								
March 15	50	57	54	46	56	51	44	54	49
April 1	53	52	57	49	62	55	46	55	51
April 15	60	69	64	56	69	63	55	64	59
May 1	63	74	69	59	71	65	58	69	64
May 15	69	75	72	66	79	72	64	81	73
May 31	69	78	74	69	78	73	70	74	72

¹Temperatures are the six-year average from 1990 to 1995.

²Temperatures are the nine-year average from 1990 to 1998.

General Agronomic Information by Seeding Date

General seeding, seedling emergence and flooding date information for the DD50 seeding date study in 2010 at the Rice Research and Extension Center near Stuttgart, Arkansas

Parameter	Seeding Date			
	March 16	April 14	May 9	June 5
Emergence date	April 9	April 30	May 19	June 10
Flood date	May 15	June 5	June 12	June 27
Days from seeding to emergence	24	16	10	5
Days from seeding to flooding	60	51	34	22
Days from emergence to flooding	36	37	24	17

Optimum Seeding Date by Geography

General suggested optimum and recommended seeding dates for south, central and north Arkansas geographic areas based on yield potential and management considerations

Geographic Region	Optimum ¹		Recommended Absolute ²	
	Begin	Cut-off	Begin	Cut-off
South	March 28	May 20	March 20	June 15
Central	April 1	May 15	March 25	June 10
North	April 10	May 10	April 1	June 5

¹ Seeding during the optimum time frame does not guarantee high yields or suggest that crop failure cannot occur when rice is seeded during these times.

² Recommended absolute does NOT mean that a successful rice crop cannot be grown if seeded outside of the dates listed. Success may be evaluated and/or interpreted using various parameters (i.e., cropping systems, management, cash flow, field reclamation, etc.) and may differ among specific cultivars.

Expected Freeze Dates by Geography

Expected freeze dates for several eastern Arkansas locations

City – County	Last Date in Spring with Temperature < 32°F ¹	First Date in Fall with Temperature < 32°F ¹
Corning – Clay ²	April 4 to April 17	October 11 to October 25
Augusta – Woodruff ³	March 29 to April 14	October 19 to November 2
Pine Bluff – Jefferson ²	March 20 to April 3	October 26 to November 9
Crossett – Ashley ²	April 4 to April 16	October 22 to November 2

¹Freeze dates were obtained from county soil surveys and are the dates for which temperatures below 32°F first or last occur in one to five out of every ten years.

²Time period from 1951 to 1974.

³Time period from 1951 to 1990.

Influence of Emergence Date on Harvest

Influence of emergence date on predicted dates for 20% grain moisture for common cultivars using 30-year weather norms for Stuttgart, Arkansas

Variety	Rice Emergence Date									
	April 1	April 10	April 20	May 1	May 10	May 20	June 1	June 10	June 20	June 30
	Predicted Date for 20% Grain Moisture ¹									
CL111	Aug 14	Aug 16	Aug 20	Aug 26	Sept 1	Sept 8	Sept 19	Sept 27	Oct 6	Oct 13
CL151	Aug 12	Aug 14	Aug 18	Aug 23	Aug 30	Sept 6	Sept 17	Sept 25	Oct 4	Oct 11
LaKast	Aug 13	Aug 15	Aug 19	Aug 24	Aug 31	Sept 7	Sept 18	Sept 26	Oct 5	Oct 12
Jupiter	Aug 21	Aug 23	Aug 28	Sept 1	Sept 8	Sept 15	Sept 26	Oct 4	Oct 13	Oct 20
CL XL745	Aug 12	Aug 14	Aug 18	Aug 22	Aug 30	Sept 6	Sept 17	Sept 25	Oct 4	Oct 11
XL753	Aug 11	Aug 13	Aug 17	Aug 22	Aug 30	Sept 5	Sept 16	Sept 25	Oct 3	Oct 10
Roy J	Aug 24	Aug 26	Aug 30	Sept 3	Sept 11	Sept 17	Sept 28	Oct 6	Oct 15	Oct 22

¹ Approximate date of 50% heading can be estimated by subtracting 35 days from listed date for CL111, CL151, LaKast, CL XL745, XL753 and Roy J; or 45 days for Jupiter.

Water-Seeded Rice

Conventional Water-Seeding

Field Prep:

- Destroy winter vegetation.
- Reduce the chance of seedling drift.

