

FRICE

INFORMATION

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'Francis' - A Summary of Research and Recommendations¹

Francis (RU9901081) is a high yielding, long grain rice variety developed and released by the University of Arkansas Agricultural Experiment Station in 2002. Francis was named in honor of Mr. Francis J. Williams (1923-2001), director of the Rice Research and Extension Center (RREC), located near Stuttgart, AR from 1953 to 1988. Francis has higher yield potential than LaGrue and Wells with similar susceptibility to the major rice diseases. Francis was derived from crosses with Lebonnet, Dawn, Starbonnet, LaGrue, and other experimental lines (Lebonnet/9902/3/Dawn/9695/Starbonnet/4/LaGrue). Francis has typical U.S. long grain cooking qualities, an apparent starch amylose content of 22.1% and an intermediate gelatinization temperature (70 to 75°C).

Francis was entered into the Arkansas foundation seed program during 2001 at the Rice Research & Extension Center and foundation seed was made available to Arkansas seed growers in 2002. In 2002, Francis was seeded on about **2500 acres** in Arkansas. *Research on rice management and yield performance in Arkansas is made possible by rice grower check-off funds administered by the Arkansas Rice Research and Promotion Board.*

AGRONOMIC TRAITS AND YIELD COMPARISONS

A comparison of Francis yields to other popular mid-south rice varieties from the Arkansas Rice Performance Trials (ARPT) shows that Francis has excellent yield potential in all areas of Arkansas (Table 1). Grain yields have averaged 4 bu/acre

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better than Wells and 12 bu/acre better than LaGrue in these studies over a three year period. The head rice yield potential of Francis has also been slightly better than LaGrue and Wells in most of these tests and appears to be more stable across environments.

Date of seeding studies conducted at the RREC during 2001 and 2002 suggest that Francis yield potential is stable across a wide range of seeding dates but, as with most other currently grown varieties, yields tend to be higher when planted earlier (Table 2). Francis performs well when planted late compared to other conventional varieties (i.e., after June 1). Growers should be aware, however, that the conditions favoring rice blast are more likely in late-planted rice. Therefore, Francis should not be planted in fields that favor blast, regardless of planting date.

The number of days required to reach 50% heading varies with seeding date and management (Tables 3 and 4). Date of planting studies show that Francis heads at about the same time as Wells. Francis is supported by the Arkansas DD50 program. Based on 30-year weather norms and current DD50 thresholds, Francis requires approximately 53 days (1235 DD50 units) and 80 days (2120 DD50 units) to reach ½ inch internode elongation (IE) and 50% heading, respectively (based on Stuttgart weather data; Tables 4 and 5). Differences in crop management and environment may result in a different rate of plant development than that predicted by the DD50 program.

The grain weight and seed dimensions of Francis are slightly less than those of Wells and LaGrue (Table 5). Based on seed weight, 87.2 lb/A (1.9 bus/A) is required to obtain 40 seed/ft² or 23 seed per 7 inch drill row foot. Straw strength is similar to that of Wells and LaGrue, but Francis is approximately 2 inches shorter than Wells and 5 inches shorter than LaGrue. Although seedling vigor tests have not been performed, visual observations in variety studies suggest that Francis has good seedling vigor and is comparable to LaGrue. Use of fungicide and/or gibberellic acid seed treatments are advised when seeding at reduced rates, early seed dates, poor seedbed conditions, no-till seedbeds, and on clay soils.

Results from a survey of 2002 Francis seed growers supports research observations on seedling vigor and yield potential at low seeding rates/stand densities (Table 6). The survey represented 24 growers and all 24 indicated they would plant Francis in future years. The overall performance of Francis was rated as either good or excellent with only one response of average. Small amounts of leaf blast were reported by four growers and one rotten neck infestation was reported. However, blast varies greatly from year to year. Sheath blight was reported by 18 of the 24 respondents while kernel smut was reported by 11 of the 24 respondents.

FERTILIZATION

The recommended nitrogen (N) rate for Francis grown on silt and sandy loam soils following soybean in rotation is **150 lb N/A** (Table 7). This recommendation is for 150 lb N/A applied in a 2-way split application where 105 lb N/A is applied pre-flood and

followed by 45 lb N/A at midseason. The total and pre-flood N rate should be increased by 30 lb N/A for rice grown on clay soils.

Limited data is available to suggest how Francis will perform on high pH and salt affected soils in relation to other varieties. Preliminary observations suggest that Francis may perform similar to LaGrue, which is one of the more tolerant long-grain varieties for these kinds of soil conditions. As with all varieties, follow University of Arkansas soil test recommendations for phosphorus, potassium and zinc fertilizer rate recommendations.

