

Supplementary data

Supplementary Table 1. Sensory Attributes for Descriptive Analysis.

attribute	verbal description	standard recipe (per 100 mL Riesling wine)
colour	yellow hue	no standard provided, training with experimental wines
smell		
citrus/mineral	fresh, citrus and mineral impression, reminiscent of lemon, lime and wet slate	5 mL citrus direct juice (Alnatura Inc.), 2.5 mL grapefruit juice (Granini Inc.), 40 µL stock solution of benzyl mercaptan (1 µg/10 mL in ethanol)
ripe apple	ripe, fruity impression, reminiscent of ripe apple (light pear)	25 mL apple juice (REWE Inc.)
yellow fruits	yellow fruity impression, reminiscent of yellow fruits like peach (vineyard peach), apricot, but also of honeydew melon and passion fruit	10 mL peach juice, 5 mL honeydew melon/mango/mint juice (both Granini Inc.), 6 mL peach syrup, 2 mL passion fruit syrup (both Monin Inc.)
green/vegetative	green, zesty impression, reminiscent of fresh grass, eucalyptus, green apple, light hay	1 bunch of fresh cut grass, some hay and a fresh cut granny smith apple, extracted for 10 to 15 mins
smoky/Honey	smoky, spicy and slightly sweet impression, reminiscent of fireplace, nutmeg and black pepper, resin and honey.	black pepper and muscat, extracted for 15 mins, 80 µL stock solution of 4-vinylguajacol (1 mg/mL in ethanol), 1 spatula flower honey
dull/ATA (odour)	Reminiscent of damp basement, wet rag, muff, earth, mothballs and acacia flower, not such a brilliant aroma over all.	wet wool, earth and a wet rag, extracted for 30 mins, 15 drops UTAFIX-3 (Würzburger UTAFIX-Test, AAP-test solution, 25 % in ethanol, ca. 5 µg/L 2-AAP, C. Schliessmann Kellerei-Chemie GmbH & Co.KG, Schwäbisch Hall, Germany), 10 µL geosmin, 1 spatula acacia honey
taste		
sweet	sweet taste	6 g/L fructose
sour	sour taste	2 g/L tartaric acid
fruity	general fruity taste impression, reminiscent of apple, peach, passion fruit, honeydew melon	no standard provided, training with experimental wines
dull/ATA (oral)	Reminiscent of off notes like wet rag, dusty, acetaldehyde, earthy, buttery, microbiological.	no standard provided, training with experimental wines
body	from thin (= watery) to dense (= full bodied)	no standard provided, training with experimental wines
mouthfeel	from soft = harmonious, balanced in sweetness, fruit, acidity and astringency; tannins are well integrated to after hard = inharmonious, too early dominance of bitterness, acidity and/or rough, unripe.	no standard provided, training with experimental wines
astringent	how much the oral cavity is dried out (rather in the finish)	0.8 g/L tannic acid
bitter	bitter taste	0.8 g/L caffeine
mineral	reminiscent of wet slate, wet stones, slightly salty, less full mouthfeel.	No standard provided, training with experimental wines

green/vegetative

reminiscent of hay, green grass

no standard provided, training with experimental wines

Supplementary Table 2. Internal deuterated Standards used for the quantification, used concentrations, quantifiers and retention times (t_R), and LRI and CAS numbers.

deuterated standard	conc. [$\mu\text{g/L}$]	quantifier [m/z]	t_R [min]	LRI (ZB5ms)	CAS-No.
ethyl acetate-d5	8000	93	2.82		synthesis
hexanol-d13	400	64, 78	9.89	860	204244-84-8
ethyl hexanoate-d5	150	93, 120	15.79	996	synthesis
hexyl acetate-d3	100	46, 64	16.43	1010	synthesis
linalool-d5	50	98, 126	20.32	1098	159592-39-9
2-phenylethanol-d5	1500	96, 127	20.90	1111	35845-63-7
4-ethylguaiaicol-d5	50	157	27.60	1272	1219803-12-9
β -damascenone-d6	10	194	31.80	1380	217482-71-8
1,1,6-trimethyl-1,2-dihydronaphthalin-d6	1	163, 178	30.88	1356	synthesis
2-aminoacetophenone-d3	2	138, 121	35.40		synthesis

Supplementary Table 3. External standards used for external calibration, calibration range, quantifiers and retention times (t_R), and LRI and CAS numbers.

