Abscisic Acid and Chitosan Modulate Polyphenol Metabolism and Berry Qualities in the Domestic White-Colored Cultivar Savvatiano

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Supplementary Data

Table S1: Date of biostimulant applications during 2019 and 2020 vintages.

	Biostimulant Application			
	2019		**2020**	
	Abscisic Acid	Chitosan	Abscisic Acid	Chitosan
1st application	23st August	16th August	27th August	21th August
2nd application	27th August	23st September	1th August	27th August
3rd application	30th August	30th August	4th September	4th September
	Sampling Dates			
1st Sampling	30th August	30th August	4th September	4th September
2nd Sampling	10th September	10th September	15th September	15th September
3rd Sampling (Harvest)	29th September	29th September	24th September	24th September

Figure S1: Map of Central Greece showing the location of the experimental vineyard

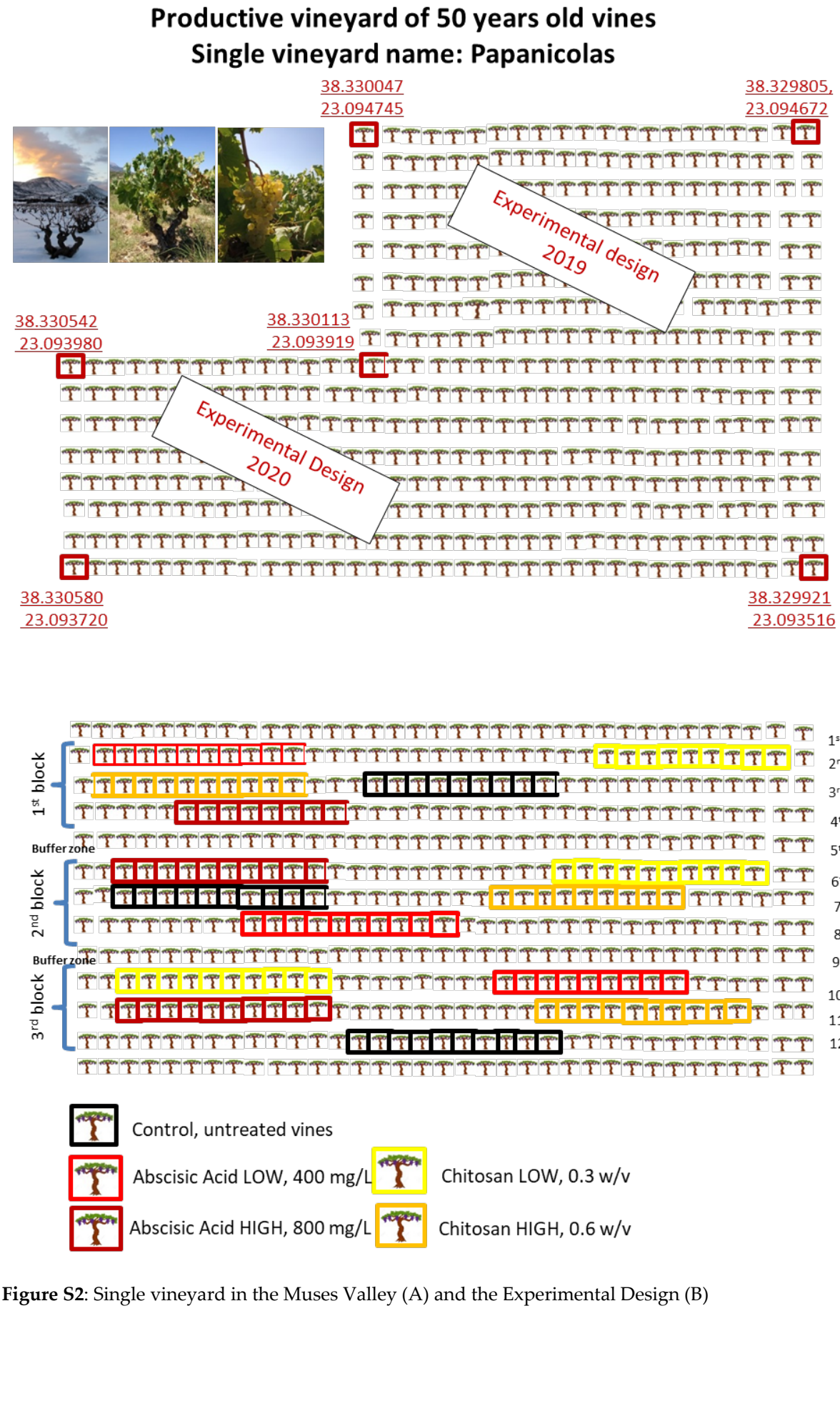

Figure S2: Single vineyard in the Muses Valley (A) and the Experimental Design (B)

