

RnD10-1250



MY1204111

Varietal Improvement of Irrigated Rice Under Minimal Water Condition

(01-01-03-0000/PR0068/0504)
2004-2007

Project Team

- Abdul Rahim Harun (MNA)- Project Leader
- Abdullah Mat Zin (Mardi)
- Prof. Dr. Marziah Mahmood (UPM)
- Dr Sobri Hussein (MNA)

Budget

- Total Project Grants = RM 275,000.00

Introductions

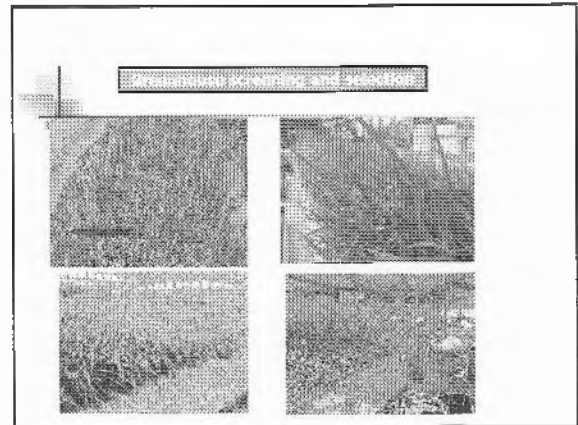
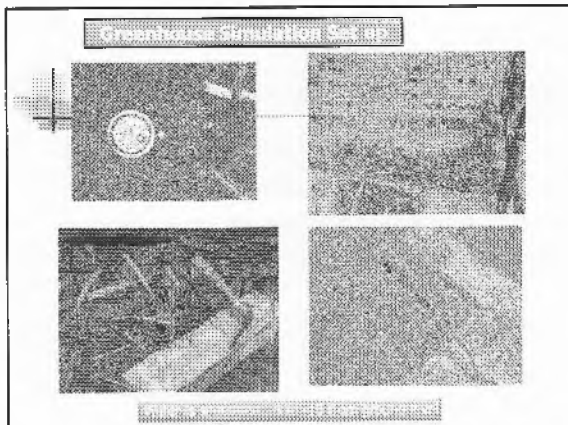
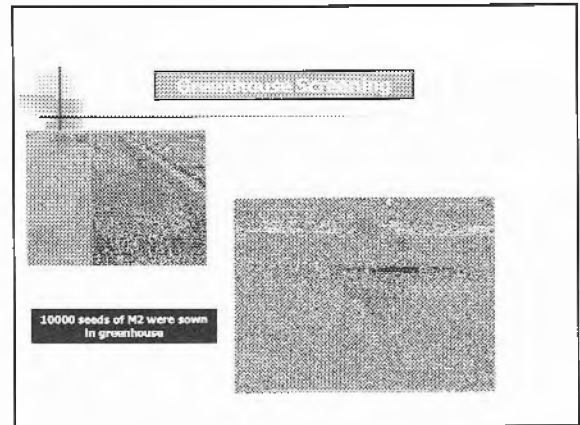
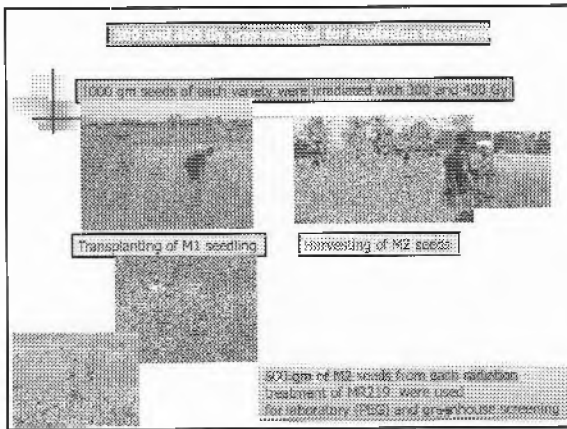
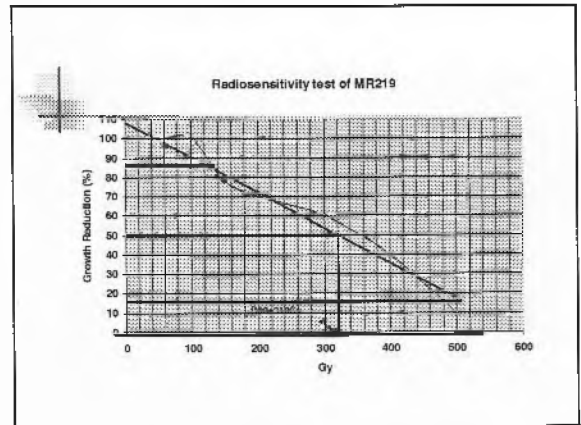
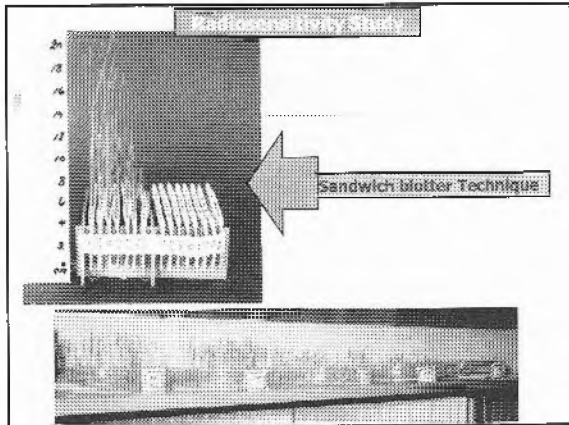
- Rice needs water to grow and produce grains
- Rice is a water plant but it can with-stand some degree of water deficit/less water/minimal water environments
- Global Water shortage
- Need to improved or generate new rice cultivar tolerance to minimal water
- Create variability through radiation induced mutation
- Officially release mutant varieties , June 2000 are 2252 (FAO/IAEA database)

