

## Supplementary or Supporting materials

**Table S1. Phenolics content (mg/100 g) in *C. quinoa* seed.** The table shows the free and bound fractions of phenolics and total phenolics content in *C. quinoa* seeds. Data are presented here as mean  $\pm$  standard deviation values of independent sample extractions (n = 4). A one-way analysis of variance ANOVA was performed and  $p$ -value  $< 0.05$  was considered as a statistically significant difference. A significant difference was found ( $p < 0.001$ ) in relative phenolics content. Significant codes: '\*\*\*' 0.001 '\*\*\*' 0.01 '\*\*' 0.05 '.' 0.1 '.' 1.

Quinoa line	Free phenolic fractions		Bound phenolics fractions		Total Phenolics	
AZ-1	53.29 $\pm$ 0.40	***	10.35 $\pm$ 0.39	***	63.64 $\pm$ 0.02	***
AZ-2	61.22 $\pm$ 0.56	***	10.79 $\pm$ 0.34		72.01 $\pm$ 0.22	***
AZ-3	46.64 $\pm$ 0.73	***	11.04 $\pm$ 0.21		57.68 $\pm$ 0.94	***
AZ-4	42.43 $\pm$ 0.41	***	11.48 $\pm$ 0.33		53.92 $\pm$ 0.73	***
AZ-5	54.23 $\pm$ 0.26		11.51 $\pm$ 0.31		65.74 $\pm$ 0.05	
AZ-6	51.58 $\pm$ 1.03		10.15 $\pm$ 0.46		61.73 $\pm$ 0.57	
AZ-7	60.29 $\pm$ 2.80	***	11.65 $\pm$ 0.33	.	71.94 $\pm$ 3.13	***
AZ-8	40.74 $\pm$ 2.17	***	9.03 $\pm$ 0.20	.	49.77 $\pm$ 2.37	***
AZ-9	43.98 $\pm$ 0.36	***	10.12 $\pm$ 0.11		54.10 $\pm$ 0.47	***
AZ-10	44.47 $\pm$ 1.57	***	9.51 $\pm$ 0.06		53.98 $\pm$ 1.63	*
AZ-11	40.50 $\pm$ 0.83	***	11.11 $\pm$ 0.22		51.61 $\pm$ 1.05	***
AZ-12	51.21 $\pm$ 2.52		9.98 $\pm$ 0.15		61.19 $\pm$ 2.67	
AZ-13	53.19 $\pm$ 0.98		22.37 $\pm$ 0.61	***	75.56 $\pm$ 1.59	***
AZ-14	49.76 $\pm$ 0.26	*	10.99 $\pm$ 0.08		60.76 $\pm$ 0.34	.
AZ-15	35.63 $\pm$ 1.15	***	11.47 $\pm$ 0.20		47.10 $\pm$ 1.36	***
AZ-16	44.55 $\pm$ 0.68	***	11.99 $\pm$ 0.49	*	56.54 $\pm$ 1.17	***
AZ-17	25.81 $\pm$ 0.88	***	15.15 $\pm$ 0.27	***	40.96 $\pm$ 0.61	***
AZ-18	23.83 $\pm$ 0.49	***	11.68 $\pm$ 0.50	.	35.51 $\pm$ 0.99	***
AZ-19	40.01 $\pm$ 0.97	***	11.39 $\pm$ 0.24		51.39 $\pm$ 0.73	***
AZ-20	35.26 $\pm$ 0.15	***	13.15 $\pm$ 0.33	***	48.41 $\pm$ 0.47	***
AZ-21	46.87 $\pm$ 0.00	***	11.89 $\pm$ 0.15	*	58.76 $\pm$ 0.14	***
AZ-22	45.54 $\pm$ 0.78	***	10.92 $\pm$ 0.11		56.45 $\pm$ 0.67	***
AZ-23	35.40 $\pm$ 0.10	***	9.72 $\pm$ 0.25		45.12 $\pm$ 0.15	***
AZ-24	43.84 $\pm$ 1.17	***	11.06 $\pm$ 0.47		54.91 $\pm$ 0.70	***
AZ-25	45.23 $\pm$ 0.31	***	10.39 $\pm$ 0.24		55.62 $\pm$ 0.55	***
AZ-26	47.37 $\pm$ 1.14	***	11.06 $\pm$ 0.57		58.43 $\pm$ 1.71	**
AZ-27	60.30 $\pm$ 3.14	***	14.92 $\pm$ 0.73	***	75.21 $\pm$ 2.41	***
AZ-29	50.30 $\pm$ 1.63	*	13.82 $\pm$ 0.79	***	64.11 $\pm$ 0.83	

