Title

Evaluation of Brake herbicide for preemergence weed control in furrow irrigated rice

Principle Investigator

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Objective

Determine the spectrum and duration of control and crop safety when utilizing Brake herbicide in furrow irrigated rice production

Justification

Fluridone, the active ingredient in Brake herbicide, was first reported as a possible herbicide for use in cotton production in 1976. This herbicide showed great promise with efficacy on many key weeds and excellent crop safety. However, high costs and rainfall or irrigation for activation requirements in excess of most other soil applied residual herbicides quickly removed this product from consideration. Fluridone found a home in the aquatic herbicide market under the name Sonar. It has been shown to control species such as hydrilla, Eurasian watermilfoil, and duckweed in ponds, lakes, lagoons, and reservoirs and other high moisture environments.

Fluridone has once again shown promise for use in cotton weed control. With a rise in the number of herbicides to which resistance has developed (Glyphosate, PPO, ALS), especially in Palmer amaranth and barnyardgrass, new modes of action effective at controlling this and other species have gained some popularity. Fluridone has been evaluated in soybeans and corn with little advantage over current standards in weed control and poor crop safety. In peanut production it has shown to be effective and safe. However, high moisture requirements for activation can still cause poor results. Earlier investigations into its use in delayed flood rice focused on preplant, at planting, and preemergence application timings. At these timings, crop injury was noted to be variable but often detrimental.

Procedures

The focus of this study was to evaluate weed control and spectrum as well as crop safety with fluridone applied as an overlapping residual after an at planting application of Command + Sharpen in furrow irrigated rice. Rice was planted on May 11 on 38" beds. Fluridone was applied at early-POST and mid-POST timings at a range of rates (8, 12, 16, and 24 fl. oz./ac.) on June 7 and June 28, respectively (Figure 1). Precipitation of nearly 0.5" was received within 4 hours following the June 7 application on previously wet soil, and 1.13" within 5 days for the June 28 application. Crop injury and weed control evaluations began 2 days after initial fluridone applications and continued until four weeks after the final fluridone application. Rice was also harvested for yield.

Results

Very few differences in weed control were observed in this study. Species evaluated were Palmer amaranth, large crabgrass, and hemp sesbania. Bleaching and chlorosis were the main crop response parameters seen. Both of these responses were minor and the crop generally recovered. However, it should be noted that most injury was observed in the furrow and moderated as you moved to the bed shoulder and to the top of the beds. Injury also persisted more so in the furrow and may have even recurred with subsequent irrigations and precipitation.

Crop response in the form of bleaching or whitening of tissue occurred after the EPOST (1-2 leaf rice) application timing on June 7. Response increased as the rate increased. The 24 fl.oz./ac rate displayed significantly higher bleaching than the 8,12, or 16 oz. rates which had more bleaching than the untreated check at 1 week after treatment (WAT) (Figure 2). MPOST timings are omitted from this analysis because those treatments had not been applied at the time of these evaluations. Similar observation occurred during the 2 and 3 WAT evaluations. After the MPOST applications had been made

we were able to compare just the MPOST applications, or all treatments. When only analyzing the MPOST treatments, we saw the same trend as the EPOST applications – rate increase=more crop response, just not significant differences at 1 WAT (Figure 3). In addition to bleaching, we also noted chlorosis significantly higher from all MPOST treatments at 1 WAT compared to the no fluridone check. (Figure 4) This trend continued, sometimes only numerically, for both types of injury through the rest of the assessments.

As touched on previously, weed control differences were minimal in this study. No statistical differences in Palmer amaranth or large crabgrass were noted until the final evaluations on July 25, and none observed in control of barnyardgrass or hemp sesbania. Barnyardgrass control was more variable than control of the other species – but populations of barnyardgrass were also more dense but sporadic than the other species. Control of barnyardgrass was greater than 80% in all treatments at the conclusion of the study, and 95% for hemp sesbania. Control of large crabgrass was 90% or better from all treatments including the no fluridone check (Figure 5).

Crop yield in this study was overall lower than one would consider adequate. No significant differences existed even though treatment averages ranged from 40 bu./ac. for the no fluridone check to 103 bu./ac. for the 8 oz. rate applied at EPOST and 12 oz. rate applied at MPOST. This was due to the high variability in the replications in this study (Figure 6).

Conclusions

From a crop safety perspective, fluridone appears to be a good candidate for use in furrow irrigated rice production. While some bleaching was encountered, these symptoms were minor and usually not long lasting , although recurrence was possible, especially as the application rate increased. This study and a previous study both show that injury is mainly confined to the furrow. In discussions with producers, I have asked and been asked is this a concern. The answer I have received is that it depends on how your furrows were made. Growers who use traditional, preplant beds maintain that this is a small but significant portion of their crop and that injury, maturity delay or death may cause economic losses. Growers who plant on flat ground and come back later and run narrow furrows probably don't have this concern and they are plowing out a couple of drill rows in the furrow making process.

Weed control was excellent in this study. However, the densities of the evaluated species were not what I expected based on the number of seed we broadcast to this study area prior to planting, nor uniform. I am well aware of this chemicals performance in cotton for controlling Palmer amaranth, and am encouraged by the crop safety in this study. Continuation of this study for another year or perhaps two could help us better understand the performance and longevity when weed densities are higher.

Figure 1. Treatment List

Treatment	Fluridone Rate (fl.oz./ac)	Application Timing
1	-	-
2	8	EPOST
3	12	EPOST
4	16	EPOST
5	24	EPOST
6	8	MPOST
7	12	MPOST
8	16	MPOST
9	24	MPOST

Figure 2. Crop response 1 WAT in the form of bleaching from fluridone applied to 1-2 leaf rice (EPOST) on June 7. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

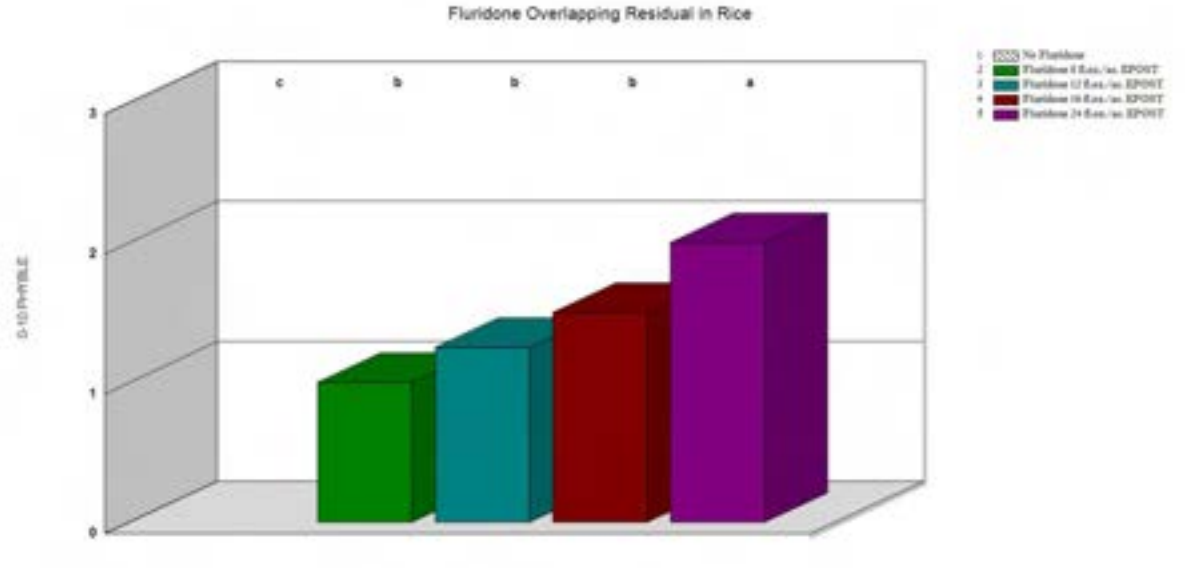


Figure 3. Crop response 1 WAT in the form of bleaching from fluridone applied to 4-5 leaf rice (MPOST) on June 30. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

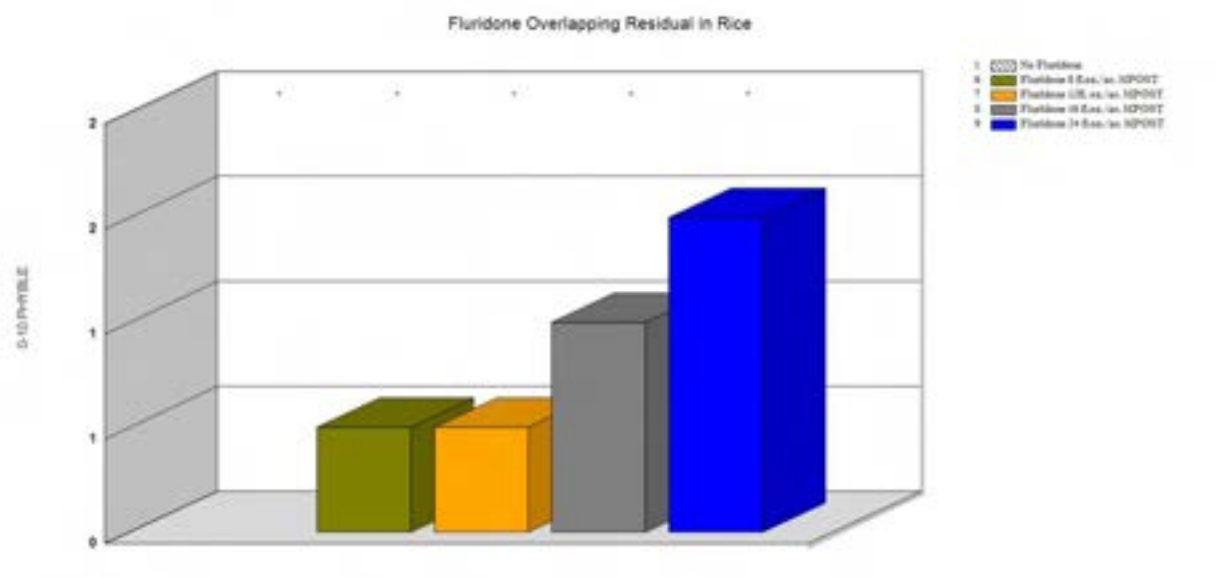


Figure 4. Crop response 1 WAT in the form of chlorosis from fluridone applied to 4-5 leaf rice (MPOST) on June 30. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

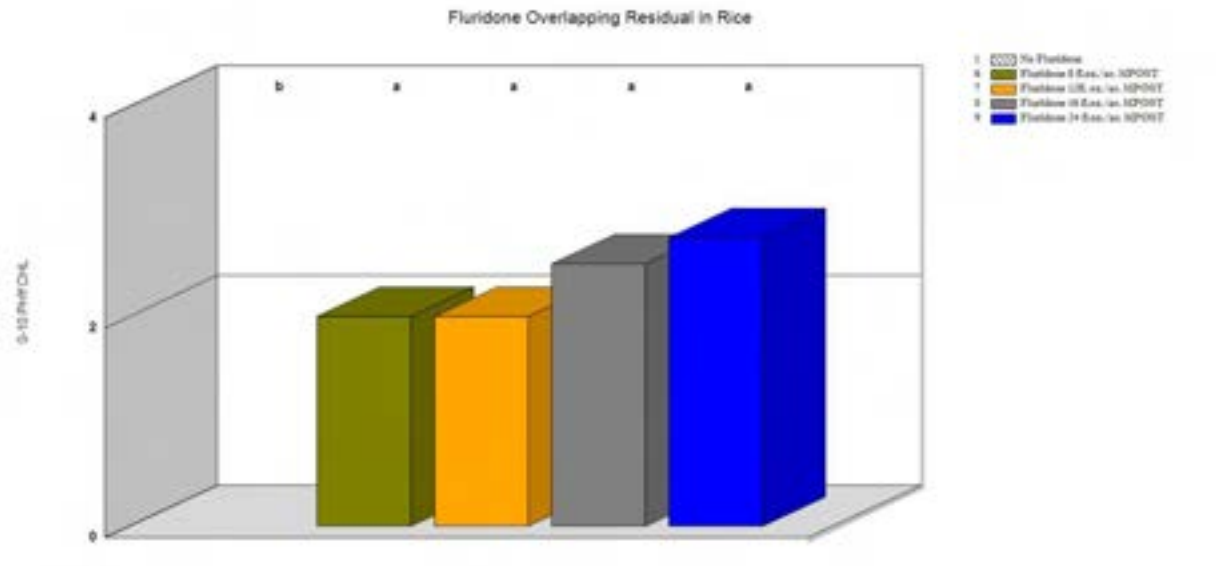


Figure 5. Large crabgrass control following applications of fluridone at 0,8,12,16 or 24 fl.oz./ac applied to 1-2 leaf rice (EPOST) or 4-5 leaf rice (MPOST) on July 25. 100=complete control and 0=no control. Data with the same letters are not statistically different.

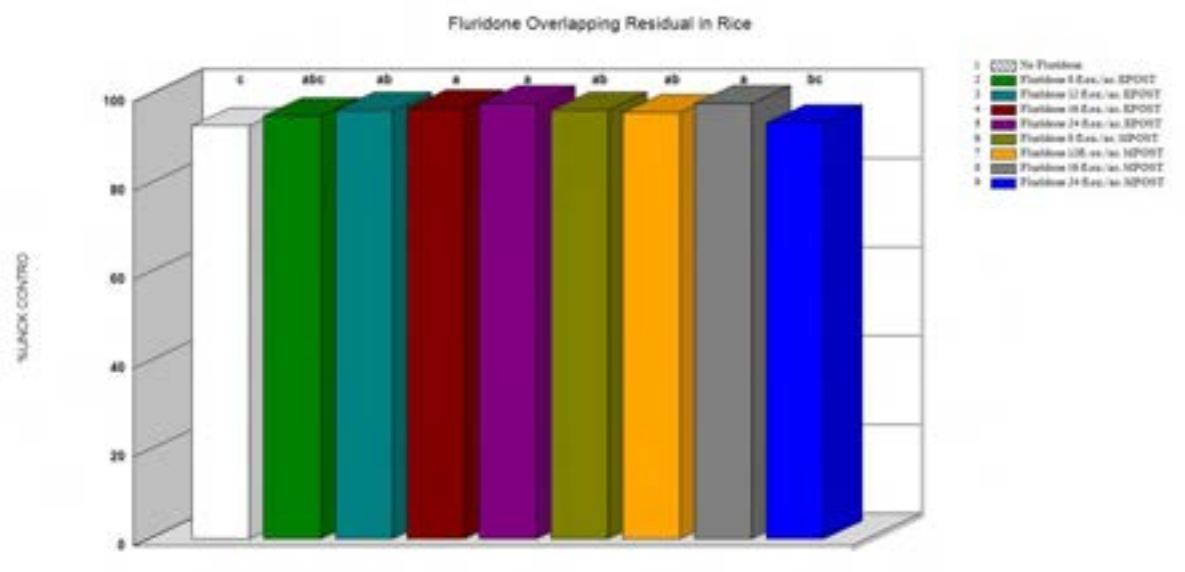
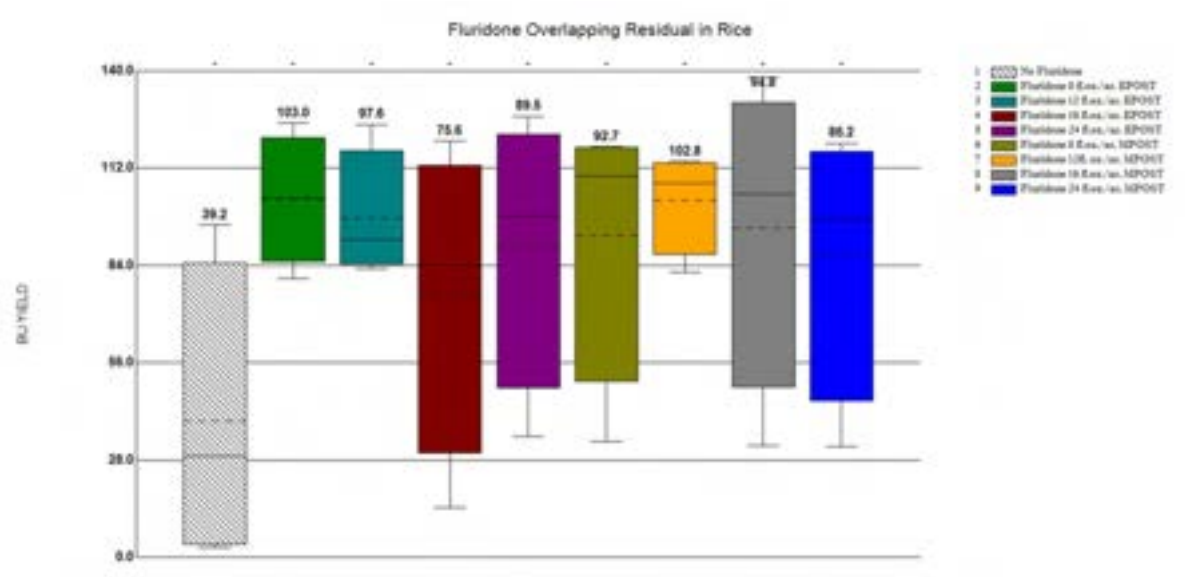


Figure 6. Rice yield (bu./ac.) following applications of fluridone at 0,8,12,16 or 24 fl.oz./ac applied to 1-2 leaf rice (EPOST) or 4-5 leaf rice (MPOST). Large boxes denote high variability in data across replications.



