



Figure S1. Pearson's correlation coefficients among the phenolic compounds (A); squalene and sterols (B); and tocopherols (C) from all genotypes in two consecutive crop seasons. The violet color indicates the significant data and the light blue color is for non-significant data. The asterisk indicates *** $p \leq 0.000$, ** $p < 0.01$, and * $p < 0.05$.

Table S1: List of olive cultivars from IOGC.

Cultivar	Country of origin
Arauco	Argentina
Arbequina	Spain
Arbosana	Spain
Biancolilla	Italy
Branquita	Spain
Bujuk Topakislak	Turkey
Canino	Italy
Carolea	Italy
Chalkidikis	Greece
Changlot Real	Spain
Chemlali	Tunisia
Chetoui	Tunisia
Cipressino	Italy
Coratina	Italy
Domat	Turkey
Dritta	Italy
Empeltre	Spain
Fishomi	Iran
Frantoio	Italy
Galega Vulgar	Portugal
Gordal Sevillana	Spain
Hojiblanca	Spain
Istarska Belica	Croatia
Izmir Sofralik	Turkey
Kalamata	Greece
Konservolia	Greece
Koroneiki	Greece
Lastovka	Croatia
Leccino	Italy
Leccio del Corno	Italy
Lechin de Sevilla	Spain
Majorca	Italy
Manzanilla de Jaen	Spain
Manzanilla de Sevilla	Spain
Maurino	Italy
Memecik	Turkey
Meski	Tunisia
Moraiolo	Italy
Moresca	Italy
Morisca	Spain
Morrut	Spain
Nocellara del Belice	Italy
Nociara	Italy
Oblica	Croatia

Passalunara	Italy
Pendolino	Italy
Peranzana	Italy
Picholine Languedoc	France
Picholine Marocaine	Morocco
Picual	Spain
Picudo	Spain
Pizz'e Carroga	Italy
Rowghani	Iran
Salonenque	France
Tanche	France
Tonda Iblea	Italy
Uovo di Piccione	Italy
Vera	Italy
Verdale	France
Zaity	Syria
Zard	Iran

Table S2. Descriptive statistics of phenols (expressed as mg kg⁻¹ of fresh fruit pulp) in 61 cultivars and two consecutive crop seasons.

Cultivar	Descriptive statistics	HTYR	TYR	D OLEU	OLEU	OLEOC	VER	RUT	LUT 7G	LUE	API 7G	Total ph*	Total STD**
Arauco	Mean	820	160	136	10748	347	59	912	729	39	266	14,216	
	STD	15	60	40	1456	10	27	210	92	1	55		447
Arbequina	Mean	291	207	11556	692	528	448	1427	659	133	209	16,149	
	STD	221	99	10022	147	139	242	213	148	160	70		3119
Arbosana	Mean	224	97	490	593	323	603	3023	351	164	125	5,994	
	STD	36	0	73	227	182	173	211	48	14	52		87
Biancolilla	Mean	205	91	973	5224	215	2129	1742	375	99	83	11,135	
	STD	22	9	71	668	22	32	77	38	1	3		203
Branquita	Mean	320	185	13957	8577	1298	1093	2117	296	57	310	28,209	
	STD	167	23	14146	11052	1223	195	411	171	31	16		5257
Buyuk Topakislak	Mean	447	141	337	4933	1230	96	588	191	72	183	8,216	
	STD	485	76	371	2508	1457	124	53	39	17	173		819
Canino	Mean	1203	129	3179	4183	571	1564	1586	660	334	348	13,759	
	STD	1388	56	901	442	274	869	330	79	91	200		446
Carolea	Mean	638	142	460	9972	588	486	1312	457	163	223	14,442	
	STD	196	79	3	10076	49	650	148	115	190	112		3137
Chalkidikis	Mean	789	480	93	10112	367	299	1413	607	28	335	14,524	
	STD	98	86	1	6202	84	52	571	317	2	213		1919
Changlot Real	Mean	363	312	158	10037	562	78	379	318	52	150	12,409	
	STD	66	124	166	8002	70	3	157	156	49	60		2501
Chemlali	Mean	343	190	1092	3216	962	481	1843	395	24	202	8,747	
	STD	21	109	126	800	19	40	211	112	10	81		236
Chetoui	Mean	333	165	1080	7075	529	195	599	319	20	101	10,415	
	STD	256	106	226	1970	76	179	35	87	5	33		594
Cipressino	Mean	364	425	327	12720	466	213	1836	256	46	185	16,838	
	STD	309	296	298	7584	71	280	1112	110	10	56		2330
Coratina	Mean	193	165	9341	7615	960	5988	983	301	130	172	25,849	
	STD	150	68	12443	4349	819	2002	433	142	45	18		3898
Domat	Mean	345	121	65	8105	525	1518	636	493	145	279	12,233	
	STD	340	65	26	8563	217	1331	56	81	24	2		2663