AZ-30	60.06 ± 0.66	***	13.74 ± 0.93	***	73.80 ± 0.27	***
AZ-31	33.01 ± 1.26	***	10.69 ± 0.08		43.70 ± 1.34	***
AZ-32	39.91 ± 1.70	***	9.98 ± 1.26		49.89 ± 2.97	***
AZ-33	34.84 ± 0.04	***	14.58 ± 0.13	***	49.42 ± 0.09	***
AZ-34	54.43 ± 2.99		14.93 ± 0.79	***	69.37 ± 2.20	**
AZ-35	35.95 ± 0.63	***	15.79 ± 0.38	***	51.74 ± 1.01	***
AZ-36	35.53 ± 5.15	***	13.64 ± 0.62	***	49.18 ± 5.77	***
AZ-37	42.60 ± 0.57	***	14.05 ± 0.09	***	56.66 ± 0.66	***
AZ-38	45.82 ± 1.24	***	14.78 ± 0.19	***	60.60 ± 1.43	.
AZ-39	61.53 ± 1.76	***	16.53 ± 0.45	***	78.06 ± 2.21	**
AZ-40	39.63 ± 0.79	***	14.56 ± 0.80	***	54.18 ± 0.00	***
AZ-41	50.81 ± 1.82	.	15.73 ± 0.56	***	66.54 ± 2.38	.
AZ-42	49.94 ± 0.10	*	15.97 ± 0.65	***	65.90 ± 0.55	
AZ-43	31.44 ± 0.86	***	15.69 ± 0.23	***	47.13 ± 0.63	***
AZ-44	52.07 ± 1.56		15.00 ± 1.68	***	67.07 ± 3.24	*
AZ-45	44.64 ± 0.96	***	16.41 ± 0.06	***	61.06 ± 1.02	
AZ-46	43.55 ± 0.19	***	17.25 ± 0.26	***	60.81 ± 0.45	.
AZ-47	49.37 ± 4.02	**	15.89 ± 0.10	***	65.26 ± 3.92	
AZ-48	49.98 ± 2.08	*	15.58 ± 1.77	***	65.56 ± 3.84	
AZ-49	39.15 ± 0.43	***	14.46 ± 1.87	***	53.60 ± 1.45	***
AZ-50	42.12 ± 3.65	***	14.25 ± 0.04	***	56.37 ± 3.69	***
AZ-51	58.71 ± 2.12	***	13.25 ± 1.20	***	71.96 ± 3.31	***
AZ-52	40.88 ± 0.52	***	15.59 ± 0.61	***	56.47 ± 1.13	***
AZ-53	43.67 ± 0.29	***	18.19 ± 1.10	***	61.86 ± 0.80	
AZ-54	43.12 ± 0.65	***	15.12 ± 1.07	***	58.24 ± 1.73	**
AZ-55	42.35 ± 1.59	***	16.13 ± 1.25	***	58.48 ± 0.34	**
AZ-56	52.57 ± 1.34		15.70 ± 0.18	***	68.27 ± 1.16	**
AZ-57	36.96 ± 3.77	***	19.43 ± 0.62	***	56.39 ± 4.39	***
AZ-58	41.22 ± 0.52	***	15.23 ± 0.94	***	56.45 ± 0.42	***
AZ-59	39.80 ± 1.50	***	15.67 ± 0.02	***	55.47 ± 1.47	***
AZ-60	43.50 ± 1.78	***	15.14 ± 0.04	***	58.64 ± 1.81	**
AZ-61	44.55 ± 1.04	***	17.19 ± 0.03	***	61.73 ± 1.07	
AZ-62	29.90 ± 0.23	***	18.02 ± 0.29	***	47.92 ± 0.06	***
AZ-63	40.00 ± 0.67	***	15.98 ± 0.36	***	55.98 ± 0.31	***
AZ-64	35.02 ± 0.45	***	15.25 ± 0.40	***	50.27 ± 0.05	***