2022 Missouri Rice Planting Date & Cultivar Trials

Flood-Irrigated and Furrow-Irrigated Production Systems

Conducted by the
University of Missouri Rice Agronomy Program

Funding and support provided by the
Missouri Rice Research and Merchandising Council

By J.L. Chlapecka, M. Johnson, K. McCorkle, C. Hunt

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2022 Missouri Planting Date / Furrow-Irrigated Rice Cultivar Trials

Site	Nearest Town	Planting Date	Emergence Date	Flood Date	Harvest Date	Soil Type	Location Info	Water Management	N Management	N Rate (lbs N/ac)
MRRMC PD1	Glennonville, Dunklin County	March 17	April 22	June 3	September 20	Silt Loam	Research Station	Flood	Single Pre-flood	130
MRRMC PD2	Glennonville, Dunklin County	April 10	April 30	June 3	September 20	Silt Loam	Research Station	Flood	Single Pre-flood	130
MRRMC PD3	Glennonville, Dunklin County	April 29	May 12	June 14	September 28	Silt Loam	Research Station	Flood	Single Pre-flood	130
MRRMC PD4	Glennonville, Dunklin County	May 19	May 28	June 22	October 18	Silt Loam	Research Station	Flood	Single Pre-flood	130
MRRMC PD5	Glennonville, Dunklin County	June 13	June 20	July 8	October 22	Silt Loam	Research Station	Flood	Single Pre-flood	130
FDRC PD1	Portageville, Pemiscot County	May 12	May 22	June 22	October 7	Clay	Research Station	Flood	Single Pre-flood	150
FDRC PD2	Portageville, Pemiscot County	June 3	June 9	July 11	October 24	Clay	Research Station	Flood	Single Pre-flood	150
MRRMC FIR Top	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Non-Flood	3-way split	130
MRRMC FIR Middle	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Muddy	3-way split	130
MRRMC FIR Bottom	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Flood	3-way split	130
FDRC FIR Top	Portageville, Pemiscot County	May 11	May 21	June 23	October 5	Clay	Research Station	Non-Flood	3-way split	150
FDRC FIR Middle	Portageville, Pemiscot County	May 11	May 21	June 23	October 5	Clay	Research Station	Muddy	3-way split	150
FDRC FIR Bottom	Portageville, Pemiscot County	May 11	May 21	June 23	October 5	Clay	Research Station	Flood	3-way split	150
Fisk FIR Top	Fisk, Butler County	April 27	May 5	June 16	September 27	Clay	On-Farm	Non-Flood	Single Pre-flood	120
Fisk FIR Bottom	Fisk, Butler County	April 27	May 5	June 16	September 27	Clay	On-Farm	Flood	Single Pre-flood	120

1) Fisk
2) MRRMC (Rice Farm)
3) FDRC (Portageville)

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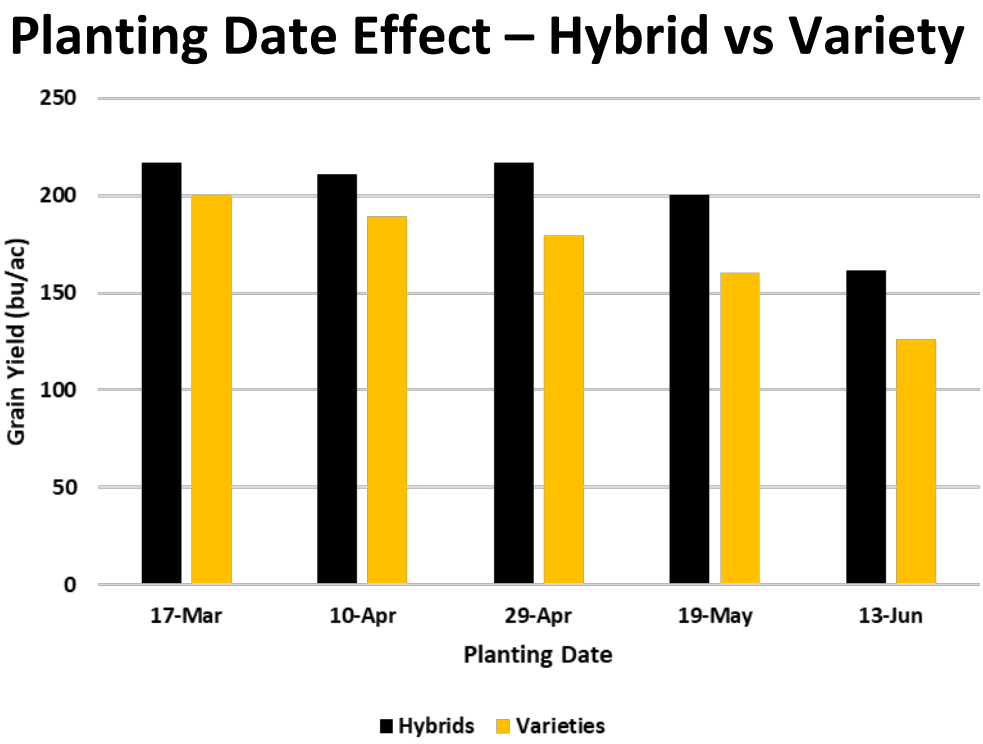
2022 Missouri Planting Date Trials Grain Yield

	Rice Farm (Glennonville)					Portageville		
Cultivar	17-Mar	10-Apr	29-Apr	19-May	13-Jun	12-May	3-Jun *	AVERAGE
XP753	218	217	219	195	173	230	100	**208**
XP780	223	219	218	218	150	215	81	**205**
RT7301	211	217	214	196	184	226	89	**212**
RT7302	243	216	226	221	172	223	103	**216**
RT7401	207	210	218	198	150	211	91	**198**
RT7321 FP	200	190	204	187	153	211	46	**192**
RT7421 FP	208	209	212	175	147	196	81	**190**
RT7521 FP	220	207	212	218	147	206	62	**201**
RT7331 MA	220	215	228	193	179	218	74	**208**
DGL037	211	206	186	169	122	185	58	**175**
DGL2065	184	178	159	151	137	193	95	**167**
DG263L	206	190	197	172	141	192	91	**182**
DGL293	193	202	175	154	90	133	51	**155**
Diamond	206	196	185	167	125	192	96	**177**
Ozark	220	193	192	180	127	210	95	**185**
ProGold1	212	187	183	165	114	183	79	**172**
ProGold2	202	182	174	149	120	175	71	**166**
CLHA02	184	176	155	153	143	191	96	**167**
CLL16	211	195	176	149	110	174	68	**166**
CLL18	218	201	188	166	135	163	93	**177**
PVL03	171	170	156	137	114	186	76	**154**
RTv7231 MA	166	166	171	155	138	176	80	**162**
DGM004	206	190	187	164	128	183	87	**175**
Jupiter	199	196	194	154	124	175	109	**172**
Taurus	222	205	195	175	147	167	112	**184**
AVERAGE	**206**	**197**	**193**	**174**	**139**	**193**	**83**	**183**

* The Portageville late planted rice was heavily damaged by blackbirds and was killed prematurely on Oct 18 due to frost. Not included in averages.



Planting date effect on the average yield of hybrids and inbred varieties at the Rice Research Farm near Glennonville, MO.

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2022 Missouri Furrow-Irrigated Cultivar Trials Grain Yield

	Rice Farm (Glennonville)			Portageville			Fisk		
Cultivar	Top	Middle	Bottom	Top	Middle	Bottom	Top	Bottom	AVERAGE
XP753	175	217	222	200	234	231	212	250	**216**
XP780	104	158	172	198	222	228	183	248	**184**
RT7301	156	211	218	175	233	230	219	252	**209**
RT7302	175	209	217	225	250	238	234	250	**222**
RT7401	160	181	188	222	236	224	197	248	**203**
RT7321 FP	160	220	216	200	219	222	212	216	**207**
RT7421 FP	140	180	186	192	234	214	201	248	**196**
RT7521 FP	157	182	176	191	238	221	208	229	**198**
RT7331 MA	158	226	219	199	235	228	225	239	**214**
DGL037	127	138	146	173	201	203	183	222	**171**
DGL2065	129	169	173	174	204	203	176	189	**175**
DG263L	129	165	149	176	196	214	177	234	**177**
DGL293	95	107	129	157	163	151	149	204	**141**
Diamond	138	176	181	178	210	202	175	209	**181**
Ozark	124	162	165	200	200	197	175	218	**177**
ProGold1	109	174	178	204	224	198	171	214	**179**
ProGold2	100	148	158	159	196	204	161	193	**160**
CLHA02	143	166	167	189	207	206	168	184	**177**
CLL16	103	148	161	187	207	196	153	202	**165**
CLL18	109	181	186	186	220	211	178	214	**182**
PVL03	107	151	158	184	191	186	155	161	**158**
RTv7231 MA	131	169	166	164	184	181	182	197	**170**
DGM004	137	167	175	197	214	210	187	207	**184**
Jupiter	158	171	176	198	215	212	186	209	**189**
Taurus	152	173	174	193	214	212	190	228	**190**
AVERAGE	**135**	**174**	**178**	**189**	**214**	**209**	**186**	**219**	**188**

* Furrow-irrigated rice trials were planted at Glennonville on May 19, Portageville on May 11, and Fisk on April 27.

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2022 Missouri Furrow-Irrigated Cultivar Trials Milling Yield

Cultivar	Rice Farm (Glennonville)			Portageville			Fisk		AVERAGE
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Bottom	
XP753	57-73	60-72	62-74	55-72	62-72	63-70	30-71	31-70	**50-72**
XP780	59-70	54-68	55-69	52-70	58-70	61-69	29-71	39-70	**50-70**
RT7301	59-73	62-72	64-73	55-71	62-72	64-72	24-71	42-71	**51-72**
RT7302	62-73	58-70	59-71	62-72	64-71	63-71	28-71	40-69	**53-71**
RT7401	57-69	55-69	59-71	59-71	62-71	64-71	33-71	39-69	**53-70**
RT7321 FP	54-72	56-71	60-73	53-71	61-71	61-71	25-72	40-71	**50-71**
RT7421 FP	57-72	55-69	55-70	59-71	61-70	58-68	31-71	37-71	**50-70**
RT7521 FP	65-73	58-70	57-68	56-71	59-70	60-69	41-71	38-71	**53-70**
RT7331 MA	61-75	60-71	64-74	58-73	63-71	65-71	29-72	35-70	**52-72**
DGL037	63-70	53-63	55-67	58-70	58-68	62-68	37-69	43-70	**53-69**
DGL2065	70-74	62-71	65-73	66-73	66-72	66-71	57-72	40-69	**61-72**
DG263L	63-72	56-66	58-69	53-69	58-68	64-70	26-69	36-69	**50-69**
DGL293**	42-59	29-57	41-65	48-67	43-62	45-58	42-65	39-70	**42-63**
Diamond	64-73	56-69	54-69	61-71	61-69	63-68	45-70	36-71	**54-70**
Ozark	67-73	59-69	62-71	64-72	65-71	63-70	54-71	38-71	**59-71**
ProGold1	63-71	59-70	59-70	62-71	61-70	59-68	45-71	39-70	**55-70**
ProGold2	62-71	58-69	61-71	64-73	62-72	63-70	41-71	39-70	**55-71**
CLHA02	68-73	65-73	59-72	63-72	64-71	63-70	43-71	40-70	**57-71**
CLL16	59-71	47-66	47-67	56-70	57-69	57-69	39-69	36-71	**49-69**
CLL18	64-71	56-68	49-66	62-71	62-70	59-69	51-69	34-71	**54-69**
PVL03	64-72	60-71	63-72	63-72	60-71	63-70	50-71	44-70	**58-71**
RTv7231 MA	60-72	64-72	60-71	59-72	62-71	65-71	37-70	38-70	**54-71**
DGM004	67-72	60-70	56-71	61-70	60-69	64-69	38-71	36-71	**54-70**
Jupiter	57-69	59-69	63-70	55-69	54-66	61-70	52-70	35-70	**54-69**
Taurus	68-73	64-71	66-71	61-72	61-69	65-70	53-72	39-71	**59-71**
AVERAGE	**61-71**	**57-69**	**58-70**	**58-71**	**60-70**	**62-69**	**39-70**	**38-70**	**53-70**

* Furrow-irrigated rice trials were planted at Glennonville on May 19, Portageville on May 11, and Fisk on April 27.

** DGL293 did not have adequate time to mature in the majority of trials.

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Rice Farm March 17 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	39	97	0	62-71	**219**
XP780	L	38	97	0	62-70	**224**
RT7301	L	39	97	0	62-71	**210**
RT7302	L	40	97	0	64-71	**243**
RT7401	L	38	96	0	60-70	**207**
RT7321 FP	L	39	96	0	61-71	**199**
RT7421 FP	L	40	96	0	60-70	**209**
RT7521 FP	L	39	100	0	61-69	**221**
RT7331 MA	L	38	96	0	63-71	**221**
DGL037	L	38	99	0	61-69	**211**
DGL2065	L	38	102	0	66-72	**184**
DG263L	L	36	96	0	63-70	**207**
DGL293	L	39	109	0	61-69	**194**
Diamond	L	37	101	0	65-71	**207**
Ozark	L	39	101	0	67-72	**221**
ProGold1	L	37	103	0	64-70	**212**
ProGold2	L	37	102	0	66-72	**203**
CLHA02	L	37	100	0	64-71	**185**
CLL16	L	39	103	0	62-70	**211**
CLL18	L	40	102	0	61-69	**218**
PVL03	L	38	103	0	64-71	**172**
RTv7231 MA	L	38	88	0	57-68	**166**
DGM004	M	37	104	0	61-69	**206**
Jupiter	M	37	102	0	63-68	**199**
Taurus	M	38	97	0	67-71	**223**
AVERAGE		**38**	**99**	**0**	**63-70**	**207**

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Rice Farm April 10 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	39	89	0	66-73	**217**
XP780	L	39	91	0	64-71	**219**
RT7301	L	39	89	0	64-73	**217**
RT7302	L	38	91	0	66-71	**216**
RT7401	L	39	89	0	64-71	**210**
RT7321 FP	L	39	88	0	63-71	**190**
RT7421 FP	L	39	90	0	63-71	**209**
RT7521 FP	L	39	93	0	64-70	**207**
RT7331 MA	L	39	88	0	65-72	**215**
DGL037	L	38	91	0	63-68	**206**
DGL2065	L	39	94	0	66-71	**178**
DG263L	L	38	88	0	64-70	**190**
DGL293	L	38	101	0	62-69	**202**
Diamond	L	38	94	0	65-71	**196**
Ozark	L	39	94	0	66-73	**193**
ProGold1	L	38	97	0	65-70	**187**
ProGold2	L	38	95	0	66-72	**182**
CLHA02	L	39	94	0	64-70	**176**
CLL16	L	38	97	0	64-72	**195**
CLL18	L	39	97	0	63-70	**201**
PVL03	L	39	98	0	66-72	**170**
RTv7231 MA	L	39	83	0	66-70	**166**
DGM004	M	38	96	0	68-72	**190**
Jupiter	M	38	95	0	66-69	**196**
Taurus	M	39	90	0	65-72	**205**
AVERAGE		**39**	**92**	**0**	**65-71**	**197**