Dritta	Mean	245	188	243	21992	613	18	1156	409	145	255	25,264	
	STD	231	136	75	15221	219	15	605	228	148	180		4751
Empeltre	Mean	526	325	1472	490	166	506	103	124	32	62	3,804	
	STD	79	100	74	26	25	0	24	1	16	14		35
Fishomi	Mean	1199	174	216	867	263	241	532	88	80	156	3,817	
	STD	16	28	74	275	26	119	332	13	21	104		114
Frantoio	Mean	397	215	1472	1018	1512	2955	1535	187	162	233	9,687	
	STD	132	60	70	117	308	333	387	51	40	1		139
Galega Vulgar	Mean	138	91	2755	501	113	620	691	131	11	58	5,109	
	STD	22	1	212	23	16	81	38	11	2	8		65
Gordal Sevillana	Mean	587	172	181	3851	322	15	592	236	52	119	6,126	
	STD	636	76	92	67	61	4	452	149	57	74		207
Hojiblanca	Mean	979	150	71	5088	263	346	1370	887	159	259	9,572	
	STD	1012	54	23	2677	46	233	20	219	11	17		846
Istarska belica	Mean	312	166	3096	14198	363	659	1487	640	26	320	21,268	
	STD	196	12	2486	10734	113	4	136	332	3	158		3358
Izmir Sofralik	Mean	1343	137	77	13431	930	171	1134	768	49	242	18,282	
	STD	104	22	9	74	28	11	22	2	4	38		33
Kalamon	Mean	1613	1114	633	10204	1033	592	2130	651	61	291	18,322	
	STD	1720	647	693	828	1085	739	541	7	18	149		522
Konservolia	Mean	390	195	93	1396	235	10	849	285	103	128	3,684	
	STD	28	26	30	42	38	10	32	13	10	36		12
Koroneiki	Mean	200	124	458	32777	828	82	5095	414	49	275	40,302	
	STD	62	1	137	5626	76	45	1292	43	14	106		1760
Lastovka	Mean	700	132	310	10628	571	259	1366	371	53	241	14,631	
	STD	156	141	290	2980	590	139	788	42	10	265		891
Leccino	Mean	425	145	1282	1005	447	296	1604	336	104	193	5,837	
	STD	448	81	1104	487	587	354	532	180	58	141		315
Leccio del Corno	Mean	293	267	123	2710	216	49	763	343	110	248	5,121	
	STD	40	18	1	232	6	5	25	25	3	11		70
Lechin de Sevilla	Mean	652	214	375	4130	1023	913	569	191	66	158	8,289	
	STD	119	31	53	768	245	127	110	52	19	17		227
Majorca	Mean	78	120	155	13208	213	505	2387	533	64	122	17,385	
	STD	2	8	10	103	10	17	275	80	1	31		85
Manzanilla de Jaen	Mean	316	236	195	4101	798	51	800	421	101	213	7,231	

	STD	19	13	8	108	74	2	16	12	1	34		35
Manzanilla de Sevilla	Mean	378	163	103	6957	422	281	775	295	93	166	9,634	
	STD	322	32	38	490	273	273	445	3	7	85		186
Maurino	Mean	693	268	308	581	421	1108	588	67	68	117	4,220	
	STD	288	101	53	42	89	260	106	6	27	34		97
Memecik	Mean	280	273	172	5693	622	61	1895	538	90	217	9,841	
	STD	74	59	49	568	53	6	373	73	11	1		189
Meski	Mean	98	127	536	29570	931	1533	1041	237	68	118	34,260	
	STD	31	54	113	11761	51	422	261	5	25	20		3687
Moraiolo	Mean	872	233	729	5770	691	1642	2275	619	445	335	13,613	
	STD	955	10	188	5826	374	629	619	72	128	27		1765
Moresca	Mean	133	97	53	5538	322	210	721	384	40	123	7,621	
	STD	0	38	5	618	62	32	69	65	21	24		186
Morisca	Mean	301	109	73	5837	239	116	1335	610	25	225	8,871	
	STD	9	7	2	6833	23	11	15	30	1	7		2157
Morrut	Mean	329	433	98	11631	382	1420	196	100	67	81	14,737	
	STD	11	53	18	704	45	633	48	24	23	24		270
Nocellara del Belice	Mean	288	197	316	8558	429	362	659	255	64	248	11,377	
	STD	54	36	109	386	30	20	161	31	1	63		115
Nociara	Mean	620	351	2605	867	2190	76	149	127	46	147	7,177	
	STD	257	6	159	75	334	16	17	12	11	16		119
Oblica	Mean	279	267	4708	4965	563	955	593	149	28	77	12,585	
	STD	28	15	5621	3125	407	1225	2	12	14	36		1887
Passalunara	Mean	385	148	1554	20535	366	281	2643	1077	178	285	27,451	
	STD	443	88	1322	6739	209	311	110	186	217	182		2055
Pendolino	Mean	282	222	4094	9932	1037	615	1415	345	54	186	18,182	
	STD	224	25	3101	7604	84	569	412	67	2	130		2429
Peranzana	Mean	946	174	193	8944	449	4523	1894	448	162	213	17,946	
	STD	182	56	176	10994	325	307	175	132	170	13		3424
Picholine Languedoc	Mean	582	355	221	8527	424	759	1146	527	52	228	12,822	
	STD	144	144	177	1411	188	759	343	272	27	194		417
Picholine Marocaine	Mean	1905	375	134	23529	652	677	1985	1527	114	209	31,107	
	STD	2325	253	101	9219	157	521	1435	1117	135	205		2793
Picual	Mean	325	180	122	14309	690	177	1843	374	89	200	18,308	
	STD	292	71	112	1861	461	68	728	73	5	100		568

