

APPENDIX

Table S1 Meteorological data of Kashmar in in 2019 and 2020 seasons

Month	Average monthly temperature (°C)		Average monthly maximum temperature (°C)		Average monthly minimum temperature (°C)		Maximum monthly wind speed (Km/h)		Total monthly rainfall (mm)	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
March	10.9	7.1	16.5	14.3	5.3	-0.1	15	17	15.7	49.1
April	18.6	15.1	25.0	23.2	12.2	7.1	15	21	1	5.1
May	23.5	20.1	29.9	28.2	17.2	12.1	10	20	56.8	16.4
June	30.4	26.6	37.2	35.5	23.6	17.8	12	17	0	0.1

Table S2 The results of the water and soil analysis of Kashmar

Soil										
Parameter	Sand (%)	Silt (%)	Clay (%)	N (%)	Fe (ppm)	Zn (ppm)	Organic bon (%)	car-	Salinity (ds/m)	pH
Value	30	52	18	0.07	1.13	0.3	0.74		1.603	7.58
Water										
Parameter	Suspended solutes in water (mg/l)	Sodium absorption ratio			Cl ⁻ (mEq/l)	SO ₄ ⁻ (mEq/l)	Salinity (S _μ)		pH	
Value	1035.12	2.46			7.2	4.7	1625		7.29	

Table S3 Response of plant height, panicle length, grain weight and shoot weight to the interaction of cultivar, priming and drought stress in the 2020 and 2021 seasons.

Treatments			H (cm)		PL (cm)		GW (g m ⁻²)		SHW (g m ⁻²)	
			2020	2021	2020	2021	2020	2021	2020	2021
I1	G	P	162.6 ab	130.0 bc	31.33 cde	37.0 b	292.3 b	362.0 a	356.7 b	362.3 ab
		No-P	98.4 cde	125.0 b-e	26.33 b	26.0 cde	145.3 de	233.7 d	244.0 e	265.3 cd
	Q12	P	129.0 bc	152.7 a	40.67 a	46.0 a	338.3 a	347.0 ab	366.7 a	355.4 ab
		No-P	121.3 bc	118.0 c-f	27.67 bcd	27.0 cd	262.0 bc	272.7 c	298.0 d	325.1 b
	Q29	P	180.6 a	153.3 a	30.00 bc	29.0 c	343.7 a	351.0 ab	342.7 c	386.8 a
		No-P	124.4 bc	130.3 b	24.33 def	28.7 cd	263.3 bc	225.0 de	223.3 f	225.1 def
I2	G	P	100.0 cde	116.7 def	21.00 fgh	42.3 a	233.7 c	327.7 b	176.0 h	322.4 b
		No-P	74.4 de	95.33 gh	19.00 ghi	24.0 de	144.3 de	215.7 def	129.3 k	210.1 efg
	Q12	P	111.6 cd	116.3 def	22.67 efg	24.7 cde	170.7 d	236.0 d	202.0 g	276.8 c
		No-P	89.0 cde	106.0 fg	20.00 gh	24.7 cde	130.7 def	191.3 fgh	138.7	170.2 gh
	Q29	P	121.9 bc	124.3 b-e	20.00 gh	26.3 cd	172.0 d	233.0 d	154.0 i	242.3 cde
		No-P	91.9 cde	114.7 ef	18.33 hij	24.3 cde	131.0 def	215.3 def	108.0 l	187.0 fgh
I3	G	P	71.6 de	72.67 j	18.00 hij	24.7 cde	65.0 h	182.7 ghi	70.7 n	149.9 h
		No-P	59.8 e	88.0 hi	14.33 jk	24.7 cde	75.7 gh	205.7 efg	44.0 p	144.9 h
	Q12	P	86.0 cde	61.67 k	18.00 hij	15.7 g	98.7 fgh	170.0 hij	83.3 m	191.2 fgh
		No-P	59.2 e	81.00 ij	15.33 ij	18.0 fg	65.3 h	151.3 j	56.0 o	159.8 h
	Q29	P	87.2 cde	127.7 bcd	17.33 hij	21.3 ef	107.7 efg	191.3 fgh	65.3 n	144.9 h
		No-P	89.6 cde	93.33 h	10.67 k	14.0 g	74.0 gh	159.3 ij	33.3 q	188.2 fgh

Mean pairs within a column with different letters are significantly different at the 5% probability level according to Duncan's new multiple-range test. G: Giza cultivar, H: plant height, PN: panicle number, GW: grain weight, SHW: shoot weight, BY: biological yield, HI: harvest index, RWC: relative water content.

Table S4 Plant height, panicle length, grain weight and shoot weight quinoa response to interaction of cultivar, priming and drought stress in 2020 and 2021 seasons.

