

Table S1. Grain quality parameters in two quinoa cultivars (Rainbow and Illpa) grown under irrigation regimes of 100% substrate holding full capacity (FC), 50% FC or 20% FC. Parameters with different letters indicate significant differences among treatments for a given cultivar ($P < 0.05$). Mean \pm SE (n = 4-5).

Grain quality parameters	Rainbow			Illpa		
	100% FC	50% FC	20% FC	100% FC	50% FC	20% FC
C (%)	43.34 \pm 0.18	43.91 \pm 0.05	43.49 \pm 0.18	40.43 \pm 0.11	40.39 \pm 0.08	40.92 \pm 0.15
N (%)	3.12 \pm 0.09	3.03 \pm 0.05	3.16 \pm 0.02	2.81 \pm 0.12	2.75 \pm 0.09	2.76 \pm 0.04
Amino acids - $\mu\text{g g}^{-1}$ DW						
	100% FC	50% FC	20% FC	100% FC	50% FC	20% FC
Aspartic acid	67.27 \pm 7.36	79.95 \pm 2.42	63.54 \pm 5.85	91.00 \pm 9.04	73.05 \pm 5.54	86.43 \pm 6.20
Glutamic acid	104.70 \pm 20.46	134.84 \pm 6.34	91.77 \pm 18.47	108.00 \pm 17.94	85.97 \pm 11.84	90.44 \pm 9.23
Serine	23.42 \pm 0.44	26.71 \pm 1.05	23.95 \pm 1.05	43.89 \pm 6.91	34.36 \pm 3.91	32.15 \pm 1.75
Glycine	18.51 \pm 1.20	19.71 \pm 0.76	17.44 \pm 1.07	28.60 \pm 3.50	24.34 \pm 1.60	25.16 \pm 0.76
Glutamine	48.07 \pm 2.66ab	54.43 \pm 0.87a	44.55 \pm 1.15b	70.83 \pm 6.00	57.39 \pm 1.90	64.17 \pm 5.30
Histidine	37.43 \pm 2.76	38.77 \pm 0.47	34.72 \pm 1.21	51.20 \pm 3.52	44.92 \pm 1.60	50.17 \pm 5.36
Threonine	43.89 \pm 3.59	44.62 \pm 1.11	43.16 \pm 10.10	45.31 \pm 2.80	41.16 \pm 0.71	47.08 \pm 4.61
Alanine	216.52 \pm 27.76	227.20 \pm 8.33	188.78 \pm 22.88	462.81 \pm 113.96	340.28 \pm 56.92	354.54 \pm 45.12
Arginine	49.23 \pm 3.58	51.37 \pm 0.67	45.88 \pm 2.02	78.64 \pm 11.00	67.57 \pm 5.12	73.55 \pm 7.55
GABA	22.36 \pm 0.63	23.68 \pm 1.13	23.65 \pm 1.16	39.15 \pm 4.36	37.19 \pm 5.33	41.51 \pm 4.66
Proline	38.20 \pm 4.54	38.17 \pm 1.22	32.30 \pm 2.58	55.24 \pm 7.99	43.49 \pm 5.81	53.02 \pm 8.91
Tyrosine	59.97 \pm 2.31	61.93 \pm 0.31	58.51 \pm 1.57	76.55 \pm 2.39	71.84 \pm 2.57	73.33 \pm 2.14
Valine	23.20 \pm 3.09	25.90 \pm 0.90	19.46 \pm 2.31	32.51 \pm 5.76	26.45 \pm 4.21	26.30 \pm 2.90
Methionine	29.71 \pm 0.61	31. \pm 0.0004	0.03 \pm 0.001	50.26 \pm 11.10	37.10 \pm 7.49	37.68 \pm 0.89
Isoleucine	0.035 \pm 0.003	31.76 \pm 0.36	30.08 \pm 0.66	40.42 \pm 2.56	36.74 \pm 1.13	38.82 \pm 1.34
Leucine	32.25 \pm 2.02	32.31 \pm 0.42	29.38 \pm 1.35	39.83 \pm 2.63	36.19 \pm 1.30	38.85 \pm 1.52
Lysine	2.63 \pm 0.81	3.24 \pm 0.42	1.83 \pm 0.69	11.02 \pm 4.84	5.19 \pm 3.07	3.68 \pm 0.96
