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SUPPLEMENTARY TABLE S1a. Effect of water deficit on the free volatile compounds in Merlot and Tocai Friulano fully irrigated (C) and deficit irrigated (D) wines in 2011 and 2012.

	Merlot					Tocai friulano				
Year	2011		2012			2011		2012		
Treatment	C	D	C	D		C	D	C	D	
Alcohols										
3-Methylthiopropanol	2204,6 ± 106.7	2779,6 ± 246.7	1718,3 ± 142.9	1568,2 ± 211.3	ns	109,7 ± 13.8	128,2 ± 22.4	88,6 ± 14.2	94,6 ± 8.7	ns
2,3-Butanediol	511,0 ± 45.3	698,9 ± 55.7	1395,4 ± 121.1	1931,2 ± 282.5	* / ns	1121,6 ± 52.4	1046,3 ± 42.3	1948,3 ± 240.5	2291,2 ± 557.1	ns
Isoamyl alcohol	12937 ± 1950	18393 ± 3051	12733 ± 618	11388 ± 542	ns	10994 ± 1226	10775 ± 1045	12665 ± 563	13368 ± 2975	ns
2-Hexenol	12,9 ± 0.4	8,1 ± 1.4	8,5 ± 3.2	3,5 ± 0.9	* / ns	--- ---	--- ---	--- ---	--- ---	
***trans* 3-Hexanol**	15,0 ± 0.8	13,7 ± 0.4	27,6 ± 2.2	23,1 ± 1.4	ns	57,9 ± 17.1	90,5 ± 15.1	91,5 ± 1.6	97,7 ± 5.5	ns
***cis* 3-Hexanol**	3,6 ± 0.2	4,6 ± 0.3	4,2 ± 0.4	4,0 ± 0.3	* / ns	24,9 ± 4.4	16,2 ± 2.0	36,3 ± 10.7	11,8 ± 2.4	ns
1-Hexanol	588,5 ± 23.9	772,2 ± 21.3	1232,4 ± 99.1	1250,8 ± 97.4	** / ns	546,3 ± 49.3	707,9 ± 28.4	995,5 ± 74.3	1032,1 ± 13.1	* / ns
1-Octen-3-ol	49,0 ± 2.2	40,7 ± 3.6	61,7 ± 5.4	26,9 ± 1.9	ns / **	19,9 ± 3.8	18,1 ± 4.9	29,5 ± 3.8	55,8 ± 3.4	ns / **
Fatty acid derivatives										
Acetic acid	16,7 ± 1.6	42,9 ± 3.3	40,3 ± 2.2	41,6 ± 8.0	*** / ns	16,4 ± 1.5	13,9 ± 1.9	9,4 ± 0.7	11,3 ± 0.8	ns
Butyric acid	303,7 ± 16.0	377,9 ± 7.2	352,2 ± 8.1	385,7 ± 23.5	** / ns	649,8 ± 28.4	594,3 ± 41.0	490,0 ± 46.8	495,5 ± 6.2	ns
Isobutyric acid	561,3 ± 27.6	477,4 ± 31.6	1184,3 ± 49.0	588,4 ± 54.4	ns / **	167,2 ± 18.3	174,8 ± 24.2	186,0 ± 26.5	181,8 ± 3.5	ns
Isovaleric acid	1830,5 ± 82.3	1586,8 ± 137.6	2633,0 ± 157.9	1416,3 ± 139.7	ns / **	290,1 ± 20.5	331,4 ± 30.3	312,5 ± 21.6	317,3 ± 13.8	ns