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Rice Farm April 29 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	39	85	2	56-71	**219**
XP780	L	37	88	1	56-69	**218**
RT7301	L	38	84	0	53-71	**214**
RT7302	L	39	87	2	58-71	**226**
RT7401	L	39	86	0	55-70	**218**
RT7321 FP	L	39	85	1	54-69	**204**
RT7421 FP	L	39	86	1	55-69	**212**
RT7521 FP	L	39	88	0	60-70	**212**
RT7331 MA	L	38	83	0	56-71	**228**
DGL037	L	36	88	0	60-67	**186**
DGL2065	L	38	90	0	63-70	**159**
DG263L	L	38	82	2	58-71	**197**
DGL293	L	39	93	1	60-69	**175**
Diamond	L	38	90	1	60-69	**185**
Ozark	L	40	90	0	61-70	**192**
ProGold1	L	38	92	1	59-70	**183**
ProGold2	L	39	91	0	59-70	**174**
CLHA02	L	38	90	1	58-68	**155**
CLL16	L	39	92	1	58-68	**176**
CLL18	L	39	90	0	55-68	**188**
PVL03	L	38	92	0	59-69	**156**
RTv7231 MA	L	40	79	0	55-68	**171**
DGM004	M	37	90	1	61-67	**187**
Jupiter	M	37	90	1	60-69	**194**
Taurus	M	37	86	0	62-69	**195**
AVERAGE		**38**	**88**	**1**	**58-69**	**193**

RICE

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Rice Farm May 19 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	43	78	0	50-72	**195**
XP780	L	42	83	0	56-70	**218**
RT7301	L	40	78	1	52-73	**196**
RT7302	L	43	80	0	55-72	**221**
RT7401	L	41	79	1	52-72	**198**
RT7321 FP	L	39	76	1	48-71	**187**
RT7421 FP	L	41	81	1	55-71	**175**
RT7521 FP	L	41	86	1	64-71	**218**
RT7331 MA	L	40	77	1	55-73	**193**
DGL037	L	39	81	1	61-69	**169**
DGL2065	L	41	84	0	67-72	**151**
DG263L	L	39	76	1	52-70	**172**
DGL293	L	42	93	0	63-70	**154**
Diamond	L	39	84	0	64-72	**167**
Ozark	L	42	83	0	66-73	**180**
ProGold1	L	40	87	0	65-72	**165**
ProGold2	L	37	86	0	57-72	**149**
CLHA02	L	39	86	0	63-71	**153**
CLL16	L	41	89	0	58-71	**149**
CLL18	L	42	88	0	65-71	**166**
PVL03	L	39	87	0	65-73	**137**
RTv7231 MA	L	40	72	2	51-71	**155**
DGM004	M	38	83	0	64-71	**164**
Jupiter	M	36	85	0	68-71	**154**
Taurus	M	41	77	0	66-72	**175**
AVERAGE		**40**	**82**	**0**	**59-72**	**174**

RICE

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Rice Agronomy

Rice Farm June 13 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	36	74	0	53-66	**173**
XP780	L	36	79	0	48-64	**150**
RT7301	L	35	74	0	57-68	**184**
RT7302	L	34	75	0	54-67	**172**
RT7401	L	33	77	0	55-64	**150**
RT7321 FP	L	34	71	0	53-66	**153**
RT7421 FP	L	36	78	0	53-66	**147**
RT7521 FP	L	33	79	0	52-65	**147**
RT7331 MA	L	33	73	0	43-59	**179**
DGL037	L	31	79	0	48-54	**122**
DGL2065	L	32	78	0	54-62	**137**
DG263L	L	33	75	0	40-58	**141**
DGL293	L	32	84	0	46-62	**90**
Diamond	L	35	80	0	43-61	**125**
Ozark	L	35	81	0	49-64	**127**
ProGold1	L	33	84	0	43-58	**114**
ProGold2	L	35	80	0	50-61	**120**
CLHA02	L	30	79	0	49-63	**143**
CLL16	L	34	82	0	33-51	**110**
CLL18	L	35	80	0	51-64	**135**
PVL03	L	32	81	0	41-59	**114**
RTv7231 MA	L	33	69	0	55-64	**138**
DGM004	M	32	80	0	58-65	**128**
Jupiter	M	32	81	0	53-54	**124**
Taurus	M	33	77	0	50-62	**147**
AVERAGE		**33**	**78**	**0**	**49-62**	**139**

RICE

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Rice Agronomy

Portageville May 12 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	42	84	0	58-73	**230**
XP780	L	43	88	0	59-72	**215**
RT7301	L	41	84	0	50-72	**226**
RT7302	L	43	85	1	54-73	**223**
RT7401	L	40	83	1	54-72	**211**
RT7321 FP	L	45	83	0	60-72	**211**
RT7421 FP	L	43	84	2	53-72	**196**
RT7521 FP	L	43	86	2	59-72	**206**
RT7331 MA	L	42	83	0	58-73	**218**
DGL037	L	37	86	2	58-70	**185**
DGL2065	L	39	87	0	65-73	**193**
DG263L	L	37	83	1	54-72	**192**
DGL293	L	37	95	1	55-68	**133**
Diamond	L	42	89	0	65-72	**192**
Ozark	L	41	91	0	67-73	**210**
ProGold1	L	41	94	1	65-72	**183**
ProGold2	L	41	91	0	64-72	**175**
CLHA02	L	38	87	0	65-73	**191**
CLL16	L	41	93	1	52-71	**174**
CLL18	L	43	96	0	63-71	**163**
PVL03	L	39	90	0	64-73	**186**
RTv7231 MA	L	39	79	0	54-72	**176**
DGM004	M	41	88	2	60-71	**183**
Jupiter	M	39	88	1	66-70	**175**
Taurus	M	39	84	2	63-71	**167**
AVERAGE		**41**	**87**	**1**	**59-72**	**193**

RICE

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Rice Agronomy

Portageville June 3 Planted

Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac
XP753	L	37	94	0	N/A	**100**
XP780	L	37	90	0	N/A	**81**
RT7301	L	36	90	0	N/A	**89**
RT7302	L	38	95	0	N/A	**103**
RT7401	L	34	90	0	N/A	**91**
RT7321 FP	L	40	91	0	N/A	**46**
RT7421 FP	L	39	94	0	N/A	**81**
RT7521 FP	L	40	88	0	N/A	**62**
RT7331 MA	L	37	89	0	N/A	**74**
DGL037	L	32	91	0	N/A	**58**
DGL2065	L	33	91	0	N/A	**95**
DG263L	L	31	91	0	N/A	**91**
DGL293	L	33	90	0	N/A	**51**
Diamond	L	39	87	0	N/A	**96**
Ozark	L	37	94	0	N/A	**95**
ProGold1	L	37	90	0	N/A	**79**
ProGold2	L	40	92	0	N/A	**71**
CLHA02	L	33	93	0	N/A	**96**
CLL16	L	38	89	0	N/A	**68**
CLL18	L	40	89	0	N/A	**93**
PVL03	L	36	91	0	N/A	**76**
RTv7231 MA	L	33	88	0	N/A	**80**
DGM004	M	36	90	0	N/A	**87**
Jupiter	M	34	91	0	N/A	**109**
Taurus	M	35	93	0	N/A	**112**
AVERAGE		**36**	**91**	**0**	**N/A**	**83**

RICE

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Rice Farm Furrow-Irrigated Rice

		Top					Middle					Bottom				
Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac	in	days	0-5	%	bu/ac	in	days	0-5	%	bu/ac
XP753	L	32	98	0	57-73	**175**	39	100	0	60-72	**217**	38	96	0	62-74	**222**
XP780	L	30	102	0	59-70	**104**	38	102	0	54-68	**158**	36	101	0	55-69	**172**
RT7301	L	33	96	0	59-73	**156**	39	98	0	62-72	**211**	42	95	0	64-73	**218**
RT7302	L	32	101	0	62-73	**175**	37	95	0	58-70	**209**	40	98	0	59-71	**217**
RT7401	L	31	102	0	57-69	**160**	36	102	0	55-69	**181**	42	99	0	59-71	**188**
RT7321 FP	L	30	96	0	54-72	**160**	40	96	0	56-71	**220**	40	95	0	60-73	**216**
RT7421 FP	L	32	101	0	57-72	**140**	37	103	0	55-69	**180**	39	101	0	55-70	**186**
RT7521 FP	L	32	102	0	65-73	**157**	39	102	2	58-70	**182**	40	100	2	57-68	**176**
RT7331 MA	L	28	98	0	61-75	**158**	37	99	0	60-71	**226**	41	96	0	64-74	**219**
DGL037	L	30	102	0	63-70	**127**	36	102	2	53-63	**138**	39	99	3	55-67	**146**
DGL2065	L	31	102	0	70-74	**129**	39	102	0	62-71	**169**	39	100	0	65-73	**173**
DG263L	L	35	95	0	63-72	**129**	34	96	2	56-66	**165**	40	93	0	58-69	**149**
DGL293	L	31	108	0	42-59	**95**	38	108	0	29-57	**107**	42	106	0	41-65	**129**
Diamond	L	33	102	0	64-73	**138**	38	102	0	56-69	**176**	41	101	0	54-69	**181**
Ozark	L	32	105	0	67-73	**124**	39	105	0	59-69	**162**	41	104	0	62-71	**165**
ProGold1	L	33	103	0	63-71	**109**	36	105	0	59-70	**174**	41	104	0	59-70	**178**
ProGold2	L	28	105	0	62-71	**100**	39	106	0	58-69	**148**	39	101	0	61-71	**158**
CLHA02	L	32	100	0	68-73	**143**	37	102	0	65-73	**166**	40	100	0	59-72	**167**
CLL16	L	31	105	0	59-71	**103**	38	105	0	47-66	**148**	43	106	0	47-67	**161**
CLL18	L	29	103	0	64-71	**109**	37	105	0	56-68	**181**	40	104	0	49-66	**186**
PVL03	L	34	102	0	64-72	**107**	38	103	0	60-71	**151**	43	103	0	63-72	**158**
RTv7231 MA	L	30	92	0	60-72	**131**	37	93	0	64-72	**169**	39	95	0	60-71	**166**
DGM004	M	28	105	0	67-72	**137**	37	105	0	60-70	**167**	41	103	0	56-71	**175**
Jupiter	M	32	103	0	57-69	**158**	33	103	0	59-69	**171**	40	101	0	63-70	**176**
Taurus	M	29	101	0	68-73	**152**	37	101	0	64-71	**173**	37	99	1	66-71	**174**
AVERAGE		**31**	**101**	**0**	**61-71**	**135**	**37**	**102**	**0**	**57-69**	**174**	**40**	**100**	**0**	**58-70**	**178**

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Portageville Furrow-Irrigated Rice

		Top					Middle					Bottom				
Cultivar	Grain Length	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield	Canopy Height	Days to Heading	Lodging	Milling Yield	Grain Yield
		in	days	0-5	%	bu/ac	in	days	0-5	%	bu/ac	in	days	0-5	%	bu/ac
XP753	L	31	97	0	55-72	**200**	36	96	0	62-72	**234**	38	98	0	63-70	**231**
XP780	L	31	100	0	52-70	**198**	37	100	0	58-70	**222**	37	100	0	61-69	**228**
RT7301	L	31	97	0	55-71	**175**	35	96	0	62-72	**233**	38	96	0	64-72	**230**
RT7302	L	32	100	0	62-72	**225**	37	102	0	64-71	**250**	39	101	0	63-71	**238**
RT7401	L	30	97	0	59-71	**222**	34	97	0	62-71	**236**	33	96	0	64-71	**224**
RT7321 FP	L	33	97	0	53-71	**200**	38	96	0	61-71	**219**	37	96	0	61-71	**222**
RT7421 FP	L	33	97	0	59-71	**192**	38	97	0	61-70	**234**	40	101	0	58-68	**214**
RT7521 FP	L	32	97	0	56-71	**191**	35	96	0	59-70	**238**	38	96	0	60-69	**221**
RT7331 MA	L	31	96	0	58-73	**199**	36	96	0	63-71	**235**	38	96	0	65-71	**228**
DGL037	L	28	99	0	58-70	**173**	32	97	0	58-68	**201**	36	99	0	62-68	**203**
DGL2065	L	29	98	0	66-73	**174**	36	96	0	66-72	**204**	37	96	0	66-71	**203**
DG263L	L	22	96	0	53-69	**176**	28	95	0	58-68	**196**	38	97	0	64-70	**214**
DGL293	L	28	108	0	48-67	**157**	36	105	0	43-62	**163**	38	98	0	45-58	**151**
Diamond	L	32	102	0	61-71	**178**	37	102	0	61-69	**210**	37	96	0	63-68	**202**
Ozark	L	31	105	0	64-72	**200**	39	105	0	65-71	**200**	35	99	0	63-70	**197**
ProGold1	L	34	105	0	62-71	**204**	37	104	0	61-70	**224**	40	101	0	59-68	**198**
ProGold2	L	32	103	0	64-73	**159**	39	105	0	62-72	**196**	37	97	0	63-70	**204**
CLHA02	L	30	100	0	63-72	**189**	32	97	0	64-71	**207**	36	97	0	63-70	**206**
CLL16	L	32	104	0	56-70	**187**	38	102	0	57-69	**207**	37	101	0	57-69	**196**
CLL18	L	33	100	0	62-71	**186**	40	101	0	62-70	**220**	36	99	0	59-69	**211**
PVL03	L	31	98	0	63-72	**184**	34	95	0	60-71	**191**	40	97	0	63-70	**186**
RTv7231 MA	L	28	95	0	59-72	**164**	33	95	0	62-71	**184**	38	96	0	65-71	**181**
DGM004	M	30	102	0	61-70	**197**	36	100	0	60-69	**214**	36	96	0	64-69	**210**
Jupiter	M	30	101	0	55-69	**198**	35	101	0	54-66	**215**	37	103	0	61-70	**212**
Taurus	M	28	97	0	61-72	**193**	34	97	0	61-69	**214**	36	100	0	65-70	**212**
AVERAGE		**30**	**100**	**0**	**58-71**	**189**	**36**	**99**	**0**	**60-70**	**214**	**37**	**98**	**0**	**62-69**	**209**

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2022 Missouri Cultivar/Planting Date Trial Averages

		Flood Rice/Planting Date Trials *				Furrow-irrigated Rice **			
Cultivar	Grain Length	Canopy Height	Days to Heading	Grain Yield	Milling Yield	Canopy Height	Days to Heading	Grain Yield	Milling Yield
		in	days	bu/ac	%	in	days	bu/ac	%
XP753	L	39	86	**208**	59-72	35	97	**216**	50-72
XP780	L	39	88	**205**	59-71	35	101	**184**	50-70
RT7301	L	38	85	**212**	56-72	36	96	**209**	51-72
RT7302	L	39	87	**216**	59-72	36	99	**222**	53-71
RT7401	L	38	86	**198**	57-71	34	99	**203**	53-70
RT7321 FP	L	39	84	**192**	57-71	36	96	**207**	50-71
RT7421 FP	L	39	87	**190**	57-71	36	100	**196**	50-70
RT7521 FP	L	39	88	**201**	62-70	36	99	**198**	53-70
RT7331 MA	L	38	84	**208**	60-72	35	97	**214**	52-72
DGL037	L	36	88	**175**	61-69	33	99	**171**	53-69
DGL2065	L	37	89	**167**	65-72	35	99	**175**	61-72
DG263L	L	36	84	**182**	58-71	33	95	**177**	50-69
DGL293	L	37	95	**155**	60-69	35	105	**141**	42-63
Diamond	L	38	89	**177**	64-71	36	100	**181**	54-70
Ozark	L	39	90	**185**	65-72	36	103	**177**	59-71
ProGold1	L	38	92	**172**	64-71	37	103	**179**	55-70
ProGold2	L	38	91	**166**	62-72	35	103	**160**	55-71
CLHA02	L	36	89	**167**	63-70	34	99	**177**	57-71
CLL16	L	39	92	**166**	59-70	36	104	**165**	49-69
CLL18	L	40	91	**177**	62-70	36	102	**182**	54-69
PVL03	L	37	91	**154**	64-72	37	100	**158**	58-71
RTv7231 MA	L	37	80	**162**	56-70	34	94	**170**	54-71
DGM004	M	37	90	**175**	63-70	34	102	**184**	54-70
Jupiter	M	36	90	**172**	65-69	34	102	**189**	54-69
Taurus	M	37	86	**184**	65-71	33	99	**190**	59-71
AVERAGE		**38**	**88**	**183**	**61-71**	**35**	**100**	**185**	**53-70**

* The Portageville late planted rice was heavily damage by blackbirds and is not included in average yield.