PEST MANAGEMENT

Francis has not shown sensitivity to registered herbicides when applied at the labeled rates and times. Always read the pesticide label to ensure that specific varieties are not excluded and/or included for each herbicide.

Based on peck damage taken from the ARPT, Francis is similar to or slightly less susceptible to rice stink bug damage than Wells or LaGrue (Table 1). Although many producers are excited about the yield potential of this new variety, they should note that Francis is susceptible to several important diseases and thus should not be planted in “high-risk” fields for these problems. Francis has similar disease susceptibility as Wells and LaGrue (Table 8). Francis is susceptible to rice blast disease and, therefore, should be planted in fields that have adequate water to maintain a good flood (4-6 inches), particularly during the reproductive growth stages. Besides blast, Francis is rated **very susceptible** to kernel smut, **susceptible** to false smut, and **moderately susceptible** to straighthead and sheath blight. A preventative application of propiconazole fungicide (Tilt® or Propimax®) should be applied during the boot stage in fields that have a history of kernel smut. Fungicides (Quadris® or GEM®) may also be needed to reduce blast damage in certain areas and years. Fungicide applications may also be warranted when sheath blight incidence (% positive stops) reaches 50% between 7-14 days after ½ inch IE.

ADDITIONAL INFORMATION SOURCES

Univ. of Arkansas Cooperative Extension Service Web	www.uaex.edu
S	Rice Information Sheet No. 145
S	Rice Information Sheet No. 146
S	Rice Information Sheet No. 148
S	Rice Information Sheet No. 151
S	
University of Arkansas Agricultural Publications	
http://www.uark.edu/depts/agripub/Publications/	
S	B.R. Wells Rice Research Studies 1999 – 2001

Table 1. Agronomic characteristics of Francis and other selected varieties in the Arkansas Rice Performance Trials 2000 - 2002.

Maturity Group and Variety	Grain Type ¹	Straw Strength ²	50% Heading ³	Plant Height	Milled Grain Weight	Rough Seed Weight	Pecky Rice ⁴	Milling Yield				Grain Yield by Year			
								2000	2001	2002	Mean	2000	2001	2002	Mean
		Rating	Days	in.	mg	mg	%	% Head Rice - % Total Rice				Bushels / Acre			
Francis	L	3	84	39	16.5	21.7	1.49	64-71	63-70	64-72	64-71	187	190	203	193
Ahrent	L	3	82	41	16.4	22.2	2.42	63-69	63-67	65-70	64-69	154	176	176	169
Cocodrie	L	2	83	38	17.6	21.8	2.71	64-70	67-71	66-73	67-71	160	180	186	175
LaGrue	L	4	86	44	17.8	24.0	1.52	57-68	62-69	63-71	61-69	167	180	197	181
Kaybonnet	L	5	84	43	14.7	20.4	1.28	60-70	66-70	66-72	64-71	152	168	164	161
Wells	L	3	85	41	18.5	25.2	1.74	61-74	66-71	64-74	62-73	181	190	197	189
Cypress	L	2	86	36	17.4	23.1	2.07	65-70	66-70	67-72	66-70	147	154	169	157
Drew	L	5	87	45	16.1	21.4	1.73	62-71	65-70	67-73	64-71	159	166	186	170

1 Grain type: L=long grain; M=medium grain

2 Relative straw strength based on field tests using the scale: 0=very strong straw, 9=very weak straw.

3 Number of days from emergence until 50% of the panicles are visibly emerged from the boot

4 Average percent, by weight, in brown rice for stink bug damage from 1999-2001.

Table 2. Yield performance of Francis and other selected varieties in date of seeding studies conducted during 2001-2002 at the RREC.

Variety	2001 Seed Date				2002 Seed Date					
	April 4	April 26	May 17	June 11	2001 Avg.	Mar. 29	April 25	May 16	June 12	2002 Avg.
	bus/acre									
Francis	195	169	153	167	171	207	209	183	148	187
Ahrent	165	156	156	142	155	184	194	152	129	165
Drew	176	164	124	139	151	-	-	-	-	-
Wells	185	165	167	161	170	203	196	170	137	177

Table 3. Effect of seeding date on the days required to reach ½" internode elongation for Francis and other selected varieties during 2001-2002 at the RREC.

Variety	2001 Seed Date				2002 Seed Date			
	April 4	April 26	June 11	2001 Avg.	Mar. 29	April 25	May 16	2002 Avg.
	days to ½" internode elongation							
Francis	60	55	43	53	63	53	41	52
Ahrent	57	58	45	54	67	56	44	56
Drew	63	57	44	55	-	-	-	-
Wells	64	57	45	55	68	55	43	55

Table 4. Effect of seeding date on the days required to reach 50% heading for Francis and other selected varieties during 2001-2002 at the RREC.

