

Supplementary data

Supplementary Table S1: Average fruit physico-chemical characteristics at different maturity stages in the 6 evaluated sweet cherry varieties.

Variety	Location	Sampling Date	DIAM (mm)	TA (g/l)	TSS(Brix)	ipH	5 Berry Weight (g)	DM (%)	FWS (KgF)
Banni	Arsal	5/7/2021	20.85	9.3	14.9	3.4	27.92	17.63	1.07
Banni	Kaa El Reem (High)	21/6/2021	26.33	9.6	16.6	3.28	43.46	15.25	1.12
Feraouni	Arsal	24/6/2021	19.85	12.4	17.45	3.16	30.48	16.97	1.66
Feraouni	Arsal	5/7/2021	20.26	11.32	17.7	3.2	30.26	19.79	1.15
Feraouni	Barqa	28/6/2021	27.63	11.79	18.66	3.17	52.86	16.16	1.24
Feraouni	Kaa El Reem (High)	7/6/2021	23.41	11.19	13.2	3.18	33.89	17.48	1.63
Feraouni	Kaa El Reem (High)	10/6/2021	23.89	11.2	13.68	3.19	37.08	17.84	1.33
Feraouni	Kaa El Reem (High)	17/6/2021	26.54	10.8	16.9	3.22	46.17	20.99	1.08
Feraouni	Kaa El Reem (High)	21/6/2021	25.05	9.66	16.08	3.27	40.13	20	0.95
Feraouni	Kaa El Reem (High)	28/6/2021	25.56	9.97	20.79	3.37	46.09	18.98	0.88
Feraouni	Kaa El Reem (Low)	31/5/2021	23.36	12.66	16.97	3.19	35.15	20.93	1.22
Feraouni	Qousaya	31/5/2021	21.01	13.53	18.2	2.96	25.27	24.24	1.45
Feraouni	Qousaya	3/6/2021	21.16	12.37	18.05	2.92	27.03	25.33	1.53
Irani	Barqa	17/6/2021	25.83	9.3	15.98	3.32	41.64	18.62	1.27
Irani	Barqa	21/6/2021	25.96	9.75	18.67	3.18	51.31	18	1.07
Irani	Barqa	28/6/2021	27.63	9.33	20.45	3.34	49.12	18.34	0.84
Irani	Kaa El Reem (High)	10/6/2021	27.24	13.35	19.65	3.22	45.65	23.14	1.26
Irani	Kaa El Reem (High)	14/6/2021	26.2	11.47	19.23	3.42	43.42	24.99	1.3
Irani	Kaa El Reem (High)	28/6/2021	28.03	9.82	23.75	3.31	49.79	23.8	0.82
Irani	Kaa El Reem (Low)	31/5/2021	22.58	9.71	13.65	3.24	27.94	19.03	1.13
Irani	Kaa El Reem (Low)	3/6/2021	22.54	10.4	14.12	3.32	27.69	19.03	1.11
Irani	Kaa El Reem (Low)	7/6/2021	22.24	9.95	15.41	3.38	27.61	20.19	0.87
Irani	Qousaya	31/5/2021	20.26	13.42	17.5	3.05	23.53	21.16	1.58
Irani	Qousaya	3/6/2021	21.24	11.31	16.85	3	25.28	21.79	1.47
Mkahhal	Arsal	5/7/2021	20.71	6.56	14.2	3.4	28.31	15.49	1.17
Mkahhal	Kaa El Reem (High)	10/6/2021	19.17	8.92	12.95	3.36	23.09	15.09	1.63
Mkahhal	Kaa El Reem (High)	17/6/2021	23.48	7.35	12.1	3.35	32.53	16.19	1.09
Mkahhal	Kaa El Reem (High)	21/6/2021	23.07	8.32	14.69	3.21	33.69	16.5	1.02
Mkahhal	Kaa El Reem (High)	28/6/2021	24.8	6.6	17.32	3.4	42	16.54	0.93
Mkahhal	Kaa El Reem (Low)	3/6/2021	22.72	8.02	13.64	3.19	37.53	18.46	1.54
Mkahhal	Kaa El Reem (Low)	7/6/2021	24.5	7.9	13.96	3.33	39.51	19.87	1.32
Mkahhal	Kaa El Reem (Low)	10/6/2021	24.8	9	15.7	3.34	43.64	19.63	1.42
Mkahhal	Qousaya	3/6/2021	20.53	10.01	13.63	3.35	26.07	17.91	1.87
Mkahhal	Qousaya	7/6/2021	21.97	9.25	15.07	3.32	28.34	19.19	1.5
Skeena	Kaa El Reem (High)	21/6/2021	26.45	9.57	17.17	3.1	46.06	17	1.27
Skeena	Kaa El Reem (High)	24/6/2021	26.12	9.27	16.53	3.24	54.01	18.43	1.18

