

**Table S1.** Specific primers used for qRT-PCR.

Gene		Primer (5'→3')
<i>VvActin</i>	Forward	CTTGCATCCCTCAGCACCTT
	Reverse	TCCTGTGGACAATGGATGGA
<i>VvOMT</i>	Forward	CCATAAGCAAACCCTAAACC
	Reverse	TGAACAAATTCTTGGCATCA
<i>VvUFGT</i>	Forward	GGGATGGTAATGGCTGTGG
	Reverse	ACATGGGTGGAGAGTGAGTT
<i>VvGST1</i>	Forward	CCAAAGAGCAAAAAGCCAAGT
	Reverse	TGTCCAGAAAACCCAAAGTC
<i>VvGST2</i>	Forward	CCCAACCCCTGAAAATCTTGCT
	Reverse	AGCGACAACCTCGCATCACTG
<i>VvGST3</i>	Forward	GTGGAACAATGGCTGGAGGT
	Reverse	CAC TTTCGCATCTGGGGGAA
<i>VvGST4</i>	Forward	CCTACCTCGAATGGGTGAGC
	Reverse	GTAACCAAGTGCGCCATTCC
<i>AM1</i>	Forward	TGCTTTTGTGATTTTGTTAGAGG
	Reverse	CCCTTCCCCGATTGAGAGTA
<i>AM3</i>	Forward	TGCTTTTGTGATTTTGTTAGAGG
	Reverse	CCCTTCCCCGATTGAGAGTA