Variety	2001 Seed Date				2002 Seed Date					
	April 4	April 26	May 17	June 11	2001 Avg.	Mar. 29	April 25	May 16	June 12	2002 Avg.
	days to 50% Heading									
Francis	87	85	72	74	80	92	82	71	69	79
Ahrent	81	82	67	73	76	91	81	68	66	77
Drew	91	87	73	79	83	-	-	-	-	-
Wells	89	85	71	76	80	97	82	71	71	80

Table 5. Kernel dimensions of Francis, LaGrue, and Wells.

Kernel Class	Kernel Weight	Length	Width	Thickness	Length/Width Ratio
	mg		mm		
Francis-Rough	22.7	8.91	2.50	1.98	3.56
Francis-Brown	17.3	6.84	2.19	1.70	3.21
Francis-Milled	16.5	6.50	2.04	1.65	3.20
LaGrue-Rough	25.1	9.36	2.58	1.96	3.63
LaGrue-Brown	21.0	7.43	2.21	1.77	3.36
LaGrue-Milled	19.0	7.07	2.13	1.70	3.32
Wells-Rough	25.1	9.46	2.31	1.80	4.10
Wells-Brown	21.3	7.34	2.05	1.63	3.58
Wells-Milled	18.9	7.00	1.94	1.51	3.61

Table 6. Results of 2002 seed grower survey for Francis.

Responses Returned	26		
Acres Represented	1867		
Average Grain Yield @ 12% moisture	175		
Yield Range, bus/A	133-203		
Avg. Head Rice % (8 of 24 responses)	61		
Avg. Total Rice % (8 of 24 responses)	70		
Avg. Seed Rate (range)	32 lbs/acre (18 – 90 lbs /acre)		
Seedling Vigor	Excellent - 13	Good - 12	Avg -1
Threshing at Harvest	Easy - 16	Avg – 10	Hard - 0
Lodging	None - 15	Slight - 8	Moderate - 3
Average N Rate, lb/A	189 lbs N/acre (420 lbs urea/acre)		
Sheath Blight	None - 6	Slight - 17	Moderate - 3
Kernel Smut	None - 13	Slight - 7	Moderate - 6
Blast Found; 4 of 26	Leaf Blast - 4	Rotten Neck - 1	
Fungicide Applied	Sheath Blight 14 of 26	Blast; 4 of 26	Kernel Smut; 11 of 26
Overall Rating	Excellent - 17	Good - 8	Avg - 1

Table 7. Francis grain yield response to nitrogen fertilizer applied in a 2-way split application in studies conducted during 2001 and 2002. The optimum N rate for each location and year are in bold.

N Rate	RREC (DeWitt silt loam)		PTBS (Calloway silt loam)		SEREC (Perry Clay)		NEREC (Sharkey clay)
	2001 ²	2002 ³	2001	2002	2001	2002	2002
lbs/acre	Bu/acre						
0	79	127	117	115	67	76	48
60	140	177	177	136	-	-	-
90	137	205	184	148	147	140	120
120	186	213	196	166	154	168	160
150	204	219	223	187	191	175	177
180	196	223	235	197	188	173	198
210	-	-	-	-	190	178	215

1 Source: B.R. Wells Rice Research Studies 2001, Research Series 468.

2 In 2001, 2-way split N application where pre-flood-midseason split for each N rate was applied as 60 (30-30), 90 (45-45), 120 (60-60), 150 (90-60), and 180 (120-60).

3 In 2002, 2-way split N application where pre-flood-midseason split for each N rate was applied as 60 (30-30), 90 (45-45), 120 (75-45), 150 (105-45), and 180 (135-45).

Table 8. Disease rating¹ for Francis and other selected long grain varieties for common diseases.

Variety	Sheath Blight	Blast	Kernel Smut	False Smut	Stem Rot	Brown Spot	Straight-head
Francis	MS	S	VS	S	S	R	MS
Ahrent	MS	R	MS	S	S	S	MS
Cocodrie	VS	MS	VS	S	S	R	VS
LaGrue	MS	S	VS	S	MS	R	MS
Wells	MS	S	MS	S	S	R	MS
Drew	MS	R	MS	S	MS	S	MS
Cypress	VS	MS	S	S	MS	R	MS

1 R, resistant; MR, moderately resistant; MS, moderately susceptible; S, susceptible; VS, very susceptible