

Table S1 Morphologic parameters among 75 pepper germplasm resources

NO.	Species	Shape	Color	Fruit Weight (g)	Length(cm)	Diameter(cm)
S01	<i>C. annuum</i>	long finger	orange	1.42±0.31	4.16±0.51	0.88±0.07
S02	<i>C. annuum</i>	short finger	Purple black	1.74±0.43	2.74±0.24	1.45±0.32
S03	<i>C. annuum</i>	short finger	olivine	2.62±1.06	3.25±0.63	1.51±0.24
S04	<i>C. annuum</i>	short finger	olivine	1.96±0.66	2.52±0.27	1.35±0.22
S05	<i>C. annuum</i>	short horn	dark green	1.68±1.02	5.59±1.56	0.66±0.14
S06	<i>C. annuum</i>	short horn	Purple black	1.13±0.32	3.13±0.70	0.97±0.11
S07	<i>C. annuum</i>	short horn	dark green	3.38±1.00	8.26±1.02	0.88±0.09
S08	<i>C. annuum</i>	short horn	dark green	2.06±0.23	6.01±0.31	0.91±0.07
S09	<i>C. annuum</i>	long finger	orange	3.60±0.52	5.39±0.42	1.17±0.07
S10	<i>C. annuum</i>	short horn	dark green	2.38±0.53	6.04±0.58	0.80±0.11
S11	<i>C. annuum</i>	short horn	dark green	1.83±0.61	5.71±1.08	0.70±0.09
S12	<i>C. annuum</i>	short horn	dark green	2.33±0.62	6.48±0.75	0.80±0.15
S13	<i>C. annuum</i>	short horn	dark green	1.82±0.66	5.42±0.53	0.89±0.10
S14	<i>C. annuum</i>	short horn	dark green	1.69±0.63	5.34±0.76	0.80±0.14
S15	<i>C. annuum</i>	short horn	dark green	1.16±0.51	4.63±0.92	0.59±0.12
S16	<i>C. annuum</i>	short horn	dark green	1.14±0.35	4.07±0.62	0.69±0.08
S17	<i>C. annuum</i>	short horn	dark green	2.92±2.30	6.44±1.58	0.75±0.15
S18	<i>C. annuum</i>	short horn	olivine	0.71±0.16	3.32±0.40	0.60±0.10
S19	<i>C. frutescens</i>	long finger	olivine	2.76±0.39	4.32±1.13	4.32±1.13
S20	<i>C. frutescens</i>	long finger	olivine	3.08±0.58	5.12±0.47	1.44±0.18
S21	<i>C. annuum</i>	short horn	dark green	1.16±1.07	3.90±0.78	0.76±0.28
S22	<i>C. chinese</i>	lantern	orange	6.82±1.28	2.67±0.24	3.40±0.28
S23	<i>C. chinese</i>	long cone	red	7.38±1.22	6.48±0.84	2.44±0.28
S24	<i>C. chinese</i>	long cone	red	7.67±1.87	5.79±0.50	2.95±0.39
S25	<i>C. annuum</i>	lantern	olivine	19.48±8.79	2.74±0.31	3.95±0.67
S26	<i>C. chinese</i>	long cone	orange	6.12±2.00	5.13±0.89	2.19±0.20
S27	<i>C. annuum</i>	short horn	dark green	1.06±0.45	4.09±0.97	0.60±0.10
S28	<i>C. annuum</i>	short horn	dark green	2.42±1.00	6.26±1.26	0.83±0.12
S29	<i>C. annuum</i>	short horn	dark green	2.24±0.81	5.71±1.42	0.83±0.11
S30	<i>C. annuum</i>	short horn	dark green	2.73±0.63	6.64±0.64	0.87±0.08
S31	<i>C. annuum</i>	lantern	olivine	4.38±1.12	2.76±0.45	2.32±0.27
S32	<i>C. annuum</i>	short horn	olivine	0.64±0.17	3.12±0.74	0.62±0.10
S33	<i>C. annuum</i>	short horn	dark green	2.07±0.60	5.45±0.61	0.80±0.08
S34	<i>C. annuum</i>	short horn	dark green	1.12±0.49	3.83±0.64	0.83±0.35
S35	<i>C. annuum</i>	short horn	dark green	1.44±0.34	4.71±0.51	0.66±0.11
S36	<i>C. annuum</i>	short horn	dark green	1.20±0.35	4.22±0.71	0.79±0.07
S37	<i>C. annuum</i>	short horn	dark green	0.74±0.22	3.01±0.45	0.56±0.06
S38	<i>C. annuum</i>	short horn	dark green	0.90±0.23	3.82±0.53	0.59±0.10
S39	<i>C. annuum</i>	short horn	dark green	1.18±0.30	4.92±1.20	0.61±0.09
S40	<i>C. annuum</i>	short horn	dark green	1.24±0.36	4.32±0.64	0.64±0.09