odourant	(<i>corresp. Deutero</i>)	min. Conc. [$\mu\text{g/L}$]	max. conc. [$\mu\text{g/L}$]	Quantifier [m/z]	t_R [min]	LRI (ZB5ms)	CAS-No.
ethyl acetate	(d5-EtAc)	988	98802	88	2.86	612	141-78-6
3-methylbutanol	(d13-HexOH)	1012	101250	55, 70	5.41	728	123-51-3
1-hexanol	(d13-HexOH)	41	4100	56, 69	10.24	863	111-27-3
ethyl butanoate	(d5-EtHex)	7	653	71, 88	7.55	803	105-54-4
ethyl hexanoate	(d5-EtHex)	15	1507	88, 115	15.95	1001	123-66-0
ethyl octanoate	(d5-EtHex)	15	1492	88, 127	24.50	1199	106-32-1
3-methylbutylacetate	(d3-HexAc)	20	1951	70, 87	10.58	877	123-92-2
hexyl acetate	(d3-HexAc)	11	1076	43, 61	16.54	1009	142-92-7
linalool	(d5-LinOH)	7	652	93, 121	20.45	1091	78-70-6
2-phenylethanol	(d5-2-PhEtOH)	303	30294	91, 122	21.00	1108	60-12-8
vitispirane	(d6-TDN)	0.1	10	177, 192	28.15	1288	65416-59-3
4-ethylguaiaicol	(d5-4-EG)	5	530	152	27.73	1283	2785-89-9
2-phenylethylacetate	(d5-2-PhEtOH)	20	2043	104	26.96	1256	103-45-7
β -damascenone	(d4- β -Dama)	0.2	21	190	31.90	1385	23696-85-7
ethyl decanoate	(d5-EtHex)	11	1053	88, 101	32.41	1388	110-38-3
TDN	(d6-TDN)	0.05	5	157, 172	31.03	1362	30364-38-6
trans-hex-2-en-1-ol	(d13-HexOH)	43	4250	57, 82	10.08	866	928-95-0
2-aminoacetophenone	(d3-2-AAP)	0.1	8	135, 120	35.47	1261	551-93-9

Szmania, C., Waber, J., Bogs, J., & Fischer, U. (2023). Sunburn in Riesling: Sensory impact of defoliation and mitigation of off-flavours by application of reflecting particles on grapes: Article submitted in cooperation with IVAS 2022. OENO One, 57(3). Retrieved from <https://oeno-one.eu/article/view/7287>

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Supplementary Table 4. Sensory data of the significant attributes of the descriptive analysis.

<i>treatment</i>	<i>Rep</i>	<i>colour</i>	<i>citrus/ mineral</i>	<i>ripe apple</i>	<i>green/ vegetative</i>	<i>smoky/ honey</i>	<i>dull/ATA (odour)</i>	<i>sweet</i>	<i>sour</i>	<i>dull/ ATA (taste)</i>	<i>body</i>	<i>bitter</i>
<i>no defoliation</i>	<i>1</i>	2.5	5.1	3.0	2.7	2.5	1.6	3.0	5.3	1.3	4.3	2.2
	<i>2</i>	3.4	3.4	3.2	2.6	2.5	1.8	2.8	5.7	1.7	4.3	2.5
<i>early defoliation</i>	<i>1</i>	5.3	2.6	3.5	2.0	3.9	2.6	3.0	5.4	2.9	4.5	2.9
	<i>2</i>	5.6	3.4	3.9	2.4	3.3	2.4	3.1	5.5	1.7	4.9	2.9
<i>early defoliation + kaolin</i>	<i>1</i>	4.2	4.3	3.1	2.8	2.6	1.6	2.8	5.5	1.3	5.1	2.2
	<i>2</i>	4.0	4.7	3.3	2.5	2.7	1.4	3.5	5.0	1.6	4.9	2.9
<i>early defoliation + Ca(OH)₂</i>	<i>1</i>	4.6	4.8	3.3	2.4	2.6	1.3	3.6	5.5	1.5	4.5	2.4
	<i>2</i>	5.1	4.1	3.6	2.3	3.0	1.7	3.3	5.1	1.6	5.0	2.7
<i>late defoliation</i>	<i>1</i>	4.3	3.9	3.2	2.3	2.9	1.8	2.9	5.4	1.8	4.6	2.9
	<i>2</i>	5.1	4.2	3.8	2.2	3.3	1.4	2.7	6.1	1.8	4.4	2.4
<i>late defoliation + kaolin</i>	<i>1</i>	3.9	4.1	3.8	2.0	2.9	1.4	2.7	5.5	1.7	4.4	2.0
	<i>2</i>	4.0	3.2	3.7	2.5	2.7	1.6	2.5	5.3	1.4	4.2	2.4
<i>late defoliation + Ca(OH)₂</i>	<i>1</i>	3.8	4.5	4.2	2.8	3.0	1.5	2.6	5.5	1.6	4.7	2.7
	<i>2</i>	3.9	4.6	3.7	3.5	2.5	1.6	3.3	4.9	1.3	4.6	2.6