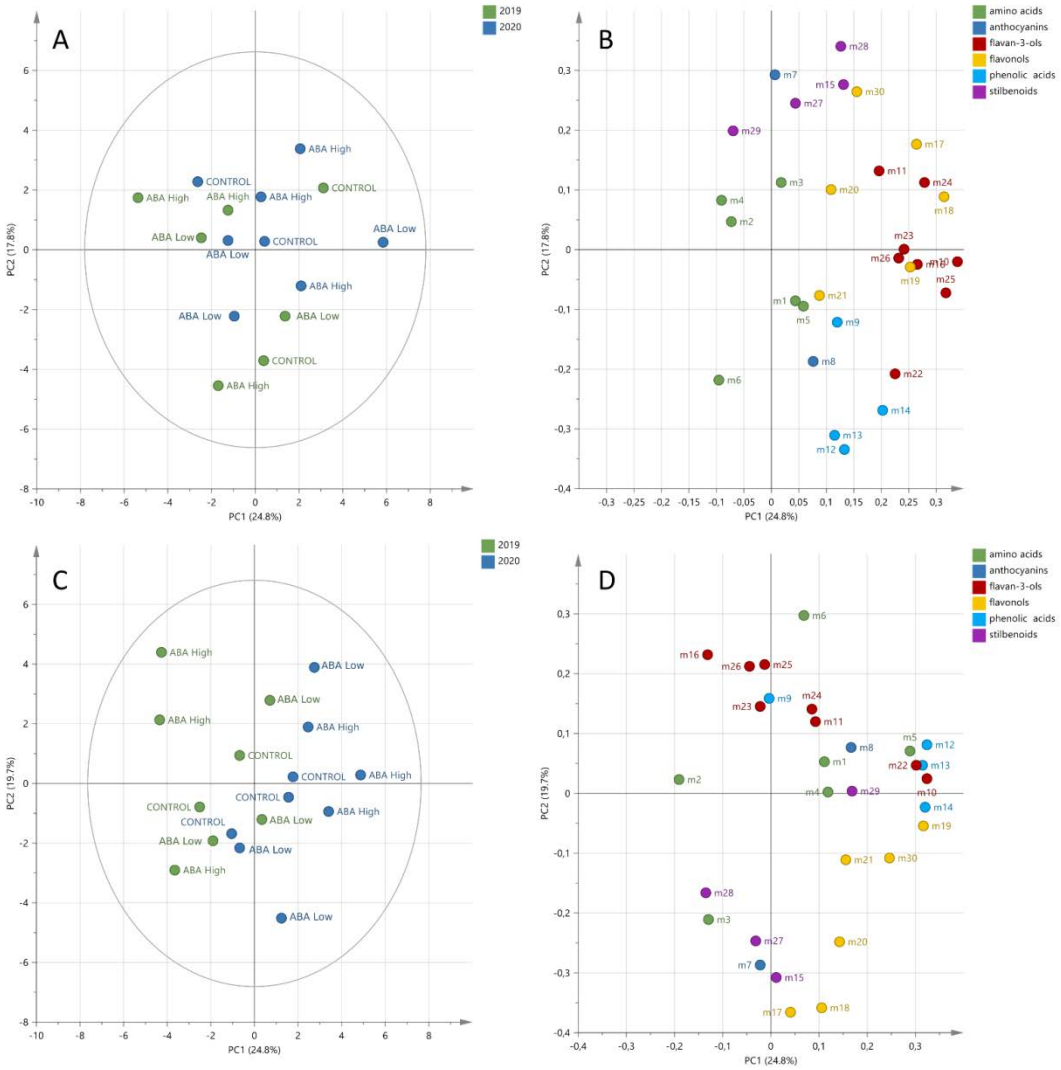

Figure S3: Unsupersvised classification using principal component analysis on metabolomic data from grape berries of cultivar Savvatiano at middle veraisson (A, B) and harvest (C, D) stages in 2019 and 2020 treated with ABA. Samples in the score plots (A, C) were colored according to the vintage, and variables in loading plots (B, D) were colored according to the metabolic class. Numbers indicate the ID of metabolites, as follows: L-proline (m1), L-leucine (m2), L-isoleucine (m3), L-phenylalanine (m4), L-tyrosine (m5), L-tryptophan (m6), cyanidin-3-*O*-galactoside (m7), peonidin-3-*O*-(6-*p*-coumaroyl-glucoside) (m8), gallic acid (m9), catechin (m10), epicatechin (m11), coutaric acid (m12), caftaric acid (m13), fertaric acid (m14), E-piceid (m15), catechin-gallate (m16), kaempferol-3-O-glucoside (m17), quercetin-3-*O*-glucoside (m18), quercetin-*O*-glucuronide (m19), quercetin-3-*O*-glucuronide (m20), myricetin-glucoside (m21), procyanidin B1 (m22), procyandin B2 (m23), procyanidin B3 (m24), procyanidin B4 (m25), procyanidin-gallate (m26), *E*-resveratrol (m27), *E*-piceatannol (m28), *E*-ε-viniferin (m29), kaempferol-3-*O*-rutinoside (m30).