**Table S2.** The identification of anthocyanin in 5 cultivars (mg/g DW grape skin).

	Cabernet Sauvignon			Pinot Noir			Syrah			Yan 73			Dunkelfelder		
	8WAA	12WAA	16WAA	8WAA	12WAA	16WAA	8WAA	12WAA	16WAA	8WAA	12WAA	16WAA	8WAA	12WAA	16WAA
Dp	32.83 ± 0.05	909.58 ± 1.02	1276.06 ± 25.74	13.15 ± 0.00	125.84 ± 0.03	358.86 ± 0.13	59.26 ± 0.10	941.33 ± 0.47	1151.80 ± 5.40	123.13 ± 0.08	6400.06 ± 2.31	11717.82 ± 10.76	107.08 ± 1.10	3906.72 ± 0.93	7589.28 ± 3.54
Cy	1.54 ± 0.05	132.18 ± 0.10	160.72 ± 0.03	1.03 ± 0.00	19.71 ± 0.46	161.20 ± 0.52	9.05 ± 0.10	167.37 ± 14.67	178.10 ± 0.57	30.40 ± 0.03	1509.25 ± 0.51	2578.87 ± 39.19	28.47 ± 1.14	772.55 ± 0.08	1777.51 ± 1.97
Pt	18.38 ± 0.10	667.00 ± 0.11	875.49 ± 0.30	14.97 ± 0.00	236.17 ± 0.95	399.08 ± 0.57	60.11 ± 0.13	1102.06 ± 1.19	1336.19 ± 7.43	117.89 ± 0.18	5316.68 ± 2.82	9600.74 ± 62.08	148.85 ± 1.40	4029.92 ± 1.38	7195.35 ± 7.33
Pn	19.26 ± 0.00	668.01 ± 0.17	813.28 ± 0.64	64.05 ± 0.00	1090.68 ± 0.66	1841.33 ± 0.32	71.15 ± 0.39	893.85 ± 0.70	1291.49 ± 6.86	211.92 ± 0.26	5981.98 ± 32.68	12101.42 ± 34.38	130.73 ± 2.40	3518.71 ± 1.12	7701.94 ± 10.80
Mv	112.40 ± 0.13	4453.52 ± 0.21	6653.84 ± 4.70	192.80 ± 0.00	5140.69 ± 20.23	4820.65 ± 2.54	264.46 ± 0.26	4334.14 ± 2.33	6333.70 ± 25.35	763.03 ± 0.40	20963.90 ± 99.55	36615.84 ± 18.28	595.57 ± 3.39	18625.23 ± 3.75	29708.69 ± 26.05
Dp-ac	3.02 ± 0.18	250.43 ± 0.13	317.26 ± 0.72	nd	nd	nd	nd	259.61 ± 0.21	256.20 ± 0.05	12.26 ± 0.05	1549.749 ± 19.55	2478.50 ± 9.60	23.05 ± 1.76	559.62 ± 0.21	1090.78 ± 7.69
Cy-ac	nd	35.16 ± 0.05	75.15 ± 3.91	nd	nd	nd	nd	59.64 ± 1.29	68.28 ± 2.37	nd	312.56 ± 8.52	653.09 ± 1.46	nd	127.83 ± 0.05	214.44 ± 1.60
Pt-ac	nd	269.32 ± 0.93	329.31 ± 1.29	nd	nd	nd	nd	389.367 ± 0.26	407.91 ± 9.17	15.98 ± 0.15	1622.33 ± 14.85	2521.52 ± 4.68	27.97 ± 1.19	717.30 ± 1.61	1103.31 ± 5.80
Dp-co	nd	82.66 ± 1.03	166.59 ± 5.49	nd	nd	nd	nd	71.65 ± 3.99	132.37 ± 17.87	nd	437.91 ± 24.13	755.25 ± 4.94	nd	347.29 ± 1.60	529.90 ± 17.16
Pn-ac	9.55 ± 1.34	396.97 ± 0.59	467.46 ± 4.89	nd	nd	nd	26.90 ± 0.15	969.19 ± 2.29	1032.02 ± 16.18	42.23 ± 0.10	1838.86 ± 24.49	3028.94 ± 10.78	46.05 ± 0.05	1189.10 ± 0.66	1818.99 ± 1.91
Mv-ac	80.74 ± 2.76	3212.91 ± 3.66	4226.38 ± 4.45	nd	nd	nd	52.26 ± 0.77	2205.99 ± 0.85	2940.27 ± 19.64	217.25 ± 0.54	7064.89 ± 11.84	10519.05 ± 14.23	131.90 ± 1.12	3912.87 ± 0.23	5270.74 ± 5.76
Cy-co	nd	14.28 ± 0.52	nd	nd	nd	nd	nd	62.60 ± 0.62	23.02 ± 0.59	nd	nd	nd	nd	27.18 ± 1.31	47.81 ± 0.44
Mv-ca	nd	116.76 ± 0.28	nd	nd	nd	nd	nd	376.21 ± 1.06	232.54 ± 0.31	nd	nd	279.13 ± 3.12	nd	276.10 ± 1.83	367.66 ± 4.89
Pt-co	nd	73.48 ± 0.28	46.45 ± 0.41	nd	nd	nd	9.23 ± 0.05	586.84 ± 0.66	624.89 ± 1.57	2.93 ± 0.05	574.15 ± 0.17	756.13 ± 1.25	28.79 ± 0.03	771.59 ± 0.87	969.71 ± 3.52
c-Pn-co	nd	1.35 ± 0.10	102.50 ± 4.71	nd	nd	nd	nd	86.48 ± 0.08	46.67 ± 0.23	nd	nd	17.28 ± 3.94	nd	16.58 ± 1.31	33.11 ± 0.28
c-Mv-co	nd	46.99 ± 0.08	483.39 ± 1.67	nd	nd	nd	nd	1195.09 ± 3.09	146.00 ± 0.10	nd	71.21 ± 0.08	97.01 ± 7.29	nd	93.48 ± 0.90	123.25 ± 1.11
t-Pn-co	nd	173.91 ± 0.03	207.85 ± 0.23	nd	nd	nd	26.01 ± 0.41	nd	1233.82 ± 7.18	10.81 ± 0.15	644.22 ± 0.23	1088.63 ± 7.96	24.47 ± 0.15	682.46 ± 0.23	1094.36 ± 4.09
t-Mv-co	15.57 ± 0.49	1005.02 ± 0.15	1455.55 ± 1.14	nd	nd	nd	70.39 ± 0.33	3382.47 ± 0.49	4443.15 ± 15.89	88.59 ± 0.21	3317.93 ± 1.04	4518.22 ± 2.03	145.82 ± 1.04	4634.41 ± 3.41	5481.59 ± 1.27
Total anthocyanins	293.30 ± 4.17	12509.52 ± 2.25	17257.28 ± 30.15	286.01 ± 0.00	6613.09 ± 10.62	7581.12 ± 12.83	648.82 ± 1.62	17173.88 ± 7.50	21878.42 ± 135.94	1636.42 ± 0.81	57739.33 ± 78.30	99327.44 ± 158.01	1438.75 ± 10.39	44208.97 ± 14.61	72118.42 ± 56.08

