SUPPLEMENTARY DATA
Rumbaugh, A., Cantu, A., Javier, F., Andrea Vergara Rosales, C., Von Baer Von Lochow, D., Maioli, F., … Balic, J. (2026). Wildfire smoke impact on País Wine composition and quality in Chile. *OENO One*, *60*(4).
https://doi.org/10.20870/oeno-one.2026.60.4.9850

SUPPLEMENTARY DATA

Table S1. Chemical standards and reagents used for the analysis of volatile phenols and select volatile phenol glycosides, as well as their deuterated (isotopically labelled) internal standards, solvents and reagents. For each compound, the CAS number, purity, manufacturer, limit of detection (LOD) and limit of quantification (LOQ) are reported.

Compound	CAS	Purity	Manufacturer	LOD (µg/L)	LOQ (µg/L)
o-cresol	95-48-7	99.5 %	ChemService[a]	0.7	2.4
m-cresol	108-39-4	99.5 %	ChemService[a]	0.8	2.7
p-cresol	106-44-5	98.9 %	ChemService[a]	0.4	1.3
4-ethylphenol	123-07-9	99.0 %	Merck[b]	0.4	1.3
guaiacol	90-05-1	98.0 %	ChemService[a]	0.4	1.3
4-methylguaiacol	93-51-6	99.5 %	ChemService[a]	0.5	1.7
phenol	108-95-2	99.5 %	ChemService[a]	1.1	3.8
syringol	91-10-1	99.5 %	ChemService[a]	1.4	4.6
d_7-*o*-cresol	202325-50-6	98.9 %	LGC Standards[c]	NA	NA
d_7-*m*-cresol	202325-51-7	98.7 %	LGC Standards[c]	NA	NA
d_7-*p*-cresol	202325-52-8	99.2 %	LGC Standards[c]	NA	NA
d_9-4-ethylphenol	2241872-74-0	>95 %	LGC Standards[c]	NA	NA
d_4-guaiacol	7329-52-4	98.8 %	LGC Standards[c]	NA	NA
d_3-4-methylguaiacol	7329-56-8	>95 %	LGC Standards[c]	NA	NA
d_6-4-methylsyringol	3028870-30-3	>95 %	LGC Standards[c]	NA	NA
d_5-phenol	4165-62-2	97.6 %	LGC Standards[c]	NA	NA
p-cresol rutinoside	1715947-02-6	94 %	LGC Standards[c]	0.1[f]	0.5[g]
guaiacol gentiobioside	NA	>85 %	LGC Standards[c]	0.1[f]	0.5[g]
guaiacol glucoside	6092-24-6	>95 %	LGC Standards[c]	0.1[f]	0.5[g]
guaiacol rutinoside	1416253-69-4	>95 %	LGC Standards[c]	0.1[f]	0.5[g]
4-methylguaiacol rutinoside	NA	>95 %	LGC Standards[c]	0.1[f]	0.5[g]
4-methylsyringol gentiobioside	**1416253-73-0**	>95 %	LGC Standards[c]	0.1[f]	0.5[g]
phenol rutinoside	**1416253-67-2**	>90 %	LGC Standards[c]	0.1[f]	0.5[g]
syringol gentiobioside	**1416253-72-9**	>95 %	LGC Standards[c]	0.1[f]	0.5[g]
d_7-*p*-cresol rutinoside	NA	>85 %	LGC Standards[c]	NA	NA
d_3-guaiacol gentiobioside	NA	>95 %	LGC Standards[c]	NA	NA
d_3-guaiacol glucoside	1208109-55-0	>95 %	LGC Standards[c]	NA	NA
d_3-guaiacol rutinoside	NA	>95 %	LGC Standards[c]	NA	NA
d_3-4-methylguaiacol rutinoside	NA	>95 %	LGC Standards[c]	NA	NA
d_6-4-methylsyringol gentiobioside	NA	>90 %	LGC Standards[c]	NA	NA
d_5-phenol rutinoside	NA	>95 %	LGC Standards[c]	NA	NA
d_6-syringol gentiobioside	NA	>95 %	LGC Standards[c]	NA	NA
hexane	110-54-3	98.5 %	Scharlab[d]	NA	NA
ethyl acetate	141-78-6	99.5 %	Scharlab[d]	NA	NA
calcium chloride	10043-52-4	>96 %	Merck[b]	NA	NA

acetonitrile	75-05-8	99.5 %	Sigma Aldrich[e]	NA	NA
sodium hydroxide	1310-73-2	97 %	Sigma Aldrich[e]	NA	NA