Hexanoic acid	835,0 ± 30.7	915,3 ± 36.5	895,9 ± 44.1	952,0 ± 68.3	ns	3134,9 ± 190.2	3035,1 ± 265.4	2179,6 ± 6.5	2160,8 ± 188.1	ns
Octanoic acid	801,6 ± 42.3	745,5 ± 33.4	668,6 ± 11.9	802,0 ± 88.5	ns	2972,8 ± 128.9	3241,8 ± 408.2	3697,0 ± 57.8	3643,8 ± 149.7	ns
Decanoic acid	87,5 ± 5.6	77,1 ± 3.6	125,3 ± 7.7	147,5 ± 12.3	ns	242,9 ± 16.0	249,9 ± 27.8	795,7 ± 69.0	1103,1 ± 57.4	*
Esters										
Ethyl lactate	4058,2 ± 343.9	6045,0 ± 1878	2284,1 ± 1233.3	3100,1 ± 2059.2	ns	1230,2 ± 161.9	2811,5 ± 1477.1	561,6 ± 151.0	595,3 ± 74.7	ns
Ethyl butyrate	57,0 ± 11.2	87,0 ± 5.1	53,4 ± 2.8	63,7 ± 5.9	ns	189,3 ± 8.9	199,7 ± 14.8	286,0 ± 11.6	291,0 ± 36.8	ns
Methyl-4-hydroxybutyrate	48,6 ± 3.3	44,2 ± 6.6	112,2 ± 3.0	56,6 ± 4.2	ns / ***	--- ---	--- ---	--- ---	--- ---	
Ethyl 4-hydroxybutyrate	7467,3 ± 297.3	6325,2 ± 1386	12978,3 ± 439.9	9593,6 ± 1487.2	ns	2019,4 ± 256.8	2018,4 ± 205.0	2384,0 ± 290.0	2741,9 ± 389.4	ns
Ethyl-3-hydroxybutyrate	197,6 ± 13.0	253,5 ± 24.3	124,4 ± 2.8	194,2 ± 20.3	ns / *	378,0 ± 37.0	299,1 ± 25.3	290,3 ± 19.2	393,7 ± 15.3	ns / *

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Ethyl hydrogen succinate	36100 ± 3204	*	83848 ± 17699	27700 ± 2635	ns	23206 ± 1640	21209 ± 2235	ns	23491 ± 7315	6989 ± 1257	ns	8607 ± 531
Isoamyl acetate	142,2 ± 10.1	ns	139,1 ± 13.8	196,8 ± 20.1	*	133,7 ± 4.1	995,4 ± 58.5	ns	850,9 ± 156.8	4513,5 ± 302.1	ns	5441,2 ± 636.7
Diethyl succinate	2807,7 ± 199.9	ns	8886,5 ± 2686.3	970,0 ± 32.3	ns	1198,4 ± 162.6	2141,1 ± 227.7	ns	2919,0 ± 1197.2	591,0 ± 12.3	***	871,6 ± 36.5
Diethyl malate	450,1 ± 47.6	ns	554,4 ± 138.7	123,9 ± 17.4	ns	112,8 ± 42.1	1678,7 ± 290.5	*	668,7 ± 172.4	169,0 ± 32.1	ns	123,8 ± 4.7
Hexyl acetate	9,4 ± 1.0	ns	6,1 ± 1.3	7,8 ± 0.3	ns	4,0 ± 1.6	33,6 ± 2.7	ns	32,9 ± 3.8	281,0 ± 13.8	ns	255,4 ± 29.6
Ethyl hexanoate	200,6 ± 10.7	ns	226,1 ± 12.0	193,7 ± 8.5	ns	217,6 ± 21.8	630,0 ± 11.0	ns	615,5 ± 45.0	710,0 ± 18.6	*	762,7 ± 1.3