AZ-65	41.38 ± 0.25	***	16.83 ± 0.82	***	58.20 ± 1.07	***
AZ-66	46.39 ± 0.05	***	13.46 ± 1.50	***	59.85 ± 1.55	*
AZ-67	37.84 ± 0.48	***	14.86 ± 0.17	***	52.70 ± 0.30	***
AZ-68	35.12 ± 0.05	***	13.88 ± 0.13	**	49.00 ± 0.08	***
AZ-69	29.36 ± 0.74	***	12.88 ± 0.11	***	42.24 ± 0.85	***
AZ-70	36.33 ± 0.67	***	14.61 ± 0.26	***	50.95 ± 0.41	***
AZ-71	31.32 ± 0.59	***	14.14 ± 0.40	***	45.46 ± 0.19	***
AZ-72	27.45 ± 0.43	***	13.42 ± 0.01	***	40.87 ± 0.42	***
AZ-73	37.54 ± 1.22	***	17.85 ± 0.70	***	55.39 ± 1.92	***
AZ-74	39.83 ± 2.96	***	16.39 ± 0.14	***	56.21 ± 2.89	***
AZ-76	36.49 ± 0.01	***	16.13 ± 0.07	***	52.62 ± 0.09	***
AZ-77	33.12 ± 0.53	***	17.24 ± 0.31	***	50.36 ± 0.84	***
AZ-78	44.93 ± 0.97	***	16.87 ± 1.02	***	61.80 ± 1.99	
AZ-79	37.10 ± 0.53	***	15.74 ± 0.06	***	52.85 ± 0.60	***
AZ-80	28.47 ± 1.50	***	15.16 ± 0.10	***	43.63 ± 1.59	***
AZ-81	35.43 ± 0.65	***	16.48 ± 0.06	***	51.91 ± 0.70	***
AZ-82	34.57 ± 0.77	***	17.25 ± 0.49	***	51.82 ± 1.25	***
AZ-83	40.54 ± 0.54	***	17.81 ± 0.04	***	58.35 ± 0.50	**
AZ-84	26.38 ± 1.38	***	17.51 ± 0.25	***	43.89 ± 1.63	***
AZ-85	26.67 ± 0.08	***	16.57 ± 0.00	***	43.24 ± 0.08	***
AZ-86	37.27 ± 0.48	***	19.86 ± 0.05	***	57.13 ± 0.43	***
AZ-87	44.87 ± 0.74	***	18.60 ± 0.19	***	63.47 ± 0.55	
AZ-88	30.05 ± 0.25	***	15.42 ± 0.20	***	45.47 ± 0.45	***
AZ-89	38.26 ± 4.34	***	18.66 ± 0.13	***	56.93 ± 4.22	***
AZ-91	50.28 ± 0.47	*	19.46 ± 2.22	***	69.74 ± 2.69	***
AZ-92	NA	***	NA	***	NA	
AZ-93	41.22 ± 0.31	***	22.25 ± 1.28	***	63.47 ± 0.97	
AZ-94	57.77 ± 0.86	**	19.72 ± 0.33	***	77.49 ± 1.19	***
AZ-95	54.13 ± 0.63		33.05 ± 0.67	***	87.18 ± 0.05	***
AZ-96	60.84 ± 1.53	***	22.04 ± 0.54	***	82.89 ± 0.99	***
AZ-97	32.32 ± 1.58	***	21.43 ± 0.56	***	53.75 ± 2.14	***
AZ-98	26.03 ± 0.92	***	23.09 ± 1.47	***	49.12 ± 2.39	***
AZ-99	24.97 ± 0.41	***	18.53 ± 0.19	***	43.50 ± 0.22	***
AZ-100	NA	***	NA	***	NA	
AZ-101	38.10 ± 0.58	***	16.50 ± 0.29	***	54.60 ± 0.87	***

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AZ-102	27.64 ± 0.02	***	15.40 ± 0.33	***	43.03 ± 0.35	***
AZ-103	24.00 ± 0.42	***	20.92 ± 0.26	***	44.92 ± 0.16	***
AZ-104	34.55 ± 0.73	***	20.13 ± 0.08	***	54.69 ± 0.81	***
AZ-105	39.35 ± 0.84	***	15.36 ± 1.02	***	54.71 ± 0.18	
AZ-107	36.68 ± 1.60	***	17.28 ± 1.47	***	53.96 ± 3.07	***
AZ-108	35.30 ± 0.24	***	17.48 ± 0.06	***	52.78 ± 0.19	***
AZ-110	56.65 ± 0.20	*	36.58 ± 3.10	***	93.23 ± 3.29	*
AZ-111	29.12 ± 0.37	***	15.41 ± 0.11	***	44.53 ± 0.48	***
AZ-112	48.02 ± 0.70	***	32.36 ± 2.12	***	80.38 ± 1.42	
AZ-113	31.31 ± 1.03	***	13.77 ± 0.04	***	45.09 ± 0.99	***
AZ-114	18.29 ± 0.11	***	18.13 ± 1.03	***	36.42 ± 1.14	***
AZ-115	62.27 ± 0.76	***	20.72 ± 0.42	***	82.99 ± 1.18	***
AZ-129	39.52 ± 0.32	***	27.28 ± 0.80	***	66.79 ± 1.12	.

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**Table S2. Tukey's – HSD multiple comparisons for phenolics content.** Multiple comparisons was carried out for phenolics content to evaluate the significant differences. Different letters, small and capital, and also letter combinations indicate significant differences among the *C. quinoa* genotypes.