Note: 'nd' means not detected. Dp, delphinidin-3-glucoside. Cy, cyanidin-3-glucoside. Pt, petunidin-3-glucoside. Pn, peonidin-3-glucoside. Mv, malvidin-3-glucoside. Dp-ac, delphinidin-3-glu acetate. Cy-ac, cyanidin -3-glu acetate. Pt-ac, petunidin-3-glu acetate. Dp-co, delphinidin-3-glu coumarate. Pn-ac, peonidin-3-glu acetate. Mv-ac, malvidin-3-glu acetate. Cy-co, cyanidin -3-glu coumarate. Mv-ca, malvidin-3-glu caffeate. Pt-co, petunidin-3-glu coumarate. c-Pn-co, cis-peonidin-3-glu coumarate, c-Mv-co, cis-malvidin-3-glu coumarate. t-Pn-co, trans-peonidin-3-glu coumarate. t-Mv-co, trans-malvidin-3-glu coumarate.

**Table 3.** Ratio of anthocyanin components.

Cultivars	WAA	Cyanidins	Delphinidins	Peonidins	Petunidins	Malvidins
Cabernet Sauvignon	8	1.54 ± 0.84eD	35.85 ± 0.49bC	28.81 ± 0.69cD	18.38 ± 0.09dD	208.72 ± 5.22aC
	12	181.62 ± 6.25cC	1242.67 ± 15.35bC	1240.23 ± 8.68bD	1009.8 ± 24.24bD	8835.2 ± 309.23aBC
	16	235.88 ± 3.25dC	1759.91 ± 18.88bC	1591.09 ± 12.73bcDE	1251.25 ± 55.06cD	12419.16 ± 149.03aC
Pinot Noir	8	1.03 ± 0.26dD	13.15 ± 0.65cD	64.05 ± 2.56bC	14.97 ± 0.19cD	192.8 ± 9.64aC
	12	19.71 ± 0.95eD	125.84 ± 2.85dD	1090.68 ± 5.45bD	236.17 ± 11.34cE	5226.35 ± 109.75aC
	16	200.65 ± 5.40dCD	436.00 ± 17.4cD	1981.67 ± 11.89bD	428.27 ± 6.42cE	5524.78143.64aD
Syrah	8	9.05 ± 0.28dC	59.26 ± 3.28cB	124.06 ± 3.85bB	69.34 ± 2.77cC	387.11 ± 1.94aB
	12	289.61 ± 3.74dC	1272.59 ± 18.82cC	2039.52 ± 93.82bC	2078.27 ± 85.21bC	11493.9 ± 218.38aB
	16	269.40 ± 3.90eC	1540.36 ± 13.90dC	3604.01 ± 25.23bC	2368.99 ± 14.21cC	14095.65 ± 521.54aC
Yan 73	8	30.40 ± 0.85dA	135.39 ± 1.28cA	264.95 ± 3.71bA	136.8 ± 5.06cB	1068.87 ± 28.86aA
	12	1955.48 ± 23.36cA	8387.7 ± 51.00bA	8465.06 ± 33.86bA	7513.16 ± 37.57bA	31417.93 ± 1162.46aA
	16	3231.97 ± 33.42dA	14951.57 ± 128.84bcA	16236.26 ± 204.94bA	12878.39 ± 489.38cA	52029.25 ± 1352.76aA
Dunkelfelder	8	24.94 ± 1.60cB	146.91 ± 3.68bA	235.31 ± 3.47bA	183.72 ± 4.29bA	882.82 ± 22.69aA
	12	927.56 ± 5.60cB	4813.64 ± 25.12bB	5406.86 ± 16.22bB	5518.81 ± 11.04bB	27542.1 ± 936.43aA
	16	2039.76 ± 11.65cB	9209.96 ± 84.39bB	10648.4 ± 95.85bB	9268.37 ± 185.37bB	40951.93 ± 1883.79aB

Note: Results were expressed as means ± SD of three biological replicates for ( $n = 3$ ). Different lowercase letters in the same line demonstrated that the difference was significant ( $p < 0.05$ ). Capital letters in the same row and same period demonstrated that the difference was significant ( $p < 0.05$ ).

