

Supplemental Table 1. Descriptive statistics on grain quality traits evaluated in the three different growing conditions

Trait ^a	Group ^b	Descriptive statistics ^c											
		Mean			Maximum			Minimum			CV (%)		
		F	GI	GII	F	GI	GII	F	GI	GII	F	GI	GII
HRP (%)	All	79.4	60.2	49.1	94.9	94.0	89.7	46.5	18.8	17.9	11.4	26.2	35.3
	J	79.2	58.8	47.3	94.9	87.5	82.3	46.5	18.8	17.9	11.7	25.8	35.1
	T	81.6	74.8	66.5	93.8	94.0	89.7	68.3	38.2	30.3	7.8	19.5	22.4
CGP (%)	All	13.4	30.7	39.4	45.2	73.4	73.3	1.1	2.9	3.8	57.1	49.2	44.1
	J	13.8	32.0	41.5	45.2	73.4	73.3	2.0	5.5	5.4	56.5	45.7	39.1
	T	9.8	17.1	18.5	21.5	54.6	63.0	1.1	2.9	3.8	53.4	76.7	78.4
AC (%)	All	18.2	15.4	14.4	21.1	20.5	19.7	9.8	5.4	3.7	8.2	16.2	17.8
	J	18.2	15.2	14.3	21.1	20.5	19.7	9.8	5.4	3.7	8.3	16.0	18.1
	T	19.0	17.2	15.6	20.9	20.3	18.2	16.6	10.7	11.8	6.0	13.8	12.7
ADV	All	5.0	4.6	4.7	6.2	6.0	6.0	3.6	3.6	3.3	14.1	11.5	8.9
	J	5.0	4.5	4.7	6.1	6.0	6.0	3.6	3.6	3.3	13.9	10.4	8.3
	T	5.5	4.9	5.1	6.2	6.0	6.0	3.7	3.7	4.1	12.4	16.9	11.3
PT (°C)	All	79.4	84.0	84.9	87.8	89.5	90.1	72.0	74.1	76.0	6.2	4.3	3.7
	J	79.2	84.0	84.8	87.8	89.5	90.1	72.0	74.1	76.0	6.2	4.3	3.8
	T	81.4	83.9	86.0	87.8	87.0	88.1	74.5	74.6	81.4	5.9	4.1	1.8
PKV	All	256.8	241.9	251.8	321.0	301.0	325.2	212.3	185.4	80.9	8.2	9.1	9.7
	J	254.0	238.3	249.1	317.8	296.7	302.9	212.3	185.4	80.9	7.6	8.1	9.3
	T	284.7	278.6	279.5	321.0	301.0	325.2	254.9	247.7	253.6	6.2	5.3	6.8
HPV	All	166.0	145.8	149.9	223.9	197.5	209.5	107.6	104.1	57.0	12.8	12.1	11.5
	J	167.0	145.5	150.2	223.9	197.5	209.5	107.6	104.1	57.0	12.8	12.4	11.8
	T	155.8	149.0	147.1	188.7	168.8	163.6	128.1	134.0	130.5	11.0	7.8	7.8
CPV	All	259.5	229.4	235.7	318.3	294.1	292.0	154.5	150.3	73.1	8.7	9.3	10.0
	J	260.4	229.3	236.3	318.3	294.1	292.0	154.5	150.3	73.1	8.7	9.4	10.1
	T	250.4	230.2	229.6	282.2	267.3	259.2	222.5	194.4	200.0	7.6	8.4	8.0
SBV	All	2.7	-12.5	-16.1	54.8	38.5	49.4	-84.2	-95.5	-86.7	808.3	168.5	127.4
	J	6.3	-8.9	-12.7	54.8	38.5	49.4	-69.3	-69.1	-74.0	284.1	197.8	138.6
	T	-34.2	-48.3	-49.9	-10.3	-7.4	-25.9	-84.2	-95.5	-86.7	54.1	40.0	33.2
BDV	All	90.8	96.1	102.0	156.4	154.9	163.6	45.6	50.3	23.9	20.7	17.5	16.6
	J	87.0	92.8	98.9	123.4	124.3	130.5	45.6	50.3	23.9	16.8	13.9	14.2
	T	128.8	129.6	132.4	156.4	154.9	163.6	107.9	98.7	113.4	9.5	11.0	9.1

^a AC, amylose content; ADV, alkali digestion value; BDV, breakdown viscosity; CGP, chalky grains percentage; CPV, cool paste viscosity; HPV, hot paste viscosity; HRP, head rice percentage; PKV, peak viscosity; PT, pasting temperature; SBV, setback viscosity.