** Furrow-irrigated rice trials were planted at Glennonville on May 19, Portageville on May 11, and Fisk on April 27.

2022 Missouri Rice Insecticide Seed Treatment Trial

Furrow-Irrigated Rice

Conducted by the
University of Missouri Rice Agronomy Program

Funding and support provided by the
Missouri Rice Research and Merchandising Council

By J.L. Chlapecka, M. Johnson, K. McCorkle, C. Hunt

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Materials & Methods: Rice billbug has become an economically important pest across a growing number of furrow-irrigated rice (FIR) acres. It currently appears that an insecticide seed treatment is the only viable way of controlling the pest. As part of a larger, multi-site project out of Arkansas, one site was included at the Missouri Rice Research Farm near Glennonville, MO. Several common rice insecticide seed treatments were studied both solo and in two-way combinations.

2022 Missouri IST Trial - FIR

Agronomic Information	
Location	MRRMC (Glennonville)
Planting Date	May 19
Emergence Date	May 28
Flood Date	June 21
Harvest Date	October 21
Soil Type	Silt Loam
Location Info	Research Station
Water Management	Furrow-Irrigated
N Management	3-way split
N Rate (lbs N/ac)	166

Results: Results suggest that there was not a significant influence of insecticide seed treatment on rice grain yield at the Missouri Rice Research Farm in 2022. There was some variability in the yield of NipsIt® + Dermacor®, CruiserMaxx® Rice + Fortenza®, and CruiserMaxx® Rice + NipsIt® but the results do not correlate to any of the products increasing yield potential this year.

However, we do see that when the trial is averaged across 6 sites with heavy billbug pressure (mostly in Northeast Arkansas), there is value in a combination insecticide seed treatment including Fortenza® or Dermacor®. We hope to continue this study in 2023 to see why the variability existed with the treatments mentioned above, with Dr. Chase Floyd taking the lead on studies going forward.

2022 Missouri IST Trial - FIR

Cultivar	Insecticide Seed Trt	Yield
		bu/ac
RT 7521 FP	Untreated Check	143
RT 7521 FP	CruiserMaxx Rice	144
RT 7521 FP	Fortenza	144
RT 7521 FP	Dermacor	142
RT 7521 FP	NipsIt	143
RT 7521 FP	NipsIt + Fortenza	140
RT 7521 FP	NipsIt + Dermacor	149
RT 7521 FP	CruiserMaxx Rice + Fortenza	157
RT 7521 FP	CruiserMaxx Rice + Dermacor	144
RT 7521 FP	CruiserMaxx Rice + NipsIt	128
AVERAGE		**143**

IST Trials - FIR Average Over 6 sites

Insecticide Seed Trt	Yield
	bu/ac
Untreated Check	167 c
CruiserMaxx Rice	182 b
Fortenza	190 b
Dermacor	189 b
NipsIt	182 b
NipsIt + Fortenza	200 a
NipsIt + Dermacor	198 a
CruiserMaxx Rice + Fortenza	200 a
CruiserMaxx Rice + Dermacor	199 a
CruiserMaxx Rice + NipsIt	183 b
AVERAGE	**189**

2022 Missouri Rice Seeding Rate Trials

Flood-Irrigated and Furrow-Irrigated Production Systems

Conducted by the
University of Missouri Rice Agronomy Program

Funding and support provided by the
Missouri Rice Research and Merchandising Council

By J.L. Chlapecka, M. Johnson, K. McCorkle, C. Hunt

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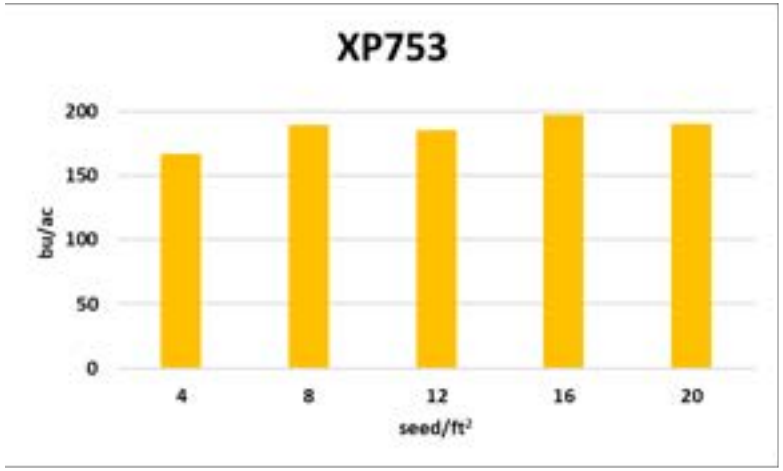
2022 Missouri Rice Seeding Rate Trials

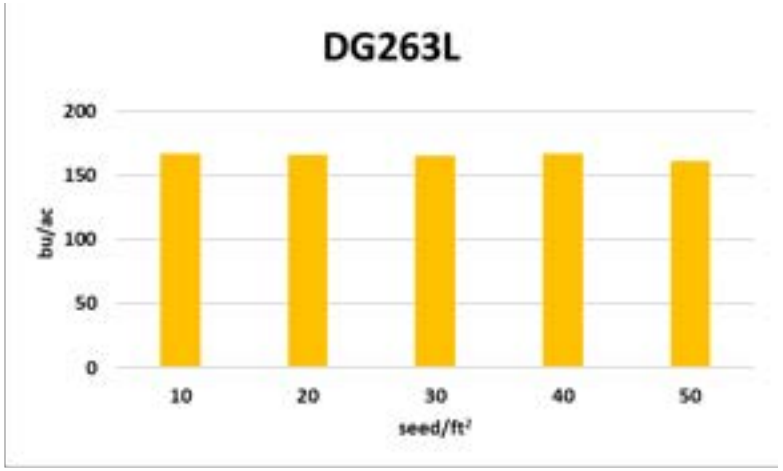
Site	Nearest Town	Planting Date	Emergence Date	Flood Date	Harvest Date	Soil Type	Location Info	Water Management	N Management	N Rate (lbs N/ac)
MRRMC PD1	Glennonville, Dunklin County	March 17	April 22	June 3	September 20	Silt Loam	Research Station	Flood	Single Pre-flood	130
MRRMC PD2	Glennonville, Dunklin County	April 10	April 30	June 3	September 20	Silt Loam	Research Station	Flood	Single Pre-flood	130
FDRC PD1	Portageville, Pemiscot County	May 12	May 22	June 22	October 7	Clay	Research Station	Flood	Single Pre-flood	150
FDRC PD2	Portageville, Pemiscot County	June 3	June 9	July 11	October 24	Clay	Research Station	Flood	Single Pre-flood	150
MRRMC FIR Top	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Non-Flood	3-way split	130
MRRMC FIR Middle	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Muddy	3-way split	130
MRRMC FIR Bottom	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Flood	3-way split	130
FDRC FIR Top	Portageville, Pemiscot County	May 11	May 21	June 23	October 5	Clay	Research Station	Non-Flood	3-way split	150
FDRC FIR Middle	Portageville, Pemiscot County	May 11	May 21	June 23	October 5	Clay	Research Station	Muddy	3-way split	150
FDRC FIR Bottom	Portageville, Pemiscot County	May 11	May 21	June 23	October 5	Clay	Research Station	Flood	3-way split	150

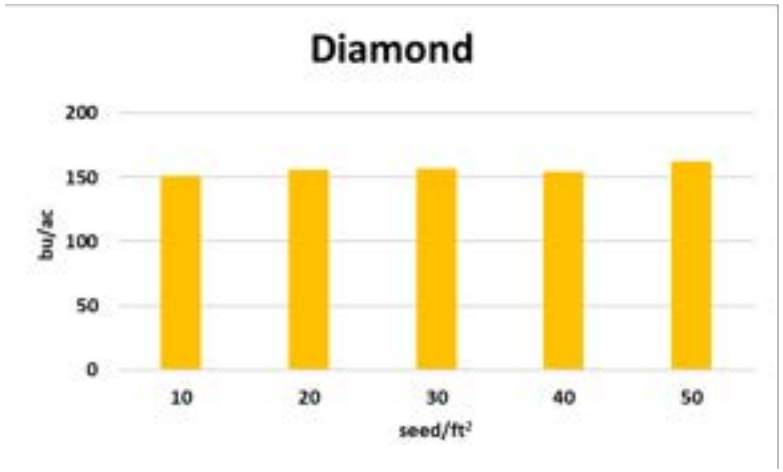
Materials & Methods: Seeding rate trials were planted in flood-irrigated rice on two sites, Portageville (FDRC) and the Rice Farm (MRRMC) and at two planting dates, normal and late planted. Furrow-irrigated trials were planted within the "normal" planting window at two sites, FDRC and MRRMC, and within three areas of the field, top, middle, and bottom. One hybrid cultivar was utilized, RT XP753, and was planted at 4, 8, 12, 16, and 20 seed/ft^2. Meanwhile, three inbred varieties were also planted, CLL16, Diamond, and DG263L at 10, 20, 30, 40, and 50 seed/ft^2. Due to seed size differences, the equivalent seeding rate in pounds per acre is included for each treatment in the data tables on the following pages.

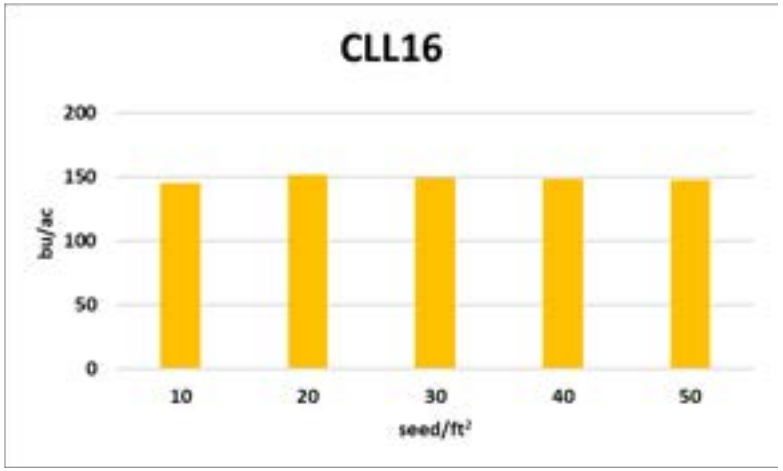
2022 Missouri Flood Rice Seeding Rate Studies Grain Yield

			Rice Farm				Portageville					
			29-Apr		13-Jun		12-May		2-Jun		AVERAGE	
Cultivar	Seeding Rate		Stand	Yield	Stand	Yield	Stand	Yield	Stand	Yield	Stand	Yield
	seed/ft^2	lb/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac
XP753	4	9	2	201	2	148	1	225	-	95	**2**	**167**
XP753	8	18	3	233	2	167	3	231	-	129	**3**	**190**
XP753	12	26	3	228	7	169	4	235	-	111	**5**	**186**
XP753	16	35	5	223	8	182	8	233	-	151	**7**	**197**
XP753	20	44	8	235	12	180	7	234	-	113	**9**	**191**
Diamond	10	24	5	201	4	118	4	196	-	90	**4**	**151**
Diamond	20	48	6	198	9	119	10	201	-	106	**8**	**156**
Diamond	30	73	14	196	13	124	14	198	-	110	**14**	**157**
Diamond	40	97	20	191	16	125	16	198	-	104	**17**	**155**
Diamond	50	121	22	195	18	126	13	213	-	116	**18**	**163**
DG263L	10	25	4	214	6	134	7	219	-	101	**6**	**167**
DG263L	20	51	14	194	13	143	11	220	-	109	**12**	**166**
DG263L	30	76	16	193	16	141	11	206	-	122	**14**	**165**
DG263L	40	101	26	197	23	137	17	210	-	123	**22**	**167**
DG263L	50	127	20	190	28	137	19	199	-	120	**22**	**161**
CLL16	10	24	3	202	3	105	7	191	-	82	**4**	**145**
CLL16	20	48	10	200	7	109	12	197	-	98	**10**	**151**
CLL16	30	72	13	199	11	111	15	195	-	90	**13**	**149**
CLL16	40	96	20	201	16	108	14	202	-	81	**17**	**148**
CLL16	50	120	24	191	17	114	16	203	-	80	**19**	**147**
AVERAGE			**12**	**204**	**12**	**135**	**10**	**210**	**-**	**107**	**11**	**164**


XP753
200
150
100
50
0
bu/ac
4
8
12
16
20
seed/ft²


DG263L
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²

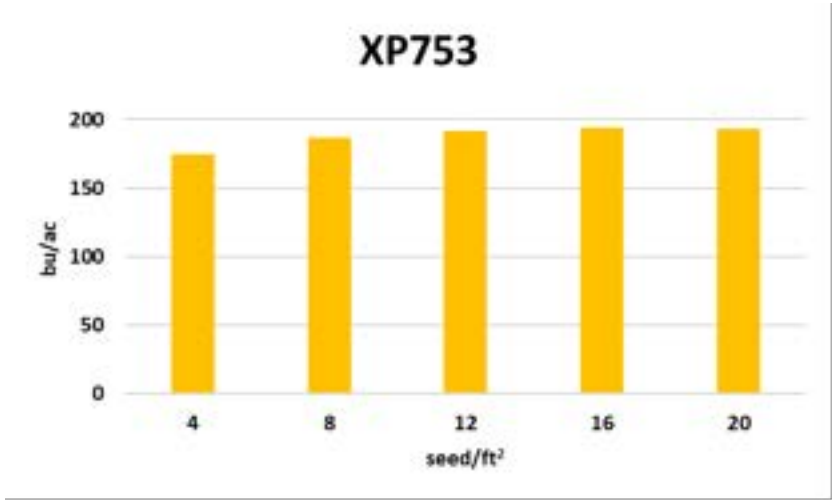

Diamond
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²

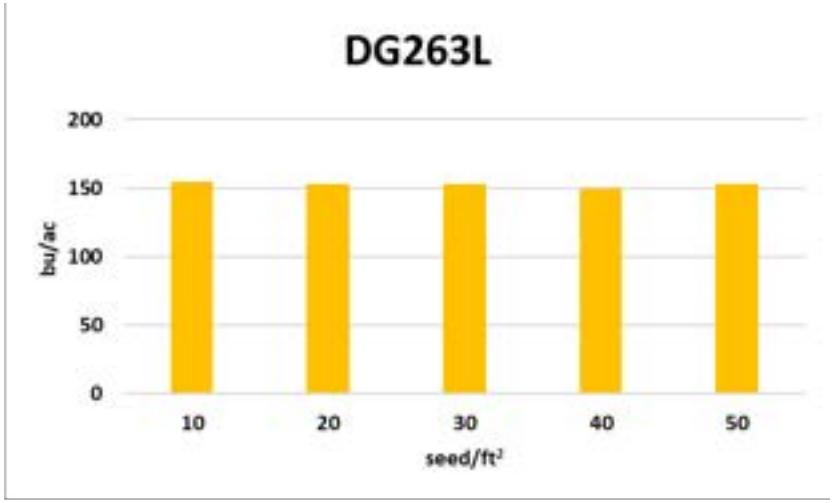

CLL16
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²

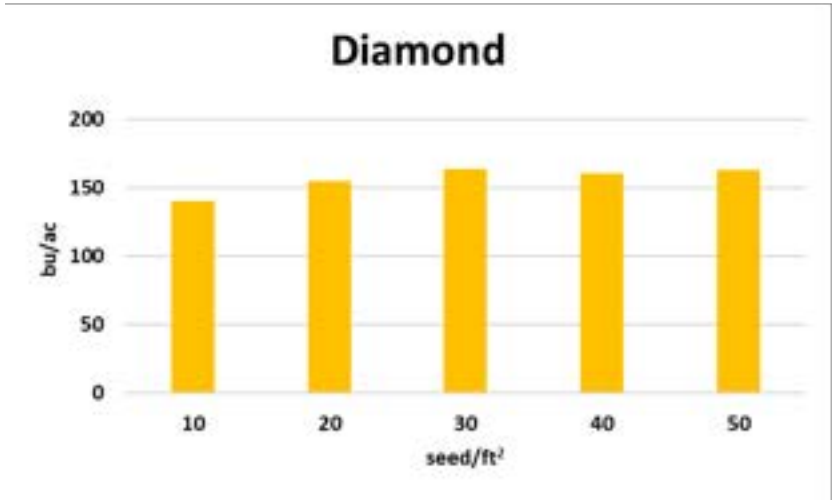
2022 Missouri Furrow-Irrigated Rice Seeding Rate Studies Grain Yield