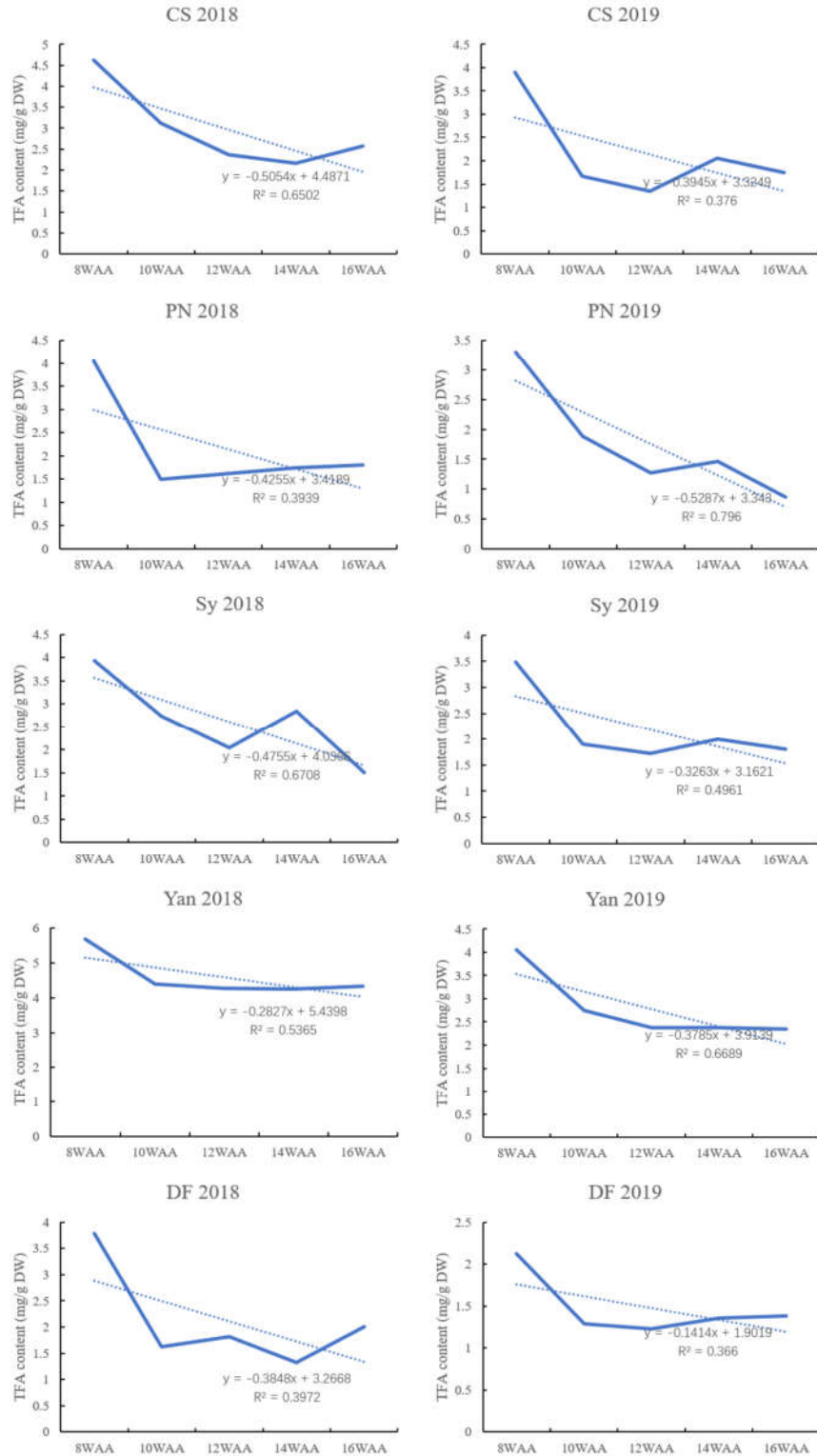


Figure S1 Regression analysis of TFA content.