Treatments			BY (g m ⁻²)		HI (%)		SP (%)		Oil (%)		RWC (%)	
			2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
I1	G	P	649.0 b	624.3 a	63.33 ab	56.1 f-i	15.20 bc	18.1 ab	3.51 ab	3.51 bcd	89.58 ab	79.8 b
		No-P	389.3 e	398.9 d	47.33 d-g	55.7 f-i	15.13 bc	15.6 d-h	3.28 a-d	3.71 ab	78.06 a-d	57.7 d
	Q12	P	705.0 a	602.4 ab	53.00 c-f	55.7 f-i	17.00 a	19.0 a	3.34 abc	3.99 a	84.06 abc	81.7 ab
		No-P	560.0 c	497.7 c	54.00 cde	53.4 i	16.23 ab	17.5 bc	3.36 abc	3.59 abc	77.03 bcd	60.2 c
	Q29	P	686.3 ab	637.8 a	68.00 a	53.7 hi	14.27 cd	16.1 c-f	3.65 a	3.65 abc	92.04 a	87.9 ab
		No-P	486.7 d	350.1 def	62.33 ab	59.1 c-g	13.39 de	16.3 c-f	2.82 d-g	2.83 gh	67.51 d-g	57.9 d
I2	G	P	409.7 e	550.1 bc	52.67 c-g	57.0 e-i	12.20 ef	17.2 bcd	3.21 a-d	3.28 b-f	54.05 gh	89.8 a
		No-P	273.7 g	325.7 ef	57.00 bc	60.1 c-f	11.30 fg	15.2 fgh	2.98 c-f	3.21 c-g	70.24 c-f	62.5 cd
	Q12	P	372.7 e	412.8 d	48.00 d-g	54.9 ghi	14.00 cd	16.1 c-f	3.05 b-e	3.39 b-e	57.30 fgh	61.6 cd
		No-P	269.3 g	261.5 gh	45.33 fg	63.2 bc	13.10 de	17.0 b-e	3.07 b-e	3.14 d-g	62.23 e-h	55.3 de
	Q29	P	326.0 f	375.3 de	54.67 cd	58.2 e-h	11.27 fg	13.3 ij	3.35 abc	3.40 b-e	74.57 cde	60.6 cde
		No-P	239.0 g	302.4 fg	52.33 c-g	62.8 bcd	10.37 gh	14.3 hi	2.52 fgh	3.40 b-e	56.65 fgh	53.6 def
I3	G	P	135.7 ij	232.5 h	36.67 h	65.9 ab	10.70 gh	16.0 c-g	2.86 d-g	3.26 c-g	54.98 gh	51.2 ef
		No-P	119.7 j	250.6 gh	44.67 g	67.9 a	9.80 hi	14.5 ghi	2.63 efg	2.34 i	54.08 gh	45.6 fgh
	Q12	P	182.0 h	261.2 gh	46.00 efg	58.5 d-g	12.50 ef	15.4 e-h	2.74 efg	3.06 efg	55.34 gh	48.6 fg
		No-P	121.3 j	211.1 h	48.00 d-g	61.2 cde	11.60 fg	13.3 ij	2.49 gh	2.89 fg	56.79 fgh	43.6 ghi
	Q29	P	173.0 hi	236.2 gh	53.67 cde	66.9 ab	9.77 hi	12.4 j	3.52 ab	2.48 hi	50.48 h	44.3 ghi
		No-P	107.3 j	247.5 gh	50.00 c-g	58.0 e-i	8.87i	13.3 ij	2.18 h	2.13 i	32.79 i	35.2 i

Mean pairs within a column with different letters are significantly different at the 5% probability level according to Duncan's new multiple-range test. G: Giza cultivar, H: plant height, PN: panicle number, GW: grain weight, SHW: shoot weight, BY: biological yield, HI: harvest index, RWC: relative water content.

Table S5 Mean comparison the interaction effects of drought stress, cultivar and priming on CMS, Proline, SOD, CAT, APX, seed protein and oil.