General Guidelines:

- Destroy winter vegetation.
- Reduce the chance of seedling drift:
 - Rough seedbed essential.
 - Leaving soil ridged minimizes seedling drift.
 - On clay soil – use disk and/or field cultivator.
 - On silt loam soil – use a groover.
- Recommended seeding rate is 30% greater than for drill-seeded rice – greater risk for seed loss from blackbirds, rice seed midge and rice water weevil.

Presoaking:

- Seed can be dry or pregerminated (presoaked).
- Pregerminated seed recommended to enhance stand establishment.
- Soak seed for 24-36 hours, drain for 24-48 hours, then fly onto field.
- Duration of drain period dependent on air and water temperature.
- DO NOT water-seed rice treated with gibberellic acid – causes rapid shoot development and increases risk of seedling drift.

Water Management:

- Adequate water supply necessary.
- Small fields ensure precise water management.
- Poor water management leads to nitrogen loss and reduced red rice suppression.
- Pinpoint flood recommended.
 - Drain water to allow seedlings to peg down.
 - DO NOT allow soil to crust.
 - Drain period is 1-5 days, depending on soil and weather conditions.
 - Reflood field to shallow depth and increase depth as seedlings develop.

Nutrient Management

Specific rates and nitrogen management practices are outlined in the **Soil Fertility** section.

Weed Control:

- Water-seeding rice can be used to effectively reduce red rice.
- A rule of thumb is that grass or rice will emerge either through soil or water but not both.
- For best red rice control, flood fields immediately after land preparation.
- Certain restrictions may apply when used in a water-seeded system. Refer to the herbicide label and MP44, *Recommended Chemicals for Weed and Brush Control*, for product use information.

Insect Control:

- Rice water weevil can be a severe problem in water-seeded rice.
- Preventative treatments are generally required to control this pest.
- Specific treatment options are outlined in the **Insect Management** section.

No-Till Water-Seeded Rice

Rice Stubble Management:

- Decaying residue from the previous crop can be toxic to seedling rice.
- Residue should be destroyed by tillage or burning.

Nitrogen Management:

- Critical for water-seeded rice.
- System doesn't allow efficient use of nitrogen fertilizer.

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How to Use the DD50

DD50 can be used by individual producers who manage their own crops, by consultants with multiple clients or by county agents for producers within their county.

<http://dd50.uaex.edu/dd50Logon.asp>

DD50 accumulation begins the day plants first emerge from the soil in dry-seeded rice (when plants have 1/2 inch shoot lengths in water-seeded rice).

At the beginning of the season, the DD50 operates using 30-year temperature averages. It is continually updated with the current year's weather data to improve accuracy. Accuracy is influenced by management practices and variations in weather within each weather zone.

The DD50 program is not intended as a substitute for scouting fields but rather as a set of guidelines to assist growers and consultants with management decisions. Therefore, growers are encouraged to manually check the plant growth stage before making management decisions where growth stage is extremely important.

DD50 Accumulations

DD50 accumulations from recent years compared to the 30-year average accumulation at Stuttgart, Arkansas

Date	30-year mean	cumulative heat units												
		2006	2007	2008	2009	2010	2011	2012	2013	2014				
March 16-31	112	53	251	105	108	59	89	292	50	46				
April 1-15	155	228	80	123	86	239	230	243	142	136				
April 16-30	228	297	201	188	265	232	252	220	211	214				
May 1-15	285	248	371	244	268	338	254	349	209	292				
May 16-31	376	414	359	384	338	420	347	432	393	355				
June 1-15	408	410	427	458	399	471	476	378	398	396				
June 16-30	439	439	457	436	476	471	466	453	452	433				
July 1-15	447	447	430	446	450	464	465	455	399	423				
July 16-31	479	486	465	507	422	503	504	499	461	406				
August 1-15	443	477	480	427	438	472	457	453	451	414				
August 16-31	469	480	506	435	425	482	484	445	449	484				

Explanation of the DD50 Printout

The DD50 provides predicted dates for timing 25 management practices.