S41	<i>C. annuum</i>	short horn	dark green	1.05±0.33	4.55±0.64	0.57±0.07
S42	<i>C. annuum</i>	short horn	dark green	0.92±0.33	4.26±0.80	0.60±0.11
S43	<i>C. annuum</i>	short horn	dark green	0.71±0.38	3.10±0.96	0.52±0.13
S44	<i>C. annuum</i>	elongated	red	4.57±0.81	8.34±1.02	1.01±0.11
S45	<i>C. annuum</i>	short horn	dark green	1.36±0.35	5.10±0.52	0.64±0.11
S46	<i>C. annuum</i>	lantern	orange	34.13±6.72	7.12±1.12	4.35±0.59
S47	<i>C. annuum</i>	short horn	dark green	1.80±0.47	5.91±0.62	0.69±0.09
S48	<i>C. annuum</i>	short horn	dark green	1.24±0.37	4.31±0.67	0.76±0.08
S49	<i>C. annuum</i>	short horn	dark green	1.70±0.56	5.48±1.14	0.71±0.12
S50	<i>C. annuum</i>	lantern	dark green	4.84±1.68	1.58±0.21	2.20±0.27
S51	<i>C. annuum</i>	short horn	dark green	1.88±0.46	5.67±0.46	0.71±0.10
S52	<i>C. annuum</i>	short horn	dark green	2.23±0.39	5.98±0.54	0.77±0.12
S53	<i>C. annuum</i>	short horn	dark green	0.98±0.34	4.39±1.05	0.56±0.08
S54	<i>C. annuum</i>	short horn	olivine	1.83±0.74	5.07±0.93	0.82±0.15
S55	<i>C. annuum</i>	short horn	dark green	3.18±1.22	7.41±1.79	0.85±0.11
S56	<i>C. annuum</i>	short horn	dark green	1.55±0.37	4.95±0.81	0.71±0.07
S57	<i>C. annuum</i>	short horn	dark green	1.69±0.35	5.24±0.50	0.94±0.31
S58	<i>C. baccatum</i>	short finger	olivine	1.27±0.56	3.40±0.67	0.87±0.19
S59	<i>C. annuum</i>	elongated	brown	11.71±3.13	15.37±3.01	1.29±0.16
S60	<i>C. annuum</i>	short horn	dark green	2.15±0.16	6.64±0.38	0.76±0.06
S61	<i>C. frutescens</i>	short horn	olivine	1.13±0.58	3.32±1.04	0.78±0.16
S62	<i>C. annuum</i>	short horn	dark green	1.10±0.41	4.22±0.74	0.63±0.10
S63	<i>C. annuum</i>	short horn	dark green	2.33±0.33	6.31±0.67	0.78±0.04
S64	<i>C. annuum</i>	short horn	dark green	0.94±0.54	3.92±0.88	0.70±0.28
S65	<i>C. annuum</i>	short horn	dark green	2.08±0.50	5.56±1.19	0.74±0.11
S66	<i>C. annuum</i>	short horn	dark green	0.79±0.25	2.86±0.68	0.61±0.14
S67	<i>C. annuum</i>	elongated	red	2.74±0.43	8.66±0.79	0.74±0.08
S68	<i>C. annuum</i>	long finger	orange	2.54±0.73	4.88±0.57	1.10±0.10
S69	<i>C. annuum</i>	short horn	Purple black	1.56±0.23	6.04±0.66	0.76±0.07
S70	<i>C. annuum</i>	short horn	Purple black	1.31±0.22	3.75±0.31	0.90±0.05
S71	<i>C. annuum</i>	long horn	Purple black	7.69±4.16	11.23±2.34	1.45±0.27
S72	<i>C. annuum</i>	short horn	dark green	2.01±0.56	6.04±0.67	0.74±0.10
S73	<i>C. annuum</i>	short horn	olivine	0.77±0.17	3.11±0.23	0.64±0.07
S74	<i>C. annuum</i>	short horn	dark green	1.70±0.54	5.17±1.02	0.88±0.08
S75	<i>C. annuum</i>	short horn	red	1.25±0.17	3.98±0.14	0.90±0.08