Skeena	Kaa El Reem (High)	28/6/2021	27.12	9.67	20.05	3.16	49.08	18.89	1.15
Teliani	Arsal	10/6/2021	23.29	8.4	17.05	3.64	34.88	19.26	1.07
Teliani	Barqa	31/5/2021	23.3	6.9	11.44	3.47	30.98	15.7	0.83
Teliani	Barqa	3/6/2021	24.11	6.86	12.63	3.38	35.08	17.35	0.84

Supplementary Table S2: Harvested cherry varieties with their corresponding dates and locations.

Variety	Location		Date of Harvest
Banni (BA)	Arsal	AR	05-Jul-2021
	Kaa El Reem (high altitude)	KR_H	21-Jun-2021
Feraouni (FE)	Arsal	AR	24-Jun-2021
	Barqa	BA	05-Jul-2021
			28-Jun-2021
	Kaa El Reem (high altitude)	KR_H	07-Jun-2021
			10-Jun-2021
			17-Jun-2021
			21-Jun-2021
			28-Jun-2021
	Kaa El Reem (low altitude)	KR_L	31-May-2021
	Qoussaya	QO	31-May-2021
			03-Jun-2021
Irani (IR)	Barqa	BA	17-Jun-2021
			21-Jun-2021
			28-Jun-2021
	Kaa El Reem (high altitude)	KR_H	10-Jun-2021
			14-Jun-2021
			28-Jun-2021
	Kaa El Reem (low altitude)	KR_L	31-May-2021
			03-Jun-2021
			07-Jun-2021
	Qoussaya	QO	31-May-2021
			03-Jun-2021
Mkahal (Mk)	Arsal	AR	05-Jul-2021
	Kaa El Reem (high altitude)	KR_H	10-Jun-2021
			17-Jun-2021
			21-Jun-2021
			28-Jun-2021
	Kaa El Reem (low altitude)	KR_L	03-Jun-2021
			07-Jun-2021
			10-Jun-2021
	Qoussaya	QO	03-Jun-2021

		07-Jun-2021
Skeena (Sk)	Kaa El Reem (high altitude)	21-Jun-2021
		24-Jun-2021
		28-Jun-2021
		10-Jun-2021
Teliani (TE)	Arsal	AR
	Barqa	BA
		03-Jun-2021

Supplementary Table S3: Description of harvested varieties, location, altitudes and maturity stages of samples