NA = not available

a = ChemService (West Chester, PA, USA)

b = Merck (Rahwway, NJ, USA)

c = LGC Standards (Manchester, NH, USA)

d = Scharlab (Barcelona, Spain)

e = Sigma-Aldrich (St. Louis, MO, USA)

f = corresponding to signal-to-noise ratio of 3

g = corresponding to a signal-to-noise ratio of 10

Table S2. Daily air-quality measurements near the study regions during the February 2023 wildfire event. Particulate matter (PM_{10}, $PM_{2.5}$; µg/m³), nitrogen oxides (NOx) and sulfur dioxide (SO_2; ppb) recorded from 2–11 February 2023 at the three monitoring stations nearest the sampled vineyards: Chillán (−36.6020, −72.0866; Ñuble Region), Tomé (−36.6017, −72.9585; Biobío Region), and Hualqui (−36.9775, −72.9319; Biobío Region). Coordinates are given in WGS84 decimal degrees. Mean and Max summarise the period for each station. Data were obtained from SINCA (Sistema de Información Nacional de Calidad del Aire), Chilean Ministry of the Environment (https://sinca.mma.gob.cl/). N.A. = not available; NOx and SO_2 were not monitored at the Chillán station. PM = particulate matter; NOx = nitrogen oxides; SO_2 = sulfur dioxide; ppb = parts per billion.

	PM10 (µg/m³)			**PM2.5 (µg/m³)**			**NOx (ppb)**			**SO_2 (ppb)**		
Date	Chillan	Tomé	Hualqui	Chillan	Tomé	Hualqui	Chillan	Tomé	Hualqui	Chillan	Tomé	Hualqui
2-Feb	86	83	49	14	22	11	N.A.	15.77	5.64	N.A.	2.07	1.00
3-Feb	183	120	108	96	42	51	N.A.	10.06	9.83	N.A.	1.76	1.14
4-Feb	515	42	85	412	17	60	N.A.	3.38	6.67	N.A.	1.00	1.00
5-Feb	303	154	424	260	127	393	N.A.	6.61	21.60	N.A.	1.01	1.00
6-Feb	152	77	155	126	57	126	N.A.	11.24	9.31	N.A.	1.89	1.00
7-Feb	157	102	103	118	61	60	N.A.	15.32	8.62	N.A.	2.20	1.00
8-Feb	221	47	105	183	28	67	N.A.	10.56	10.03	N.A.	2.15	1.00
9-Feb	117	60	98	89	38	67	N.A.	10.58	8.31	N.A.	1.33	1.00
10-Feb	64	63	34	40	40	9	N.A.	12.27	N.A.	N.A.	1.12	1.00
11-Feb	70	49	51	48	28	26	N.A.	11.06	N.A.	N.A.	1.35	1.00
Mean	**187**	**80**	**121**	**139**	**46**	**87**	**N.A.**	**10.69**	**10.00**	**N.A.**	**1.59**	**1.01**
Max	**515**	**154**	**424**	**412**	**127**	**393**	**N.A.**	**15.77**	**21.60**	**N.A.**	**2.20**	**1.14**

Table S3. Sensory attributes and reference standard formulation developed from consensus training for País wines in 2023 and 2024.

Attribute	Recipe	Source
Aromas		
Red fruits	Frozen mix, 1 tbs each raspberry and strawberries, plus fresh sweet cherries	Frozen mix Frutos del Maipo, fresh sweet local cherries
Black fruits	Frozen mix, 1 tbs each, blackberries and blueberries, plus hydrated prunes	Frozen mix Frutos del Maipo
Oxidize red apple	3-4 apple slices (2 h old)	Fuji
Green apple	3-4 fresh apple slices	Granny Smith
Acetone	3 mL acetone in 50 mL of water	Merck
Vinegar	3 tsps. white wine vinegar/ 50 mL of water	Traverso
Alcohol	1 mL vodka/50 mL water	Eristoff
Camphor	1 peas size chest rub on cotton ball	Vick's VapoRub ™
Medicinal	cough syrup in a cotton ball	Muxol®
Herbal	20 mL herbal liquor	Jägermeister
Floral	Flower petals (3 wild rose flowers, 1 small geranium) +1 drop wild violet scent on a cotton ball	From local gardens
Smoky	2 drops of bio-oil (from wood pyrolysis) on a cotton ball	Produced in UdeC
Wood	1/3 of the glass filled with firewood chips	From local firewood
Musty/Earthy	1/3 of the glass filled with potting soil, sphagnum moss + 1 chopped mushroom	Local greenhouse
Soil	1/3 of the glass filled with fresh potting soil	University gardens
Metallic	Bronze coins and aluminium foil balls/150 ml water	Chilean bronze coins and household alu foil
Tastes		
Bitter	1 g/ L caffeine	Nutricost
Sweet	12g/L sucrose	Iansa
Salty	1g/L salt	Los Lobos
Sour	3 g/L tartaric acid	CAPYBARA Distributors Inc.
Umami	2g/L monosodium glutamate	Gourmet
Mouthfeels		
Astringent	1 g/L alum	MB Herbals
Hot/Burning	250 ml/L vodka	Eristoff
Viscous	3g/L carboxymethylcellulose	DecorRom
Effervescent	carbonated water	Cachantun