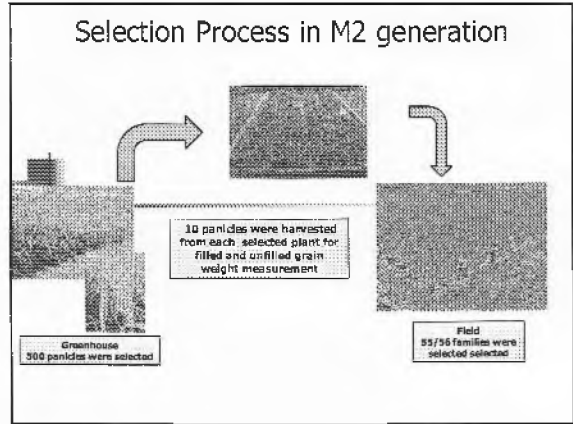
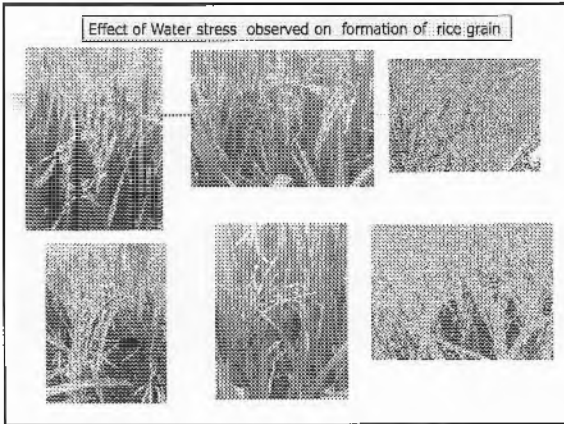
Objectives

- To generate superior genotypes (derived from MR211, MR219, MR220) for minimal water requirement through induced mutation techniques.
- To evaluate the performance of selected mutant/cell lines under lab and glasshouse conditions.
- To conduct field trials for yield and superior traits of selected genotypes suited to minimal water requirement.