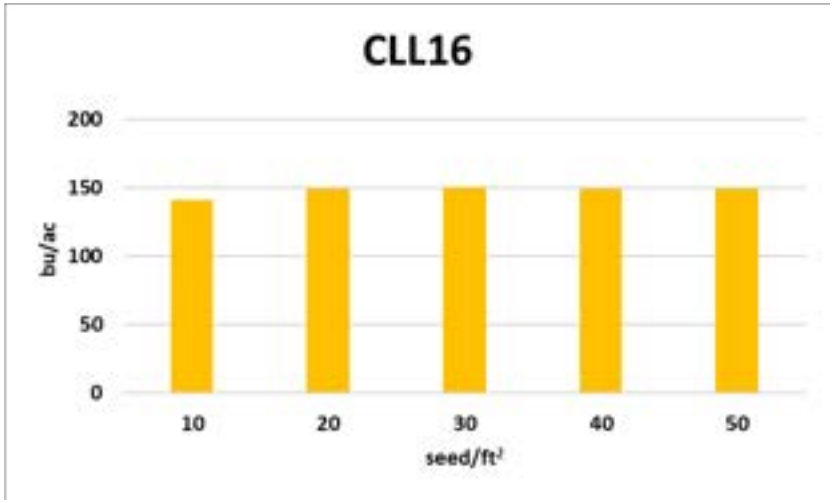
		Rice Farm						Portageville							
		Top		Middle		Bottom		Top		Middle		Bottom		AVERAGE	
Cultivar	Seeding Rate	Stand	Yield	Stand	Yield	Stand	Yield	Stand	Yield	Stand	Yield	Stand	Yield	Stand	Yield
	seed/ft^2	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac	seed/ft^2	bu/ac
XP753	4	2	144	2	177	3	198	3	153	2	162	3	213	**2**	**174**
XP753	8	5	172	5	188	3	189	5	158	6	186	5	225	**5**	**186**
XP753	12	6	166	6	195	6	205	11	168	9	188	9	226	**8**	**192**
XP753	16	8	186	7	203	7	203	12	161	10	187	10	225	**9**	**194**
XP753	20	12	163	9	202	9	201	11	170	12	194	12	230	**11**	**193**
Diamond	10	4	108	3	157	3	156	6	114	6	131	6	177	**5**	**141**
Diamond	20	8	130	10	172	6	170	10	135	10	140	10	183	**9**	**155**
Diamond	30	12	145	13	183	10	179	13	154	12	143	14	176	**12**	**163**
Diamond	40	12	144	13	178	11	177	14	145	14	141	15	179	**13**	**161**
Diamond	50	18	143	16	175	14	175	20	161	19	151	18	172	**17**	**163**
DG263L	10	6	141	8	162	4	176	6	126	6	152	4	172	**6**	**155**
DG263L	20	9	135	10	162	7	177	12	120	11	154	11	169	**10**	**153**
DG263L	30	16	141	10	159	12	181	21	122	19	152	19	163	**16**	**153**
DG263L	40	15	146	16	154	14	173	19	132	17	154	17	138	**16**	**150**
DG263L	50	21	139	16	155	13	167	22	148	23	162	22	149	**20**	**153**
CLL16	10	5	135	4	167	3	161	6	112	7	115	6	157	**5**	**141**
CLL16	20	11	150	12	176	9	178	10	112	10	122	10	157	**10**	**149**
CLL16	30	19	163	17	185	12	176	14	115	16	113	14	150	**15**	**150**
CLL16	40	20	158	18	167	15	170	22	127	22	127	23	148	**20**	**150**
CLL16	50	22	152	21	171	15	176	16	121	24	130	22	144	**20**	**149**
AVERAGE		**12**	**148**	**11**	**174**	**9**	**180**	**13**	**138**	**13**	**150**	**12**	**178**	**11**	**161**

* Furrow-irrigated rice trials were planted at Glennonville on May 19 and Portageville on May 11.


XP753
200
150
100
50
0
bu/ac
4
8
12
16
20
seed/ft²

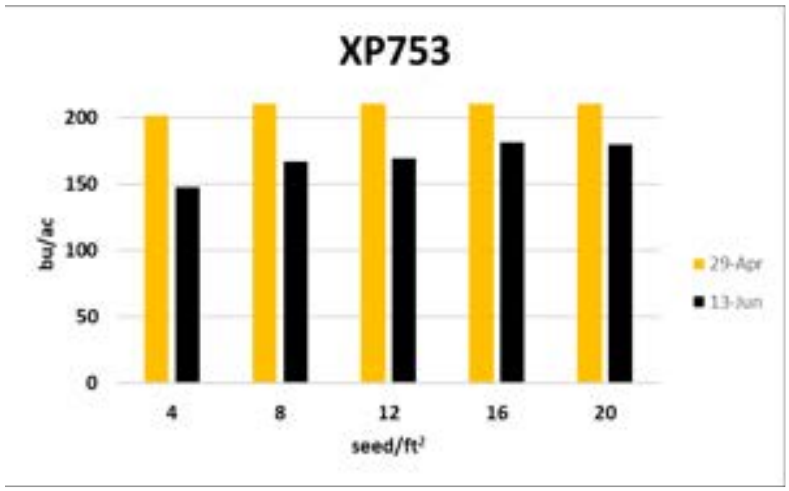

DG263L
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²

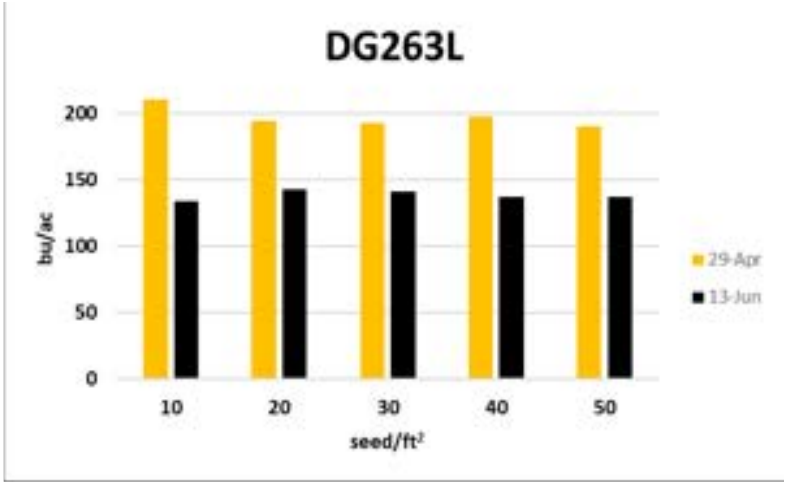

Diamond
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²

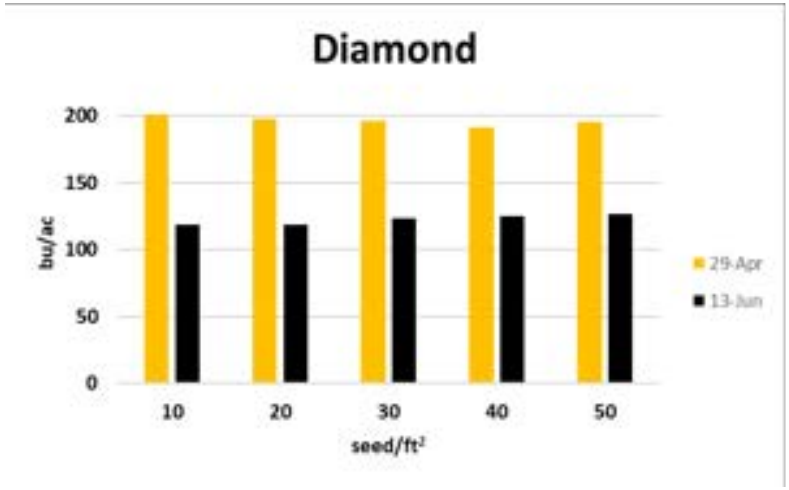

CLL16
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²

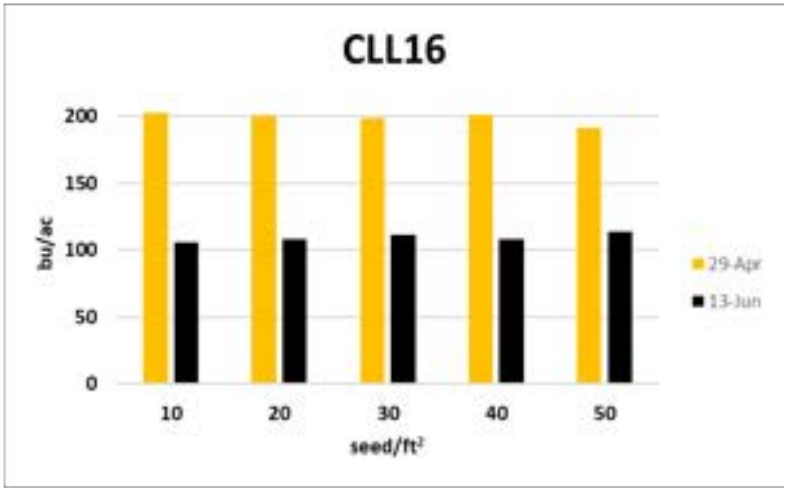
2022 Rice Farm Flood Rice Seed Rate Study

			29-Apr				13-Jun			
Cultivar	**Seeding Rate**		**Stand**	**Heading**	**Yield**	**Milling**	**Stand**	**Heading**	**Yield**	**Milling**
	seed/ft²	**lb/ac**	**seed/ft²**	**days to**	**bu/ac**	**HR-TR**	**seed/ft²**	**days to**	**bu/ac**	**HR-TR**
XP753	4	9	2	88	**201**	60-72	2	87	**148**	58-69
XP753	8	18	3	87	**233**	60-70	2	86	**167**	49-68
XP753	12	26	3	87	**228**	61-71	7	85	**169**	55-68
XP753	16	35	5	87	**223**	61-72	8	84	**182**	56-70
XP753	20	44	8	87	**235**	61-72	12	83	**180**	54-69
Diamond	10	24	5	93	**201**	63-71	4	91	**118**	40-61
Diamond	20	48	6	94	**198**	63-70	9	92	**119**	41-61
Diamond	30	73	14	93	**196**	62-70	13	92	**124**	42-61
Diamond	40	97	20	93	**191**	62-70	16	91	**125**	45-62
Diamond	50	121	22	93	**195**	62-70	18	90	**126**	42-61
DG263L	10	25	4	89	**214**	64-70	6	89	**134**	49-62
DG263L	20	51	14	87	**194**	63-70	13	87	**143**	53-64
DG263L	30	76	16	87	**193**	63-69	16	85	**141**	52-64
DG263L	40	101	26	87	**197**	63-70	23	85	**137**	53-64
DG263L	50	127	20	87	**190**	63-70	28	84	**137**	49-66
CLL16	10	24	3	96	**202**	60-69	3	95	**105**	25-52
CLL16	20	48	10	95	**200**	60-69	7	94	**109**	23-49
CLL16	30	72	13	97	**199**	62-71	11	93	**111**	29-54
CLL16	40	96	20	96	**201**	61-70	16	93	**108**	27-51
CLL16	50	120	24	95	**191**	61-70	17	93	**114**	32-56
AVERAGE			**12**	**91**	**204**	**62-70**	**12**	**89**	**135**	**44-62**


XP753
200
150
100
50
0
bu/ac
4
8
12
16
20
seed/ft²
29-Apr
13-Jun

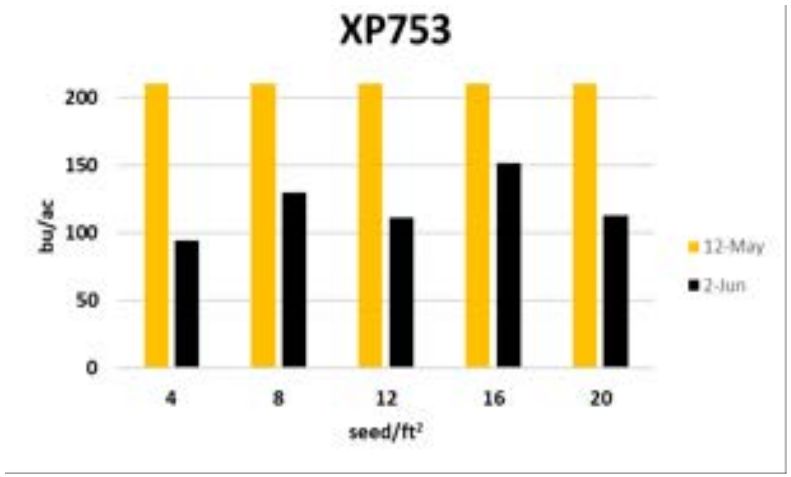

DG263L
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
29-Apr
13-Jun

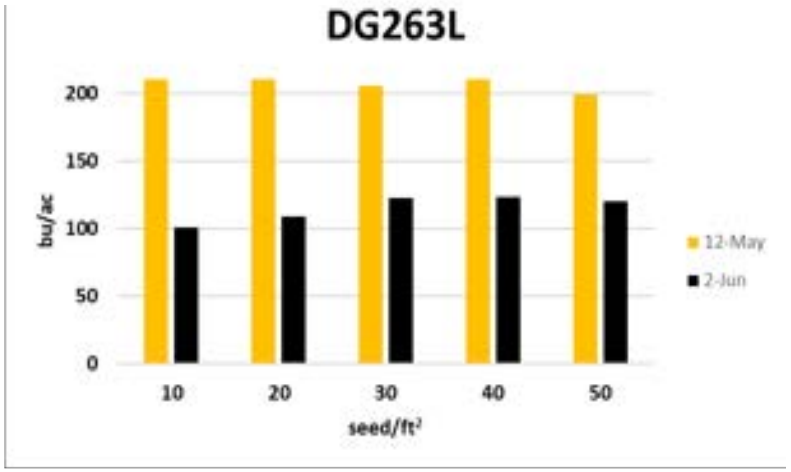

Diamond
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
29-Apr
13-Jun

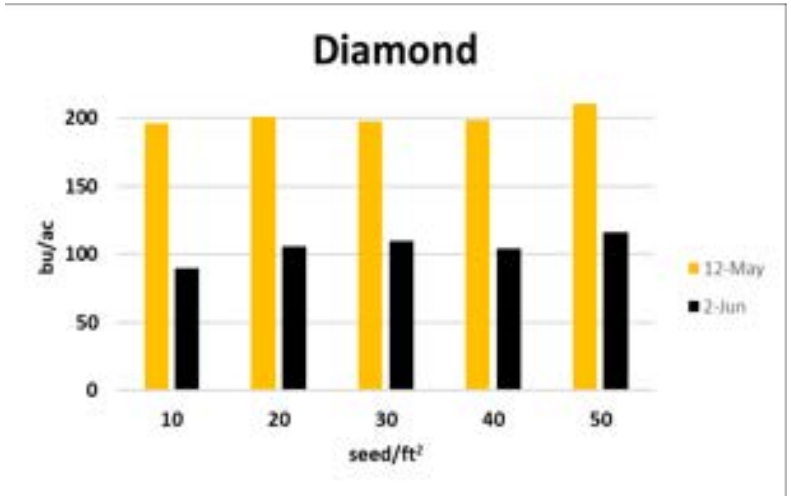

CLL16
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
29-Apr
13-Jun

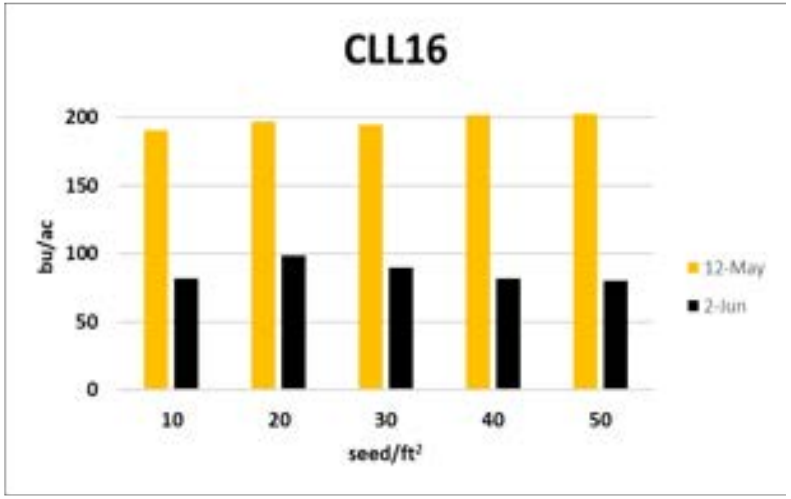
2022 Portageville Flood Rice Seed Rate Study