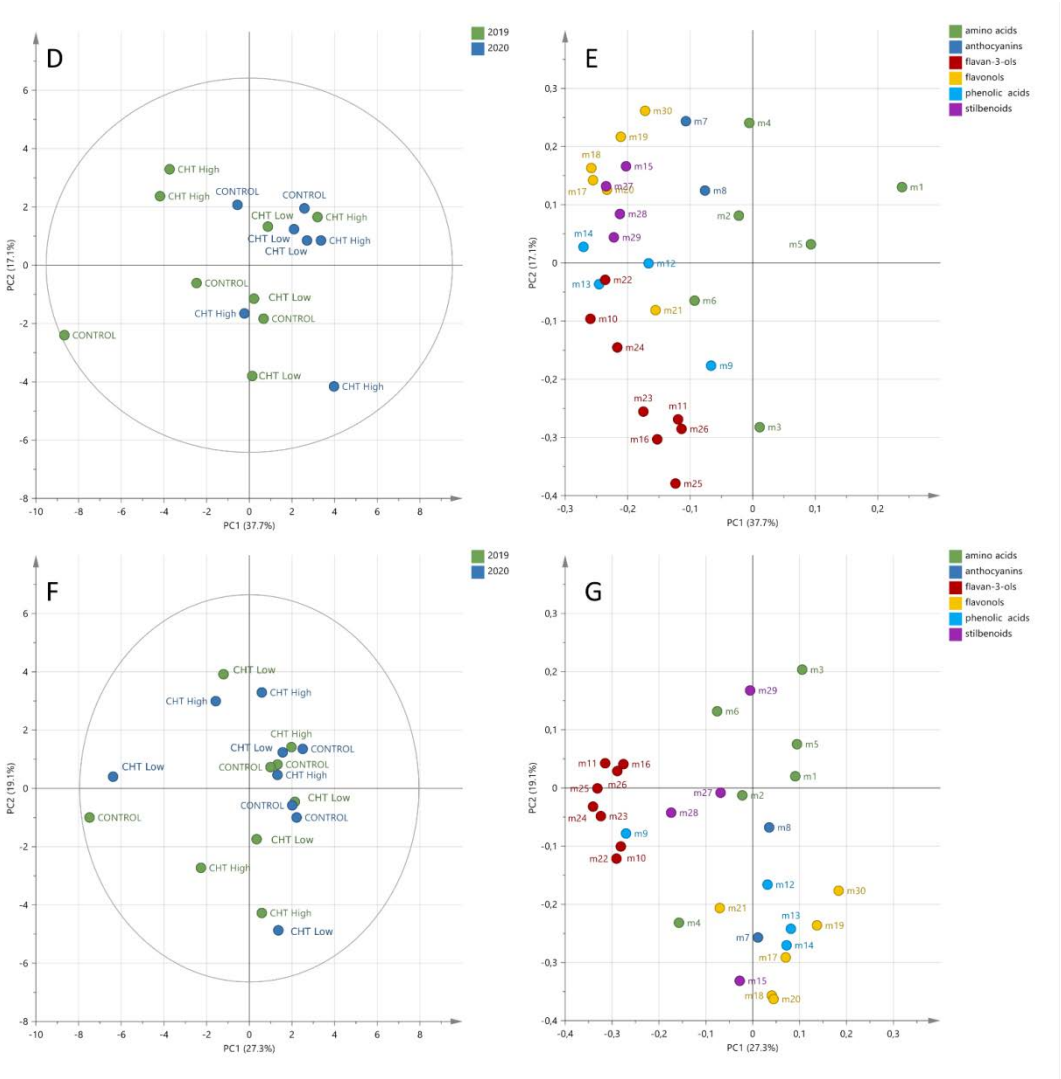

Figure S4: Unsupersvised classification using principal component analysis on metabolomic data from grape berries of cultivar Savvatiano at middle veraison (A, B) and harvest (C, D) stages in 2019 and 2020 treated with chitosan. Samples in the score plots (A, C) were colored according to the vintage, and variables in loading plots (B, D) were colored according to the metabolic class. Numbers indicate the ID of metabolites, as follows: L-proline (m1), L-leucine (m2), L-isoleucine (m3), L-phenylalanine (m4), L-tyrosine (m5), L-tryptophan (m6), cyanidin-3-O-galactoside (m7), peonidin-3-O-(6-p-coumaroyl-glucoside) (m8), gallic acid (m9), catechin (m10), epicatechin (m11), coutaric acid (m12), caftaric acid (m13), fertaric acid (m14), E-piceid (m15), catechin-gallate (m16), kaempferol-3-O-glucoside (m17), quercetin-3-O-glucoside (m18), quercetin-O-glucuronide (m19), quercetin-3-O-glucuronide (m20), myricetin-glucoside (m21), procyanidin B1 (m22), procyandin B2 (m23), procyanidin B3 (m24), procyanidin B4 (m25), procyanidin-gallate (m26), E-resveratrol (m27), E-piceatannol (m28), E-ε-viniferin (m29), kaempferol-3-O-rutinoside (m30)