Project Activities

- Mutation induction studies
- Minimal water simulation studies
- Screening and selection
- Identification of potential lines





- ### Selection procedure- M3
- 10 Panicles M3 generation were harvested from each of 55 mutant families
 - Weight of filled and unfilled grains were recorded
 - The highest weight of filled grain amongst harvested panicles from 55 families were selected for next generation
 - 38 mutant lines were selected based on the highest grains weight amongst the harvested M3 mutant plants

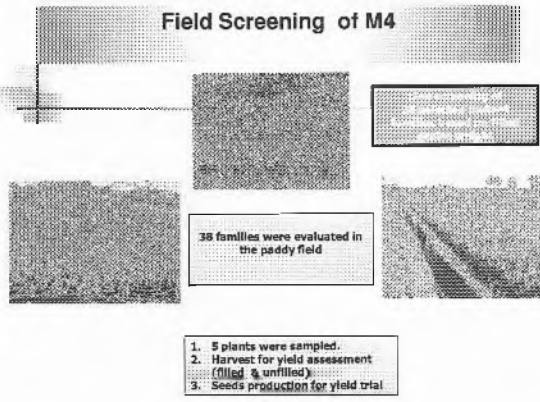
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Variety: MR219 2000 Y

Plant # (Family)	Yield data for M3 (2000)			
	Unfilled grains (g/pan)	Filled grains (g/pan)	Filled + Unfilled grains	% Filled
M3-1	1.2	2.8	4.0	70.0
M3-2	1.5	3.2	4.7	68.1
M3-3	1.1	3.0	4.1	73.2
M3-4	1.3	3.1	4.4	70.5
M3-5	1.4	2.9	4.3	67.4
M3-6	1.2	3.3	4.5	73.3
M3-7	1.1	3.1	4.2	73.8
M3-8	1.3	3.0	4.3	70.0
M3-9	1.2	3.2	4.4	72.7
M3-10	1.4	2.9	4.3	67.4
M3-11	1.5	3.1	4.6	67.4
M3-12	1.3	3.0	4.3	70.0
M3-13	1.2	3.1	4.3	70.0
M3-14	1.4	3.0	4.4	68.2
M3-15	1.3	3.1	4.4	70.5
M3-16	1.2	3.2	4.4	72.7
M3-17	1.1	3.0	4.1	73.2
M3-18	1.3	3.1	4.4	70.5
M3-19	1.2	3.2	4.4	72.7
M3-20	1.4	2.9	4.3	67.4
M3-21	1.5	3.1	4.6	67.4
M3-22	1.3	3.0	4.3	70.0
M3-23	1.2	3.1	4.3	70.0
M3-24	1.4	3.0	4.4	68.2
M3-25	1.3	3.1	4.4	70.5
M3-26	1.2	3.2	4.4	72.7
M3-27	1.1	3.0	4.1	73.2
M3-28	1.3	3.1	4.4	70.5
M3-29	1.2	3.2	4.4	72.7
M3-30	1.4	2.9	4.3	67.4
M3-31	1.5	3.1	4.6	67.4
M3-32	1.3	3.0	4.3	70.0
M3-33	1.2	3.1	4.3	70.0
M3-34	1.4	3.0	4.4	68.2
M3-35	1.3	3.1	4.4	70.5
M3-36	1.2	3.2	4.4	72.7
M3-37	1.1	3.0	4.1	73.2
M3-38	1.3	3.1	4.4	70.5
M3-39	1.2	3.2	4.4	72.7
M3-40	1.4	2.9	4.3	67.4
M3-41	1.5	3.1	4.6	67.4
M3-42	1.3	3.0	4.3	70.0
M3-43	1.2	3.1	4.3	70.0
M3-44	1.4	3.0	4.4	68.2
M3-45	1.3	3.1	4.4	70.5
M3-46	1.2	3.2	4.4	72.7
M3-47	1.1	3.0	4.1	73.2
M3-48	1.3	3.1	4.4	70.5
M3-49	1.2	3.2	4.4	72.7
M3-50	1.4	2.9	4.3	67.4
M3-51	1.5	3.1	4.6	67.4
M3-52	1.3	3.0	4.3	70.0
M3-53	1.2	3.1	4.3	70.0
M3-54	1.4	3.0	4.4	68.2
M3-55	1.3	3.1	4.4	70.5
M3-56	1.2	3.2	4.4	72.7
M3-57	1.1	3.0	4.1	73.2
M3-58	1.3	3.1	4.4	70.5
M3-59	1.2	3.2	4.4	72.7