Treatments			CMS (%)		Proline ($\mu\text{g/g}$)		SOD (U mg^{-1} protein)		CAT (U mg^{-1} protein)		APX (mg^{-1} protein)	
			2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
I1	G	P	79.49 abc	49.3 e	2.68 i	3.20 e	27.74 ij	27.8 fg	0.42 hi	0.34 g-j	1.06 i	0.68 d
		No-P	71.39 b-e	68.6 c	2.93 hi	3.30 e	32.60 hij	31.6 b-g	0.37 j	0.37 f-i	0.40 j	0.76 d
	Q12	P	81.75 abc	88.6 a	3.05 ghi	3.80 de	30.19 hij	29.0 efg	0.44 gh	0.30 ij	1.35 h	0.58 d
		No-P	73.20 b-e	80.6 b	2.98 ghi	3.50 de	35.35 ghi	30.7 c-g	0.39 ij	0.29 ij	0.44 j	0.49 d
	Q29	P	91.05 a	38.0 f	2.99 ghi	3.80 de	26.42 j	27.0 g	0.44 fg	0.34 g-j	0.95 i	0.45 d
		No-P	76.86 bcd	59.2 d	3.33 f-i	8.70 a	31.12 hij	40.4 bc	0.39 gh	0.51 bcd	0.38 j	0.39 d
I2	G	P	62.00 efg	27.3 ghi	5.61 cde	4.32 cde	38.34 fgh	29.6 d-g	0.52 ef	0.27 j	2.03d	1.58 c
		No-P	72.78 b-e	37.2 f	4.67 def	5.28 b-e	44.46 ef	33.6 b-g	0.47 de	0.32 hij	1.67 f	1.51 c
	Q12	P	65.19 def	37.4 f	4.22 e-i	5.27 b-e	41.43 efg	32.7 b-g	0.54 d	0.38 f-i	2.36 c	1.57 c
		No-P	82.28 ab	47.5 e	4.52 efg	5.18 b-e	47.90 e	34.7 b-g	0.49 ef	0.34 g-j	2.03 d	1.71 bc
	Q29	P	56.51 fg	32.8 fgh	3.93 f-i	4.63 b-e	36.67 fgh	31.0 b-g	0.54 d	0.40 e-h	1.87 e	2.38 a
		No-P	67.81 c-f	34.2 fg	4.44 e-h	5.23 b-e	42.60 efg	33.0 b-g	0.49 ef	0.58 ab	1.52 g	1.70 bc
I3	G	P	25.43 jk	25.4 hi	7.99 a	5.50 b-e	67.59 ab	39.2 bcd	0.60 c	0.42 d-g	2.66 a	2.68 a
		No-P	41.74 hi	20.8 i	6.80 abc	6.23 bcd	59.21 cd	40.8 b	0.65 ab	0.53 bc	2.45 bc	2.26 ab
	Q12	P	30.67 ij	26.9 ghi	6.61 abc	7.33 b	72.24 a	38.7 b-e	0.67 a	0.45 c-f	2.46 bc	2.20 ab
		No-P	51.36 gh	22.9 i	6.29 bc	6.97 bc	63.44 bcd	37.6 b-f	0.62 bc	0.49 b-e	2.15 d	2.54 a
	Q29	P	15.40 k	33.9 fg	6.09 bcd	6.62 bc	65.05 abc	57.1 a	0.67 a	0.65 a	2.70 a	2.60 a
		No-P	34.74 ij	28.3 ghi	7.27 ab	5.70 b-e	56.91 d	37.0 b-f	0.62 bc	0.48 cde	2.56 ab	2.70 a

Meanpairs within a column with different letters are significantly different at the 5% probability level according to Duncan's new multiple-range test. G: Giza cultivar, CMS cell membrane stability, SOD: superoxide dismutase, CAT: catalyze, APX: ascorbate peroxidase.

Table S6 Pearson's correlation matrix of response variables of quinoa genotypes grown under drought stress and priming. Values in bold indicate a significant correlation at $\alpha = 0.05$.

Variables	H	PL	GW	SHW	BY	HI	SP	Oil	RWC	CMS	Pro-line	SOD	CAT	APX
H	1													
PL	0.46	1												
GW	0.64	0.88	1											
SHW	0.71	0.75	0.83	1										
BY	0.70	0.86	0.96	0.95	1									
HI	0.35	0.40	0.54	0.27	0.43	1								
SP	0.43	0.84	0.79	0.79	0.83	0.30	1							
Oil	0.46	0.51	0.48	0.62	0.57	0.08	0.53	1						
RWC	0.47	0.15	0.11	0.48	0.30	-0.17	0.23	0.40	1					
CMS	-0.72	-0.73	-0.76	-0.79	-0.81	-0.37	-0.66	-0.52	-0.39	1				
Proline	-0.23	-0.14	-0.15	-0.29	-0.23	-0.03	-0.15	-0.26	-0.16	0.18	1			
SOD	-0.63	-0.71	-0.78	-0.81	-0.83	-0.48	-0.71	-0.59	-0.28	0.72	0.29	1		
CAT	-0.48	-0.73	-0.72	-0.73	-0.76	-0.32	-0.71	-0.49	-0.16	0.64	0.28	0.78	1	
APX	0.12	0.11	0.17	0.22	0.20	0.39	0.16	-0.03	-0.13	-0.11	-0.24	-0.39	-0.17	1

Values in bold are different from 0 with a significance level $\alpha=0.95$. H: plant height, PL: panicle length, GW: grain weight, SHW: shoot weight, BY: biological yield, HI: harvest index, SP: seed protein, RWC: relative water content, CMS cell membrane stability, SOD: superoxide dismutase, CAT: catalyze, APX: ascorbate peroxidase.

Table S7 Eigen value in factor analysis by principal component

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
Eigenvalue	7.80	1.64	1.19	0.9	0.61	0.51	0.35	0.34	0.24	0.15	0.13	0.12	0.04
Variability (%)	55.7	11.7	8.5	6.4	4.34	3.60	2.53	2.39	1.71	1.10	0.93	0.85	0.27
Cumulative %	55.7	67.4	75.9	82.3	86.6	90.2	92.7	95.1	96.9	97.9	98.9	99.7	100