Cultivar	Seeding Rate		12-May				2-Jun			
			Stand	Heading	Yield	Milling	Stand	Heading	Yield	Milling
	seed/ft^2	lb/ac	seed/ft^2	days to	bu/ac	HR-TR	seed/ft^2	days to	bu/ac	HR-TR
XP753	4	9	1	86	**225**	62-71	-	88	**95**	50-67
XP753	8	18	3	86	**231**	62-71	-	81	**129**	54-68
XP753	12	26	4	85	**235**	62-72	-	88	**111**	47-65
XP753	16	35	8	84	**233**	63-72	-	88	**151**	54-68
XP753	20	44	7	84	**234**	62-71	-	88	**113**	47-65
Diamond	10	24	4	92	**196**	60-70	-	89	**90**	46-66
Diamond	20	48	10	91	**201**	60-70	-	90	**106**	33-59
Diamond	30	73	14	90	**198**	60-69	-	91	**110**	30-58
Diamond	40	97	16	89	**198**	60-70	-	90	**104**	38-62
Diamond	50	121	13	89	**213**	60-70	-	89	**116**	44-65
DG263L	10	25	7	84	**219**	59-69	-	92	**101**	32-59
DG263L	20	51	11	84	**220**	59-70	-	91	**109**	30-55
DG263L	30	76	11	83	**206**	59-70	-	89	**122**	42-64
DG263L	40	101	17	82	**210**	58-69	-	89	**123**	41-63
DG263L	50	127	19	82	**199**	58-69	-	89	**120**	37-61
CLL16	10	24	7	95	**191**	55-68	-	95	**82**	16-48
CLL16	20	48	12	96	**197**	56-69	-	95	**98**	35-60
CLL16	30	72	15	95	**195**	57-69	-	95	**90**	20-52
CLL16	40	96	14	95	**202**	57-68	-	95	**81**	28-56
CLL16	50	120	16	94	**203**	59-69	-	95	**80**	24-55
AVERAGE			**10**	**88**	**210**	**59-70**	**-**	**90**	**107**	**37-61**


XP753
200
150
100
50
0
bu/ac
4
8
12
16
20
seed/ft²
12-May
2-Jun

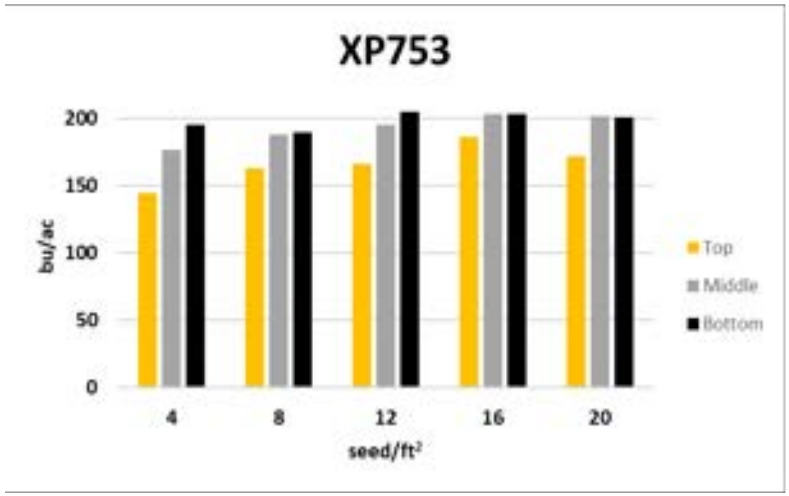

DG263L
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
12-May
2-Jun

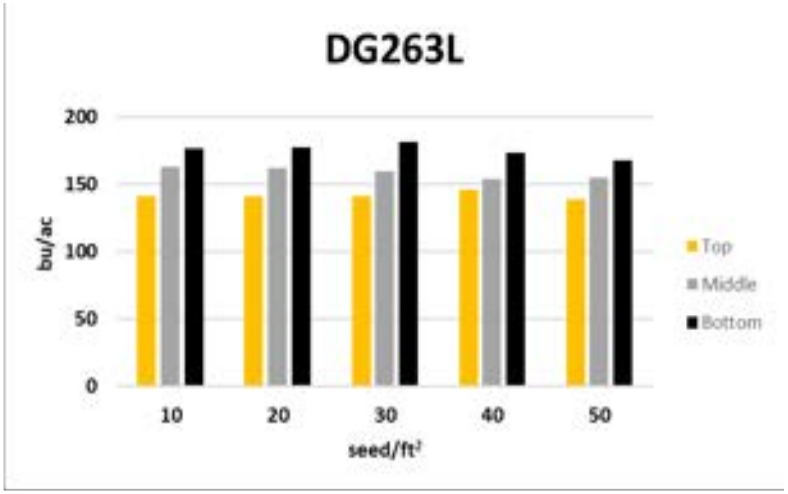

Diamond
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
12-May
2-Jun

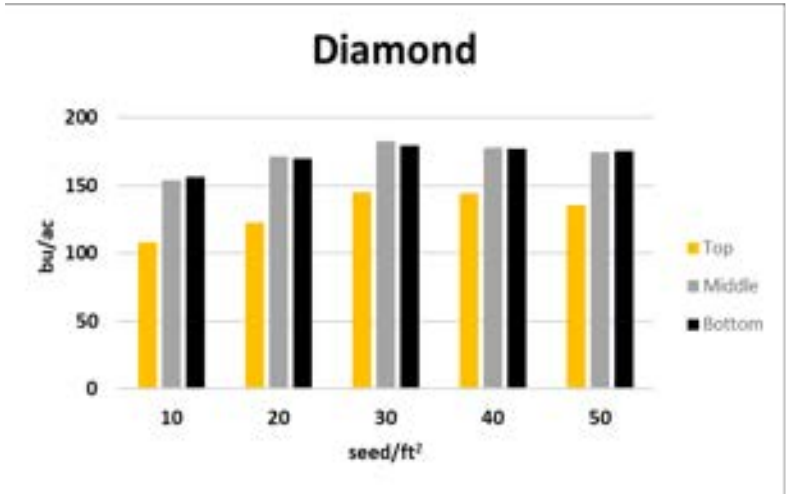

CLL16
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
12-May
2-Jun

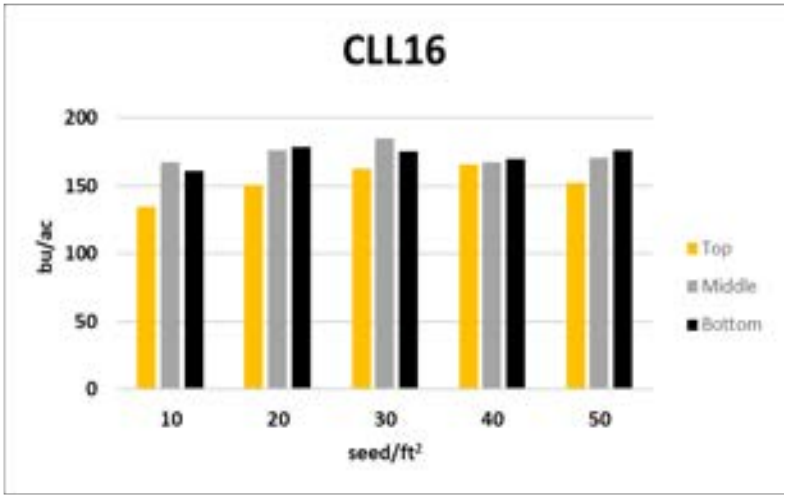
2022 Rice Farm Furrow-Irrigated Rice Seed Rate Study

Cultivar	Seeding Rate		Top			Middle			Bottom		
			Stand	Yield	Milling	Stand	Yield	Milling	Stand	Yield	Milling
	seed/ft^2	lb/ac	seed/ft^2	bu/ac	HR-TR	seed/ft^2	bu/ac	HR-TR	seed/ft^2	bu/ac	HR-TR
XP753	4	9	5	**144**	51-71	6	**176**	52-71	8	**195**	56-71
XP753	8	18	12	**163**	52-72	11	**188**	55-71	9	**189**	58-71
XP753	12	26	13	**166**	53-72	12	**195**	54-71	12	**205**	58-71
XP753	16	35	14	**186**	52-72	13	**203**	54-71	13	**203**	59-71
XP753	20	44	17	**172**	52-72	15	**202**	54-71	15	**201**	58-71
Diamond	10	24	10	**108**	53-70	9	**154**	53-69	9	**156**	52-68
Diamond	20	48	14	**123**	53-70	16	**172**	54-69	12	**170**	52-68
Diamond	30	73	17	**145**	56-71	18	**183**	55-69	16	**179**	52-68
Diamond	40	97	17	**144**	55-70	18	**177**	56-70	17	**177**	53-68
Diamond	50	121	20	**136**	57-71	19	**175**	55-68	18	**175**	52-67
DG263L	10	25	13	**141**	54-70	14	**162**	55-68	10	**176**	55-67
DG263L	20	51	15	**141**	52-70	16	**162**	52-68	13	**177**	55-68
DG263L	30	76	19	**141**	51-70	16	**159**	51-69	17	**181**	54-67
DG263L	40	101	19	**146**	50-69	19	**154**	50-68	18	**173**	56-69
DG263L	50	127	21	**139**	51-70	19	**155**	50-68	18	**167**	54-68
CLL16	10	24	11	**134**	54-70	10	**167**	50-68	8	**161**	42-64
CLL16	20	48	16	**150**	57-71	17	**176**	52-70	15	**178**	45-65
CLL16	30	72	20	**163**	53-70	19	**185**	48-68	17	**175**	45-65
CLL16	40	96	21	**166**	57-71	20	**167**	52-69	19	**170**	46-66
CLL16	50	120	21	**152**	54-69	21	**171**	53-69	19	**176**	45-66
AVERAGE			**16**	**148**	**53-71**	**15**	**174**	**53-69**	**14**	**179**	**53-71**


XP753
200
150
100
50
0
bu/ac
4
8
12
16
20
seed/ft²
Top
Middle
Bottom

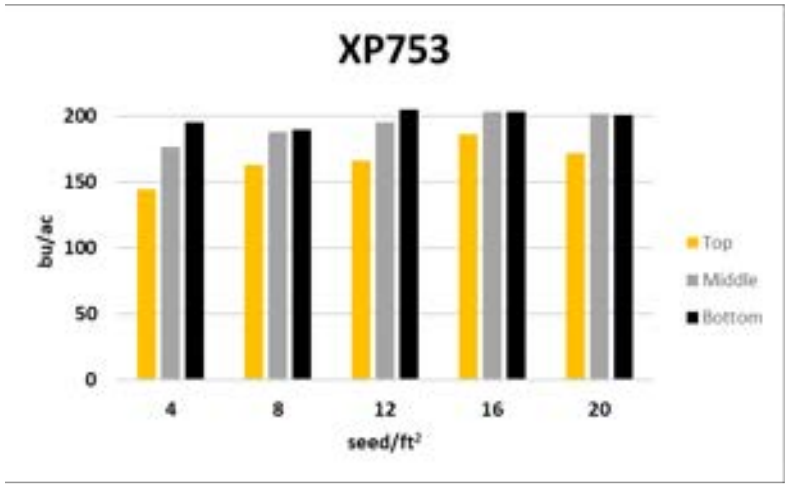

DG263L
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
Top
Middle
Bottom

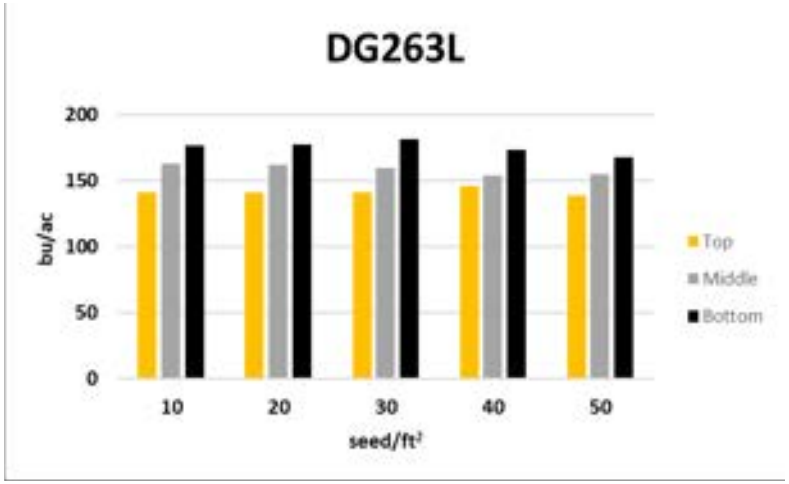

Diamond
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
Top
Middle
Bottom

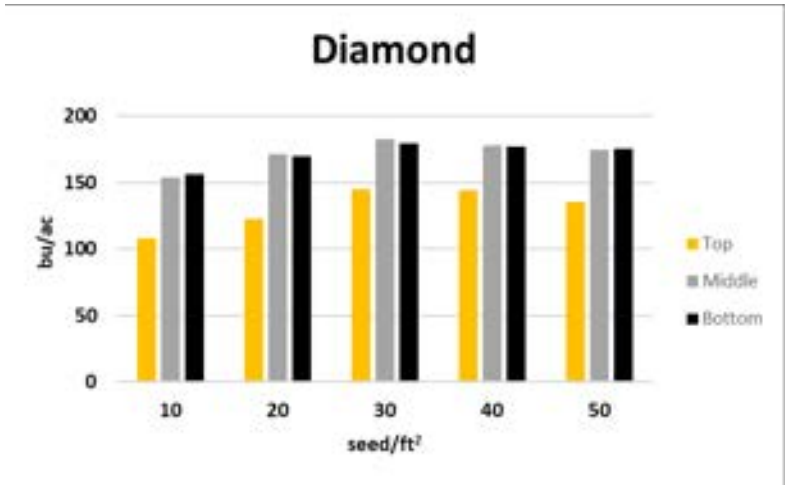

CLL16
200
150
100
50
0
bu/ac
10
20
30
40
50
seed/ft²
Top
Middle
Bottom

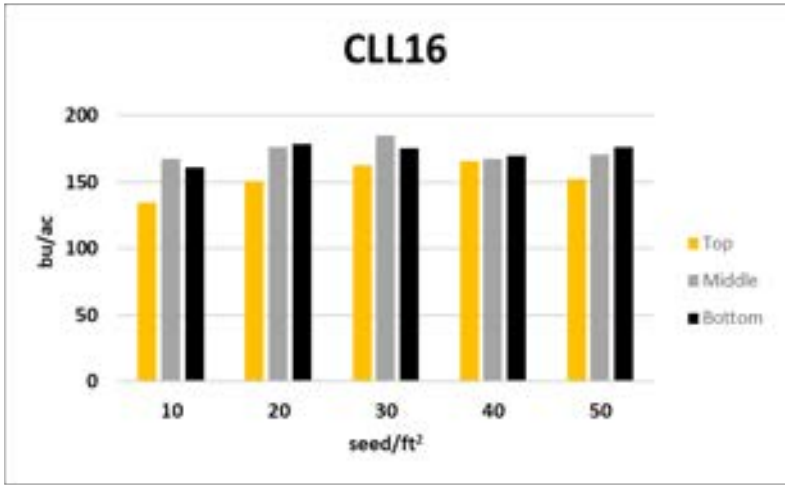
2022 Portageville Furrow-Irrigated Rice Seed Rate Study