M3-60	1.4	2.9	4.3	67.4
M3-61	1.5	3.1	4.6	67.4
M3-62	1.3	3.0	4.3	70.0
M3-63	1.2	3.1	4.3	70.0
M3-64	1.4	3.0	4.4	68.2
M3-65	1.3	3.1	4.4	70.5
M3-66	1.2	3.2	4.4	72.7
M3-67	1.1	3.0	4.1	73.2
M3-68	1.3	3.1	4.4	70.5
M3-69	1.2	3.2	4.4	72.7
M3-70	1.4	2.9	4.3	67.4
M3-71	1.5	3.1	4.6	67.4
M3-72	1.3	3.0	4.3	70.0
M3-73	1.2	3.1	4.3	70.0
M3-74	1.4	3.0	4.4	68.2
M3-75	1.3	3.1	4.4	70.5
M3-76	1.2	3.2	4.4	72.7
M3-77	1.1	3.0	4.1	73.2
M3-78	1.3	3.1	4.4	70.5
M3-79	1.2	3.2	4.4	72.7
M3-80	1.4	2.9	4.3	67.4
M3-81	1.5	3.1	4.6	67.4
M3-82	1.3	3.0	4.3	70.0
M3-83	1.2	3.1	4.3	70.0
M3-84	1.4	3.0	4.4	68.2
M3-85	1.3	3.1	4.4	70.5
M3-86	1.2	3.2	4.4	72.7
M3-87	1.1	3.0	4.1	73.2
M3-88	1.3	3.1	4.4	70.5
M3-89	1.2	3.2	4.4	72.7
M3-90	1.4	2.9	4.3	67.4
M3-91	1.5	3.1	4.6	67.4
M3-92	1.3	3.0	4.3	70.0
M3-93	1.2	3.1	4.3	70.0
M3-94	1.4	3.0	4.4	68.2
M3-95	1.3	3.1	4.4	70.5
M3-96	1.2	3.2	4.4	72.7
M3-97	1.1	3.0	4.1	73.2
M3-98	1.3	3.1	4.4	70.5
M3-99	1.2	3.2	4.4	72.7
M3-100	1.4	2.9	4.3	67.4
M3-101	1.5	3.1	4.6	67.4
M3-102	1.3	3.0	4.3	70.0
M3-103	1.2	3.1	4.3	70.0
M3-104	1.4	3.0	4.4	68.2
M3-105	1.3	3.1	4.4	70.5
M3-106	1.2	3.2	4.4	72.7
M3-107	1.1	3.0	4.1	73.2
M3-108	1.3	3.1	4.4	70.5
M3-109	1.2	3.2	4.4	72.7
M3-110	1.4	2.9	4.3	67.4
M3-111	1.5	3.1	4.6	67.4
M3-112	1.3	3.0	4.3	70.0
M3-113	1.2	3.1	4.3	70.0
M3-114	1.4	3.0	4.4	68.2
M3-115	1.3	3.1	4.4	70.5
M3-116	1.2	3.2	4.4	72.7
M3-117	1.1	3.0	4.1	73.2
M3-118	1.3	3.1	4.4	70.5
M3-119	1.2	3.2	4.4	72.7
M3-120	1.4	2.9	4.3	67.4
M3-121	1.5	3.1	4.6	67.4
M3-122	1.3	3.0	4.3	70.0
M3-123	1.2	3.1	4.3	70.0
M3-124	1.4	3.0	4.4	68.2
M3-125	1.3	3.1	4.4	70.5
M3-126	1.2	3.2	4.4	72.7
M3-127	1.1	3.0	4.1	73.2
M3-128	1.3	3.1	4.4	70.5
M3-129	1.2	3.2	4.4	72.7
M3-130	1.4	2.9	4.3	67.4
M3-131	1.5	3.1	4.6	67.4
M3-132	1.3	3.0	4.3	70.0
M3-133	1.2	3.1	4.3	70.0
M3-134	1.4	3.0	4.4	68.2
M3-135	1.3	3.1	4.4	70.5
M3-136	1.2	3.2	4.4	72.7
M3-137	1.1	3.0	4.1	73.2
M3-138	1.3	3.1	4.4	70.5
M3-139	1.2	3.2	4.4	72.7
M3-140	1.4	2.9	4.3	67.4
M3-141	1.5	3.1	4.6	67.4
M3-142	1.3	3.0	4.3	70.0
M3-143	1.2	3.1	4.3	70.0
M3-144	1.4	3.0	4.4	68.2
M3-145	1.3	3.1	4.4	70.5
M3-146	1.2	3.2	4.4	72.7
M3-147	1.1	3.0	4.1	73.2
M3-148	1.3	3.1	4.4	70.5
M3-149	1.2	3.2	4.4	72.7
M3-150	1.4	2.9	4.3	67.4