SUPPLEMENTARY DATA
Rumbaugh, A., Cantu, A., Javier, F., Andrea Vergara Rosales, C., Von Baer Von Lochow, D., Maioli, F., … Balic, J. (2026). Wildfire smoke impact on País Wine composition and quality in Chile. *OENO One*, *60*(4).
https://doi.org/10.20870/oeno-one.2026.60.4.9850

Table S4. Concentrations of volatile phenols and their glycoconjugates (µg/L) in wines produced in 2023 and 2024. Different letters indicate significantly different values based on the Tukey post hoc test ($p < 0.05$).

Volatile Phenols	**PS1_23**	**PS1_24**	**PS2_23**	**PS2_24**	**PS3_23**	**PS3_24**	**PS4_23**	**PS4_24**	**PS5_23**	**PS5_24**
Guaiacol	8.9 ± 0.17b	1.3 ± 0.03fg	8.2 ± 0.23b	1.8 ± 0.08f	6.8 ± 0.13c	1.1 ± 0.01g	5.1 ± 0.01d	3.3 ± 0.10e	15.4 ± 0.68a	1.5 ± 0.06fg
4MG	3.1 ± 0.06b	0.8 ± 0.02e	3.0 ± 0.09b	0.8 ± 0.02e	2.2 ± 0.02c	0.6 ± 0.04e	1.6 ± 0.04d	0.6 ± 0.04e	6.9 ± 0.34a	0.6 ± 0.02e
o-Cresol	5.2 ± 0.15b	1.4 ± 0.05e	4.6 ± 0.44c	1.1 ± 0.08e	4.4 ± 0.17c	0.5 ± 0.04f	1.2 ± 0.06e	2.9 ± 0.12d	8.2 ± 0.27a	1.1 ± 0.09e
p-Cresol	4.7 ± 0.18c	1.6 ± 0.18g	5.5 ± 0.31b	2.1 ± 0.07f	4.7 ± 0.18c	1.9 ± 0.07fg	4.1 ± 0.02d	5.5 ± 0.08b	6.1 ± 0.10a	3.5 ± 0.04e
m-Cresol	6.1 ± 0.15b	2.2 ± 0.32de	6.3 ± 0.17b	2.1 ± 0.11de	5.2 ± 0.23c	1.4 ± 0.05e	5.9 ± 0.25bc	8.8 ± 0.39a	8.8 ± 0.59a	2.8 ± 0.08d
Phenol	39.9 ± 1.29a	10.7 ± 0.36ef	13.1 ± 1.37d	12.5 ± 1.44de	19.7 ± 0.43c	9.7 ± 0.12f	29.8 ± 0.48b	19.8 ± 0.33c	40.6 ± 0.52a	11.3 ± 0.39def
4EP	1607.4 ± 37.22a	725.4 ± 10.44b	727.8 ± 17.33b	563.5 ± 6.87c	91.7 ± 1.61f	104.9 ± 2.59f	225.4 ± 4.24e	189.1 ± 1.19e	370.7 ± 14.16d	25.2 ± 0.91g
Syringol	266.3 ± 3.51de	86.0 ± 12.17g	235.3 ± 4.04e	146.3 ± 0.58f	383.3 ± 4.16c	146.0 ± 5.57f	458.3 ± 22.37b	294.7 ± 13.43d	769.3 ± 23.50a	133.0 ± 9.85f
Glycoconjugates	**PS1_23**	**PS1_24**	**PS2_23**	**PS2_24**	**PS3_23**	**PS3_24**	**PS4_23**	**PS4_24**	**PS5_23**	**PS5_24**
GG	2.2 ± 0.02c	<LOQ	19.9 ± 0.12b	<LOQ	30.1 ± 0.46a	<LOQ	1.1 ± 0.13d	<LOQ	0.3 ± 0.59e	<LOQ
GGB	<LOQ	<LOQ	0.8 ± 0.18b	0.8 ± 0.08b	1.9 ± 0.15a	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
SGB	9.8 ± 0.24c	<LOQ	23.0 ± 0.18b	1.4 ± 0.04e	40.7 ± 0.37a	1.3 ± 0.07e	1.6 ± 0.30e	<LOQ	8.4 ± 0.43d	1.4 ± 0.14e
4MSGB	<LOQ	<LOQ	1.8 ± 0.13b	<LOQ	3.2 ± 0.89 a	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
PRu	1.5 ± 0.21c	<LOQ	1.2 ± 0.17c	<LOQ	3.7 ± 0.4a	<LOQ	<LOQ	<LOQ	2.0 ± 0.11b	<LOQ
GRu	1.9 ± 0.15d	<LOQ	3.4 ± 0.43c	<LOQ	5.8 ± 0.73a	<LOQ	<LOQ	<LOQ	4.5 ± 0.22b	<LOQ
CRu	3.5 ± 0.11cd	1.9 ± 0.38de	5.4 ± 0.58bc	3.6 ± 0.33cd	7.6 ± 1.94a	2.0 ± 0.6de	2.6 ± 0.50 de	1.8 ± 0.20de	6.7 ± 0.36ab	1.2 ± 0.09e
4MGRu	5.5 ± 0.49c	1.7 ± 0.49d	7.8 ± 0.62b	1.8 ± 0.63d	7.0 ± 0.70bc	1.1 ± 0.37 d	1.2 ± 0.26d	1.6 ± 0.49 d	11.4 ± 0.24 a	1.6 ± 0.49d