Quinoa line	Mean of total phenolics	Group
AZ-110	93.22983	a
AZ-95	87.17887	b
AZ-115	82.9905	c
AZ-96	82.88524	c
AZ-112	80.37865	cd
AZ-39	78.06033	de
AZ-94	77.48487	de
AZ-13	75.55702	ef
AZ-27	75.21342	efg
AZ-30	73.80319	fg
AZ-2	72.01177	gh
AZ-51	71.956	gh
AZ-7	71.93701	gh
AZ-91	69.73767	hi
AZ-34	69.36536	hi
AZ-56	68.2674	ij
AZ-44	67.07299	ijk
AZ-129	66.79088	ijkl
AZ-41	66.53601	ijkl
AZ-42	65.90288	jkl
AZ-5	65.74014	jkl
AZ-48	65.56392	jkl
AZ-47	65.25482	jkl
AZ-29	64.11236	klm
AZ-1	63.64191	lmn
AZ-87	63.46929	lmn
AZ-93	63.46705	lmn
AZ-53	61.85943	mno
AZ-78	61.79592	mnop
AZ-61	61.73296	mnop
AZ-6	61.7266	mnopq

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AZ-12	61.18842	mnopqr
AZ-45	61.05549	mnopqrs
AZ-46	60.80756	mnopqrs
AZ-14	60.75526	mnopqrs
AZ-38	60.60186	nopqrs
AZ-66	59.84657	opqrst
AZ-21	58.75804	opqrstu
AZ-60	58.63752	opqrstu
AZ-55	58.48027	opqrstu
AZ-26	58.42822	pqrstu
AZ-83	58.34946	qrstu
AZ-54	58.24188	rstuv
AZ-65	58.19942	rstuv
AZ-3	57.68249	stuvw
AZ-86	57.12863	tuvwx
AZ-89	56.9252	tuvwxy
AZ-37	56.65579	tuvwxy
AZ-16	56.54022	tuvwxy
AZ-52	56.47232	tuvwxy
AZ-22	56.45392	uvwxy
AZ-58	56.45309	uvwxy
AZ-57	56.39303	uvwxy
AZ-50	56.36905	uvwxy
AZ-74	56.21266	uvwxy
AZ-63	55.98056	uvwxyz
AZ-25	55.62015	uvwxyz
AZ-59	55.4715	uvwxyz
AZ-73	55.39096	uvwxyz
AZ-24	54.90791	vwxyzA
AZ-105	54.71002	wxyzAB
AZ-104	54.68513	wxyzAB
AZ-101	54.59629	wxyzAB
AZ-40	54.18043	xyzABC
AZ-9	54.09799	xyzABC
AZ-10	53.97499	xyzABC

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AZ-107	53.95687	xyzABC
AZ-4	53.9167	xyzABC
AZ-97	53.75205	xyzABC
AZ-49	53.59938	yzABCD
AZ-79	52.84664	zABCDE
AZ-108	52.7747	zABCDEF
AZ-67	52.69803	zABCDEF
AZ-76	52.62313	zABCDEFG
AZ-81	51.90877	ABCDEFG
AZ-82	51.82193	ABCDEFG
AZ-35	51.74361	ABCDEFGH
AZ-11	51.60834	ABCDEFGH
AZ-19	51.38992	BCDEFGH
AZ-70	50.94574	CDEFGHI
AZ-77	50.35749	DEFGHIJ
AZ-64	50.27197	DEFGHIJ
AZ-32	49.88606	EFGHIJ
AZ-8	49.76812	EFGHIJ
AZ-33	49.41797	FGHIJ
AZ-36	49.17809	GHIJ
AZ-98	49.11803	GHIJ
AZ-68	48.99999	GHIJ
AZ-20	48.40739	HIJK
AZ-62	47.91763	IJKL
AZ-43	47.12669	JKLM
AZ-15	47.09704	JKLM
AZ-88	45.46851	KLMN
AZ-71	45.46205	KLMN
AZ-23	45.11911	KLMN
AZ-113	45.08812	KLMN
AZ-103	44.92076	LMN
AZ-111	44.53161	MN
AZ-84	43.88982	MNO
AZ-31	43.6996	NO
AZ-80	43.63056	NO

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AZ-99	43.5028	NO
AZ-85	43.23764	NO
AZ-102	43.03049	NO
AZ-69	42.23851	NO
AZ-17	40.95686	O
AZ-72	40.86676	O
AZ-114	36.42125	P
AZ-18	35.51339	P