Variety: MR219 2000 Y

Plant # (Family)	Yield data for M3 (2000)			
	Unfilled grains (g/pan)	Filled grains (g/pan)	Filled + Unfilled grains	% Filled
M3-1	1.2	2.8	4.0	70.0
M3-2	1.5	3.2	4.7	68.1
M3-3	1.1	3.0	4.1	73.2
M3-4	1.3	3.1	4.4	70.5
M3-5	1.4	2.9	4.3	67.4
M3-6	1.5	3.1	4.6	67.4
M3-7	1.3	3.0	4.3	70.0
M3-8	1.2	3.1	4.3	70.0
M3-9	1.4	3.0	4.4	68.2
M3-10	1.3	3.1	4.4	70.5
M3-11	1.2	3.2	4.4	72.7
M3-12	1.1	3.0	4.1	73.2
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M3-17	1.3	3.0	4.3	70.0
M3-18	1.2	3.1	4.3	70.0
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M3-20	1.3	3.1	4.4	70.5
M3-21	1.2	3.2	4.4	72.7
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M3-26	1.5	3.1	4.6	67.4
M3-27	1.3	3.0	4.3	70.0
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M3-37	1.3	3.0	4.3	70.0
M3-38	1.2	3.1	4.3	70.0
M3-39	1.4	3.0	4.4	68.2
M3-40	1.3	3.1	4.4	70.5
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M3-42	1.1	3.0	4.1	73.2
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M3-44	1.2	3.2	4.4	72.7
M3-45	1.4	2.9	4.3	67.4
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M3-47	1.3	3.0	4.3	70.0
M3-48	1.2	3.1	4.3	70.0
M3-49	1.4	3.0	4.4	68.2
M3-50	1.3	3.1	4.4	70.5
M3-51	1.2	3.2	4.4	72.7
M3-52	1.1	3.0	4.1	73.2
M3-53	1.3	3.1	4.4	70.5
M3-54	1.2	3.2	4.4	72.7
M3-55	1.4	2.9	4.3	67.4
M3-56	1.5	3.1	4.6	67.4
M3-57	1.3	3.0	4.3	70.0
M3-58	1.2	3.1	4.3	70.0
M3-59	1.4	3.0	4.4	68.2
M3-60	1.3	3.1	4.4	70.5
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M3-65	1.4	2.9	4.3	67.4
M3-66	1.5	3.1	4.6	67.4
M3-67	1.3	3.0	4.3	70.0
M3-68	1.2	3.1	4.3	70.0
M3-69	1.4	3.0	4.4	68.2
M3-70	1.3	3.1	4.4	70.5
M3-71	1.2	3.2	4.4	72.7
M3-72	1.1	3.0	4.1	73.2
M3-73	1.3	3.1	4.4	70.5
M3-74	1.2	3.2	4.4	72.7
M3-75	1.4	2.9	4.3	67.4
M3-76	1.5	3.1	4.6	67.4
M3-77	1.3	3.0	4.3	70.0
M3-78	1.2	3.1	4.3	70.0
M3-79	1.4	3.0	4.4	68.2
M3-80	1.3	3.1	4.4	70.5
M3-81	1.2	3.2	4.4	72.7
M3-82	1.1	3.0	4.1	73.2
M3-83	1.3	3.1	4.4	70.5
M3-84	1.2	3.2	4.4	72.7
M3-85	1.4	2.9	4.3	67.4
M3-86	1.5	3.1	4.6	67.4
M3-87	1.3	3.0	4.3	70.0
M3-88	1.2	3.1	4.3	70.0
M3-89	1.4	3.0	4.4	68.2
M3-90	1.3	3.1	4.4	70.5
M3-91	1.2	3.2	4.4	72.7
M3-92	1.1	3.0	4.1	73.2
M3-93	1.3	3.1	4.4	70.5
M3-94	1.2	3.2	4.4	72.7
M3-95	1.4	2.9	4.3	67.4
M3-96	1.5	3.1	4.6	67.4
M3-97	1.3	3.0	4.3	70.0
M3-98	1.2	3.1	4.3	70.0