Ethyl octanoate	164,3 ± 9.5	ns	162,9 ± 12.2	142,3 ± 7.6	ns	179,5 ± 24.6	487,8 ± 14.2	ns	487,7 ± 68.4	678,9 ± 64.1	ns	698,8 ± 17.9
Ethyl decanoate	15,7 ± 0.6	ns	12,9 ± 1.8	28,9 ± 2.4	ns	36,4 ± 5.0	20,5 ± 3.7	ns	20,8 ± 3.7	100,6 ± 17.9	ns	156,2 ± 15.4
Ethyl-2-phenyl acetate	8,0 ± 0.2	*	6,7 ± 0.5	8,8 ± 0.7	**	4,3 ± 0.4	--- ---		--- ---	--- ---		--- ---
2-Phenylethyl acetate	--- ---		--- ---	--- ---		--- ---	158,2 ± 20.4	ns	150,0 ± 14.0	599,9 ± 57.0	ns	751,3 ± 85.0
Lactones												
γ-Butyrolactone	476,3 ± 32.6	ns	551,8 ± 29.7	340,7 ± 5.7	ns	381,8 ± 42.6	142,0 ± 11.4	*	100,0 ± 3.4	64,2 ± 5.7	ns	67,4 ± 6
4-Ethoxy-γ-butyrolactone	202,2 ± 11.6	ns	265,9 ± 43.2	217,5 ± 27.5	ns	275,3 ± 25.1	71,1 ± 10.3	ns	84,2 ± 30.2	58,8 ± 0.1	ns	67,7 ± 9.0
Pantolactone	98,3 ± 2.9	ns	91,8 ± 7.8	140,1 ± 5.3	**	91,0 ± 5.0	49,3 ± 3.9	ns	59,7 ± 1.7	52,0 ± 2.0	*	44,3 ± 1.7
Ketones												
Acetoin	59,6 ± 21.5	ns	179,9 ± 98.2	63,0 ± 10.1	ns	74,4 ± 27.1	84,0 ± 13.5	ns	164,0 ± 67.4	143,3 ± 45.1	**	786,7 ± 84.2
Phenylpropanoid derivatives												
Benzyl alcohol	1507,7 ± 104.6	***	539,5 ± 80.7	1890,5 ± 199.2	**	403,2 ± 50.7	65,3 ± 14.6	*	110,4 ± 6.8	38,8 ± 8	ns	36,1 ± 3.1
Benzaldehyde	8,0 ± 2.8	ns	4,0 ± 0.4	5,4 ± 0.5	ns	4,2 ± 0.1	13,6 ± 6.7	ns	9,8 ± 6.9	9,6 ± 2.8	ns	8,0 ± 1.2
2-Phenylethanol	59466 ± 4547	ns	68460 ± 4795	58217 ± 364	**	43482 ± 1923	20502 ± 2002	ns	22345 ± 1652	18994 ± 957	ns	22744 ± 1725
Tryptophol	3432,1 ± 334.8	ns	5654,8 ± 1376.7	3325,7 ± 189.5	**	9175,7 ± 1168.6	274,1 ± 77.0	ns	358,9 ± 85.3	153,4 ± 58.4	*	418,9 ± 54.9
Vanillin	51,2 ± 9.1	ns	45,7 ± 14.1	24,4 ± 3.8	ns	35,1 ± 1.8	11,5 ± 2.9	ns	10,6 ± 1.2	11,2 ± 0.5	ns	10,3 ± 1.2
Isovanillic acid	1665,0 ± 139.6	ns	1897,8 ± 70.7	1930,5 ± 36.7	ns	1550,1 ± 157.0	--- ---		--- ---	--- ---		--- ---
Acetovanillone	125,3 ± 7.9	**	81,2 ± 6.6	105,1 ± 1.1	***	83,7 ± 1.2	10,9 ± 1.1	ns	11,7 ± 0.6	11,6 ± 0.3	ns	11,6 ± 1.2