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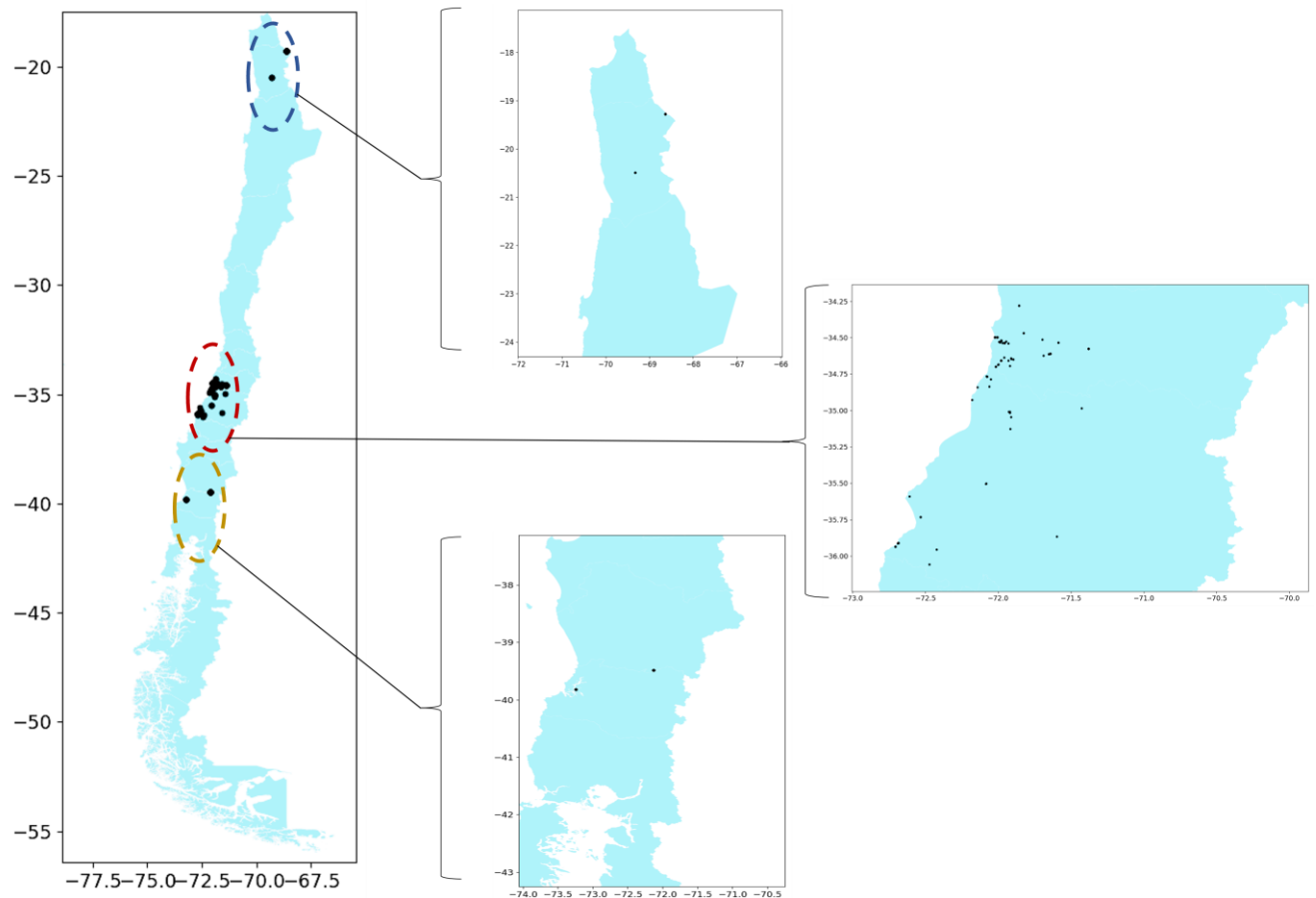


**Table S3. Loading factors of variables in PCs in PCA.** Principal component analysis (PCA) was carried out by considering both free and bound phenolics. The factor loadings on each component of the PCA show the contribution of variables to total phenolics variation among the studied population.