^b J, Japonica varieties (n = 170); T, Tongil-type varieties (n = 17).

^c CV coefficient of variance. F, field; GI, greenhouse I; GII greenhouse II.

Supplemental Table 2. Variations in grain quality traits according to maturity group evaluated in the three different growing conditions [Mean \pm SD (Range)]

Trait ^a	Env ^b	Maturity Group ^c					
		I	II	III	IV	V	VI
HRP (%)	F	76.9 \pm 7.55 (60.7–91.4)	72.2 \pm 13.10 (46.5–94.9)	79.2 \pm 7.29 (63.7–91.8)	82.3 \pm 6.64 (68.3–92.4)	81.2 \pm 7.45 (66.6–92.5)	84.5 \pm 6.64 (66.6–93.8)
	GI	53.5 \pm 11.36 (18.8–75.7)	51.8 \pm 14.94 (27.6–78.3)	51.2 \pm 12.16 (32.0–83.4)	53.1 \pm 15.31 (24.5–84.1)	69.9 \pm 11.37 (42.1–87.5)	76.4 \pm 9.93 (52.0–94.0)
	GII	39.4 \pm 11.70 (19.1–66.4)	37.6 \pm 14.53 (17.9–68.1)	38.0 \pm 11.38 (21.0–70.9)	43.0 \pm 12.46 (21.5–68.3)	59.2 \pm 12.35 (37.5–80.4)	71.8 \pm 8.60 (54.5–89.7)
CGP (%)	F	13.7 \pm 6.09 (2.8–28.0)	19.7 \pm 11.41 (2.3–45.2)	13.5 \pm 6.59 (3.9–26.2)	11.3 \pm 5.43 (4.0–20.8)	12.8 \pm 6.96 (2.0–28.5)	9.8 \pm 5.38 (1.1–25.6)
	GI	37.3 \pm 11.78 (15.1–73.4)	38.8 \pm 14.38 (11.4–63.0)	39.2 \pm 11.70 (6.7–57.4)	36.7 \pm 15.44 (10.1–67.0)	21.7 \pm 10.34 (5.5–48.9)	15.2 \pm 8.39 (2.9–36.1)
	GII	49.9 \pm 11.56 (24.0–69.5)	51.0 \pm 15.65 (8.2–73.3)	49.1 \pm 12.78 (9.3–67.9)	42.8 \pm 15.76 (9.5–69.1)	30.2 \pm 11.29 (11.6–51.0)	17.2 \pm 8.46 (3.8–34.5)
AC (%)	F	16.8 \pm 1.06 (15.0–18.9)	17.1 \pm 1.89 (9.8–19.6)	18.2 \pm 1.13 (14.2–19.5)	18.6 \pm 0.75 (17.1–19.9)	19.0 \pm 0.86 (16.3–20.4)	19.6 \pm 0.9 (17.2–21.1)
	GI	13.8 \pm 1.75 (8.9–16.4)	14.4 \pm 2.47 (5.4–17.6)	14.6 \pm 1.69 (10.7–17.2)	13.8 \pm 2.17 (8.2–17.5)	16.8 \pm 1.54 (10.9–18.9)	18.5 \pm 1.38 (15.3–20.5)
	GII	12.7 \pm 1.81 (8.6–16.7)	12.5 \pm 2.93 (3.7–15.8)	13.4 \pm 1.70 (9.2–15.6)	13.5 \pm 1.75 (10.4–16.7)	15.9 \pm 1.39 (12.1–18.5)	17.6 \pm 0.89 (15.5–19.7)
ADV	F	4.6 \pm 0.63 (3.7–5.9)	4.9 \pm 0.78 (3.7–6.0)	4.8 \pm 0.76 (3.6–6.0)	5.0 \pm 0.67 (3.8–6.1)	5.3 \pm 0.53 (4.1–6.0)	5.6 \pm 0.5 (4.6–6.2)