Tyrosol	17880 ± 2615	ns	22432 ± 2378	13975 ± 881	ns	10077 ± 1548	5589 ± 956	*	9303 ± 1095	9202 ± 1433	ns	12291 ± 1141
Guaiacol	11,8 ± 2.7	ns	17,7 ± 9.0	5,5 ± 1.2	ns	6,5 ± 0.0	--- ---		--- ---	--- ---		--- ---
4-Vinylguaiacol	19,9 ± 3.3	ns	27,5 ± 6.6	43,7 ± 8.9	ns	21,9 ± 3.4	25,7 ± 7	ns	28,4 ± 3.1	25,4 ± 2.8	ns	23,2 ± 2.5

SUPPLEMENTARY DATA

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Monoterpenes											
Linalool	5,3 ± 0.4	ns	5,0 ± 0.1	5,0 ± 0.7	ns	4,9 ± 0.4	10,7 ± 2.0	ns	11,0 ± 1.3	9,0 ± 1.9	*	33,5 ± 6.0
***trans* Linalool oxide (furanoid)**	--- ---		--- ---	--- ---		--- ---	5,5 ± 0.4	ns	7,0 ± 0.8	6,2 ± 0.9	*	12,9 ± 1.2
***cis* Linalool oxide (furanoid)**	--- ---		--- ---	--- ---		--- ---	1,8 ± 0.2	ns	3,3 ± 0.6	1,0 ± 0.2	*	1,7 ± 0.2
α-Terpineol	2,3 ± 0.2	ns	3,5 ± 0.5	2,1 ± 0.3	ns	2,4 ± 0.2	5,8 ± 0.5	ns	5,9 ± 0.8	3,5 ± 0.6	*	9,8 ± 1.3
Citronellol	16,8 ± 0.3	*	14,1 ± 0.9	22,1 ± 0.4	ns	21,9 ± 1.8	5,4 ± 0.5	*	7,3 ± 0.5	6,8 ± 1.3	ns	7,6 ± 0.8
Diendiol (I)	15,9 ± 1.9	ns	13,1 ± 1.3	22,1 ± 1.3	ns	18,6 ± 1.2	80,2 ± 19.1	ns	85,9 ± 3.5	337,5 ± 105.9	*	1153,7 ± 204.6
Geranic acid	5,6 ± 0.3	*	4,3 ± 0.3	7,6 ± 0.1	*	9,1 ± 0.5	--- ---		--- ---	--- ---		--- ---
p-Cymene	5,1 ± 0.2	*	2,4 ± 0.6	2,4 ± 1.1	ns	0,7 ± 0.1	--- ---		--- ---	--- ---		--- ---

The average concentration of each compounds ± SE is represented as µl/L of n-heptanol equivalents. The difference between treatments was assessed with a one-way ANOVA. The level of significance is reported within the columns: *, **, *** or ns, P<0.05, P<0.01, P<0.001 or not significant, respectively

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SUPPLEMENTARY TABLE S1b. Effect of water deficit on the glycosidically-bound volatile compounds in Merlot and Tocai Friulano fully irrigated (C) and deficit irrigated (D) wines in 2011 and 2012.