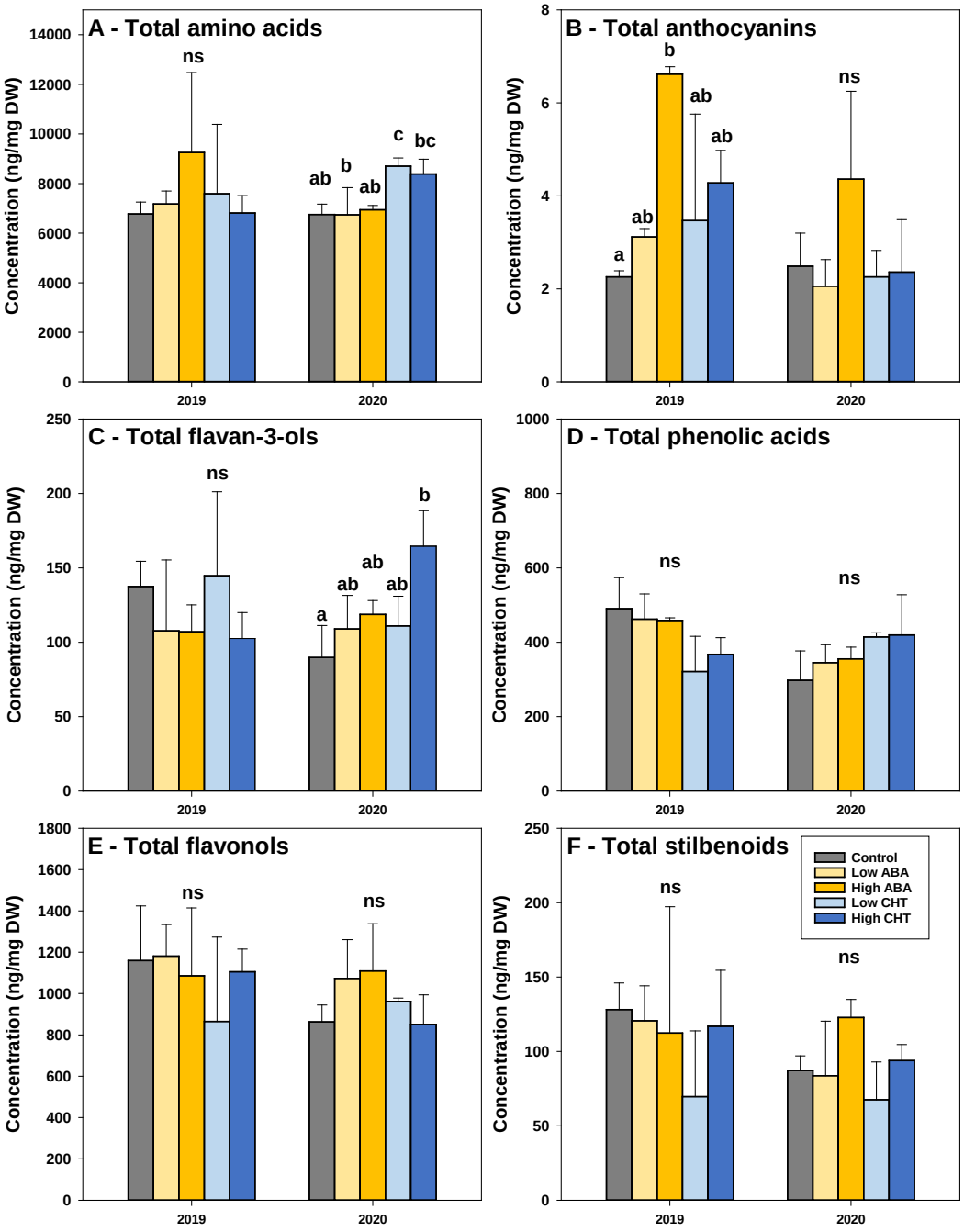

Figure S5: Total concentrations of amino acids (A), anthocyanins (B), flavan-3-ols (C), phenolic acids (D), flavonols (E) and stilbenoids (F) in Savvatiano berries at middle veraison stage in 2019 and 2020 depending on the treatment: control (grey), low concentration of abscisic acid (light yellow), high concentration of abscisic acid (dark yellow), low concentration of chitosan (light blue) and high concentration of chitosan (dark blue). Error bars represent the standard deviations. No significant difference (ns) were found between values with the same letters (one-way ANOVA, p-value > 0.05)