	GI	4.6 \pm 0.50 (3.8–5.9)	4.4 \pm 0.43 (3.6–5.2)	4.4 \pm 0.36 (3.9–5.4)	4.3 \pm 0.45 (3.7–5.5)	4.7 \pm 0.47 (3.8–5.8)	5.0 \pm 0.63 (4.1–6.0)
	GII	4.6 \pm 0.37 (3.6–5.1)	4.6 \pm 0.57 (3.3–5.6)	4.7 \pm 0.24 (4.1–5.0)	4.7 \pm 0.30 (4.3–5.6)	4.8 \pm 0.36 (4.0–5.7)	5.0 \pm 0.51 (4.0–6.0)
PT (°C)	F	80.8 \pm 4.40 (73.9–86.9)	78.9 \pm 4.57 (73.7–87.2)	79.9 \pm 5.07 (73.6–86.7)	79.5 \pm 4.89 (73.6–87.8)	77.8 \pm 5.34 (72.0–87.4)	80.1 \pm 4.61 (72.6–87.8)
	GI	84.2 \pm 2.88 (78.4–88.6)	85.1 \pm 2.63 (77.8–89.1)	83.5 \pm 3.26 (76.9–88.2)	83.9 \pm 2.82 (77.0–89.1)	82.5 \pm 4.62 (74.1–89.5)	84.4 \pm 4.25 (74.7–88.8)
	GII	86.2 \pm 1.62 (81.8–89.6)	85.8 \pm 2.69 (78.1–89.6)	84.1 \pm 2.74 (78.0–88.0)	84.4 \pm 2.95 (77.8–88.4)	84.0 \pm 4.02 (76.0–90.1)	85.1 \pm 3.21 (76.7–88.1)
PKV	F	271.9 \pm 20.53 (216.7–317.8)	265.7 \pm 23.62 (222.8–321.0)	252.2 \pm 15.39 (227.4–285.4)	257.3 \pm 18.54 (218.9–307.3)	247.8 \pm 14.59 (216.4–283.1)	247.1 \pm 21.19 (212.3–311.1)
	GI	251.0 \pm 19.5 (202.9–296.7)	247.1 \pm 22.29 (208.8–290.0)	231.6 \pm 19.58 (197.1–275.7)	243.0 \pm 20.17 (192.7–289.9)	235.5 \pm 20.83 (185.4–299.6)	244.6 \pm 25.92 (200.5–301.0)
	GII	254.6 \pm 17.76 (219.6–289.4)	246.5 \pm 40.58 (80.9–299.0)	245.5 \pm 18.63 (209.9–285.4)	253.5 \pm 22.66 (187.6–299.7)	249.7 \pm 21.52 (187.7–309.1)	261.7 \pm 20.39 (230.5–325.2)
HPV	F	186.9 \pm 16.50 (148.2–223.4)	177.6 \pm 20.84 (142.0–223.9)	157.7 \pm 16.28 (131.2–190.8)	159.8 \pm 17.96 (128.6–191.5)	159.7 \pm 15.91 (122.0–193.2)	151.2 \pm 17.52 (107.6–186.9)
	GI	159.6 \pm 16.19 (125.7–188.2)	152.1 \pm 17.01 (109.9–197.5)	134.4 \pm 14.06 (113.4–169.0)	138.5 \pm 15.38 (111.6–176.9)	142.5 \pm 13.18 (119.0–174.6)	144.4 \pm 18.77 (104.1–190.3)
	GII	154.5 \pm 13.38 (131.7–194.0)	148.4 \pm 22.42 (57.0–174.3)	141.5 \pm 12.98 (116.2–173.0)	148.6 \pm 20.57 (96.8–209.5)	151.0 \pm 17.07 (90.2–191.9)	152.6 \pm 14.81 (118.5–191.0)
CPV	F	278.4 \pm 15.89 (235.9–308.4)	267.4 \pm 23.09 (220.7–318.3)	248.8 \pm 16.87 (218.6–285.9)	254.7 \pm 20.5 (216.1–300.9)	255.4 \pm 17.52 (212.5–290.1)	247.8 \pm 26.10 (154.5–283.3)