Table S2. Variation of 75 pepper germplasm resources

	N	Mean	Standard deviation	Extreme difference	Minimum	Maximum	Coefficient Variation/%
Fruit_Weight	75	2.988	4.579	33.490	0.640	34.130	153.212
Length	75	5.072	2.024	13.790	1.580	15.370	39.895
Diameter	75	1.094	0.840	3.830	0.520	4.350	76.729
Capsanthin	75	17.210	31.384	170.920	0.000	170.920	182.363
Zeaxanthin	75	36.848	23.860	116.220	2.690	118.910	64.752
BetaCarotene	75	1365.352	1613.410	11158.940	0.000	11158.940	118.168
Delphinidin	75	228.383	332.661	2370.100	0.000	2370.100	145.659
Ascorbic_acid	75	399.764	347.795	1513.840	3.480	1517.320	87.000
Nordihydrocapsaicin	75	0.372	0.289	1.830	0.000	1.830	77.502
Capsaicin	75	1.882	3.374	22.960	0.000	22.960	179.246
Dihydrocapsaicin	75	1.204	1.826	13.860	0.000	13.860	151.683
Total_phenolics	75	3.778	1.293	10.240	1.890	12.130	34.219
Total_soluble_sugars	75	27.572	13.991	56.950	5.450	62.400	50.742
Total_soluble_solids	75	0.739	0.206	1.090	0.250	1.340	27.810
Titratable_acidity	75	0.309	0.087	0.490	0.140	0.630	28.265
Total_soluble_protein	75	4.201	2.565	10.210	0.410	10.620	61.057

Table S3. Morphologic parameters and chemical parameters among three *Capsicum* species

Species	N	Fruit Weight (g)	Length (cm)	Diameter (cm)	Total phenolics (mg/g)	Total soluble sugars (mg/g)	Total soluble solids (°Brix)
<i>C. annuum</i>	67	2.80±4.73ab	5.14±2.09a	0.95±0.65b	3.74±0.83b	27.93±14.32a	0.75±0.20a
<i>C. frutescens</i>	3	2.32±1.05b	4.25±0.90a	2.18±1.88a	2.98±0.99b	13.36±4.07b	0.44±0.07b
<i>C. chinese</i>	4	7.00±0.68a	5.02±1.66a	2.75±0.53a	5.19±4.62a	33.15±6.92a	0.71±0.08a
Species	N	Titratable acidity (%)	Total soluble protein (mg/g)	Capsanthin (μg/g)	Zeaxanthin (μg/g)	β-Carotene (μg/g)	
<i>C. annuum</i>	67	0.31±0.08a	4.47±2.55a	18.09±32.72a	40.41±22.69a	1328.45±1539.25a	
<i>C. frutescens</i>	3	0.31±0.09a	2.63±1.62ab	0.74±1.28a	4.95±1.64b	95.97±90.68a	
<i>C. chinese</i>	4	0.26±0.03a	1.45±0.90b	19.01±19.23a	8.70±6.47b	3220.19±2327.65a	
Species	N	Delphinidin (μg/g)	Nordihydrocapsaicin (mg/g)	Capsaicin (mg/g)	Dihydrocapsaicin (mg/g)	ascorbic acid (μg/g)	
<i>C. annuum</i>	67	255.65±342.05a	0.35±0.23b	1.20±0.85b	0.86±0.49b	407.81±349.92a	
<i>C. frutescens</i>	3	0.00b	0.35±0.26b	1.98±1.41b	1.27±0.93b	95.33±158.07a	
<i>C. chinese</i>	4	0.00b	0.75±0.75a	13.50±8.50a	7.07±5.25a	525.67±390.32a	

Values are mean ± SD ; Values with the same lowercase letter within each column are not significantly (p<0.05) different.