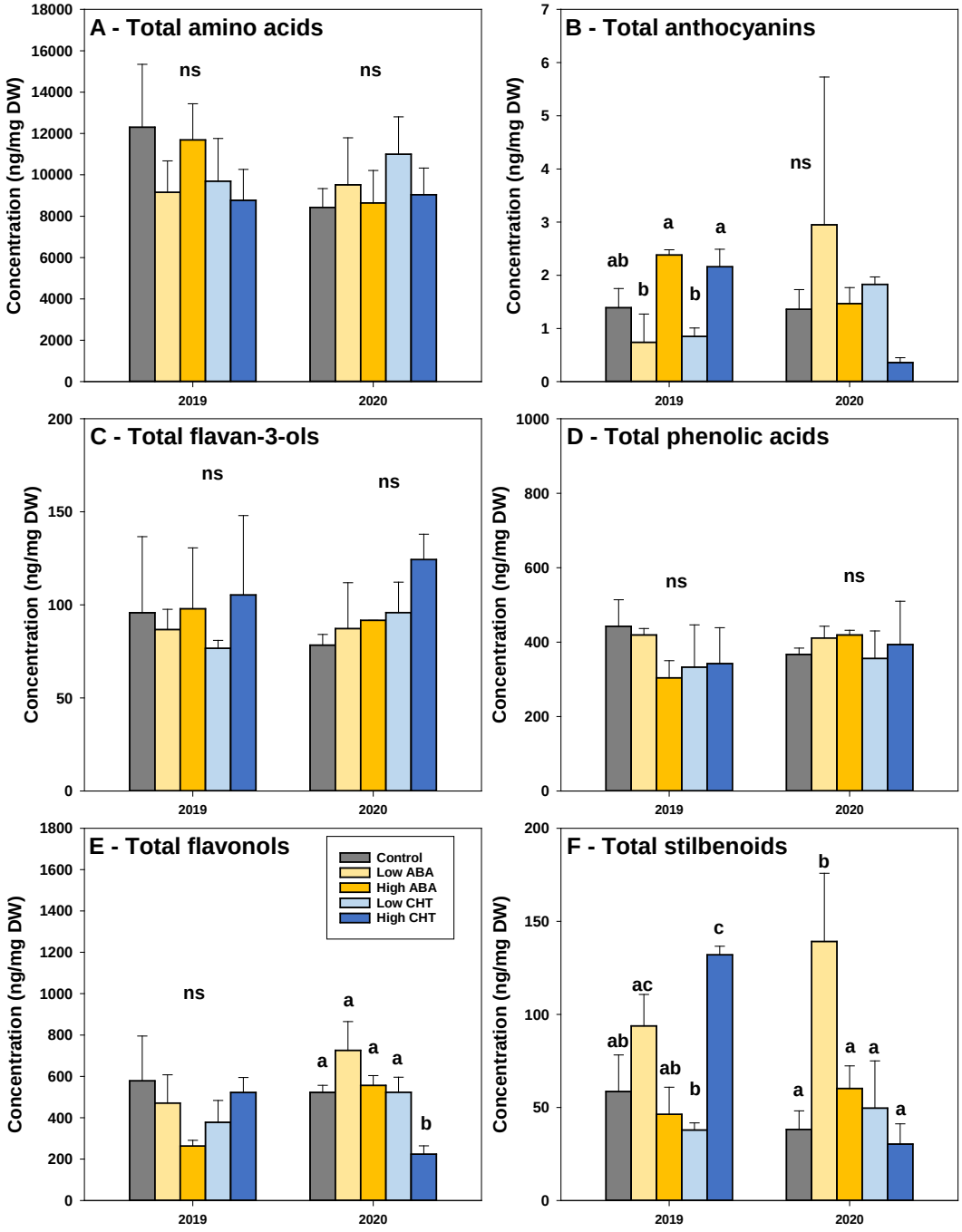

Figure S6: Total concentrations of amino acids (A), anthocyanins (B), flavan-3-ols (C), phenolic acids (D), flavonols (E) and stilbenoids (F) in Savvatiano berries at harvest stage in 2019 and 2020 depending on the treatment : control (grey), low concentration of abscisic acid (light yellow), high concentration of abscisic acid (dark yellow), low concentration of chitosan (light blue) and high concentration of chitosan (dark blue). Error bars represent the standard deviations. No significant difference (ns) were found between values with the same letters (one-way ANOVA, p-value > 0.05).