	GI	239.2 \pm 19.07 (189.5–273.2)	229.4 \pm 22.53 (168.9–294.1)	212.6 \pm 18.63 (171.5–263.6)	223.4 \pm 20.36 (190.3–275.7)	232.0 \pm 15.99 (203.0–264.0)	233.5 \pm 24.93 (150.3–275.7)
	GII	238.1 \pm 13.97 (208.5–271.1)	226.2 \pm 35.60 (73.1–272.1)	223.8 \pm 18.51 (179.1–273.9)	235.7 \pm 23.12 (177.7–292.0)	241.2 \pm 21.22 (160.5–280.1)	244.1 \pm 20.81 (174.5–280.4)
SBV	F	6.5 \pm 16.03 (–27.8–35.7)	1.7 \pm 29.20 (–58.6–42.4)	–3.4 \pm 14.31 (–33.8–24.9)	–2.6 \pm 25.36 (–84.2–54.8)	7.7 \pm 17.91 (–43.4–42.5)	0.7 \pm 24.95 (–69.3–35.9)
	GI	–11.7 \pm 16.29 (–42.9–23.9)	–17.6 \pm 25.65 (–66.5–38.5)	–19.0 \pm 15.59 (–53.7–7.4)	–19.6 \pm 22.47 (–95.5–27.7)	–3.5 \pm 18.92 (–62.2–31.7)	–11.1 \pm 24.29 (–70.2–24.0)
	GII	–16.5 \pm 15.96 (–44.3–17.3)	–20.3 \pm 27.59 (–71.7–24.6)	–21.7 \pm 15.81 (–56.6–5.7)	–17.8 \pm 20.28 (–86.7–16.5)	–8.4 \pm 19.73 (–50.4–49.4)	–17.6 \pm 21.42 (–74.0–11.9)
BDV	F	85.0 \pm 14.56 (53.1–120.1)	88.1 \pm 24.55 (45.6–141.9)	94.5 \pm 13.56 (68.3–122.5)	97.4 \pm 21.33 (54.6–156.4)	88.1 \pm 17.17 (51.8–136.9)	95.9 \pm 19.44 (64.5–139.0)
	GI	91.3 \pm 12.16 (66.4–124.3)	95.0 \pm 18.83 (50.3–132.5)	97.1 \pm 14.18 (66.1–124.1)	104.5 \pm 16.76 (71.2–154.9)	93.0 \pm 16.72 (66.4–143.4)	100.2 \pm 19.76 (70.6–152.2)
	GII	100.1 \pm 10.93 (81.4–122.0)	98.1 \pm 24.59 (23.9–137.3)	104.1 \pm 12.30 (83.5–129.9)	105.0 \pm 15.27 (82.5–151.7)	98.7 \pm 17.58 (45.7–145.5)	109.2 \pm 16.5 (87.0–163.6)

^a AC, amylose content; ADV, alkali digestion value; BDV, breakdown viscosity; CGP, chalky grains percentage; CPV, cool paste viscosity; HPV, hot paste viscosity; HRP, head rice percentage; PKV, peak viscosity; PT, pasting temperature; SBV, setback viscosity.

^b F, field; GI, greenhouse I; GII, greenhouse II.

^c A total of 187 nonglutinous Korean rice varieties were divided into six maturity groups (I–VI) according to their heading dates (see Supplemental Table 1 for the number of varieties in each group and the average temperature during grain filling for each maturity group).