Picudo	Mean	764	263	102	21817	599	132	2570	734	174	399	27,554	
	STD	656	141	6	12881	583	118	2245	788	36	374		3954
Pizz'e Carroga	Mean	485	179	6389	13717	626	70	369	149	53	227	22,264	
	STD	207	93	8412	3254	284	26	79	57	44	88		2703
Rowghani	Mean	407	201	150	3406	3351	829	2226	509	275	470	11,824	
	STD	18	1	7	215	121	64	96	11	35	29		68
Salonenque	Mean	300	239	200	8943	2044	24	2037	377	66	62	14,291	
	STD	66	53	93	535	85	9	168	78	20	5		157
Tanche	Mean	179	238	180	3885	275	86	537	357	43	147	5,927	
	STD	67	71	26	478	8	0	145	9	27	47		144
Tonda iblea	Mean	238	132	106	3126	230	70	801	521	87	226	5,538	
	STD	193	74	50	594	81	46	510	344	70	204		201
Uovo di Piccione	Mean	245	191	87	2856	97	97	571	441	52	123	4,758	
	STD	13	6	2	13	2	2	23	23	3	1		9
Vera	Mean	235	260	113	6335	300	68	1248	868	44	233	9,702	
	STD	7	8	15	43	30	33	17	28	8	4		13
Verdale	Mean	164	216	155	4331	185	34	1132	444	62	142	6,866	
	STD	6	17	35	144	4	14	103	62	23	22		46
Zaity	Mean	371	178	147	5406	331	265	299	197	64	155	7,414	
	STD	390	103	101	4802	156	83	42	78	58	16		1486
Zard	Mean	263	175	298	12524	919	51	2567	499	74	506	17,876	
	STD	180	71	133	12019	849	17	399	73	2	53		3747

* Total phenols represented the sum of all analyzed phenolic compounds for each cultivar.

** Total STD is a standard deviation of all phenols calculated from each STD.

Table S3. Descriptive statistics of squalene and sterols (expressed as mg kg⁻¹ of fresh fruit pulp) in 61 cultivars and two consecutive crop seasons.

