

Table 1. N accumulation rate (kgN ha⁻¹ d⁻¹) during the reproductive stage (from 9-week after sowing to heading) and ripening stage for each cultivar.

	Reproductive stage				Ripening stage			
	Tokyo		Osaka		Tokyo		Osaka	
	2007	2008	2007	2008	2007	2008	2007	2008
Aerobic								
Akihikari	2.56	3.19	4.08	2.71	0.78	0.79	1.46	2.29
IRAT109	2.58	3.49	3.44	3.27	0.63	0.86	1.33	1.20
Lemont	2.38	2.26	3.07	2.89	0.97	1.44	1.09	0.91
Takanari	2.69	4.04	2.88	3.23	0.71	1.25	1.19	0.37
Average	2.55	3.25	3.36	3.02	0.77	1.08	1.27	1.19
Flooded								
Akihikari	2.99	2.58	2.53	3.82	0.02	1.02	0.93	1.20
IRAT109	2.71	2.90	1.32	2.20	0.28	0.20	1.33	1.48
Lemont	2.22	1.89	1.55	1.77	0.77	0.59	0.60	1.12
Takanari	3.50	2.54	2.66	2.40	1.26	2.00	0.71	1.38
Average	2.86	2.48	2.01	2.55	0.58	0.95	0.89	1.30
LSD (0.05)								
Water regime	0.27	0.31	0.50	0.34	NS	NS	0.24	NS
Cultivar	0.38	0.44	0.71	0.48	NS	0.29	0.34	0.30
Cultivar × Water	NS	NS	NS	0.68	NS	0.41	NS	0.42

Table 2. Aboveground biomass at maturity, growth duration, incident and intercepted radiation, fraction of radiation intercepted, and radiation use efficiency at Tokyo in 2007 and 2008.

	Aboveground biomass at maturity (t ha ⁻¹)	Growth duration ^a (days)	Incident radiation ^b (× 10 ³ MJ)	Intercepted radiation ^b (× 10 ³ MJ)	Fraction of radiation intercepted ^b	Radiation use efficiency ^b (g MJ ⁻¹)
2007						
Aerobic						
Akihikari	13.2	137	1.67	1.02	0.61	1.33
IRAT109	15.0	147	1.76	1.19	0.68	1.34
Lemont	15.6	161	1.90	1.28	0.67	1.24
Takanari	16.1	171	2.00	1.30	0.65	1.30
Average	15.0	154	1.83	1.20	0.653	1.30
Flooded						
Akihikari	13.7	137	1.67	1.03	0.61	1.39
IRAT109	13.3	147	1.76	1.11	0.63	1.29
Lemont	13.1	161	1.90	1.23	0.65	1.13
Takanari	23.5	168	1.99	1.37	0.69	1.68
Average	15.9	153	1.83	1.19	0.647	1.37
LSD (0.05)						
Water regime	0.4			0.01	0.006	0.03
Cultivar	0.6			0.02	0.01	0.04
Cultivar × Water	0.8			0.02	0.01	0.06
2008						
Aerobic						
Akihikari	15.1	145	1.72	1.08	0.63	1.43
IRAT109	17.8	145	1.72	1.20	0.70	1.50
Lemont	17.4	159	1.87	1.29	0.69	1.35
Takanari	23.6	169	1.98	1.37	0.69	1.72
Average	18.5	155	1.82	1.23	0.68	1.50
Flooded						
Akihikari	15.1	138	1.64	1.06	0.65	1.47
IRAT109	13.3	142	1.70	1.12	0.66	1.32
Lemont	14.0	157	1.84	1.20	0.65	1.21
Takanari	20.7	162	1.90	1.34	0.70	1.50
Average	15.8	150	1.77	1.18	0.67	1.37
LSD (0.05)						
Water regime	0.5			0.01	0.01	0.05
Cultivar	0.7			0.02	0.01	0.07
Cultivar × Water	1.0			0.02	0.01	0.10

a Values from sowing to maturity.

b Values from transplanting to maturity

Table 3. Aboveground biomass at maturity, growth duration, incident and intercepted radiation, fraction of radiation intercepted, and radiation use efficiency at Osaka in 2007 and 2008.

	Aboveground biomass at maturity (t ha ⁻¹)	Growth duration ^a (days)	Incident radiation ^b (×10 ³ MJ)	Intercepted radiation ^b (×10 ³ MJ)	Fraction of radiation intercepted ^b	Radiation use efficiency ^b (g MJ ⁻¹)
2007						
Aerobic						
Akihikari	15.3	124	1.80	1.16	0.64	1.42
IRAT109	17.5	134	1.98	1.54	0.78	1.24
Lemont	17.5	148	2.17	1.70	0.78	1.13
Takanari	21.7	155	2.28	1.69	0.74	1.28
Average	18.0	140	2.06	1.52	0.737	1.27
Flooded						
Akihikari	14.2	116	1.68	1.09	0.65	1.40
IRAT109	13.1	126	1.85	1.21	0.65	1.20
Lemont	12.6	137	2.06	1.38	0.67	1.06
Takanari	18.9	142	2.13	1.54	0.72	1.31
Average	14.7	130	1.93	1.31	0.674	1.24
LSD (0.05)						
Water regime	0.7			0.04	0.023	NS
Cultivar	1.0			0.06	0.03	0.06
Cultivar × Water	1.5			0.09	0.05	NS
2008						
Aerobic						
Akihikari	15.2	132	1.99	1.13	0.57	1.34
IRAT109	16.7	135	2.03	1.26	0.62	1.38
Lemont	16.1	142	2.12	1.36	0.64	1.28
Takanari	20.8	166	2.43	1.68	0.69	1.27
Average	17.2	144	2.14	1.36	0.63	1.32
Flooded						
Akihikari	14.0	120	1.78	1.21	0.68	1.26
IRAT109	13.9	126	1.88	1.28	0.68	1.18
Lemont	13.5	138	2.08	1.44	0.69	1.05
Takanari	19.5	137	2.08	1.52	0.73	1.33
Average	15.2	130	1.95	1.36	0.70	1.20
LSD (0.05)						
Water regime	0.7			NS	0.03	0.07
Cultivar	1.0			0.08	0.04	0.09
Cultivar × Water	NS			0.12	NS	0.13

a Values from sowing to maturity.

b Values from transplanting to maturity

Table 4. The parameters of a and b for the Eq. (1) ($critical\ N\% = a\ TDW^{-b}$) for rice grown in aerobic and flooded culture.

	Logarithm of a	a	b
Tokyo			
Aerobic	1.24 \pm 0.114	3.47	0.36 \pm 0.050
Flooded	1.09 \pm 0.129	2.98	0.34 \pm 0.058
Osaka			
Aerobic	1.03 \pm 0.104	2.80	0.28 \pm 0.046
Flooded	0.99 \pm 0.116	2.69	0.36 \pm 0.054
Sheehy et al. (1998)	1.64	5.18	0.52

Values followed by \pm represent 95% confidence limits.