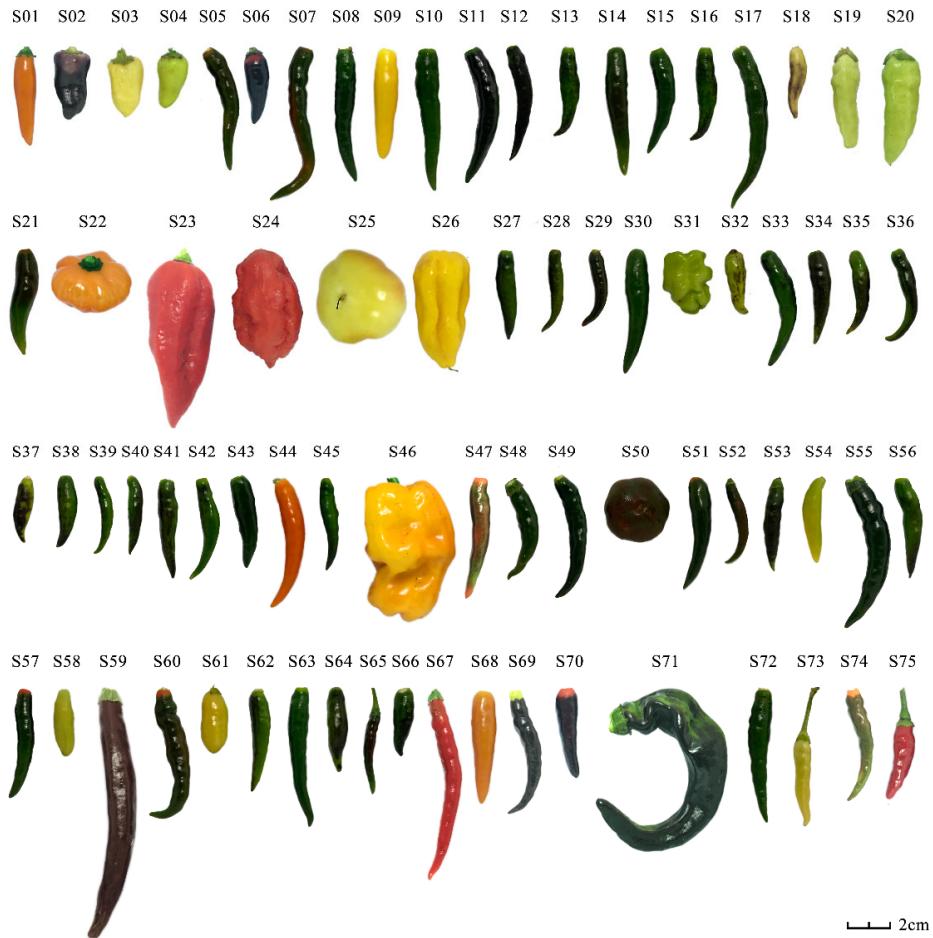


Figure S1. The investigated 75 peppers germplasm samples. 54 (S01, *C. annuum*), 117 (S02, *C. annuum*), 293(S03, *C. annuum*), 355 (S04 *C. annuum*), 358 (S05, *C. annuum*), 362F1 (S06, *C. annuum*), A298 (S07, *C. annuum*), ASK96 (S08, *C. annuum*), C95 (S09, *C. annuum*), CTJ117 (S10, *C. annuum*), CTJ153 (S11, *C. annuum*), CTJ1831 (S12, *C. annuum*), CTJ1945 (S13, *C. annuum*), CTJ1946 (S14, *C. annuum*), CTJ1947 (S15, *C. annuum*), CTJ23 (S16, *C. annuum*), CTJ5 (S17, *C. annuum*), CTJ84 (S18, *C. annuum*), M103 (S19, *C. frutescens*) M241 (S20, *C. frutescens*), P01825 (S21, *C. annuum*), W155 (S22, *C. chinense*), W209 (S23, *C. chinense*), W22 (S24, *C. chinense*), W334 (S25, *C. annuum*), W54 (S26, *C. chinense*), X1 (S27, *C. annuum*), X10 (S28, *C. annuum*), X11 (S29, *C. annuum*), X12 (S30, *C. annuum*), X13 (S31, *C. annuum*), X2 (S32, *C. annuum*), X3 (S33, *C. annuum*), X4 (S34, *C. annuum*), X5 (S35, *C. annuum*), X6 (S36, *C. annuum*), X7 (S37, *C. annuum*), X8 (S38, *C. annuum*), X9 (S39, *C. annuum*), XH005 (S40, *C. annuum*), XH012 (S41, *C. annuum*), XH176 (S42, *C. annuum*), XZ (S43, *C. annuum*), Dazhong885 (S44, *C. annuum*), Dianjian1 (S45, *C. annuum*), Dianzhou 3 (S46, *C. annuum*), Fengshun5 (S47, *C. annuum*), Fengshun8 (S48, *C. annuum*), Guila408 (S49, *C. annuum*), Hongbaoshi (S50, *C. annuum*), Hongyin102 (S51, *C. annuum*), Huayi20-03 (S52, *C. annuum*), Huayi20-04 (S53, *C. annuum*), Jinjiao39 (S54, *C. annuum*), Jinwangchaotianjiao13 (S55, *C. annuum*), Jinwangchaotianjiao 1 (S56, *C. annuum*), Jinwangchaotianjiao 3 (S57, *C. annuum*), Jingcui (S58, *C. baccatum*), Coffee Pepper (S59, *C. annuum*), Leqi335 (S60, *C. annuum*), Leqicuixiangla (S61, *C. frutescens*), Lieyan999 (S62, *C. annuum*), Shenyingyanli (S63, *C. annuum*), Taihong668 (S64, *C. annuum*), Taihuola (S65, *C. annuum*), Wannongxiaoguo1 (S66, *C. annuum*), Wenganjiao (S67, *C. annuum*), Wenjin 1 (S68, *C. annuum*), Wenzijiao3 (S69, *C. annuum*), Wenzijiao6 (S70, *C. annuum*), Wenzixian3 (S71, *C. annuum*), Qianshouyinghong (S72, *C. annuum*), Xingmei (S73, *C. annuum*), Xiuhong (S74, *C. annuum*), Purple pepper (S75, *C. annuum*).

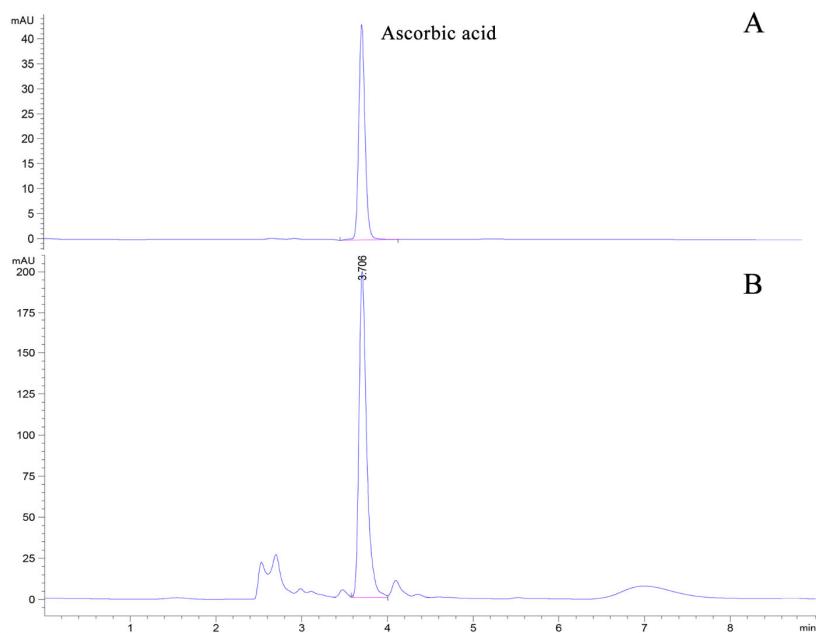


Figure S2. HPLC chromatogram of ascorbic acid of standard (A) and sample S28 (*C. annuum*) (B).

