Impact of oenological processing aids and additives on the genetic traceability of 'Nebbiolo' wine produced with withered grapes

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Supplementary material

Table S1. Primers and probes used for the SNP genotyping.

ID marker	SNP position	Allele Nebbiolo	Allele non-Nebbiolo	ID Oligo	Primer and Probe sequences 5'-3'	Length of the fragment (bp)
SNP_14783	chr8_13053532	G	A	For	GAGCACAATCAACAATTATCCATTT	83
				Rev	TGGTTGTGTTAATAGCAGGCAA	
				Probe Allele A	FAM-TAAAAAAGTGTTAAGGTGATAAT-NFQ	
				Probe Allele G	VIC-TAAAAAAGTGTTAAGGTGATGAT-NFQ	
SNP_15082	chr8_19402046	T	C	For	TCTCTTCTGGCATGGAAATCAAT	89
				Rev	TAGATTACGGGCCAAGCTGA	
				Probe Allele T	FAM-TCTCATTTTCCTCATTAT-NFQ	
				Probe Allele C	VIC-TCTCATTTTCCTCATCATG-NFQ	

Table S2. Characterization of 'Nebbiolo' wine before the treatments. Data are mean values ± SDs of two replicates.

Wine parameter	
Ethanol (% v/v)	13.61±0.00
Glycerol (g/L)	11.08±0.02
pH	3.46±0.00
Total acidity (g/L tartaric acid)	6.32±0.08
Malic acid (g/L)	0.04±0.02
Lactic acid (g/L)	1.95±0.00
Tartaric acid (g/L)	1.60±0.06
Citric acid (g/L)	0.13±0.01
Acetic acid (g/L)	0.30±0.00
Free SO_2 (mg/L)	10.50±0.71
Total SO_2 (mg/L)	76.48±0.91
Turbidity (NTU)	15.05±0.01
Color intensity (AU)	8.29±0.01
Hue	0.75±0.00
L*	16.2±0.0
a*	46.99±0.04
b*	27.12±0.02
Total phenolics (mg/L (-)–epicatechin)	3163±70
Total anthocyanins (mg/L malvidin-3-O-glucoside chloride)	148.4±1
Total flavonoids (mg/L (+)–catechin)	1063±6

Table S3. DNA quantity and quality extracted from 'Nebbiolo' wines treated with different additives and processing aids using Plant/Fungi DNA Isolation Kit (Norgen). For each treatment repetition, one sample was extracted (R1, R2, and R3). Purity and yield measured using NanoDrop. Allelic profiles of genotyping assays SNP_15082 and SNP_14783. '-' in the allelic profile denotes an incorrect allelic call; '+' indicates samples that correctly amplified, and 'nd' stands for 'not detected'. Data are means of 3 replicates ± standard deviation. Values followed by different letters within a column are significantly different ($p < 0.05$, Kruskal-Wallis test with Conover's Comparison test). CONTR20: untreated control sampled one year before the application of additives; CONTR: untreated control; BEN: bentonite; GEL: gelatine; VEG: vegetable protein; PVPP: polyvinylpolypyrrolidone; YST: yeast hulls; CHT: chitosan; MAN: mannoprotein; ARG: arabic gum; POL: potassium polyaspartate; TAN: grape skin tannin.

Sample	**Treatment**	**NanoDrop Quantification**			**SNP_14783**			**SNP_15082**		
		DNA yield [ng/mL of wine]	**A_{260}/A_{280}**	**A_{260}/A_{230}**	**Alleles**			**Alleles**		
					R1	**R2**	**R3**	**R1**	**R2**	**R3**
CONTR20	-	33.7±6.5 a	1.35±0.15 a	0.51±0.15 a	+	+	+	+	+	+
CONTR	-	5.2±1.1 b	1.13±0.11 a	0.26±0.04 a	nd	-	nd	-	-	-
BEN	Bentonite	3.4±1.8 b	1.13±0.08 a	0.23±0.14 a	-	-	-	-	-	-
GEL	Gelatine	6.8±3.1 b	1.19±0.07 a	0.31±0.01 a	-	-	-	-	-	-
VEG	Vegetables protein	7.6±1.8 b	1.27±0.05 a	0.31±0.03 a	-	-	-	-	-	-
PVPP	Polyvinylpolypyrrolidone	5.8±0.9 b	1.05±0.19 a	0.24±0.09 a	-	-	-	-	-	-
YST	Yeasts hulls	7.5±3.1 b	1.18±0.06 a	0.27±0.02 a	nd	nd	nd	nd	nd	nd
CHT	Chitosan	7.4±2.4 b	0.98±0.06 a	0.21±0.04 a	-	nd	nd	nd	nd	-
MAN	Yeast mannoprotein	11.9±5.1 b	1.17±0.09 a	0.25±0.03 a	-	-	-	-	-	-
ARG	Arabic gum	16.6±19.9 b	1.11±0.06 a	0.29±0.06 a	nd	nd	nd	nd	nd	nd
POL	Potassium polyaspartate	6.7±0.8 b	1.08±0.09 a	0.26±0.06 a	+	nd	nd	nd	+	nd
TAN	Grape skin tannin	5.5±1.2 b	1.03±0.14 a	0.31±0.12 a	-	nd	-	nd	nd	-