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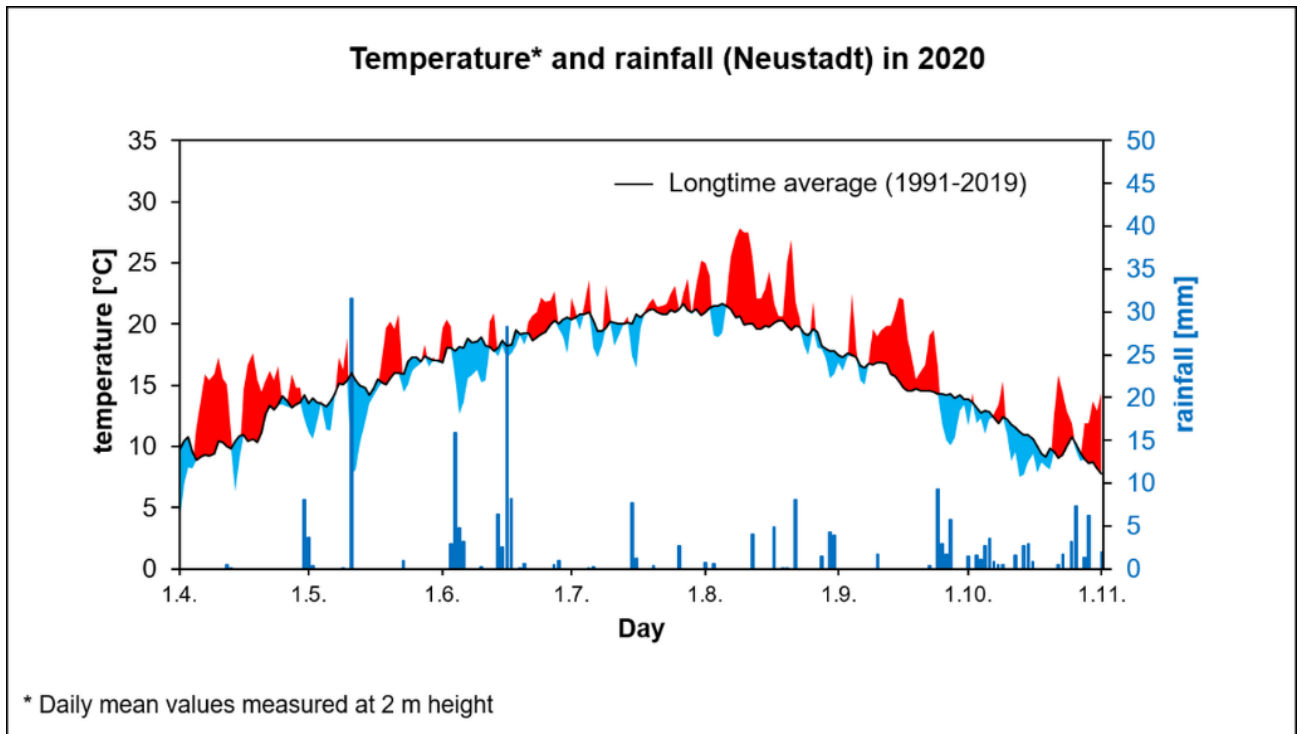
6 **Supplementary Table 5. Aroma analysis data of all replicates.**