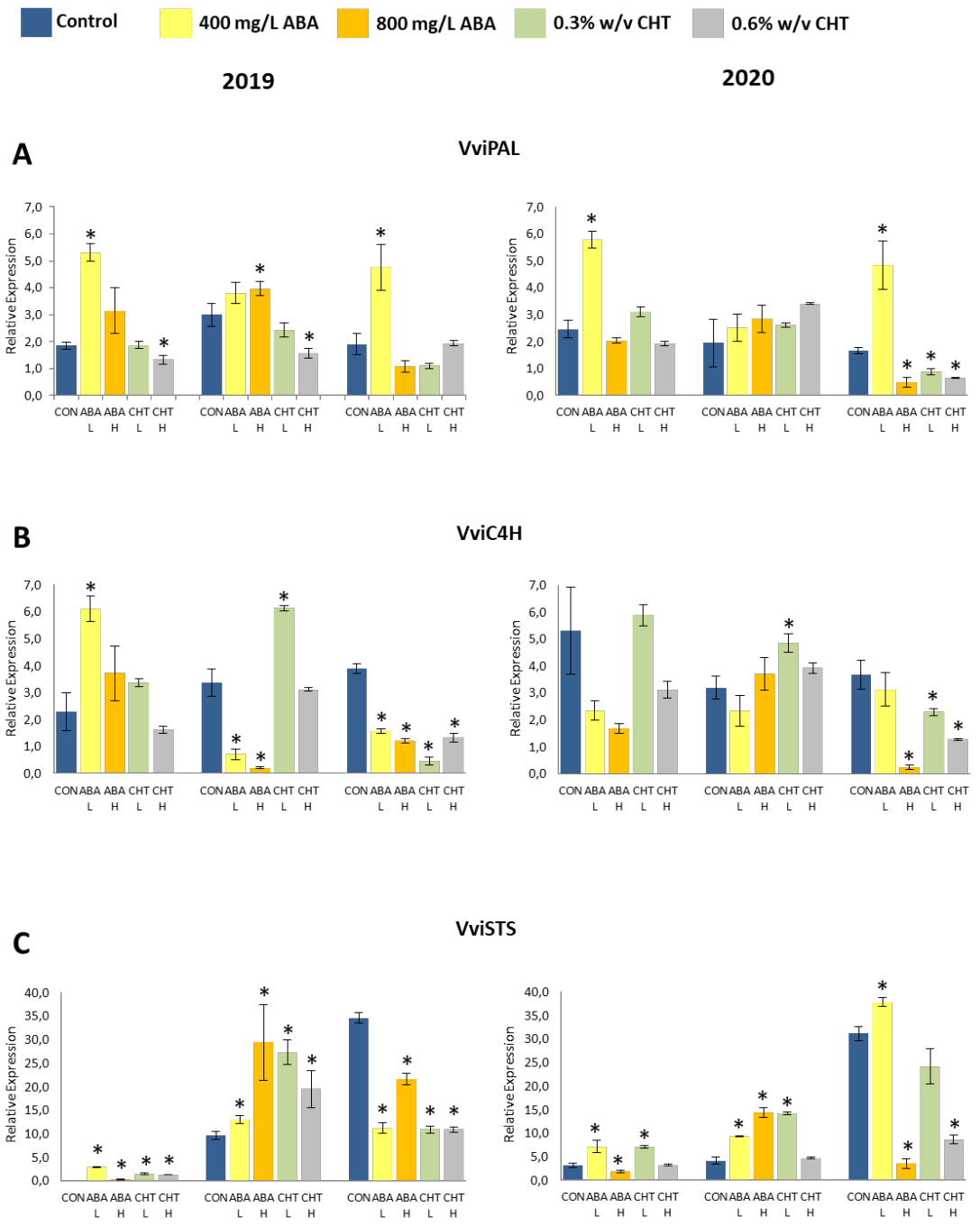

Figure S7: Expression level of genes involved in phenylpropanoid pathway (VviPAL (A), VviC4H (B) and VviUFGT (C)) in Savvatiano during two vegetative seasons (2019 and 2020). Vertical bars represent the standard deviation and asterisks indicate the statistically significant differences (Student's *t*-test, p–value < 0.05). The three sampling points (veraison; middle veraison, and harvest,) are indicated under each graphs