Cultivar	Descriptive statistics	SQU	CAMP	ST STE	β STE	β STA	Total ST*	Total STD**
Arauco	Mean	1241	6.26	5.79	164.41	9.93	186.39	
	STD	8.85	0.03	4.50	0.98	0.10		3.80
Arbequina	Mean	666	11.54	7.07	196.10	39.03	253.75	
	STD	237.49	5.99	4.26	26.61	8.31		101.55
Arbosana	Mean	717	17.02	9.31	236.57	36.25	299.15	
	STD	180.31	4.39	3.48	4.52	15.20		77.70
Biancolilla	Mean	2068	5.42	7.45	205.82	12.24	230.92	
	STD	85.18	0.59	0.78	10.50	1.08		36.89
Branquita	Mean	1222	22.05	19.20	406.91	42.04	490.20	
	STD	46.49	6.74	2.87	72.67	5.01		31.39
Buyuk Topakislak	Mean	1948	22.67	11.78	498.03	1.92	534.39	
	STD	1740	20.05	11.80	513.96	1.21		749.42
Canino	Mean	858	16.42	24.27	215.31	37.44	293.43	
	STD	409.40	5.58	23.50	70.13	22.71		171.15
Carolea	Mean	2613	13.19	5.75	441.60	63.38	523.92	
	STD	264.63	4.88	1.83	283.22	16.50		146.05
Chalkidikis	Mean	1087	15.88	4.65	272.51	7.48	300.51	
	STD	325.61	4.44	3.04	40.27	1.38		141.06
Changlot Real	Mean	1191	5.33	7.55	98.44	8.17	119.48	
	STD	231.93	0.55	8.34	37.79	1.88		99.45
Chemlali	Mean	1553	34.45	4.42	626.58	36.77	702.22	
	STD	407.15	16.36	4.35	266.96	2.03		187.22
Chetoui	Mean	1293	12.80	7.79	295.35	20.26	336.20	
	STD	187.10	3.66	6.54	177.57	20.25		94.58
Cipressino	Mean	1046	21.69	24.68	224.19	23.77	294.33	
	STD	710.45	7.63	21.17	44.66	27.49		306.72
Coratina	Mean	1499	13.23	3.66	304.40	19.38	340.66	
	STD	816.19	6.59	1.64	68.94	3.00		357.17
Domat	Mean	3052	18.27	5.99	340.66	1.57	366.49	
	STD	336.83	10.11	0.80	211.20	0.20		154.63
Dritta	Mean	817	11.38	16.38	151.34	35.32	214.42	
	STD	629.02	0.49	8.77	8.95	17.54		277.38
Empeltre	Mean	468	14.90	9.51	285.91	21.71	332.03	
	STD	328.50	8.88	1.62	117.42	25.45		137.83
Fishomi	Mean	2181	14.95	2.69	183.39	9.61	210.64	
	STD	1157	0.65	1.14	25.15	8.32		513.74
Frantoio	Mean	1119	19.18	5.88	353.85	25.72	404.63	
	STD	519.60	6.42	3.68	32.09	27.83		224.90
Galega Vulgar	Mean	274	2.59	4.50	116.81	11.45	135.35	
	STD	30.52	0.12	0.71	1.69	0.69		13.30
Gordal Sevillana	Mean	1843	9.49	3.82	278.30	2.26	293.88	
	STD	50.04	0.12	4.26	102.57	0.93		44.88
Hojiblanca	Mean	2060	14.04	2.28	389.48	2.17	407.97	
	STD	2097	12.31	0.54	358.77	0.24		909.20
Istarska belica	Mean	2497	8.57	8.91	184.42	32.28	234.17	
	STD	232.71	3.54	5.51	34.45	7.41		99.18
Izmir Sofralik	Mean	818	1.94	1.06	162.73	1.64	167.38	
	STD	12.64	0.22	0.08	21.42	0.91		9.63
Kalamon	Mean	1700	10.06	13.72	385.85	49.70	459.32	