Phenylalanine	46.62 \pm 2.29	47.52 \pm 0.92	43.84 \pm 1.79	55.44 \pm 1.29	53.00 \pm 1.39	55.69 \pm 1.30
Total amino acids	1017.18 \pm 100.65	1094.84 \pm 28.51	922.25 \pm 81.07	1350.30 \pm 208.58	1050.55 \pm 122.28	1112.47 \pm 110.22
Carbohydrates - g 100 g⁻¹ DW						
	100% FC	50% FC	20% FC	100% FC	50% FC	20% FC
Starch	20.44 \pm 2.239ab	23.42 \pm 0.504a	17.61 \pm 0.449b	41.13 \pm 3.521a	37.97 \pm 4.237a	33.57 \pm 3.134a
Glucose	0.185 \pm 0.017	0.166 \pm 0.014	0.15 \pm 0.012	0.107 \pm 0.012	0.145 \pm 0.017	0.158 \pm 0.038
Fructose	-	-	-	0.037 \pm 0.007	0.053 \pm 0.012	0.104 \pm 0.037
Sucrose	3.078 \pm 0.05	2.940 \pm 0.03	2.897 \pm 0.07	2.287 \pm 0.049	2.196 \pm 0.1	2.057 \pm 0.072
Minerals - mg 100 g⁻¹ DW						
	100% FC	50% FC	20% FC	100% FC	50% FC	20% FC
Ca	44.822 \pm 3.8	43.544 \pm 2.8	37.895 \pm 2.8	65.245 \pm 2.32	63.979 \pm 8.13	62.68 \pm 6.32
Mg	225.009 \pm 10.5	219.046 \pm 4.9	206.933 \pm 8.1	240.914 \pm 5.95	223.202 \pm 18.28	243.33 \pm 10.28
Na	1.319 \pm 0.2a	0.498 \pm 0.1b	0.386 \pm 0.1b	9.804 \pm 1.11	6.986 \pm 0.47	8.095 \pm 1.33
K	1273.787 \pm 64.1	1254.335 \pm 47	1196.402 \pm 76.9	1237.737 \pm 42.57	1138.68 \pm 10.61	1277.975 \pm 55.86
P	492.201 \pm 24.9	465.857 \pm 9.7	445.705 \pm 16.6	443.302 \pm 16.36	387.81 \pm 35.43	400.051 \pm 21.13
Fe	7.239 \pm 0.653	6.319 \pm 0.339	5.795 \pm 0.225	14.948 \pm 2.32	9.665 \pm 1.86	8.374 \pm 0.9

Cu	0.429 ± 0.037	0.427 ± 0.035	0.353 ± 0.017	0.818 ± 0.06	0.618 ± 0.07	0.613 ± 0.02
Zn	5.166 ± 1.043	4.254 ± 0.156	3.656 ± 0.2	5.623 ± 0.42	4.493 ± 0.45	5.104 ± 0.32
Mn	3.336 ± 0.178	3.268 ± 0.072	3.08 ± 0.123	3.346 ± 0.2	2.893 ± 0.24	2.942 ± 0.15
B	0.976 ± 0.06a	0.871 ± 0.03ab	0.757 ± 0.04b	0.964 ± 0.23	0.62 ± 0.25	0.42 ± 0.17
Si	1.687 ± 0.32a	0.684 ± 0.04b	0.752 ± 0.12b	18.669 ± 3.02	21.918 ± 8.08	12.116 ± 3.83
S	147.8 ± 8.34	139.78 ± 2.78	132.93 ± 5.02	136.522 ± 3.37	122.936 ± 9.61	126.62 ± 5.55
Total minerals	2148 ± 114	2141 ± 64.18	2036 ± 109	2185 ± 49.41	2095 ± 136.10	2159 ± 42.51

Table S2. Carbohydrates, amino acids and minerals composition in leaves of two quinoa cultivars (Rainbow and Illpa) grown under irrigation regimes of 100% substrate holding full capacity (FC), 50% FC or 20% FC. Parameters with different letters indicate significant differences among treatments for a given cultivar ($P < 0.05$). Mean ± SE (n = 8-10).