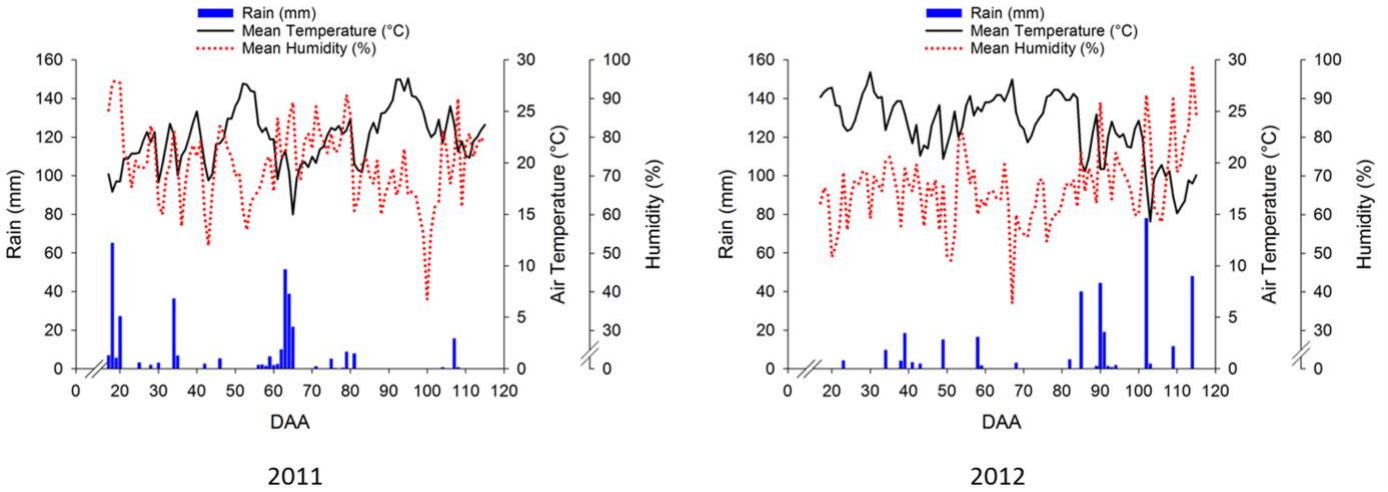
	Merlot						Tocai friulano					
Year	2011			2012			2011			2012		
Treatment	C		D	C		D	C		D	C		D
Alcohols												
2-Hexenol	32,0 ± 2.8	**	68,4 ± 8.3	12,9 ± 1.3	**	35,3 ± 2.8	--- ---		--- ---	--- ---		--- ---
***trans* 3-Hexanol**	3,9 ± 0.2	ns	4,5 ± 0.3	2,6 ± 0.2	***	5,0 ± 0.1	--- ---		--- ---	--- ---		--- ---
***cis* 3-Hexanol**	2,7 ± 0.2	**	4,3 ± 0.3	2,4 ± 0.2	**	4,4 ± 0.3	2,8 ± 0.1	ns	2,5 ± 0.4	8,5 ± 1.1	*	4,6 ± 0.2
1-Hexanol	81,4 ± 3.9	**	107,3 ± 4.9	57,3 ± 4.5	**	122,9 ± 10.5	21,3 ± 4.7	ns	21,3 ± 5.0	16,5 ± 0.5	**	34,2 ± 2.2
1-Octanol	7,0 ± 0.4	ns	8,3 ± 0.5	5,7 ± 0.2	*	8,9 ± 0.7	4,6 ± 0.6	ns	3,3 ± 0.1	4,2 ± 0.0	***	6,1 ± 0.2
Fatty acid derivatives												
Hexanoic acid	2,9 ± 0.4	ns	3,3 ± 0.2	3,2 ± 0.3	ns	4,4 ± 0.4	2,4 ± 0.4	ns	2,8 ± 0.4	2,0 ± 0.2	ns	3,0 ± 0.8
Octanoic acid	10,7 ± 0.8	***	42,1 ± 5.0	31,7 ± 4.6	ns	48,8 ± 5.0	11,6 ± 1.8	ns	8,6 ± 1.4	9,2 ± 1.5	ns	14,8 ± 3.0
Decanoic acid	8,7 ± 0.8	*	15,2 ± 1.8	17,5 ± 4.2	ns	25,8 ± 1.6	10,0 ± 1.7	ns	6,4 ± 0.8	10,0 ± 1.1	ns	15,0 ± 2.5
Palmitic acid	79,6 ± 15.9	ns	63,3 ± 7.0	112,3 ± 32.4	ns	86,3 ± 24.1	64,2 ± 19.4	ns	63,9 ± 10.0	108,0 ± 22.3	ns	101,2 ± 23.6
Phenylpropanoid derivatives												
Benzyl alcohol	3963,4 ± 259.5	***	2025,8 ± 183.0	3365,3 ± 46.7	***	1693,2 ± 42.1	229,2 ± 15.4	ns	205,0 ± 19.7	303,1 ± 8.0	ns	284,8 ± 5.4
Benzaldehyde	17,3 ± 2.4	*	9,9 ± 1.1	20,3 ± 3.8	ns	10,9 ± 1.3	1,3 ± 0.2	ns	1,3 ± 0.1	1,3 ± 0.1	ns	1,7 ± 0.2