Variety	Location	Longitude	Latitude	Altitude (m)	Sampling Date	DIAM (mm)	TA (g/l)	TSS(Brix)	ipH	S Berry Weight (g)	DM (%)	FWS (KgF)
Banni	Arsal	34.095397	36.409924	2080	5/7/2021	20.85	9.3	14.9	3.4	27.92	17.63	1.07
Banni	Kaa El Reem (High)	33.888591	35.872562	1600	21/6/2021	26.33	9.6	16.6	3.28	43.46	15.25	1.12
Feraouni	Arsal	34.095397	36.409924	2080	24/6/2021	19.85	12.4	17.45	3.16	30.48	16.97	1.66
Feraouni	Arsal	34.095397	36.409924	2080	5/7/2021	20.26	11.32	17.7	3.2	30.26	19.79	1.15
Feraouni	Barqa	34.215077	36.132286	1930	28/6/2021	27.63	11.79	18.66	3.17	52.86	16.16	1.24
Feraouni	Kaa El Reem (High)	33.888591	35.872562	1600	7/6/2021	23.41	11.19	13.2	3.18	33.89	17.48	1.63
Feraouni	Kaa El Reem (High)	33.888591	35.872562	1600	10/6/2021	23.89	11.2	13.68	3.19	37.08	17.84	1.33
Feraouni	Kaa El Reem (High)	33.888591	35.872562	1600	17/6/2021	26.54	10.8	16.9	3.22	46.17	20.99	1.08
Feraouni	Kaa El Reem (High)	33.888591	35.872562	1600	21/6/2021	25.05	9.66	16.08	3.27	40.13	20	0.95
Feraouni	Kaa El Reem (High)	33.888591	35.872562	1600	28/6/2021	25.56	9.97	20.79	3.37	46.09	18.98	0.88
Feraouni	Kaa El Reem (Low)	33.888591	35.872562	1280	31/5/2021	23.36	12.66	16.97	3.19	35.15	20.93	1.22
Feraouni	Qousaya	33.807742	36.02482	1130	31/5/2021	21.01	13.53	18.2	2.96	25.27	24.24	1.45
Feraouni	Qousaya	33.807742	36.02482	1130	3/6/2021	21.16	12.37	18.05	2.92	27.03	25.33	1.53
Irani	Barqa	34.215077	36.132286	1930	17/6/2021	25.83	9.3	15.98	3.32	41.64	18.62	1.27
Irani	Barqa	34.215077	36.132286	1930	21/6/2021	25.96	9.75	18.67	3.18	51.31	18	1.07
Irani	Barqa	34.215077	36.132286	1930	28/6/2021	27.63	9.33	20.45	3.34	49.12	18.34	0.84
Irani	Kaa El Reem (High)	33.888591	35.872562	1600	10/6/2021	27.24	13.35	19.65	3.22	45.65	23.14	1.26
Irani	Kaa El Reem (High)	33.888591	35.872562	1600	14/6/2021	26.2	11.47	19.23	3.42	43.42	24.99	1.3
Irani	Kaa El Reem (High)	33.888591	35.872562	1600	28/6/2021	28.03	9.82	23.75	3.31	49.79	23.8	0.82
Irani	Kaa El Reem (Low)	33.888591	35.872562	1280	31/5/2021	22.58	9.71	13.65	3.24	27.94	19.03	1.13
Irani	Kaa El Reem (Low)	33.888591	35.872562	1280	3/6/2021	22.54	10.4	14.12	3.32	27.69	19.03	1.11
Irani	Kaa El Reem (Low)	33.888591	35.872562	1280	7/6/2021	22.24	9.95	15.41	3.38	27.61	20.19	0.87
Irani	Qousaya	33.807742	36.02482	1130	31/5/2021	20.26	13.42	17.5	3.05	23.53	21.16	1.58
Irani	Qousaya	33.807742	36.02482	1130	3/6/2021	21.24	11.31	16.85	3	25.28	21.79	1.47
Mkahhal	Arsal	34.095397	36.409924	2080	5/7/2021	20.71	6.56	14.2	3.4	28.31	15.49	1.17
Mkahhal	Kaa El Reem (High)	33.888591	35.872562	1600	10/6/2021	19.17	8.92	12.95	3.36	23.09	15.09	1.63
Mkahhal	Kaa El Reem (High)	33.888591	35.872562	1600	17/6/2021	23.48	7.35	12.1	3.35	32.53	16.19	1.09
Mkahhal	Kaa El Reem (High)	33.888591	35.872562	1600	21/6/2021	23.07	8.32	14.69	3.21	33.69	16.5	1.02
Mkahhal	Kaa El Reem (High)	33.888591	35.872562	1600	28/6/2021	24.8	6.6	17.32	3.4	42	16.54	0.93
Mkahhal	Kaa El Reem (Low)	33.888591	35.872562	1280	3/6/2021	22.72	8.02	13.64	3.19	37.53	18.46	1.54
Mkahhal	Kaa El Reem (Low)	33.888591	35.872562	1280	7/6/2021	24.5	7.9	13.96	3.33	39.51	19.87	1.32
Mkahhal	Kaa El Reem (Low)	33.888591	35.872562	1280	10/6/2021	24.8	9	15.7	3.34	43.64	19.63	1.42
Mkahhal	Qousaya	33.807742	36.02482	1130	3/6/2021	20.53	10.01	13.63	3.35	26.07	17.91	1.87
Mkahhal	Qousaya	33.807742	36.02482	1130	7/6/2021	21.97	9.25	15.07	3.32	28.34	19.19	1.5
Skeena	Kaa El Reem (High)	33.888591	35.872562	1600	21/6/2021	26.45	9.57	17.17	3.1	46.06	17	1.27
Skeena	Kaa El Reem (High)	33.888591	35.872562	1600	24/6/2021	26.12	9.27	16.53	3.24	54.01	18.43	1.18
Skeena	Kaa El Reem (High)	33.888591	35.872562	1600	28/6/2021	27.12	9.67	20.05	3.16	49.08	18.89	1.15
Teliani	Arsal	34.095397	36.409924	2080	10/6/2021	23.29	8.4	17.05	3.64	34.88	19.26	1.07
Teliani	Barqa	34.215077	36.132286	1930	31/5/2021	23.3	6.9	11.44	3.47	30.98	15.7	0.83
Teliani	Barqa	34.215077	36.132286	1930	3/6/2021	24.11	6.86	12.63	3.38	35.08	17.35	0.84