Cultivar	Seeding Rate		Top			Middle			Bottom		
			Stand	Yield	Milling	Stand	Yield	Milling	Stand	Yield	Milling
	seed/ft^2	lb/ac	seed/ft^2	bu/ac	HR-TR	seed/ft^2	bu/ac	HR-TR	seed/ft^2	bu/ac	HR-TR
XP753	4	9	5	**144**	52-71	6	**176**	58-72	8	**195**	57-70
XP753	8	18	12	**163**	47-71	11	**188**	54-71	9	**189**	59-71
XP753	12	26	13	**166**	45-71	12	**195**	55-71	12	**205**	59-71
XP753	16	35	14	**186**	42-71	13	**203**	54-70	13	**203**	61-71
XP753	20	44	17	**172**	46-71	15	**202**	52-71	15	**201**	55-71
Diamond	10	24	10	**108**	53-71	9	**154**	59-70	9	**156**	58-69
Diamond	20	48	14	**123**	54-70	16	**172**	59-70	12	**170**	58-69
Diamond	30	73	17	**145**	56-71	18	**183**	59-71	16	**179**	60-70
Diamond	40	97	17	**144**	57-71	18	**177**	60-71	17	**177**	60-70
Diamond	50	121	20	**136**	52-70	19	**175**	60-70	18	**175**	61-70
DG263L	10	25	13	**141**	49-69	14	**162**	58-69	10	**176**	58-69
DG263L	20	51	15	**141**	55-71	16	**162**	56-69	13	**177**	56-69
DG263L	30	76	19	**141**	53-69	16	**159**	57-69	17	**181**	59-70
DG263L	40	101	19	**146**	50-70	19	**154**	53-69	18	**173**	57-69
DG263L	50	127	21	**139**	50-69	19	**155**	59-70	18	**167**	59-69
CLL16	10	24	11	**134**	55-70	10	**167**	57-69	8	**161**	55-68
CLL16	20	48	16	**150**	57-70	17	**176**	59-70	15	**178**	57-68
CLL16	30	72	20	**163**	58-71	19	**185**	60-70	17	**175**	55-68
CLL16	40	96	21	**166**	56-71	20	**167**	57-69	19	**170**	54-67
CLL16	50	120	21	**152**	56-71	21	**171**	59-70	19	**176**	56-67
AVERAGE			**16**	**148**	**52-71**	**15**	**174**	**57-70**	**14**	**179**	**58-69**









Results: Results from the seeding rate studies suggest that recommended seeding rates are still in the correct ballpark for most cultivars in both production systems. One cultivar that shows promise for a lower seeding rate is DG263L. Maximum yields were obtained at all sites other than late-planted with the lowest seeding rate tested, near 25 lb/ac. The 2022 data also suggest that a slightly higher seeding rate may be beneficial in furrow-irrigated rice, but that will inherently vary based on factors such as planting style, drill setup, and how furrows are created.

2022 Missouri Starter Fertilizer Trials

Flood-Irrigated and Furrow-Irrigated Production Systems

Conducted by the
University of Missouri Rice Agronomy Program

Funding and support provided by the
Missouri Rice Research and Merchandising Council

By J.L. Chlapecka, M. Johnson, K. McCorkle, C. Hunt

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2022 Missouri Starter Fertilizer Studies (2- to 3-leaf Application)

Site	Nearest Town	Planting Date	Emergence Date	Starter App	Flood Date	Harvest Date	Soil Type	Water Management	N Management	N Rate (lbs N/ac)
FDRC Flood	Portageville, Pemiscot County	May 12	May 22	June 8	June 22	September 26	Clay	Flood	Single Preflood	150
MRRMC Flood	Glennonville, Dunklin County	May 17	May 27	June 13	June 23	October 4	Silt Loam	Flood	Single Preflood	130
MRRMC FIR Top	Glennonville, Dunklin County	May 19	May 28	June 14	June 21	October 19	Silt Loam	Non-Flood	3-way split	166
MRRMC FIR Middle	Glennonville, Dunklin County	May 19	May 28	June 14	June 21	October 19	Silt Loam	Muddy	3-way split	166
MRRMC FIR Bottom	Glennonville, Dunklin County	May 19	May 28	June 14	June 21	October 19	Silt Loam	Flood	3-way split	166
FDRC FIR Top	Portageville, Pemiscot County	May 11	May 21	June 8	June 23	October 3	Clay	Non-Flood	3-way split	196
FDRC FIR Middle	Portageville, Pemiscot County	May 11	May 21	June 8	June 23	October 3	Clay	Muddy	3-way split	196
FDRC FIR Bottom	Portageville, Pemiscot County	May 11	May 21	June 8	June 23	October 3	Clay	Flood	3-way split	196

Materials & Methods: Two sites were used for flood-irrigated rice and two were used for furrow-irrigated rice. Flood rice included two rice cultivars, RT XP753 and Diamond, and four starter fertilizer treatments: no starter fertilizer, 100 lbs/ac diammonium phosphate (DAP, 18-46-0), 100 lbs/ac urea (46-0-0), and 100 lbs/ac triple superphosphate (TSP, 0-45-0) applied at 2- to 3-leaf stage. Furrow-irrigated trials used only RT XP753 and 16 starter fertilizer treatments: no starter fertilizer applied; 65, 130, 196, 261, and 326 lbs/ac DAP; 65, 130, 196, 261, and 326 lbs/ac TSP; and 26, 51, 77, 102, and 128 lbs/ac urea. These amounts were selected to provide set amounts of phosphorus, nitrogen, both in combination, or neither to tease out which nutrient or nutrient interaction, if any, would be responsible for differences in yield. A precipitation event of 0.23” occurred at Portageville (FDRC) the day of application, while 0.17” were received at the Rice Farm (MRRMC) 3-4 days after starter fertilizer application. The furrow-irrigated rice fields were also flushed within two days after application. Aside from the starter fertilizer application, all trials were treated according to University of Missouri recommendations for rice production.

2022 Missouri Flood Rice Starter Fert Studies

			Rice Farm		Portageville		AVERAGE	
Cultivar	**Product**	**Rate**	**Yield**	**Milling**	**Yield**	**Milling**	**Yield**	**Milling**
		lb/ac	**bu/ac**	**HR-TR**	**bu/ac**	**HR-TR**	**bu/ac**	**HR-TR**
Diamond	None	100	191	61-70	160	59-67	**176**	**60-68**
Diamond	DAP	100	190	60-70	155	60-68	**173**	**60-69**
Diamond	Urea	100	193	60-69	155	60-69	**174**	**60-69**
Diamond	TSP	100	194	59-69	159	61-69	**177**	**60-69**
RT XP753	None	100	225	58-71	215	61-71	**220**	**59-71**
RT XP753	DAP	100	229	59-72	224	61-70	**227**	**60-71**
RT XP753	Urea	100	229	57-71	216	62-71	**223**	**59-71**
RT XP753	TSP	100	221	58-72	215	62-71	**218**	**60-71**
AVERAGE			**209**	**59-70**	**187**	**61-70**	198	**60-70**

2022 Missouri Furrow-Irrigated Rice Starter Fertilizer Studies

					Rice Farm						Portageville							
		Rate Applied			Top		Middle		Bottom		Top		Middle		Bottom		AVERAGE	
Cultivar	Product	Product	P_2O_5	N	Yield	Milling	Yield	Milling	Yield	Milling	Yield	Milling	Yield	Milling	Yield	Milling	Yield	Milling
		lb/ac			bu/ac	HR-TR	bu/ac	HR-TR	bu/ac	HR-TR	bu/ac	HR-TR	bu/ac	HR-TR	bu/ac	HR-TR	bu/ac	HR-TR
XP753	None	0	0	0	164	53-70	192	55-71	234	58-69	161	55-72	183	60-72	171	60-71	**184**	57-71
XP753	DAP	65	30	12	166	52-71	199	54-70	236	58-71	156	54-71	179	62-72	175	60-70	**185**	57-71
XP753	DAP	130	60	23	169	56-71	198	56-71	233	58-70	156	55-71	191	62-72	178	60-70	**187**	58-71
XP753	DAP	196	90	35	175	56-71	199	55-71	218	60-71	161	57-71	183	61-72	177	60-70	**185**	58-71
XP753	DAP	261	120	47	170	56-71	201	56-71	229	60-72	157	57-71	173	61-72	175	59-70	**184**	58-71
XP753	DAP	326	150	59	176	57-71	197	56-71	224	60-71	176	58-72	189	61-72	177	59-70	**190**	58-71
XP753	TSP	65	30	0	168	54-71	195	55-71	230	60-72	156	56-71	187	61-72	175	61-71	**185**	58-71
XP753	TSP	130	60	0	175	53-71	199	54-70	229	59-71	154	56-71	174	60-72	180	61-70	**185**	57-71
XP753	TSP	196	90	0	171	53-71	203	56-72	228	59-70	157	55-71	174	61-72	178	60-69	**185**	57-71
XP753	TSP	261	120	0	173	53-71	201	55-71	221	59-71	148	56-71	187	61-72	178	60-70	**185**	57-71
XP753	TSP	326	150	0	175	54-70	205	55-70	234	59-71	145	59-72	179	61-72	177	60-71	**186**	58-71
XP753	Urea	26	0	12	177	54-71	200	55-70	233	58-70	155	54-71	181	62-72	179	61-70	**187**	58-71
XP753	Urea	51	0	23	178	53-71	192	57-71	232	59-71	161	54-71	179	60-72	174	59-70	**186**	57-71
XP753	Urea	77	0	35	173	53-71	192	55-71	229	59-71	157	57-71	175	61-72	184	59-71	**185**	57-71
XP753	Urea	102	0	47	176	55-71	192	56-71	233	59-70	164	56-71	186	61-72	180	61-71	**189**	58-71
XP753	Urea	128	0	59	173	56-71	203	56-71	224	59-70	155	58-72	182	61-72	179	59-70	**186**	58-71
AVERAGE					**172**	**54-71**	**198**	**55-71**	**229**	**59-71**	**157**	**56-71**	**181**	**61-72**	**177**	**60-70**	186	**58-71**

* Furrow-irrigated rice trials were planted at Glennonville on May 19 and Portageville on May 11.

Conclusions: The addition of starter fertilizer on 2- to 3-leaf rice did not significantly improve grain or milling yield in either rice production system in 2022 when averaged across sites. This is contrary to some recent studies out of Arkansas, but agrees with other studies and current recommendations, which are to not apply starter fertilizer in most instances. Again, a precipitation event of 0.23" occurred at Portageville (FDRC) the day of application, while 0.17" were received at the Rice Farm (MRRMC) 3-4 days after starter fertilizer application. It is possible that the rainfall events were not satisfactory to incorporate some of the fertilizer treatments in the flood-irrigated tests, specifically all the phosphorus-containing products. If that is the case, it reiterates the importance of applying treatments just prior to a significant rainfall or flushing the field for incorporation.

Title

Evaluation of acetochlor (Warrant) + safeners on control of grasses and small seeded broadleaf weeds in furrow irrigated rice (FIR).*

Principle Investigator

James Heiser, Sr. Research Associate, MU Fisher Delta Research Center

Objective

Determine the effectiveness of acetochlor for controlling common grass and broadleaf weeds in furrow irrigated rice as well as evaluating the utility of safeners for crop safety when applying acetochlor to rice.

Justification

Control of grassy weeds can be one of the most difficult tasks in rice production. Barnyardgrass and Amazon sprangletop are among the most problematic weeds in delayed flood production systems in Missouri. In FIR production, additional species such as crabgrass, goosegrass, and broadleaf signalgrass can also be detrimental to producing a clean crop. Additionally, small seeded broadleaf weeds such as Palmer amaranth can be more problematic in FIR. The herbicide Warrant (active ingredient Acetochlor) is used in corn, cotton, and soybeans for preemergence control of grasses and small seeded broadleaf weeds. In recent years the concept of overlaying soil residual herbicides in these crops has gained popularity. In this process, a preemergent (PRE) herbicide would be applied at or shortly after planting. A second soil residual herbicide, safe to apply over the top of the emerged crop, is then applied just before the residual activity of the PRE herbicide is expected to break. In this way, less pressure is put on our postemergence herbicides.

The need for additional modes of action is as evident in rice as any of our major crops in Southeast Missouri. Many rice fields have shown to have populations of barnyardgrass tolerant or resistant to propanil, Command, Facet, Clincher, Ricestar HT, and/or Newpath and Beyond herbicides. Additional species have also been noted to be tolerant to these and other herbicides used in rice production. The herbicide active ingredient pretilachlor (same family as acetochlor, metolachlor), has been employed for weed control in areas outside of the U.S. for many years. Many formulations include the herbicide safener fenclorim as a premix to prevent injury to the rice crop. A recent study in Arkansas looked to determine the efficacy and crop safety when acetochlor + fenclorim was applied preplant, preemergence and to spiking rice. This study would investigate the residual control and crop safety when acetochlor + fenclorim or acetochlor + dichlormid, another safener used with chloroacetamide herbicides, are applied at later rice growth stages as an overlapping residual following a PRE application of Command + Sharpen.

Procedures

Rice was drill seeded on 38” beds on May 18 at the MRRMC farm near Glennonville, Mo. A low rate of Command (8 fl.oz./ac.) was applied one day after planting to the study area. Treatments included two application rates of acetochlor formulated as Warrant herbicide (1.25 and 1.9 quarts/acre – low and high range on label for most crops) alone, and with the safeners fenclorim or dichlormid applied at 0-, 50-, 175-, and 300-grams active ingredient per acre (Figure 1). These applications were made at the 2-3 leaf rice growth stage when control from PRE Command applications began to break. These applications occurred on June 14. There were mixing and application issues with the fenclorim safener that potentially reduced the actual applied rate in those treatments.

Crop injury evaluations (stand reduction, stunting, chlorosis, necrosis) began 1 day following applications. A broad spectrum, non-residual herbicide program was employed at this time to evaluate the residual activity and duration of acetochlor on target species. Weed control evaluations began two weeks after applications and continued through canopy closure. Species evaluated included Palmer amaranth, entire leaf morningglory, and a mix of grass species that included barnyardgrass, crabgrass and broadleaf

signalgrass. NDVI measurements were made just before applications and at 1, 3, 7, and 14 days after application to determine if any differences in light reflectance, which may not be evident to human eyes, is occurring and to what extent. Plots were harvested for yield.

Results

Initial evaluations for crop response (1 and 3 DAT) from these applications revealed no adverse response in the form of chlorosis, necrosis, or crop stunting. However, by 7 DAT, stunting was evident although minor. No differences statistically were found. In fact, for all injury evaluations, only one treatment was observed to have higher incidence of stunting than any other treatment. Observations 14 DAT showed that applications of 1.9 qt./ac. of Warrant applied with the lowest rate of fenclorim produced the greatest amount of crop stunting – more so than when no safener was applied (Figure 2). If we compare the different rates of Warrant and just one safener, fenclorim, we see that this safener was able to reduce stunting when applied at the 300 g ai rate, especially with the higher rate of Warrant (Figure 3). No significant differences were noted when we looked at only the dichlormid treatments.

Residual control of the aforementioned weeds was exceptional in this study. Palmer amaranth and morningglory emergence was nonexistent following 2-3 leaf applications in the treated plot area, while border areas between plots and alleys had a fair amount of these species. Grass control was also good to great for the evaluation period. However, numerical differences in control were observed. No clear pattern of what caused these differences emerged (Figure 4). Similarly, no differences in crop yield were noted at the completion of this study.

Normalized difference vegetative index (NDVI) measurements were made just prior to Warrant applications and at several intervals following applications. When analyzing the entire study, no differences were found in these measurements. If we look only at the fenclorim and no safener treatments, we see some minor, non-significant differences (Figure 5).