2-Phenylethanol	581,8 ± 11.7	ns	642,7 ± 27.7	999,6 ± 39.6	ns	1239,6 ± 81.7	161,1 ± 7.3	ns	177,6 ± 20.5	229,9 ± 15.7	*	296,2 ± 7.9
Tryptophol	34,0 ± 2.6	ns	59,5 ± 12.8	47,5 ± 3.9	ns	89,6 ± 19.8	1,9 ± 0.3	ns	2,9 ± 0.5	3,4 ± 0.6	ns	10,7 ± 1.2
Vanillin	41,0 ± 6.4	ns	32,7 ± 3.9	23,0 ± 2.0	ns	18,3 ± 0.5	3,0 ± 0.5	ns	2,3 ± 0.4	3,2 ± 0.4	ns	3,8 ± 0.7
Vanillyl acetone	27,8 ± 2.6	ns	35,2 ± 6.2	21,7 ± 0.8	***	35,8 ± 0.5	1,5 ± 0.3	ns	1,7 ± 0.4	0,9 ± 0.1	ns	1,6 ± 0.4
Tyrosol	220,9 ± 61.0	ns	278,4 ± 25.6	153,9 ± 39.4	ns	206,3 ± 35.2	124,8 ± 47.6	ns	56,1 ± 13.6	70,6 ± 34.1	ns	85,8 ± 35.5
4-Vinylphenol	8,4 ± 0.5	ns	10,8 ± 1.4	6,5 ± 0.8	ns	10,8 ± 2.9	5,7 ± 0.8	ns	3,8 ± 0.4	3,9 ± 0.2	**	5,7 ± 0.2
Phenylpropanoid derivatives												
Guaiacol	1,7 ± 0.2	**	2,5 ± 0.1	2,4 ± 0.2	ns	2,6 ± 0.3	0,6 ± 0.1	ns	0,5 ± 0.1	0,5 ± 0.1	ns	0,6 ± 0.1
4-Vinylguaiacol	3,0 ± 0.2	*	18,3 ± 5.5	3,7 ± 0.3	*	40,2 ± 10.3	1,7 ± 0.2	ns	2,0 ± 0.1	2,0 ± 0.1	ns	2,1 ± 0.2
Eugenol	1,2 ± 0.1	ns	1,5 ± 0.2	1,2 ± 0.1	ns	1,5 ± 0.1	1,2 ± 0.1	ns	1,3 ± 0.2	2,1 ± 0.2	ns	2,2 ± 0.3
Monoterpenes												
Linalool	--- ---		--- ---	--- ---		--- ---	2,6 ± 1.2	ns	2,7 ± 0.6	12,1 ± 5.3	*	50,4 ± 12.5

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***trans* Linalool oxide (furanoid)**	--- ---		--- ---	--- ---		--- ---	3,8 ± 1.0	ns	3,5 ± 0.4	12,0 ± 4.0	*	40,5 ± 5.6
***cis* Linalool oxide (furanoid)**	--- ---		--- ---	--- ---		--- ---	1,3 ± 0.1	ns	1,5 ± 0.2	1,6 ± 0.2	*	2,7 ± 0.3
***trans* Linalool oxide (pyranoid)**	--- ---		--- ---	--- ---		--- ---	4,0 ± 0.3	ns	4,5 ± 0.3	6,8 ± 1.1	*	12,5 ± 1.5
***trans* 8-Hydroxylinalool**	8,3 ± 0.2	*	9,7 ± 0.5	7,1 ± 0.5	**	10,0 ± 0.3	8,9 ± 1.6	ns	7,5 ± 1.5	28,8 ± 6.9	*	86,9 ± 11.4
***cis* 8-Hydroxylinalool**	5,3 ± 0.2	***	3,2 ± 0.2	3,2 ± 0.4	*	5,1 ± 0.4	43,7 ± 12	ns	41,3 ± 13.7	190,9 ± 59.7	*	528,1 ± 46.3
Geraniol	10,4 ± 0.2	ns	10,5 ± 0.1	15,0 ± 1.0	ns	15,3 ± 0.9	10,4 ± 1.4	ns	8,1 ± 1.4	74,3 ± 3.1	ns	59,8 ± 4.6
7-Hydroxygeraniol	7,0 ± 0.5	**	9,2 ± 0.2	8,6 ± 0.4	*	12,2 ± 1.0	8,3 ± 1.2	ns	7,7 ± 1.6	32,0 ± 6.4	*	63,5 ± 4.3
Nerol	3,6 ± 0.2	ns	3,3 ± 0.1	4,4 ± 0.2	ns	4,3 ± 0.3	2,7 ± 0.5	ns	2,1 ± 0.4	12,4 ± 1.0	ns	16,5 ± 1.4
Geranic acid	5,9 ± 0.1	*	7,7 ± 0.5	7,5 ± 0.4	*	9,3 ± 0.3	0,6 ± 0.1	ns	0,6 ± 0.1	3,4 ± 0.2	*	4,4 ± 0.3
C_{13}-Norisoprenoids												
3-Hydroxy-β-damascone	94,1 ± 3.6	*	126,9 ± 10.8	99,7 ± 5.2	**	131,1 ± 3.6	70,6 ± 15.7	ns	84,5 ± 23.1	160,4 ± 17.4	*	224,3 ± 13.2
3-Oxo-α-ionol	48,5 ± 0.4	*	70,4 ± 8.5	57,6 ± 3.7	**	96,8 ± 4.8	33,9 ± 8.2	ns	58,2 ± 8.2	72,5 ± 6.1	*	96,8 ± 2.5
3-Hydroxy-7,8-dihydro-β-ionol	37,3 ± 1.4	*	52,7 ± 4.7	39,8 ± 2.3	**	61,8 ± 2.6	13,7 ± 2.9	ns	16,8 ± 3.4	39,2 ± 3.0	*	51,6 ± 2.6
Vomifoliol	9,8 ± 1.2	ns	10,1 ± 0.9	8,6 ± 1.1	ns	10,4 ± 1.7	12,6 ± 4.6	ns	19,2 ± 3.6	17,4 ± 1.8	ns	22,0 ± 2.9

The average concentration of each compounds ± SE is represented as µl/L of n-heptanol equivalents. The difference between treatments was assessed with a one-way ANOVA. The level of significance is reported within the columns: *, **, *** or ns, $P < 0.05$, $P < 0.01$, $P < 0.001$ or not significant, respectively.