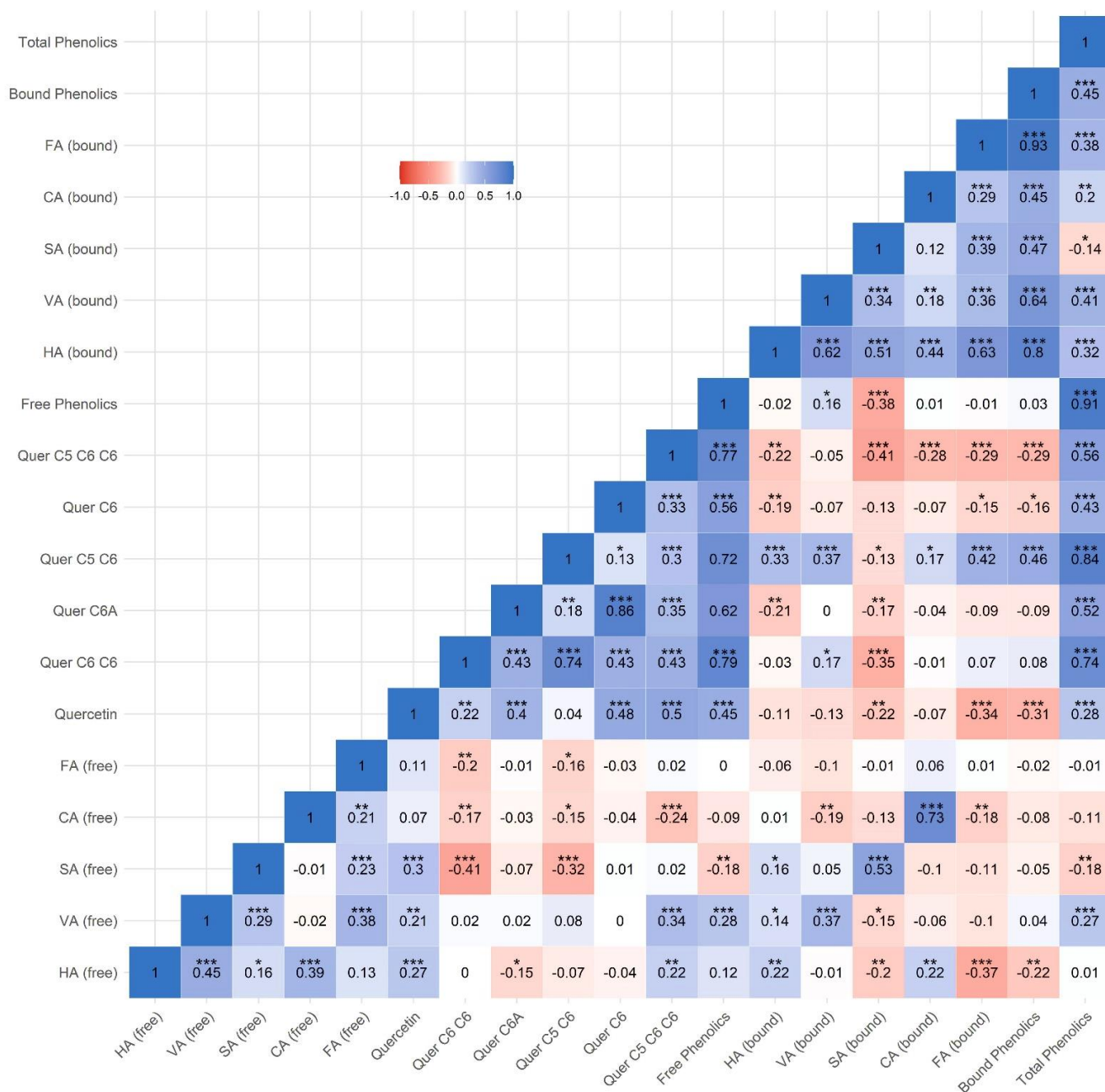
	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18	PC19
<b>HA (free)</b>	-0.03	0.10	-0.47	-0.18	-0.23	0.32	0.06	-0.41	0.40	-0.14	0.05	0.00	0.11	0.14	0.04	-0.45	0.01	0.02	0.01
<b>VA (free)</b>	-0.11	0.01	-0.43	0.20	-0.32	-0.24	0.36	0.01	-0.13	-0.05	-0.47	-0.17	-0.39	0.08	-0.08	0.18	0.02	0.05	0.02
<b>SA (free)</b>	0.11	0.02	-0.36	0.43	0.21	0.14	-0.26	0.30	0.08	-0.08	-0.38	0.05	0.51	-0.15	-0.08	0.00	0.00	0.00	0.00
<b>CA (free)</b>	0.07	0.03	-0.32	-0.53	0.24	-0.01	0.01	0.27	-0.06	-0.06	-0.11	0.17	0.00	0.16	0.58	0.24	0.04	0.09	0.03
<b>FA (free)</b>	0.04	0.05	-0.33	0.05	0.04	-0.76	-0.14	0.00	0.30	0.19	0.38	0.04	0.07	-0.07	-0.05	-0.01	0.02	0.04	0.01
<b>Quercetin</b>	-0.21	0.20	-0.26	0.13	0.21	0.19	-0.30	-0.17	-0.38	0.64	0.06	-0.07	-0.18	0.15	0.05	-0.10	0.00	0.01	0.00
<b>Quer-C6-C6</b>	-0.38	-0.02	0.16	-0.12	-0.09	0.08	-0.02	0.14	0.44	0.29	-0.09	-0.56	0.23	0.14	0.05	0.28	0.07	0.14	0.04
<b>Quer-C6-A</b>	-0.30	0.11	0.06	0.06	0.46	-0.10	0.33	-0.10	-0.05	-0.17	0.02	0.20	0.19	0.53	-0.29	-0.02	0.11	0.25	0.08
<b>Quer-C5-C6</b>	-0.33	-0.23	0.09	-0.10	-0.17	0.03	-0.22	0.23	0.21	0.16	-0.21	0.53	-0.24	-0.13	-0.14	-0.20	0.16	0.36	0.11
