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M-210 RICE: DESCRIPTION AND MANAGEMENT GUIDELINES

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Introduction:

M-210 is a blast-resistant, high-yielding, early-maturing, Temperate Japonica, Calrose-type medium grain. Is the product of a DNA marker-assisted backcrossing project started in 2005 by the retired RES rice pathologist, Mr. Jeffrey Oster, to develop isolines of M-206 containing individual blast resistance genes from various germplasm sources. M-210 was selected from one of the blast-resistant isolines of M-206 that performed similarly in terms of grain yield, milling characteristics, and other agronomic traits. It was developed by the California Cooperative Rice Research Foundation, Inc. at the Rice Experiment Station (RES), Biggs, CA and released to growers in April 2018. M-210 is being protected under the US Plant Protection Act, Title 5 (to only be sold as a class of certified seed) as well as a US Plant Utility Patent. M-210 is available exclusively to California rice growers, export of seed is prohibited, and use in genetic or breeding research requires a Material Transfer Agreement.

Pedigree and Breeding:

The pedigree of M-210 is M-206*8/97-Y-315vE. M-206 is a high yielding, glabrous, early maturing, Calrose-type medium grain variety released by RES in 2003. It was chosen as a recurrent parent because of wide adaptability, good combining ability, and superior milling performance. 97-Y-315vE is a very early (vE), blast resistant, short grain entry. It possessed the *Pi-b* gene which is linked to a microsatellite marker that was used in marker assisted selection. After several backcrosses, M-210 is estimated to be 99.6% genetically similar to M-206. M-210 was tested in the 2015-18 University of California Cooperative Extension (UCCE) Statewide Yield Tests under the experimental designation 12Y3097.

Agronomic Characteristics:

Table 1 contains a summary of the agronomic data collected in the UCCE Statewide Yield Tests. 12Y3097 was first entered in the preliminary UCCE Statewide Test (SW) tests in 2013, and tested in all locations beginning in 2015.

Table 1. Agronomic performance in UCCE Statewide Yield Tests in 2013 and 2015-2018.

Variety	Grain Yield (lbs./a)	Seedling Vigor (1-5)	Days to 50% Heading	Plant Height (in)	Lodging (%)
2013					
12Y3097	9530	4.9	85	37	32
M-208	8590	5.0	91	39	41
M-206	9520	5.0	85	39	28
2015					
12Y3097	9460	4.8	83	38	13
M-208	9080	5.0	86	38	20
M-206	9480	5.0	82	38	15
2016					
12Y3097	10,030	4.9	88	38	31
M-208	9020	5.0	90	39	28
M-206	10,002	4.9	87	39	34
2017					
12Y3097	8879	4.7	79	39	51
M-208	8515	4.8	82	40	52
M-206	8819	4.8	79	39	53
2018					
M-210	9130	4.7	83	38	6
M-206	9020	4.7	85	38	19

12Y3097 was tested in comparison to M-206 and M-208 in a total of 43 SW experiments over a span of 5 years. The overall grain yield of 12Y3097 across 43 SW experiments averaged 9300 lbs./acre compared to 9370 and 8910 lbs./acre for M-206 and M-208, respectively. It reached 50% heading in 83 days, had slightly shorter plant height and

similar in terms of seedling vigor and lodging percentage when compared to M-206. M-210 commercial seed production field yields averaged 92 cwt/acre in 2018.

Cold-induced blanking experiments in San Joaquin (SJ) and GH cold tolerance screening at RES were performed from 2015 to 2017. Results indicate that M-210 had better cold tolerance than M-208 and is close to the level of M-206.

M-210 has a wider blast resistance spectrum and has comparable reaction to aggregate sheath spot as the check varieties. Reaction to stem rot of M-210 is slightly better than M-206 and M-208.

No marked difference in sensitivity to standard rice herbicides from the parent varieties have been observed, however commercial experience is limited.

Milling and Quality:

The milled kernels of M-210 are heavier (1000-grain weight =21.65 grams) and slightly wider (width=2.78 mm) compared to M-208 (21.19g, 2.75mm) and M-206 (20.73g, 2.73mm). The grain length (5.96mm) and length/width ratio (2.14) were in between that of M-206 and M-208. Even with slightly heavier grains and wider grain width, M-210 meets the criteria for the Calrose rice market and therefore can be co-mingled with other Calrose rice varieties currently in production in California.

Milling data showed that the head rice yield of M-210 when harvested at 19-22% grain moisture, averaged 65/70 (head/total) compared to 64/69 and 63/68 for M-206 and M-208, respectively. When cut at moistures above 22%, milling yield improved to 66/70. Head rice decreased on all entries cut below 19% harvest moisture. Expectation is that M-210 will perform similar to M-206.

Table 2. Table 18. Average percent head rice and total milled rice (2015 to 2017) of 12Y3097, M-208, and M-206 at harvest grain moisture content above 22%, 19-22%, and below 19%.

Variety	H/T at Harvest %MC		
	> 22%	19-22%	< 19%
12Y3097	66/70	65/70	56/69
M-208	63/68	63/68	60/69
M-206	63/68	64/69	56/69

Area of Adaptation:

M-210 was released as a replacement for M-208 with improved yield and resistance to the races of rice blast in California. It would be an option in areas or fields where rice blast has been observed. It is not considered as a replacement for M-206.

Management Guidelines:

The following guidelines are based on research, observation and experience gained in variety development and testing. These suggested cultural practices are intended to assist in the production of optimum yields and quality.

- Uniform water depth, adequate fertility, uniform seed distribution and good weed control practices are important because they maintain uniform heading and harvest moisture which in turn increase head rice milling yield. Field situations that are conducive to rice blast development (field drainage, exposed soil, “upland conditions”) should be avoided.
- Fertilizer rates and other management practices should be similar to those for other medium grain varieties in your production area. Excessive N will increase lodging, blanking, and disease.
- Preferred seeding dates are the same as for other California varieties/Standard seeding rates of 130 to 150 lbs./acre are recommended, although good yields at lower seeding rates were reported when good stands were achieved. Excessive seeding rates reduce yield potential and increase susceptibility to disease.
- Water depth should be increased to about 8 inches after panicle initiation (50 to 55 days after planting) to protect developing panicles from low temperature exposure during occasional cool nights.

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