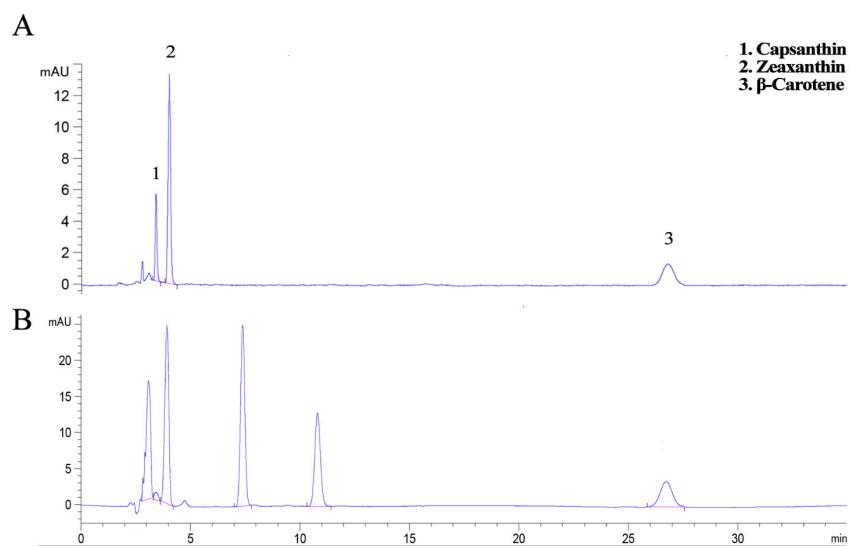


Figure S3. HPLC chromatogram of capsanthin, zeaxanthin and β -carotene of standard (A) and sample S40 (*C. annuum*) (B).

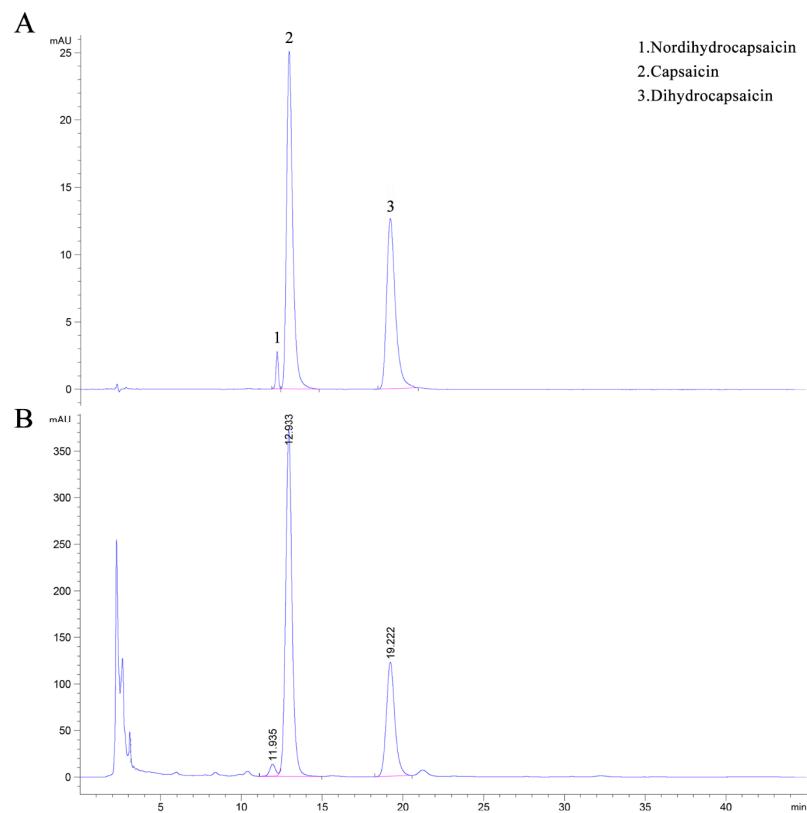


Figure S4. HPLC chromatogram of nordihydrocapsaicin, capsaicin and dihydrocapsaicin of standard (A) and sample S24 (*C. chinense*) (B).