[1]= PS1_23 indicates País wine from site 1 on the map in Figure 1, made in 2023. PS = País, 1-5 = site 1-5 from Figure 1, 23 = 2023, 24 = 2024; 4MG = 4-methylguaiacol, 4EP = 4-ethylphenol, GGB = guaiacol gentiobioside, SGB = syringol gentiobioside, GG = guaiacol glucoside, PRu = phenol rutinoside, GRu = guaiacol rutinoside, 4MSGB = 4-methylsyringol gentiobioside, CRu = p-cresol rutinoside, 4MGRu = 4-methylguaiacol rutinoside; LOQ = limit of quantification.

SUPPLEMENTARY DATA
Rumbaugh, A., Cantu, A., Javier, F., Andrea Vergara Rosales, C., Von Baer Von Lochow, D., Maioli, F., … Balic, J. (2026). Wildfire smoke impact on País Wine composition and quality in Chile. *OENO One*, *60*(4).
https://doi.org/10.20870/oeno-one.2026.60.4.9850

Table S5. Significant sensory mean ratings for orthonasal (O) and retronasal (R) aromas, tastes and mouthfeels in 2023 and 2024 País wines. Differences in lettering indicate significantly different values based on the LSD test ($p < 0.05$). Line scale rating corresponded to 0-100.

Wine	Acetone O	Alcohol O	Musty/Earthy O	Smoky O	Musty/Earthy R	Sweet	Salty	Sour	Bitter	Astringent	Effervescent	Hot
PS1_23[1]	11.2 abc	28.8 b	8.3 d	9.5 b	1.7 c	26.7 b	4.6 cd	16 bcd	14.2 bcde	29.5 defg	12.3 bc	29.5 ab
PS1_24	3.2 d	23.5 b	33.8 a	6.2 b	13.5 a	9.4 c	16.9 a	26.2 ab	10 de	28.1 efg	22.2 ab	20.4 bc
PS2_23	5.9 cd	22.9 b	10.6 cd	20.4 ab	4.7 bc	13.4 c	11 abcd	16.8 bcd	21.7 ab	45.1 ab	8 cd	28.1 ab
PS2_24	8.5 bcd	22.6 b	17.4 bc	9.8 b	7.7 b	10 c	11.9 abc	32 a	13.4 bcde	32.9 cdef	19.5 ab	25.6 ab
PS3_23	16.4 a	27.4 b	12.9 cd	10.8 b	6.8 bc	10.5 c	14.1 ab	18.7 bc	25.1 a	47.7 a	4.8 cd	32.6 a
PS3_24	14.4 ab	25 b	24.8 bc	5.7 b	2.2 c	14 c	6.8 bcd	13.8 cd	21 abc	38.8 bc	7.1 cd	25.8 ab
PS4_23	8.3 bcd	22.8 b	14.3 cd	7.2 b	8.5 ab	15.2 c	11.3 abcd	14.5 cd	11.9 cde	21.6 g	3.3 d	20.1 bc
PS4_24	6.3 cd	23.3 b	13.8 cd	9.1 b	3.8 bc	40.7 a	5.4 cd	7.8 d	5.6 e	24.6 fg	1.9 d	10.7 c
PS5_23	8.6 bcd	24.5 b	9.7 d	12 ab	5.8 bc	15.2 c	5.6 cd	20.6 bc	17.8 abcd	37.5 bcd	6.3 cd	25.8 ab
PS5_24	4.9 cd	38.9 a	13.3 cd	3.9 b	6.7 bc	26.9 b	3.7 d	13.8 cd	15.8 abcd	36.1 cdef	18.5 ab	29.5 ab

[1]*= PS1_23 indicates País wine from site 1 on the map in Figure 1, made in 2023. PS = País, 1-5 = site 1-5 from Figure 1, 23 = 2023, 24 = 2024; O = orthonasal, R = retronasal.*