	Rainbow			Illpa		
	100% FC	50% FC	20% FC	100% FC	50% FC	20% FC
C (%)	33.11 ± 0.62	33.87 ± 0.24	32.27 ± 0.29	33.58 ± 0.78	34.41 ± 0.78	33.10 ± 0.73
N (%)	3.69 ± 0.14	3.45 ± 0.07	3.48 ± 0.12	4.08 ± 0.22	4.45 ± 0.17	4.46 ± 0.20
Carbohydrates						
Starch (g 100 g ⁻¹ DW)	2.22 ± 0.29 a	2.81 ± 0.27 a	0.57 ± 0.11 b	2.43 ± 0.21	2.10 ± 0.17	1.65 ± 0.33
Glucose (μmol g ⁻¹ DW)	114.54 ± 18.77 a	88.70 ± 17.79 ab	50.27 ± 6.34 b	25.18 ± 6.90 b	20.28 ± 3.27 b	137.95 ± 15.92 a
Fructose (μmol g ⁻¹ DW)	43.57 ± 6.60 a	31.90 ± 5.22 ab	23.57 ± 4.05 b	11.82 ± 3.11 b	12.03 ± 1.91 b	105.00 ± 8.94 a
Saccharose (μmol g ⁻¹ DW)	48.68 ± 8.25 a	58.61 ± 7.08 a	29.75 ± 4.18 b	10.55 ± 0.93 b	9.53 ± 0.74 b	43.49 ± 7.70 a
Amino acids (μg g⁻¹ DW)						
Asp	284.34 ± 41.22	330.50 ± 68.24	419.92 ± 49.50	222.08 ± 43.86	285.72 ± 47.09	167.15 ± 46.44
Ala	2396.04 ± 400.92 ab	1546 ± 287.16 b	3451.48 ± 609.00 a	998.56 ± 244.77 a	1631.01 ± 316.96 a	1362.46 ± 303.56 a
Arg	295.83 ± 50.25	232.51 ± 35.50	349.26 ± 49.62	94.66 ± 19.83 b	184.09 ± 30.85 a	160.85 ± 23.05 ab
Asn	204.54 ± 74.39	82.36 ± 26.15	315.57 ± 87.21	126.36 ± 38.56	165.63 ± 54.87	149.59 ± 54.61
GABA	278.18 ± 46.15	197.82 ± 30.14	187.73 ± 58.21	77.26 ± 12.01	167.30 ± 20.03	159.16 ± 32.32
Gln	254.11 ± 39.10 b	268.16 ± 45.06 b	916.42 ± 107.06 a	242.74 ± 79.66	166.33 ± 40.97	156.43 ± 40.28
Glu	645.95 ± 143.36 b	884.41 ± 202.49 b	1499.2 ± 107.27 a	355.99 ± 88.08	474.67 ± 96.00	294.40 ± 82.05
Gly	69.45 ± 17.04 b	65.00 ± 11.78 b	113.99 ± 13.68 a	33.71 ± 10.18	52.20 ± 11.20	44.49 ± 7.84
His	73.89 ± 10.97	49.65 ± 6.82	75.14 ± 6.74	42.37 ± 2.52	46.47 ± 3.46	45.43 ± 2.80
Ile	99.04 ± 17.19	103.00 ± 16.98	125.67 ± 11.59	51.59 ± 5.36	54.87 ± 5.69	67.62 ± 6.78
Leu	201.01 ± 116.60	76.80 ± 10.69	95.50 ± 12.89	52.31 ± 5.73	64.20 ± 7.34	76.13 ± 10.23
Lys	54.92 ± 12.09	44.60 ± 11.51	133.03 ± 44.20	12.05 ± 3.41	93.90 ± 72.46	53.78 ± 17.10