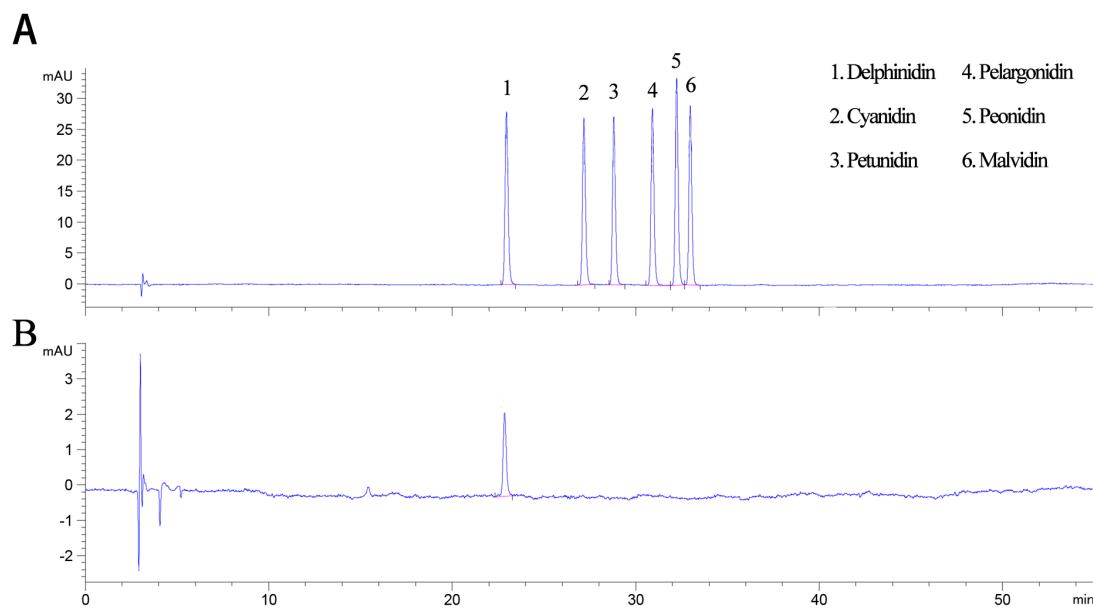


Figure S5. HPLC chromatogram of anthocyanidins of standard (A) and sample S34 (*C. annuum*) (B).

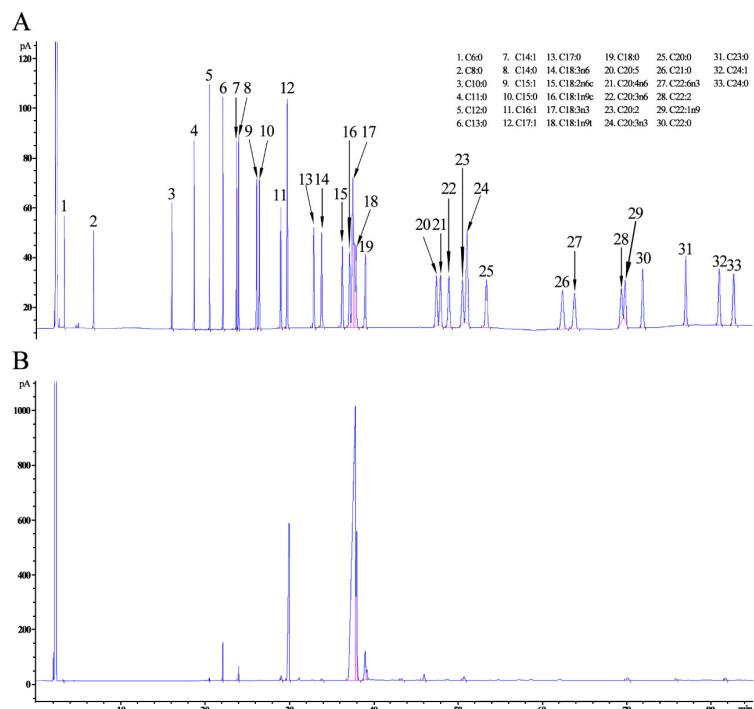


Figure S6. HPLC chromatogram of fatty acid methyl ester of standard (A) and sample S09 (*C. annuum*) (B).