Field Screening of M4



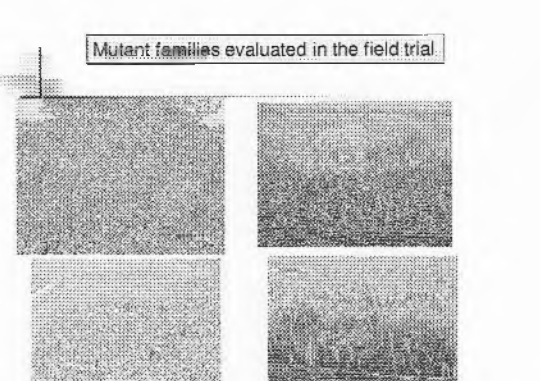
38 families were evaluated in the paddy field

- 5 plants were sampled.
- Harvest for yield assessment (filled & unfilled).
- Seeds production for yield trial

Field Screening of M4



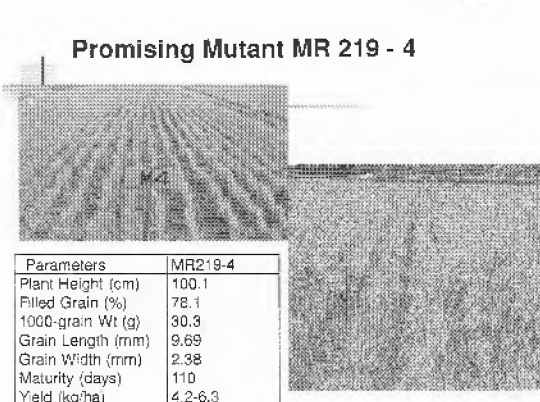
Mutant families evaluated in the field trial



Potential Mutant Lines

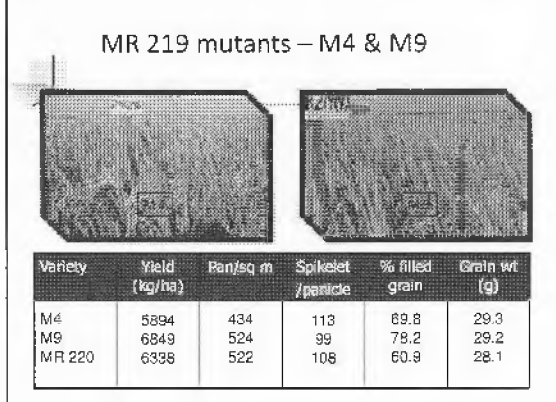
Parameters	MR219-4	MR219-9	MR219	Difference Over parent
Panicles/plant	8.5	7.4	5	lower
Plant ht	100.1	100.4	103.1	lower
No. of filled/ill	9	8	5	lower
Percent Filled Grain	78.1	87.7	73.4	higher
1000-grain wt (g)	30.3	30.3	28	higher
Grain Length (mm)	9.69	9.69	9.86	lower
Grain width (mm)	2.38	2.41	2.39	higher
Panicle length	n.a	n.a	n.a	n.a
Yield (kg)	5259	6000	5444	lower
Maturity	110	112	115	lower

Promising Mutant MR 219 - 4



Parameters	MR219-4
Plant Height (cm)	100.1
Filled Grain (%)	78.1
1000-grain Wt (g)	30.3
Grain Length (mm)	9.69
Grain Width (mm)	2.38
Maturity (days)	110
Yield (kg/ha)	4.2-6.3

MR 219 mutants – M4 & M9



Variety	Yield (kg/ha)	Pan/sq m	Spikelet /panicle	% filled grain	Grain wt (g)
M4	5894	434	113	89.8	29.3
M9	6849	524	99	78.2	29.2
MR 220	6338	522	108	60.9	28.1