Met	48.96 ± 5.16	45.46 ± 2.27	42.53 ± 1.48	43.18 ± 2.33	46.19 ± 2.61	49.53 ± 3.53
Phe	169.11 ± 31.17 ab	117.93 ± 16.40 b	226.25 ± 38.98 a	78.97 ± 9.55	82.68 ± 8.11	107.19 ± 18.06
Pro	259.67 ± 27.08 b	234.35 ± 26.25 b	395.89 ± 33.58 a	68.14 ± 16.62	120.07 ± 22.88	107.15 ± 31.48
Ser	133.79 ± 29.56 b	142.32 ± 29.46 b	250.51 ± 22.44 a	66.40 ± 10.98	92.12 ± 14.07	87.19 ± 16.22
Thr	171.47 ± 27.02 a	149.18 ± 26.21 ab	110.87 ± 8.47 b	-	-	-
Tyr	131.33 ± 19.96 ab	127.77 ± 13.61 b	166.95 ± 13.25 a	82.73 ± 4.74	89.00 ± 5.16	101.26 ± 9.30
Val	76.05 ± 14.31 b	82.21 ± 15.65 b	168.99 ± 15.18 a	39.70 ± 7.29	44.86 ± 6.50	56.80 ± 9.03
Total amino acids	7206.13 ± 1228.72	5400.50 ± 926.40	8669.73 ± 950.99	2386.84 ± 463.79	3768.63 ± 877.86	3576.16 ± 690.09
Minerals (mg 100 g⁻¹ DW)						
Al	1.84 ± 0.20 b	1.41 ± 0.05 b	2.57 ± 0.27 a	5.89 ± 0.60 ab	6.25 ± 0.45 a	4.39 ± 0.30 b

B	2.63 ± 0.26	2.79 ± 0.47	2.13 ± 0.36	2.04 ± 0.27	1.49 ± 0.26	1.85 ± 0.34
Ca	1229.25 ± 82.89ab	1170.69 ± 35.73b	1505.38 ± 106.57a	1119.9 ± 103.45	1068.23 ± 65.14	1060.60 ± 82.00
Cu	0.40 ± 0.02	0.40 ± 0.02	0.40 ± 0.02	0.43 ± 0.02	0.44 ± 0.02	0.43 ± 0.02
Fe	5.83 ± 0.34	4.98 ± 0.25	5.72 ± 0.36	7.36 ± 0.76	5.99 ± 0.429	6.00 ± 0.58
K	7091.13 ± 232.74 b	6963.53 ± 186.89 b	8207.76 ± 282.33 a	8134.31 ± 913.30 a	9168.78 ± 641.82 ab	10714.06 ± 458.16 b
Mg	1725.59 ± 96.14	1670.59 ± 53.59	2185.59 ± 183.05	1608.13 ± 124.01	1597.61 ± 137.33	1627.94 ± 87.15
Mn	10.45 ± 0.47 b	10.05 ± 0.24 b	12.69 ± 0.98 a	11.99 ± 0.78	12.11 ± 0.63	11.67 ± 0.60
Na	21.08 ± 3.05 b	28.08 ± 4.28ab	38.99 ± 7.14 a	4.50 ± 1.06	4.31 ± 0.62	5.65 ± 1.20
P	661.79 ± 51.74	673.91 ± 33.83	755.57 ± 55.11	420.50 ± 66.30	412.60 ± 43.67	380.48 ± 24.98
S	215.84 ± 14.11	199.91 ± 11.03	219.70 ± 12.58	345.69 ± 25.88	305.84 ± 17.35	361.18 ± 24.57
Si	42.35 ± 2.88 b	43.46 ± 3.16 b	52.96 ± 5.97 a	27.66 ± 3.75	27.12 ± 2.33	28.61 ± 2.22
Zn	1.41 ± 0.09	1.82 ± 0.16	1.46 ± 0.11	2.18 ± 0.23	2.28 ± 0.21	2.05 ± 0.12