Supplementary Table S4: List of primers used for quantitative real-time PCR

Accession No.	Gene Name	Gene abbreviation	Primer name	Sequences 5'-3'
XM_021970433.1	Auxin response factor 8	ARF8	Pa-ARF8-F	TTGGGTGGTTTCTCTCTGG
			Pa-ARF8-R	CTAGCCTCTGCGCTCTCTGT
XM_021966615.1	Auxin-responsive protein	IAA 29	Pa-IAA29-F	GGTGGGAATTGTGAGGAAGA
			Pa-IAA29-R	GCACGGACTTGATGAAGGTT
XM_021959041.1	Auxin response factor 2B	ARF2B	Pa-ARF2B-F	GTGAACGGGAACGTGTCTTT
			Pa-ARF2B-R	ACCTCATCAGTGTCCGGTTC
XM_021970645.1	Abscisic acid receptor PYL8	AAR PLY8	Pa-AAR PYL8-F	TTTGTACAGAGGTGTGTGGT

			Pa-AAR PYL8-R	TCTCTGGATGGAGGGAGATG
XM_021970784.1	Abscisic acid receptor PYL4	AAR PLY4	Pa-AAR PYL4-F	GGAGATCCTGGACGATGAGA
			Pa-AAR PYL4-R	ATCGTGTCCACGAACGTACA
XM_021977028.1	GATA transcription factor 25	GATA25	Pa-GATA25-F	TCAGGATGCACGTAACAAG
			Pa-GATA25-R	CCACAAGCATTGCAAAGAGA
XM_021962427.1	<i>Prunus avium</i> protein TIFY 9	TIF Y9	Pa-TIFY9-F	AGCAAATCCCATTTCCTCT
			Pa-TIFY9-R	CAATATGCTCCCAGCCTTGT
XM_021951712.1	Ethylene receptor 2-like	ETR2L	Pa-ER2L-F	TGGAAGTCAGGGAAGGAATG
			Pa-ER2L-R	TGCAAATGGTGAAGCTCAAG
XM_021975856.1	Cytokinin dehydrogenase 5	CKK5	Pa-CD5-F	GCTAGGGCAATTTGGAATCA
			Pa-CD5-R	AATCGAACTTGTGGGTGGAG
XM_021956635.1	Cytokinin riboside 5'-monophosphate phosphoribohydrolase	LOG5	Pa-CR LOG1-F	TAGCCCAGGAAAGAAAAGCA
			Pa-CR LOG1-R	TTCACCTCCCCACTGTTTC
XM_021956636.1	Gibberellin-regulated protein 14	GRP14	Pa-GRP14-F	CAGTCCTCCTAAGCTTCCA
			Pa-GRP14-R	CTGACAGGAGTGGGTGGAGT
XM_021971185.1	Gibberellin 20 oxidase 2	GA20ox2	Pa-G20 O2-F	TTGGGTGGTTTTCTCTCTGG
			Pa-G20 O2-R	CTAGCCTCTGCGCTCTCTGT
XM_021976055.1	<i>Prunus avium</i> actin-7	A7	Pa-A7-F	TCAATGTGCCTGCCATGTAT
			Pa-A7-R	AGCAAGGTCCAGACGAAGAA
XM_021975187.1	<i>Prunus avium</i> histone H3.2	H3	Pa-H3.2-F	GCAAGCTTCCATTTAGAGG
			Pa-H3.2-R	CTCTCGCCTCTGATCCTACG

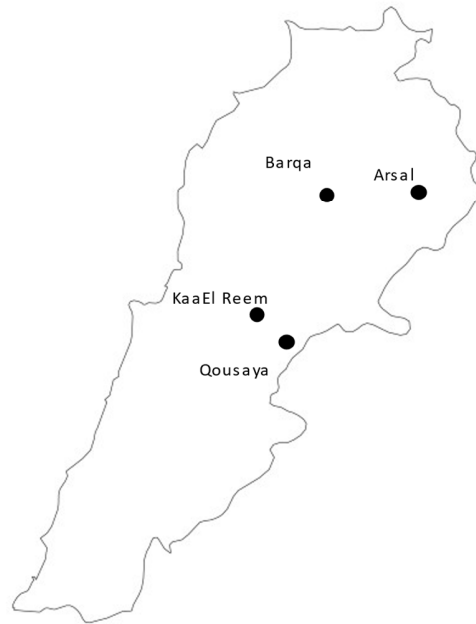
Supplementary Table S5: Average hormone quantification in the 6 evaluated sweet cherry varieties.