<b>Quer-C6</b>	-0.28	0.14	0.02	0.09	0.48	0.02	0.26	-0.26	0.20	-0.04	-0.09	-0.04	-0.18	-0.63	0.22	-0.02	0.01	0.02	0.01
<b>Quer-C5-C6-C6</b>	-0.31	0.19	-0.09	0.15	-0.21	0.05	-0.27	0.07	-0.29	-0.48	0.36	-0.18	0.00	-0.13	0.15	0.07	0.17	0.38	0.12
<b>Free Phenolics</b>	-0.44	0.03	-0.05	-0.02	-0.03	-0.02	-0.10	0.14	0.03	-0.15	0.04	0.11	-0.03	0.07	-0.01	0.02	-0.24	-0.27	-0.77
<b>HA (bound)</b>	-0.01	-0.41	-0.22	0.04	-0.01	0.24	-0.05	-0.37	0.05	0.02	0.20	0.24	0.03	-0.06	-0.16	0.67	0.08	-0.01	-0.03
<b>VA (bound)</b>	-0.10	-0.33	-0.12	0.19	-0.13	0.13	0.55	0.31	-0.15	0.25	0.34	0.05	0.23	-0.11	0.21	-0.20	0.22	-0.04	-0.08
<b>SA (bound)</b>	0.17	-0.27	-0.06	0.33	0.31	0.18	-0.10	0.26	0.34	-0.15	0.21	-0.18	-0.53	0.28	0.08	-0.07	0.02	0.00	-0.01
<b>CA (bound)</b>	0.00	-0.22	-0.25	-0.48	0.24	0.04	-0.02	0.19	-0.19	-0.08	0.06	-0.34	-0.06	-0.24	-0.55	-0.14	0.11	-0.02	-0.04
<b>FA (bound)</b>	-0.03	-0.42	0.12	0.03	0.08	-0.25	-0.23	-0.33	-0.13	-0.10	-0.26	-0.16	0.09	0.10	0.25	-0.19	0.54	-0.09	-0.19
<b>Bound Phenolics</b>	-0.05	-0.47	-0.01	0.02	0.06	-0.11	-0.02	-0.15	-0.15	-0.01	-0.05	-0.13	0.11	0.01	0.15	-0.15	-0.69	0.39	0.03
<b>Total Phenolics</b>	-0.41	-0.17	-0.05	-0.01	0.00	-0.07	-0.10	0.06	-0.04	-0.14	0.01	0.05	0.02	0.06	0.05	-0.05	-0.16	-0.63	0.57