	STD	1213	7.77	15.86	167.13	43.41		520.11
Konservolia	Mean	2296	10.86	21.29	251.60	5.45	289.19	
	STD	764.85	2.40	1.22	120.34	0.45		332.16
Koroneiki	Mean	928	12.39	11.32	186.22	23.87	233.79	
	STD	103.39	0.21	0.37	9.56	31.40		43.49
Lastovka	Mean	1525	8.58	26.27	217.60	11.41	263.86	
	STD	356.89	7.51	15.82	86.17	2.94		150.88
Leccino	Mean	1071	10.35	9.60	199.30	18.88	238.13	
	STD	952.34	6.25	7.44	76.59	24.59		414.04
Leccio del Corno	Mean	478	10.91	6.06	244.90	2.50	264.37	
	STD	34.93	0.59	4.21	18.24	0.71		14.85
Lechin de Sevilla	Mean	1168	16.36	9.58	362.77	12.78	401.49	
	STD	460.85	3.12	1.31	129.20	13.96		197.01
Majorca	Mean	846	8.42	19.51	182.70	2.50	213.13	
	STD	19.76	0.38	4.86	6.02	0.71		7.90
Manzanilla de Jaen	Mean	810	8.59	5.70	155.88	22.64	192.81	
	STD	78.63	0.59	0.43	8.65	0.50		34.21
Manzanilla de Sevilla	Mean	2116	9.01	13.77	297.67	9.91	330.36	
	STD	1240	2.65	11.84	138.59	7.01		539.51
Maurino	Mean	1039	10.12	3.31	223.73	27.42	264.59	
	STD	581.31	2.15	1.70	40.69	23.54		252.88
Memecik	Mean	2131	12.57	7.30	317.68	1.99	339.55	
	STD	1158	3.32	2.45	170.04	0.70		503.38
Meski	Mean	1145	11.62	2.40	239.79	48.66	302.48	
	STD	825.14	6.82	0.14	52.87	35.78		358.97
Moraiolo	Mean	2234	11.50	6.34	312.09	10.36	340.29	
	STD	693.92	3.45	6.14	68.52	6.45		302.12
Moresca	Mean	2333	13.89	21.09	221.77	29.44	286.19	
	STD	830.90	0.43	4.27	3.49	21.23		368.39
Morisca	Mean	3300	22.14	7.49	829.60	119.89	979.11	
	STD	126.14	1.61	0.73	7.64	7.22		54.58
Morrut	Mean	2769	15.30	15.20	306.93	15.24	352.67	
	STD	514.09	2.59	6.29	209.79	13.59		221.99
Nocellara del Belice	Mean	2251	12.50	10.00	237.50	20.50	280.50	
	STD	419.31	0.71	1.41	23.33	0.71		184.85
Nociara	Mean	1566	14.22	5.49	297.43	27.59	344.73	
	STD	575.65	1.23	3.00	101.21	7.20		248.46
Oblica	Mean	2325	20.57	29.55	388.94	10.70	449.76	
	STD	1511	0.64	27.43	184.35	12.84		654.85
Passalunara	Mean	3187	15.90	24.41	209.05	5.46	254.82	
	STD	3744	3.97	25.59	111.80	4.90		1658.44
Pendolino	Mean	641	6.35	3.68	170.06	11.17	191.27	
	STD	489.52	3.25	2.38	34.50	0.24		214.87
Peranzana	Mean	2639	12.71	3.81	247.09	15.47	279.08	
	STD	133.70	3.19	0.44	81.10	7.42		59.83
Picholine Languedoc	Mean	1234	19.62	4.40	342.76	4.07	370.85	
	STD	810.35	12.16	0.24	155.28	0.85		349.74
Picholine Marocaine	Mean	1506	17.90	2.23	421.22	6.98	448.32	
	STD	218.02	0.55	0.38	85.10	6.40		94.26
Picual	Mean	1519	15.65	3.09	336.62	5.50	360.86	
	STD	1351	8.56	0.44	239.71	3.51		584.80
Picudo	Mean	1182	12.01	5.97	251.51	4.72	274.21	
	STD	280.05	0.06	4.20	41.08	4.55		120.81
Pizz'e Carroga	Mean	2184	12.72	4.94	232.36	48.33	298.34	

	STD	522.45	2.57	1.64	50.61	21.31		226.01
Rowghani	Mean	1033	12.40	8.96	142.49	12.64	176.49	
	STD	67.05	3.67	1.35	24.76	0.91		28.35
Salonenque	Mean	1314	14.11	14.51	342.87	57.60	429.09	
	STD	592.93	4.14	9.96	15.10	23.02		259.42
Tanche	Mean	1355	15.99	14.52	303.79	47.16	381.45	
	STD	756.99	11.87	4.87	259.19	39.84		320.86
Tonda iblea	Mean	1846	15.00	8.18	264.40	11.05	298.63	
	STD	287.57	2.75	2.13	5.74	11.67		126.17
Uovo di Piccione	Mean	2659	61.86	12.36	843.28	1.37	918.87	
	STD	153.21	13.26	3.31	79.71	0.89		66.10
Vera	Mean	1068	12.03	22.77	208.77	4.30	247.87	
	STD	107.65	0.46	2.65	22.24	3.02		45.82
Verdale	Mean	4351	25.54	6.18	456.59	11.04	499.36	
	STD	1.34	6.31	1.15	7.65	1.48		3.14
Zaity	Mean	1498	12.40	22.82	144.13	11.00	190.36	
	STD	573.88	1.26	25.81	28.00	0.00		250.84
Zard	Mean	1222	8.62	12.46	185.23	20.59	226.90	
	STD	104.76	0.24	13.40	80.81	1.33		49.10

* Total sterols for each cultivar.

** Total STD is a standard deviation of squalene and sterols from each STD.

Table S4. Descriptive statistics of tocopherols (expressed as mg kg⁻¹ of fresh fruit pulp) and oil content in fruit fresh weight (%) in 61 cultivars and two consecutive crop seasons.