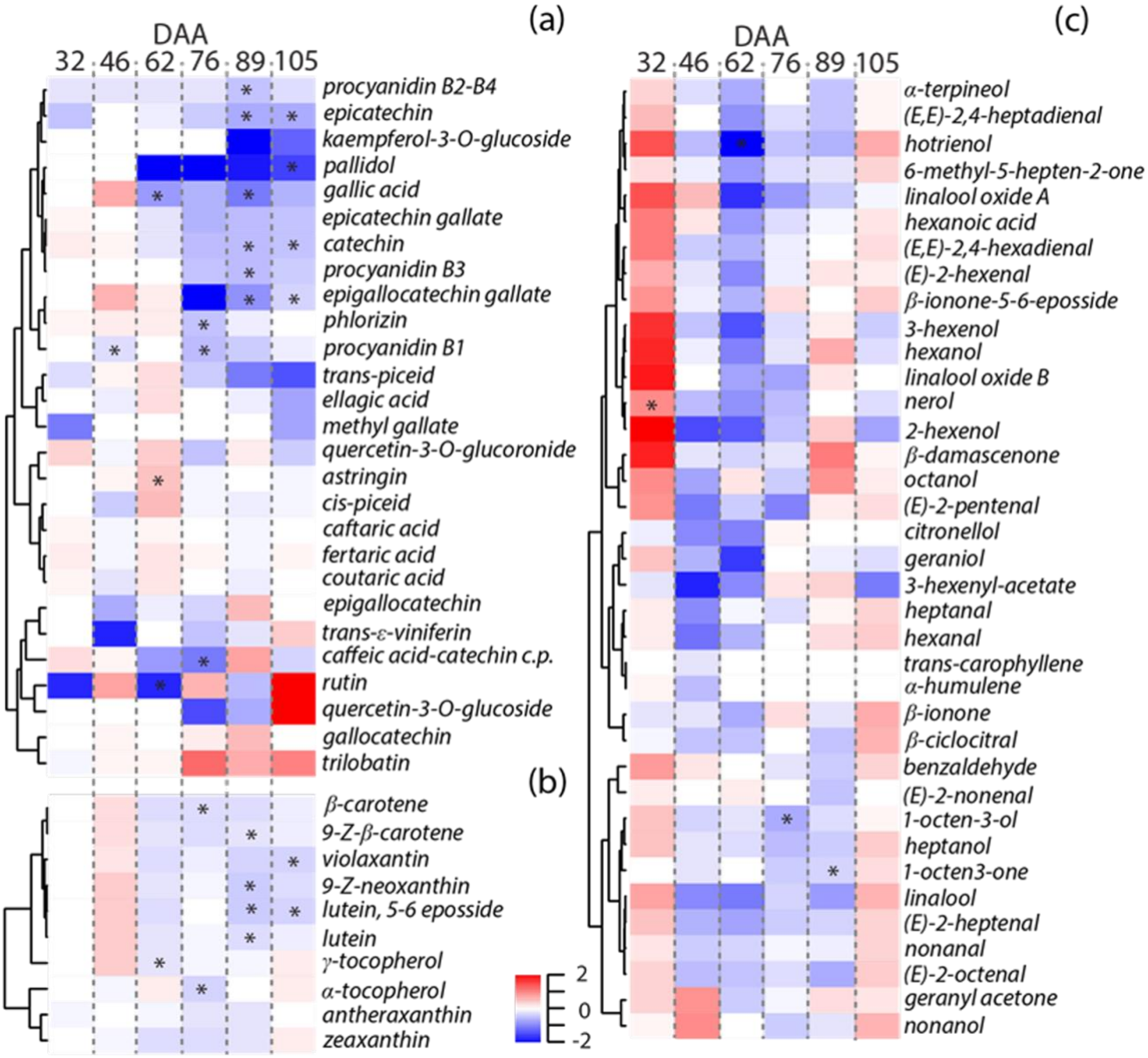
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SUPPLEMENTARY FIGURE S1. Weather conditions at the experimental site.

Measurement of rain (mm), mean air temperature (°C), and mean humidity (%) were recorded by an automated weather station located 100 m from the experimental site during the 2011 and 2012 seasons.

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SUPPLEMENTARY FIGURE S2. Effect of water deficit on secondary metabolites during fruit development in Tocai Friulano 2011.

Heatmaps represent log_2fold change (D/C) of the (a) phenolic, (b) carotenoid and tocopherol, and (c) VOC concentration under water deficit conditions during berry development and ripening. Blue and red boxes indicate lower and higher concentration in D respectively. Asterisks indicate significant differences ($P < 0.05$) between treatments. Metabolites were hierarchically clustered based on their response to water deficit. Methods for the metabolites analyses were the same as for the Tocai Friulano 2012 data and are described in (Savoi *et al.*, 2016).