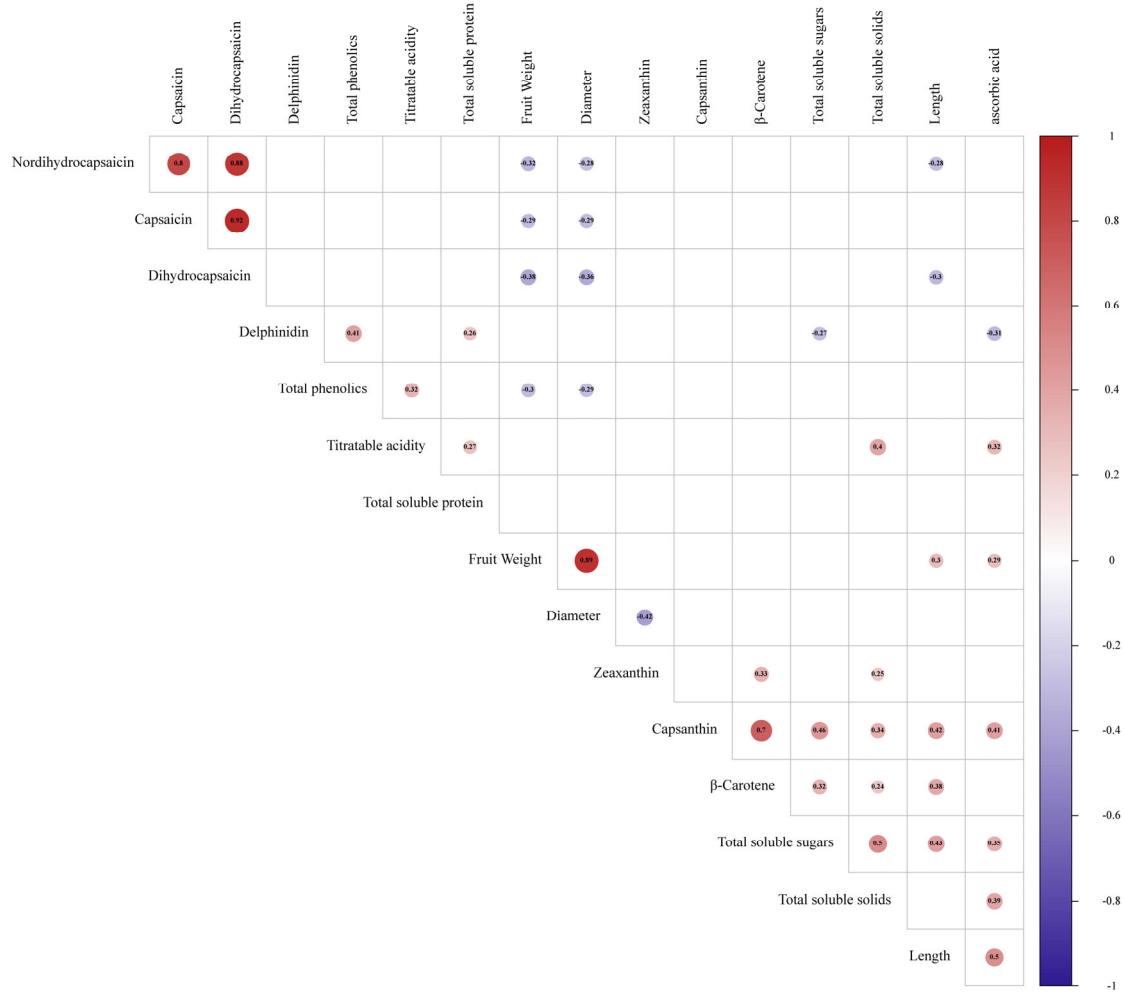


Figure S7. Correlation heat map of quality-related indicators in the *C. annuum* (67 accessions). Blue means negative correlation, red means positive correlation. The depth of the color represents the level of correlation (the higher the correlation, the darker the color). The size of the circle also indicates the level of the correlation coefficient, and the higher the correlation coefficient, the larger the circle. If P value is greater than 0.05, there is no circle display.