Cultivar	Descriptive statistics	α _TOC	γ _TOC	β _TOC	OCFFW	Total TOC*	Total TOC STD**
Arauco	Mean	230.42	23.31	3.90	21.52	257.64	
	STD	30.89	1.86	3.96	0.69		16.19
Arbequina	Mean	308.66	22.38	5.83	19.30	336.87	
	STD	179.93	6.46	8.24	3.92		99.64
Arbosana	Mean	474.05	23.39	0.63	19.73	498.07	
	STD	118.18	3.03	0.88	0.32		67.11
Biancolilla	Mean	161.19	28.92	7.25	25.01	197.36	
	STD	17.30	9.19	3.89	0.02		6.76
Branquita	Mean	365.52	24.04	14.10	17.37	403.66	
	STD	114.15	1.94	2.97	3.55		64.49
Buyuk Topakislak	Mean	310.86	30.63	10.58	16.47	352.07	
	STD	205.20	24.41	0.81	7.73		111.81
Canino	Mean	306.91	25.11	11.15	19.46	343.16	
	STD	42.63	4.11	6.08	1.77		21.69
Carolea	Mean	241.43	21.42	12.88	19.54	275.73	
	STD	43.39	2.78	9.73	0.12		21.72
Chalkidikis	Mean	151.84	14.62	4.29	23.80	170.75	
	STD	54.40	10.05	1.82	6.36		28.28
Changlot Real	Mean	175.30	16.43	9.03	24.86	200.76	
	STD	87.85	10.28	9.37	6.94		45.05
Chemlali	Mean	520.88	34.89	23.37	18.16	579.14	
	STD	254.15	9.88	0.17	4.61		143.92
Chetoui	Mean	343.38	57.14	23.26	20.38	423.77	
	STD	116.84	12.54	0.20	0.33		64.08
Cipressino	Mean	455.86	56.44	21.12	15.26	533.42	
	STD	236.35	45.53	7.85	3.32		122.51
Coratina	Mean	276.52	25.52	6.00	17.05	308.04	
	STD	143.97	20.73	6.16	2.69		75.71
Domat	Mean	242.35	13.09	9.10	20.05	264.53	
	STD	166.80	6.98	1.27	1.53		93.96
Dritta	Mean	229.89	29.51	18.82	17.55	278.22	
	STD	7.44	7.08	2.35	0.18		2.84
Empeltre	Mean	238.50	27.51	2.85	13.21	268.87	
	STD	55.57	20.24	0.92	1.79		27.72
Fishomi	Mean	227.58	29.03	20.19	17.69	276.79	
	STD	83.08	29.44	22.76	0.99		33.07
Frantoio	Mean	221.42	21.94	3.40	18.94	246.76	
	STD	97.61	0.31	2.26	0.63		55.62
Galega Vulgar	Mean	122.46	8.08	4.11	12.09	134.65	
	STD	2.89	0.28	0.13	1.34		1.55
Gordal Sevillana	Mean	233.88	23.15	9.12	16.33	266.16	
	STD	196.87	16.58	4.35	5.03		107.79
Hojiblanca	Mean	242.19	16.07	11.74	13.04	270.00	
	STD	96.93	5.28	7.44	2.81		52.30
Istarska belica	Mean	124.40	11.09	2.73	22.37	138.21	
	STD	61.04	8.39	2.16	4.95		32.34
Izmir Sofralik	Mean	198.80	15.69	3.30	26.09	217.79	
	STD	17.36	7.26	0.14	0.50		8.65
Kalamon	Mean	295.91	30.44	21.25	21.86	347.60	