Variety	Absciscic_Acid_ABA (ng/g DW)	Salicylic_Acid_SA (ng/g DW)	Gibberellic_Acid_GA3 (ng/g DW)	Benzyl_Adenine_BA (ng/g DW)	Zeatin (ng/g DW)
Feraouni	7.00	8.03	1.40	0.10	2.92
Banni	17.94	6.14	1.58	0.05	2.98
Irani	8.73	4.37	1.43	0.17	2.71
Mkahal	17.63	8.89	1.78	0.10	5.31
Skeena	3.06	2.33	2.25	0.26	2.45
Teliani	11.32	2.79	1.24	0.60	1.50
Average	10.95	5.42	1.61	0.21	2.98

Supplementary Table S6: Genotype x Location interaction for evaluated hormones

Variety	Location	Abscisic Acid_ABA	Salicylic Acid_SA	Gibberellic Acid_GA3	Benzyl Adenine_BA	Zeatin
Feraouni	KER high	9.35 ± 2.51	8.70 ± 1.74 ab	1.57 ± 0.17	0.12 ± 0.03	2.57 ± 0.36
	QOU	5.16 ± 0.69	3.70 ± 0.29 a	0.90 ± 0.06	0.13 ± 0.03	3.39 ± 0.24
	ARS	5.43 ± 2.07	7.35 ± 1.14 ab	1.26 ± 0.28	0.070 ± 0.01	3.32 ± 0.73
	BAR	5.52 ± 0.08	9.36 ± 0.03 ab	2.18 ± 0.13	0.1 ± 0.005	2.34 ± 0.09
	KER low	3.52 ± 0.04	13.42 ± 0.92 b	1.12 ± 0.02	0.07 ± 0.01	3.54 ± 0.12
Skeena	KER high	3.06 ± 0.34	2.33 ± 0.37	2.25 ± 0.14	0.26 ± 0.02	2.45 ± 0.14
Banni	KER high	17.78 ± 0.33	6.39 ± 0.35	0.91 ± 0.18	0.04 ± 0.0001	1.84 ± 0.02 b
	ARS	18.11 ± 0.24	5.88 ± 0.18	2.24 ± 0.07	0.06 ± 0.02	4.11 ± 0.07 a
Irani	KER high	5.20 ± 2.04	2.46 ± 0.38 b	1.16 ± 0.17	0.14 ± 0.02	1.57 ± 0.27 b
	QOU	8.76 ± 3.13	3.48 ± 0.26 ab	1.41 ± 0.09	0.14 ± 0.06	4.16 ± 0.83 a
	BAR	12.56 ± 4.46	8.65 ± 1.56 a	1.9 ± 0.34	0.24 ± 0.02	1.88 ± 0.17 ab
	KER low	8.39 ± 1.45	2.59 ± 0.63 b	1.25 ± 0.06	0.22 ± 0.02	3.71 ± 0.47 ab
Teliani	ARS	18.96 ± 0.14 a	2.31 ± 0.46	1.94 ± 0.01	1.17 ± 0.01 a	1.48 ± 0.01
	BAR	7.50 ± 0.86 b	3.03 ± 0.23	0.89 ± 0.34	0.31 ± 0.02 b	1.51 ± 0.12
Mkahal	KER high	22.38 ± 7.11	11.77 ± 1.81 a	1.90 ± 0.15	0.13 ± 0.02	6.17 ± 0.6
	QOU	14.93 ± 1.79	5.04 ± 0.39 b	1.52 ± 0.19	0.13 ± 0.04	5.53 ± 0.37
	ARS	17.5 ± 0.02	4.97 ± 0.14 b	1.63 ± 0.15	0.07 ± 0.01	4.49 ± 0.01
	KER low	13.15 ± 2.9	8.93 ± 0.56 ab	1.83 ± 0.17	0.05 ± 0.02	4.28 ± 0.35
Interaction			**	**	***	***

Supplementary Figure S1: Map of Lebanon describing harvested locations



Supplementary Figure S2: Phytohormones contents (ng/g DW) in sweet cherry fruits harvested at several ripening stages in different locations.