Growth Stages:

- Beginning and Optimum Tillering, Apply Early/Preflood N
- Final Recommended Time to Apply Preflood N
- Beginning Internode Elongation
- 1/2 inch IE
- 50% Heading
- Drain Date
- 20% Grain Moisture

Herbicides:

- Aim or Grandstand
- Blazer + Propanil Tank Mix
- Blazer or Lockout Application
- Londax
- Permit
- Phenoxy's, 2,4-D
- Propanil
- Regiment
- Ricestar
- Whip

Other:

- Rice Water Weevil Alert
- Straighthead
- Midseason N
- Apply Boot N
- Sheath Blight
- Apply Tilt for Kernel Smut Prevention
- Blast
- Stink Bugs

Example of DD50 Printout

University of Arkansas Cooperative Extension Service
Rice DD50 Report

Jarrold Hardke
RREC
Stuttgart, AR 72160

July 24, 2013 13:17
County: Arkansas
Variety: Roy J

Field: Rice Production (1 acres) Field # 1
Emergence date: 4/30 DD50 weather zone: 11

**** Predicted dates for timing specific management practices in rice ****

Beginning and Optimum Tillering: Apply Early/Preflood N..... 5/21 - 5/30

Final recommended time to apply preflood N if early N delayed... 6/11

Rice Water Weevil Alert: 5/30 - 6/ 7
High risk of infestation, at flood scout first 7 days for leaf scars.

Roy J is rated susceptible for straighthead.

Have soil dried between..... 6/12 - 6/26

Begin checking for beginning of internode elongation..... 6/23

Predicted 1/2 inch internode elongation:..... 6/30

Apply 1st midseason N split between:..... 6/24 - 6/30

(May apply all midseason N as a single application)

(Optional) Apply 2nd midseason N between:..... 6/30 - 7/ 7

Scout for sheath blight symptoms*..... 6/23 - 7/27

(Roy J is rated moderately susceptible for sheath blight.)

Boot N Application Not recommended

Apply Tilt for kernel smut prevention*..... 7/14 - 7/27

Roy J rated very susceptible for kernel smut; treatment recommended.

Critical scouting time for blast symptoms*..... 6/23 - 8/ 2

(Roy J is rated susceptible for blast.)

1st critical stage (approximate) for fungicide application*... 7/24

2nd critical stage (approximate) for fungicide application*... 8/ 2

* See explanation for disease control measures in MP192

Scout for rice stink bug between:..... 8/ 1 - 9/ 4

Predicted date for 50% Heading:..... 7/31

Draining field 8/25

Approximate time of 20% grain moisture:..... 9/ 4

Herbicide Application Information

Apply Ricestar Between:..... 5/12 - 6/23

Apply Regiment Between:..... 5/17 - 6/23

Apply AIM or Grandstand - R between:..... 5/17 - 6/30

Apply Blazer+Propanil tank-mix between:..... 5/17 - 6/23

Apply Londax between:..... 5/12 - 7/ 6

Apply Blazer or Lockdown for coffeebean/NJV control..... 6/15 - 7/16

Propanil application cut-off date..... 6/23

Recommended Beyond application cut-off date Not recommended

Apply Phenoxxy (2,4 - D) between:..... 6/18 - 6/30

Recommended Grasp application cut-off date..... 7/ 6

Recommended Permit application cut-off date..... 7/18

Produced through the joint efforts of the Agricultural Experiment Station and the UA CES
using weather data supplied by the Southern Regional Climate Center - LSU.

Drain Timing

General guide for days to draining after 50% heading:

Long-grain	25 days
Medium-grain	30 days
Short-grain	35 days



Rice panicles at varying maturity levels described by percent straw color: Left – 100%, Center – 67%, Right – 33%.

Fields with nearly all kernels straw colored (100%; left) are well past the safe point to drain.

Fields with two-thirds kernels straw colored (67%; center) would be safe to drain on a silt loam soil.

Fields with one-third kernels straw colored (33%; right) would be too early to drain on a silt loam soil, but approaching the point of safe to drain on a clay soil.

Harvest Aids

Sodium Chlorate

Apply 3-6 lb AI per acre when rice grain is near 25% moisture.

Harvest within 4-7 days after application.

Although typically used to desiccate weeds and foliage, grain moisture is also reduced.

Sodium chlorate at 6 lb AI significantly reduces grain moisture by 2% to 5% within 4 days after application.

Sodium chlorate should be applied to rice that is between 18% to 25% moisture with timely harvest following application.

Desiccation is noticeable within 36 hours – especially with high temperatures.

Exercise caution when considering sodium chlorate on fields with uneven maturity.

Aim 2 EC

Aim can be added or used instead of Sodium Chlorate for desiccation of primarily morningglory species. Apply 1.5 oz/A of Aim plus 1% COC when average grain moisture is at or near 25%.