	STD	143.61	3.78	0.30	2.22		81.75
Konservolia	Mean	322.10	28.26	10.38	17.90	360.74	
	STD	85.39	7.30	0.53	7.08		47.16
Koroneiki	Mean	213.13	14.90	3.03	16.84	231.05	
	STD	24.28	4.69	0.53	7.54		12.69
Lastovka	Mean	319.03	20.32	13.52	17.45	352.88	
	STD	125.84	0.62	3.78	6.56		71.40
Leccino	Mean	325.87	29.17	19.46	14.85	374.50	
	STD	94.71	12.07	14.42	0.69		47.05
Leccio del Corno	Mean	192.80	22.33	12.10	14.16	227.23	
	STD	27.87	4.58	0.42	0.12		14.79
Lechin de Sevilla	Mean	184.88	20.09	5.48	17.42	210.45	
	STD	98.79	6.07	5.27	2.78		53.76
Majorca	Mean	139.52	11.64	10.05	16.37	161.21	
	STD	1.80	0.57	0.22	0.17		0.83
Manzanilla de Jaen	Mean	458.58	51.21	5.80	9.10	515.59	
	STD	12.14	1.70	1.13	1.28		6.20
Manzanilla de Sevilla	Mean	214.92	35.67	9.24	16.13	259.83	
	STD	91.36	29.21	1.79	6.08		45.90
Maurino	Mean	307.06	24.40	10.83	15.02	342.28	
	STD	180.35	17.26	0.46	2.45		99.36
Memecik	Mean	326.44	28.63	19.11	18.14	374.19	
	STD	149.24	9.18	1.40	0.83		83.20
Meski	Mean	260.92	44.74	15.57	13.92	321.23	
	STD	180.74	48.16	9.83	0.94		89.68
Moraiolo	Mean	282.44	23.98	11.95	19.88	318.36	
	STD	125.27	18.70	10.88	5.29		63.90
Moresca	Mean	273.64	18.41	13.85	21.19	305.90	
	STD	194.95	10.46	0.21	5.52		109.60
Morisca	Mean	280.74	23.83	14.85	23.02	319.42	
	STD	9.53	2.58	1.20	0.14		4.47
Morrut	Mean	202.05	18.71	10.60	20.64	231.36	
	STD	90.51	15.35	0.57	4.55		48.23
Nocellara del Belice	Mean	262.00	25.70	8.50	16.32	296.20	
	STD	16.97	0.57	0.14	1.27		9.60
Nociara	Mean	373.56	35.64	9.00	16.75	418.20	
	STD	7.76	8.50	0.14	1.88		4.63
Oblica	Mean	218.89	18.83	9.48	18.95	247.20	
	STD	79.05	12.30	9.24	2.38		39.45
Passalunara	Mean	135.77	13.57	6.55	22.07	155.89	
	STD	38.26	4.78	0.08	2.31		20.82
Pendolino	Mean	378.49	23.39	9.33	10.49	411.21	
	STD	239.75	4.15	4.07	0.40		136.05
Peranzana	Mean	390.27	30.86	9.80	16.74	430.93	
	STD	5.66	0.94	0.42	2.84		2.88
Picholine de Languedoc	Mean	291.97	31.45	7.56	18.87	330.98	
	STD	105.03	33.43	6.64	2.77		50.87
Picholine Marocaine	Mean	214.83	18.55	11.85	16.88	245.23	
	STD	107.65	2.05	2.19	3.58		60.93
Picual	Mean	286.11	21.19	10.43	16.82	317.72	
	STD	214.81	9.25	2.23	5.40		120.76
Picudo	Mean	217.76	19.80	7.20	16.65	244.76	
	STD	118.69	13.11	3.54	1.87		63.90
Pizz'e Carroga	Mean	297.16	26.59	12.49	23.32	336.24	

	STD	103.09	11.48	1.40	6.28		56.03
Rowghani	Mean	286.55	46.25	7.25	16.20	340.05	
	STD	4.88	1.34	1.48	0.42		2.00
Salonenque	Mean	236.59	32.29	7.76	18.21	276.63	
	STD	114.56	7.18	3.17	2.89		63.18
Tanche	Mean	302.85	20.57	9.08	19.80	332.51	
	STD	105.07	6.68	5.12	1.88		57.26
Tonda iblea	Mean	179.26	13.68	3.78	18.60	196.71	
	STD	89.03	6.55	2.44	3.38		48.85
Uovo di Piccione	Mean	157.20	18.96	2.30	18.05	178.46	
	STD	10.49	4.47	0.14	3.83		5.20
Vera	Mean	149.05	18.93	5.65	24.23	173.63	
	STD	18.52	5.20	0.07	0.15		9.52
Verdale	Mean	156.00	12.35	3.15	14.77	171.50	
	STD	2.83	1.20	0.49	0.78		1.20
Zaity	Mean	201.81	15.66	6.63	16.38	224.10	
	STD	105.85	10.33	7.60	1.78		55.95
Zard	Mean	377.13	41.06	10.76	18.13	428.95	
	STD	244.44	33.75	0.06	1.50		132.45

* Total tocopherols for each cultivar.

** Total STD is a standard deviation of all tocopherols from each STD.

Table S5. Descriptive statistics by analysis of the nineteen chemical parameters (expressed as mg kg⁻¹ of fruit pulp) in 61 cultivars during two consecutive crop seasons.