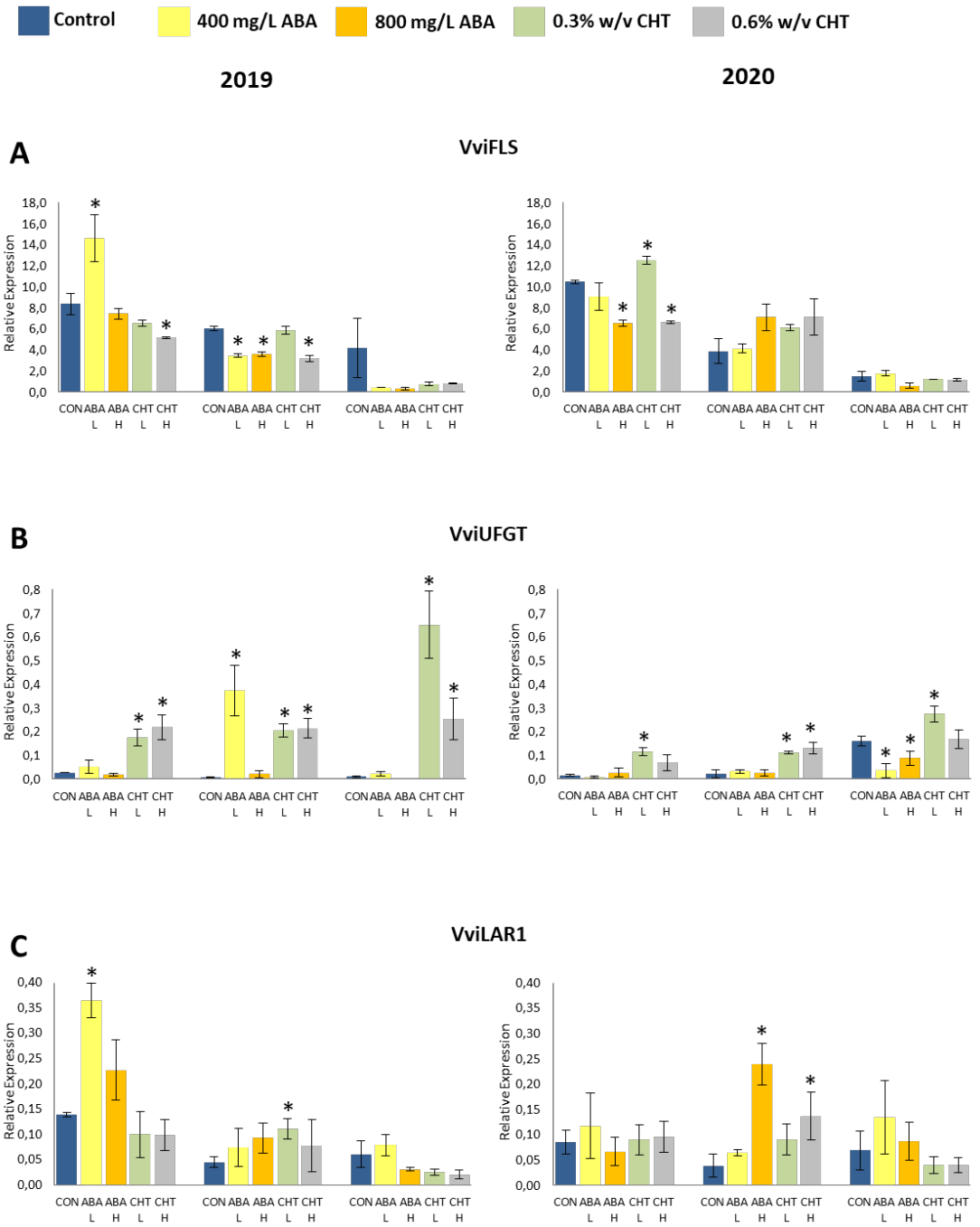

Figure S8: Expression levels of genes involved in phenylpropanoid pathway (VviFLS (A), VviUFGT (B) and VviLAR1 (C)) in Savvatiano during two vegetative seasons (2019 and 2020). Vertical bars represent the standard deviation and asterisks indicate the statistically significant differences (Student's *t*-test, p–value < 0.05). The three sampling points (veraison; middle veraison, and harvest,) are indicated under each graphs.

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