**Table S4. Variance by genotypic effect.** Variance by genotypic effect (Vg) was calculated according to the restricted maximum likelihood (REML) variance components. The table shows the significant genotypic effect represented by Vg, and the existence of genetic diversity is up to 97.4% within the tested population for total phenolics content. Mu and Sigma are the mean and the standard deviation of each variable. HA: Hydroxybenzoic acid, VA: Vanillic acid, SA: Syringic acid, CA: Coumaric acid, FA: Ferulic acid, and Quer: Quercetin

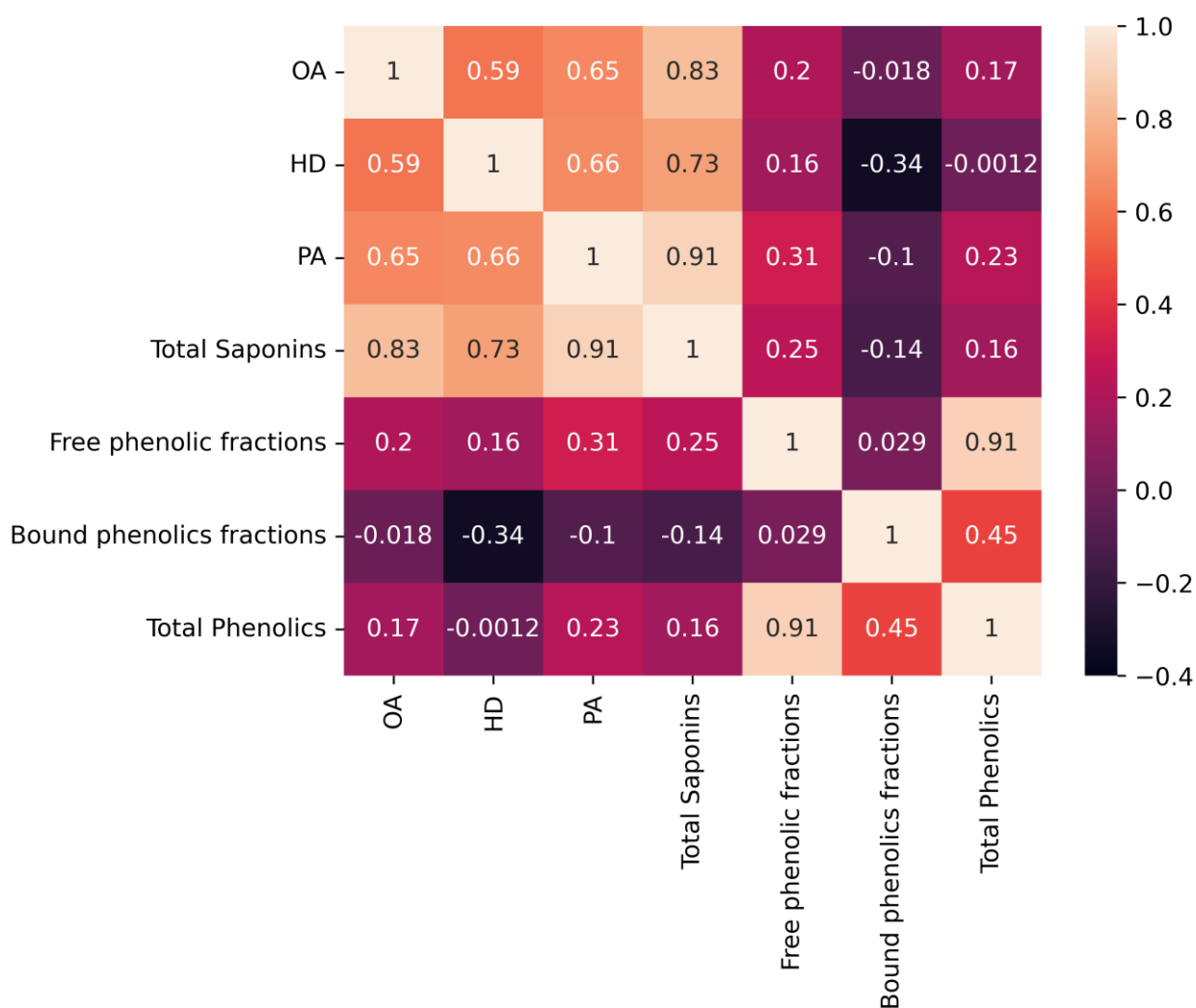
Trait	Mu	sigma	Min	Max	Vg
HA (free)	0.592388	0.198319	0.198006	1.309528	94.254
VA (free)	2.107306	0.578495	0.967155	4.044008	97.344
SA (free)	0.074047	0.039782	0	0.263093	96.911
CA (free)	0.527335	1.040418	0.00281	9.90862	99.418
FA (free)	1.181418	0.423881	0.391423	2.727963	87.724
Quercetin	0.191008	0.113442	0.002923	0.515652	97.723
Quer-C6-C6	4.099636	1.646901	0.364768	11.49459	98.805
Quer-C6-A	3.236785	2.871954	0.196384	15.18767	98.547
Quer-C5-C6	7.971638	4.145332	1.706806	22.2887	98.91
Quer-C6	0.296524	0.268049	-0.00111	1.542875	99.033
Quer-C5-C6-C6	21.27081	4.373358	7.661806	32.14863	98.58
Free Phenolics	41.5489	9.72486	18.21315	62.81175	97.964
HA (bound)	1.292423	0.46281	0.5146	2.974102	95.429
VA (bound)	3.660862	1.331271	1.046432	7.632642	96.88
SA (bound)	0.161909	0.099703	0.015221	0.554955	98.038
CA (bound)	0.818578	0.64447	0.081537	4.796541	97.765
FA (bound)	9.833673	3.264481	5.138059	25.14741	98.37
Bound Phenolics	15.76745	4.590845	8.889862	38.76759	97.238
Total Phenolics	57.31634	10.88117	34.81036	95.55831	97.45



**Figure S1.** Collection localities of *C. quinoa* germplasm. *C. quinoa* germplasm belongs to two groups of genotypes representing the large variation from different regions, coastal-lowland as well as highlands of Chile. The diversity panel included 9 genotypes (salares ecotype) originally collected in the Chilean Altiplano, and 102 genotypes originating from the Chilean central and southern regions (coastal-lowland ecotype). The blue, dark-red, and golden colors of ellipses represent the different biomes of Chile, Chilean Altiplano regions, Central coastal-lowland regions, and Southern Chile regions (Villarrica locality), respectively. The x-axis and the y-axis show latitude and longitude, respectively.



**Figure S2.** Pearson's correlation heat map of total phenolics and individual phenolic derivatives. Pearson's correlation matrix showing pairwise correlations between total phenolics and free and bound fractions of phenolics. The colored squares displays statistical significance and strength of the correlation apparent by color intensity. HA: Hydroxybenzoic acid, VA: Vanillic acid, SA: Syringic acid, CA: Coumaric acid, FA: Ferulic acid, and Quer: Quercetin. Significant differences: \*\*\*\* 0.0001 \*\*\* 0.001 \*\* 0.01 \* 0.05 . 0.1 ' 1.



**Figure S3.** Pearson's correlation between secondary metabolites in *C. quinoa*. Saponins content data were previously published (Pandya et al. 2021). Pearson's correlation matrix showing intercorrelations between phenolics and saponin derivatives in *C. quinoa*. The colored squares display a strength of the correlation apparent by the color intensity and statistical significance. OA: oleanolic acid, HD: hederagenin, PA: phytolaccagenic acid.