Crop season		Minimum	Maximum	Mean	Std. Error	Std. Deviation
2015-2016	HTYR	120.00	3549.00	700.12	64.49	580.45
	TYR	97.00	1571.00	248.28	18.65	167.85
	D_OLEU	54.00	24393.00	2108.86	528.83	4759.51
	OLEU	335.00	36755.00	6873.11	821.90	7397.09
	OLEOC	183.00	3436.00	819.77	70.95	638.57
	VER	4.00	8067.00	840.14	152.58	1373.26
	RUT	120.00	4212.00	1455.70	104.05	936.44
	LUT_7G	50.00	1308.00	430.14	30.74	276.62
	LUE	20.00	593.00	131.81	12.80	115.16
	API_7G	52.00	672.00	261.25	15.05	135.45
	SQU	564.00	5874.00	1799.25	107.32	965.92
	CAMP	5.00	36.00	14.31	0.71	6.41
	ST_STE	1.00	57.00	9.20	0.85	7.63
	β _STE	56.00	530.00	245.94	11.77	105.94
	β _STA	2.00	80.00	25.48	2.20	19.76
	α _TOC	148.00	739.00	355.69	13.57	122.15
	Y_TOC	12.00	92.00	33.00	1.80	16.22
	β _TOC	0.00	44.00	12.21	0.89	7.97
	OCFFW	8.00	30.00	16.16	0.38	3.43
2016-2017	HTYR	67.00	1416.00	309.25	24.84	267.56
	TYR	30.00	1054.00	194.45	13.44	144.72
	D_OLEU	31.00	20682.00	1127.28	273.24	2942.84
	OLEU	387.00	39766.00	9723.17	784.30	8447.20
	OLEOC	28.00	2015.00	474.14	38.21	411.55
	VER	9.00	4878.00	629.31	93.58	1007.84
	RUT	85.00	6124.00	1186.56	87.68	944.32
	LUT_7G	62.00	2386.00	415.53	31.75	341.96
	LUE	10.00	395.00	65.37	5.74	61.86
	API_7G	50.00	556.00	161.39	8.50	91.53
	SQU	230.00	4352.00	1524.19	94.16	1014.08
	CAMP	2.00	71.00	14.51	0.97	10.39
	ST_STE	1.00	51.00	11.45	1.13	12.14
	β _STE	116.00	900.00	325.84	17.60	189.60
	β _STA	0.00	123.00	16.84	2.03	21.84
	α _TOC	76.00	655.00	194.11	7.83	84.37
	Y_TOC	1.00	66.00	17.97	0.98	10.51
	β _TOC	0.00	25.00	8.57	0.52	5.64
	OCFFW	11.00	33.00	19.99	0.39	4.21

Table S6. Tests of between-subjects effects from general linear model for 61 olive cultivars in two consecutive crop seasons.

	Genotype			Environment			Genotype \times Environment		
	<i>F</i>	<i>P</i>	$\eta^2(\%)$	<i>F</i>	<i>P</i>	$\eta^2(\%)$	<i>F</i>	<i>P</i>	$\eta^2(\%)$
HTYR	105.07	< 0.0001	27.74	2094.49	< 0.0001	9.22	87.48	< 0.0001	18.09
TYR	12.58	< 0.0001	24.74	33.89	< 0.0001	1.11	5.38	< 0.0001	8.29
D_OLEU	260.02	< 0.0001	50.29	134.04	< 0.0001	0.43	226.33	< 0.0001	34.29
VER	270.11	< 0.0001	65.17	24.89	< 0.0001	0.10	30.43	< 0.0001	5.75
RUT	90.09	< 0.0001	26.17	161.44	< 0.0001	0.78	18.84	< 0.0001	4.29
LUT_7G	67.54	< 0.0001	22.40	20.20	< 0.0001	0.11	30.21	< 0.0001	7.85
OLEU	49.59	< 0.0001	33.24	116.91	< 0.0001	1.31	18.73	< 0.0001	9.83
API_7G	22.13	< 0.0001	12.91	348.44	< 0.0001	3.39	17.20	< 0.0001	7.86
OLEOC	30.90	< 0.0001	29.53	166.30	< 0.0001	2.65	11.10	< 0.0001	8.31
LUE	26.41	< 0.0001	33.73	182.25	< 0.0001	3.88	8.61	< 0.0001	8.62
SQU	39.76	< 0.0001	14.93	58.88	< 0.0001	0.37	31.80	< 0.0001	9.36
CAMP	10.62	< 0.0001	18.05	0.00	1.00	0.00	4.57	< 0.0001	6.08
ST_STE	7.82	< 0.0001	24.36	12.17	< 0.0001	0.63	7.49	< 0.0001	18.28
β _STE	34.42	< 0.0001	13.59	161.88	< 0.0001	1.07	21.72	< 0.0001	6.72
β _STA	34.62	< 0.0001	38.24	102.01	< 0.0001	1.88	13.13	< 0.0001	11.36
α _TOC	5.90	< 0.0001	7.71	285.84	< 0.0001	6.23	2.33	< 0.0001	2.39
Y_TOC	5.02	< 0.0001	10.43	170.95	< 0.0001	5.92	4.93	< 0.0001	8.02
β _TOC	18.70	< 0.0001	18.86	103.11	< 0.0001	1.73	11.59	< 0.0001	9.16
OCFFW	5.58	< 0.0001	2.57	115.34	< 0.0001	0.89	2.27	< 0.0001	0.82
Mean of $\eta^2(\%)$			24.98			2.19			9.76

Eta squared (η^2): percentage of trait variability explained by each factor and the interaction. In bold the traits with highest source effect.

F ratio: variation between samples/variation within the samples. p-value: significance level.