Conclusions

The use of Acetochlor as formulated in Warrant herbicide was found to be safe when applied to rice at the 1-2 leaf growth stage with or without the herbicide safeners fenclorim and dichlormid. The addition of a safener to applications before, during, or shortly after germination but before crop emergence would probably benefit from a safener more than applications after crop establishment – as was the case in this study. Due to no differences in weed control being observed, we can conclude that we did not safen the weeds to the herbicide – useful to know for overlapping residual applications *and* applications made during crop germination.

Figure 1. Treatment list

Treatment	Warrant Rate(qt./ac.)	Safener	Safener Rate (g ai./ac.)
1	1.2	-	0
2	1.2	Fenclorim	50
3	1.2	Fenclorim	175
4	1.2	Fenclorim	300
5	1.2	Dichlormid	50
6	1.2	Dichlormid	175
7	1.2	Dichlormid	300
8	1.2	-	0
9	1.9	Fenclorim	50
10	1.9	Fenclorim	175
11	1.9	Fenclorim	300
12	1.9	Dichlormid	50
13	1.9	Dichlormid	175
14	1.9	Dichlormid	300

Figure 2. Crop stunting on June 28 following applications of Warrant at 1.9 and 1.9 qt./ac. alone or with the safeners fenclorim or dichlormid at 50, 175, or 300g ai./ac. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

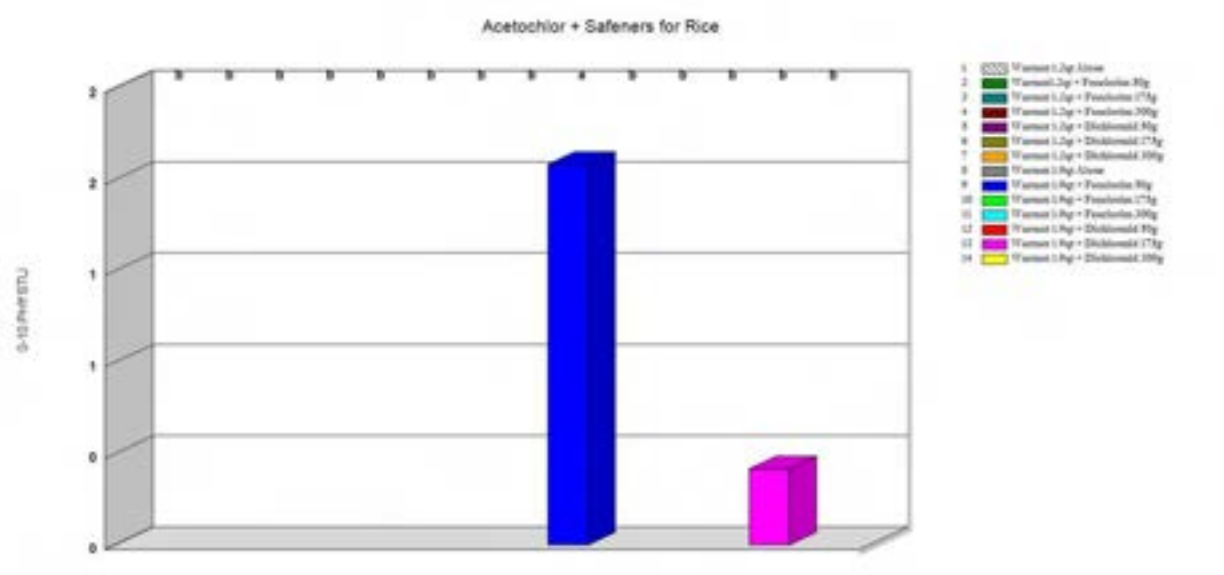


Figure 3. Crop stunting on June 21 following applications of Warrant with the safener Fenclorim applied at 0, 50, 175, or 300 g ai./ac. Rating scale is 0= no injury and 10=severe tissue damage/plant death. Data with the same letters are not statistically different.

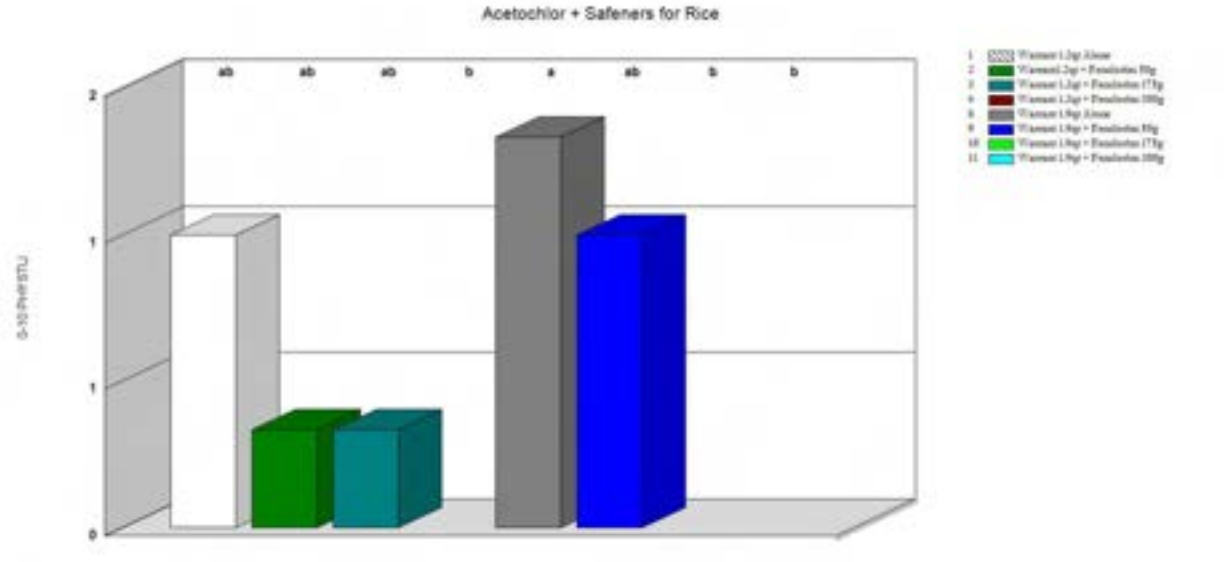


Figure 4. Control of grasses (barnyardgrass, crabgrass, and broadleaf signalgrass) when Warrant was applied at 1.2 or 1.9 qt./ac. with 0, 50, 175, 300 g ai./ac. of either Fenclorim or Dichlormid safeners. No significant differences in grass, Palmer amaranth, or entireleaf morningglory were observed at any timing in this study.

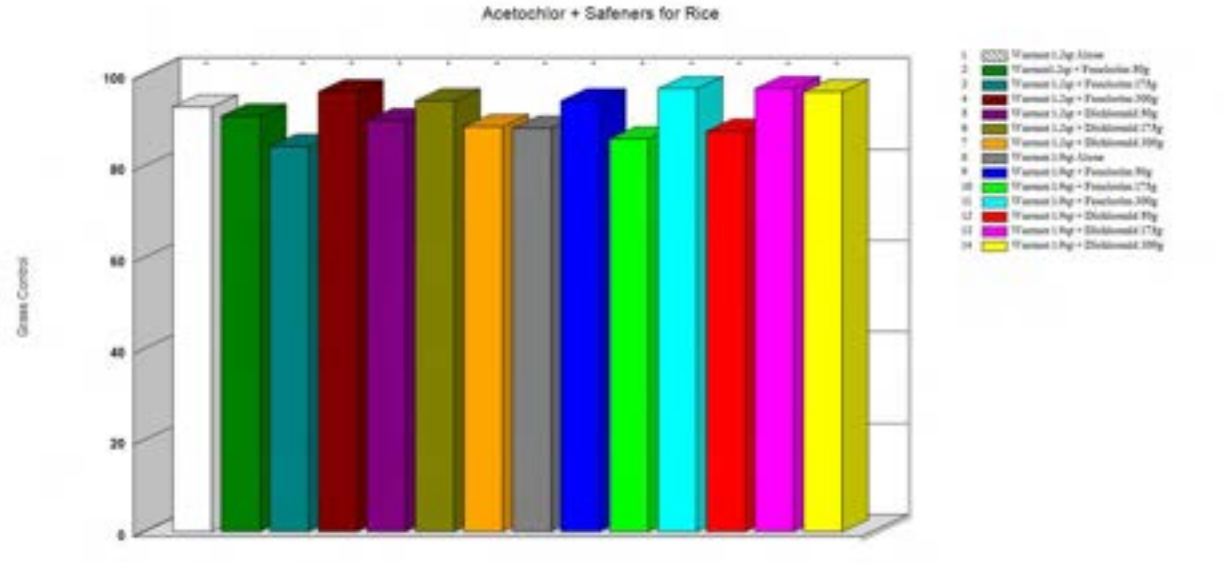
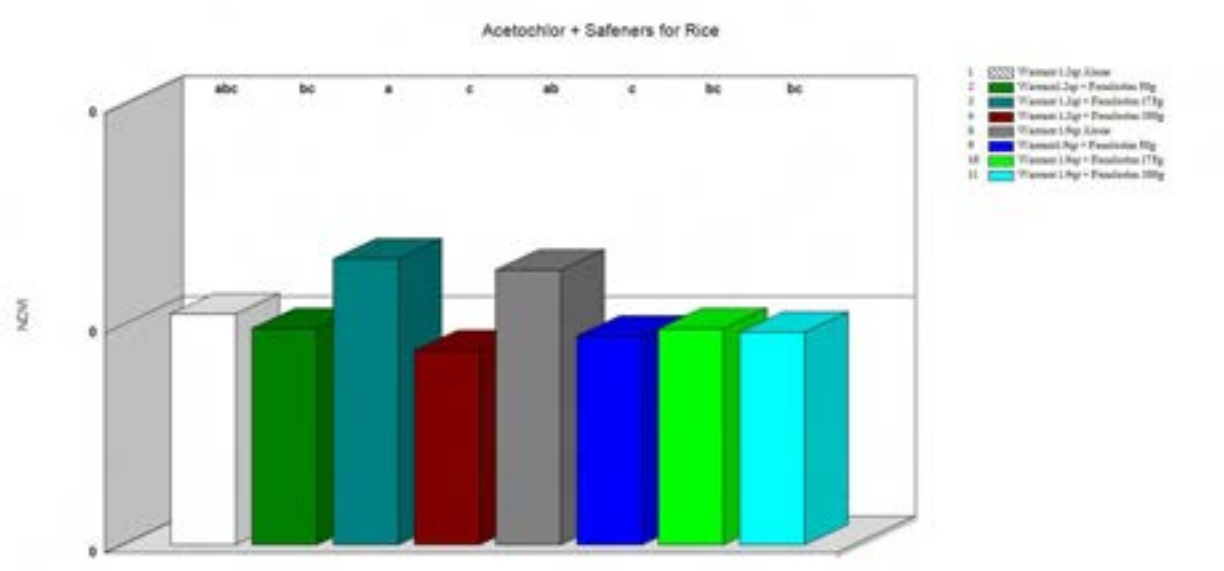


Figure 5. Normalized difference vegetative index (NDVI) measurements on June 15 (1 DAT) following applications of Warrant with the safener Fenclorim applied at 0, 50, 175, or 300 g ai./ac. Data with the same letters are not statistically different.



2022 Missouri Rice Nitrogen Trials

Flood-Irrigated and Furrow-Irrigated Production Systems

Conducted by the
University of Missouri Rice Agronomy Program

Funding and support provided by the
Missouri Rice Research and Merchandising Council

By J.L. Chlapecka, M. Johnson, K. McCorkle, C. Hunt

RICE

University of Missouri

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2022 Missouri Planting Date / Furrow-Irrigated Rice Cultivar Trials

Site	Nearest Town	Planting Date	Emergence Date	Flood Date	Harvest Date	Soil Type	Location Info	Water Management	N Management	N Rate (lbs N/ac)
FDRC Flood	Portageville, Pemiscot County	May 12	May 22	June 22	October 7	Clay	Research Station	Flood	Variable	Variable
MRRMC FIR Top	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Non-Flood	Variable	Variable
MRRMC FIR Middle	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Muddy	Variable	Variable
MRRMC FIR Bottom	Glennonville, Dunklin County	May 19	May 28	June 21	October 21	Silt Loam	Research Station	Flood	Variable	Variable
FDRC FIR Top	Portageville, Pemiscot County	April 27	May 8	June 5	September 14	Silt Loam	Research Station	Non-Flood	Variable	Variable

Materials & Methods: The flood-irrigated rice variety x nitrogen (VxN) trial was conducted at Portageville with two cultivars, RT XP753 and Diamond, four nitrogen rates (0, 80, 120, and 160 lbs N/ac), and two timings [single preflood and 2-way split with second application made at midseason (at least green ring stage and 4 weeks after preflood incorporation)]. One furrow-irrigated VxN trial was conducted in the top, middle, and bottom of the field at the Rice Farm and included CLL16 and DG263L with either 0 N applied, a single preflood application of 120 lbs N/ac, three applications of 46 lbs N/ac, four applications of 46 lbs N/ac, or 60 lbs N/ac applied at preflood timing, 60 lbs N/ac applied two weeks later, and 46 lbs N/ac applied one week after the second application. The second VxN trial in furrow-irrigated rice was altered due to space constraints and included DG263L under the same N management strategies as the other furrow-irrigated trial. However, there were two timings for the first N application, either at 4-leaf or 6-leaf stage, to determine the optimum time to initiate N fertilization in furrow-irrigated rice.

2022 Portageville Flood Rice VxN

Cultivar	N Rate	App Method	Yield
	lb/ac	Splits	bu/ac
Diamond	0	0	**156**
Diamond	80	SPF	**172**
Diamond	120	SPF	**189**
Diamond	160	SPF	**186**
Diamond	80	2-way	**160**
Diamond	120	2-way	**185**
Diamond	160	2-way	**186**
RT XP753	0	0	**177**
RT XP753	80	SPF	**197**
RT XP753	120	SPF	**199**
RT XP753	160	SPF	**207**
RT XP753	80	2-way	**173**
RT XP753	120	2-way	**198**
RT XP753	160	2-way	**198**
AVERAGE			**184**

Conclusions: With quick flood establishment (1-2 days after application), a single preflood application provided either the same or slightly greater yield potential compared to a 2-way split with the same season-total N rate. A SPF of 120 lbs N/ac maximized yield potential in Diamond, while a SPF of 160 lbs N/ac maximized the yield of RT XP753, although 80 lbs N/ac was more economical.

In furrow-irrigated rice at MRRMC, all three- to four-way split applications maximized yield potential of both CLL16 and DG263L in all three portions of the field. At Portageville (FDRC), yield potential was greatest with the 60-60-46 lbs N/ac split was utilized, with a season-total N rate of 166 lbs N/ac, regardless of the initiation timing.

2022 Missouri Furrow-Irrigated Rice VxN - MRRMC

	N Rate Applied					----------Yield----------			
Cultivar	Wk 1	Wk 2	Wk 3	Wk 4	Total	Top	Middle	Bottom	AVERAGE
	lb N/ac					bu/ac			
CLL16	0	0	0	0	0	95	126	159	126
CLL16	120	0	0	0	120	115	155	172	147
CLL16	46	46	46	0	138	127	158	174	153
CLL16	46	46	46	46	184	132	157	174	154
CLL16	60	0	60	46	166	136	160	174	157
DG263L	0	0	0	0	0	123	176	159	153
DG263L	120	0	0	0	120	155	178	179	171
DG263L	46	46	46	0	138	156	186	190	177
DG263L	46	46	46	46	184	171	186	183	180
DG263L	60	0	60	46	166	163	181	183	175
AVERAGE						**137**	**166**	**174**	**159**

2022 Missouri Furrow-Irrigated Rice VxN - FDRC

		N Rate Applied					
Cultivar	First App	Wk 1	Wk 2	Wk 3	Wk 4	Total	Yield
		lb N/ac					bu/ac
DG263L	4-leaf	0	0	0	0	0	100
DG263L	4-leaf	120	0	0	0	120	130
DG263L	4-leaf	46	46	46	0	138	173
DG263L	4-leaf	46	46	46	46	184	188
DG263L	4-leaf	60	0	60	46	166	213
DG263L	6-leaf	0	0	0	0	0	68
DG263L	6-leaf	120	0	0	0	120	100
DG263L	6-leaf	46	46	46	0	138	143
DG263L	6-leaf	46	46	46	46	184	168
DG263L	6-leaf	60	0	60	46	166	230
AVERAGE							**151**