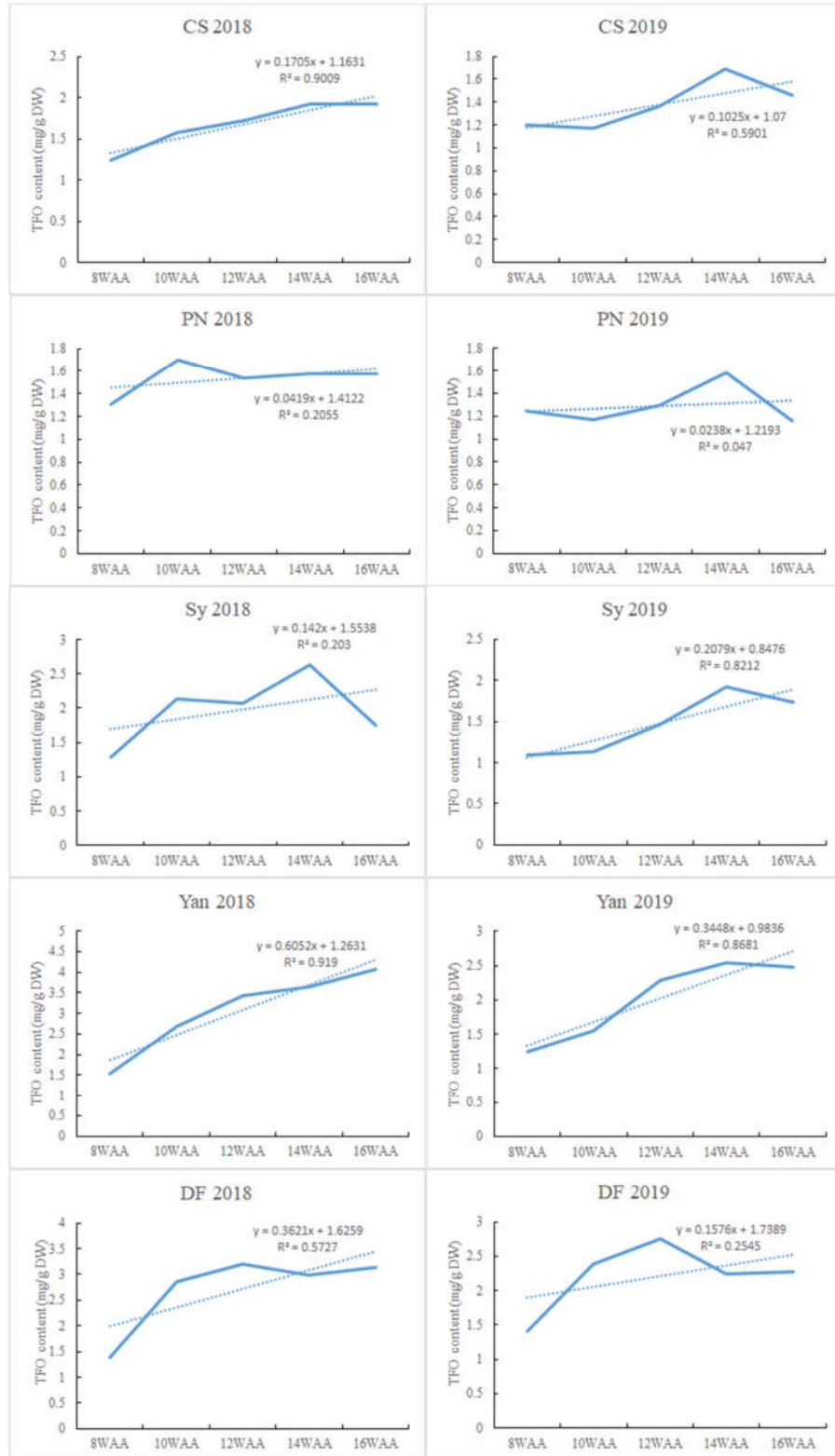


Figure S2 Regression analysis of TFO content.