Treatment	Rep	TDN free	vitispirane free	β-damasce none	4-vinyl-guaiacol	linalool	2-phenyl-ethanol	2/3-methyl-butanol	hexanol	ethyl butanoate	ethyl hexanoate	ethyl octanoate	ethyl decanoate	ethyl acetate	hexyl acetate	2/3-methyl-butyl acetate	2-phenyl-ethyl acetate	2-amino-acetophe none
		[µg/L]	[µg/L]	[µg/L]	[µg/L]	[µg/L]	[mg/L]	[mg/L]	[mg/L]	[µg/L]	[µg/L]	[mg/L]	[mg/L]	[mg/L]	[µg/L]	[mg/L]	[µg/L]	[µg/L]
no defoliation	1	0.48	3.19	0.29	8.30	23.01	13.51	224.32	3.22	367.94	982.55	3.63	1.29	64.88	242.16	2.76	317.08	0.35
	2	1.94	13.14	0.75	9.95	25.64	12.58	221.86	2.69	331.61	764.82	3.60	1.34	63.28	128.16	1.92	219.98	0.16
	3	0.75	5.74	0.86	9.68	28.86	14.89	251.15	3.62	308.39	673.08	2.45	1.02	63.33	136.25	1.88	214.72	0.17
early defoliation	1	1.73	9.38	0.68	7.94	46.53	18.37	251.21	2.49	326.95	726.81	3.12	1.22	69.81	102.89	1.62	220.53	0.21
	2	1.52	8.13	1.75	8.87	69.75	21.00	268.84	2.73	310.36	738.94	3.32	1.14	70.45	83.05	1.25	192.20	0.27
	3	3.36	21.10	1.53	11.82	57.28	19.88	239.12	2.71	296.07	785.86	2.56	0.82	63.86	80.47	1.02	187.87	0.20
early defoliation + kaolin	1	1.19	6.74	1.02	11.67	70.54	14.33	250.46	3.26	375.10	1026.55	4.11	1.47	62.05	161.14	1.84	171.68	0.43
	2	3.25	16.66	0.94	9.46	40.62	15.93	234.30	3.05	311.40	933.05	3.45	1.05	61.13	150.48	1.70	208.50	0.34
	3	1.75	10.52	0.77	9.90	60.54	20.64	251.34	2.95	299.26	851.68	3.42	1.26	61.35	130.80	1.38	197.13	0.30
early defoliation + Ca(OH)2	1	0.89	4.64	0.95	7.71	47.62	17.66	284.12	2.77	394.37	1161.85	4.35	1.31	58.77	130.01	1.80	240.69	0.00
	2	0.92	5.45	1.37	9.43	73.02	15.78	237.87	1.98	386.69	967.77	4.02	1.60	75.41	151.76	2.49	320.85	0.00
	3	0.82	5.36	0.91	7.22	54.57	15.87	254.68	2.45	394.43	854.91	3.77	1.29	70.76	112.96	2.16	256.27	0.00
late defoliation	1	1.82	12.53	0.99	11.86	60.86	15.78	234.52	3.21	362.15	1014.00	3.44	1.05	52.90	164.37	2.00	232.39	0.13
	2	4.08	23.41	1.15	12.44	53.48	16.18	232.19	2.03	309.28	779.26	3.07	0.90	55.86	101.53	1.72	198.12	0.14
	3	3.72	17.66	0.28	8.50	49.26	22.38	282.83	1.91	271.67	882.28	2.80	0.94	67.42	91.68	1.45	210.14	0.12
late defoliation + kaolin	1	3.34	22.32	0.73	10.62	52.63	15.95	234.17	2.97	302.37	728.59	2.68	0.58	52.88	141.47	1.82	228.89	0.17
	2	2.21	13.53	0.82	9.74	57.67	15.17	223.23	3.34	261.74	714.15	2.97	1.05	47.12	129.58	1.62	203.93	0.16
	3	1.89	14.36	2.46	17.44	75.65	20.29	268.03	3.18	290.46	697.43	2.74	0.93	61.34	98.68	1.49	184.68	0.18
late defoliation + Ca(OH)2	1	0.74	5.25	0.31	7.44	62.48	16.19	230.83	3.44	339.22	1001.91	3.67	1.20	51.94	259.58	2.46	292.07	0.00
	2	1.71	7.20	0.68	6.40	64.57	26.62	315.49	3.58	290.34	939.21	3.05	1.09	49.66	180.39	1.79	273.23	0.16
	3	2.11	16.90	0.67	11.45	61.16	18.32	249.81	3.64	344.53	979.59	3.52	1.13	49.37	203.42	1.98	252.50	0.00

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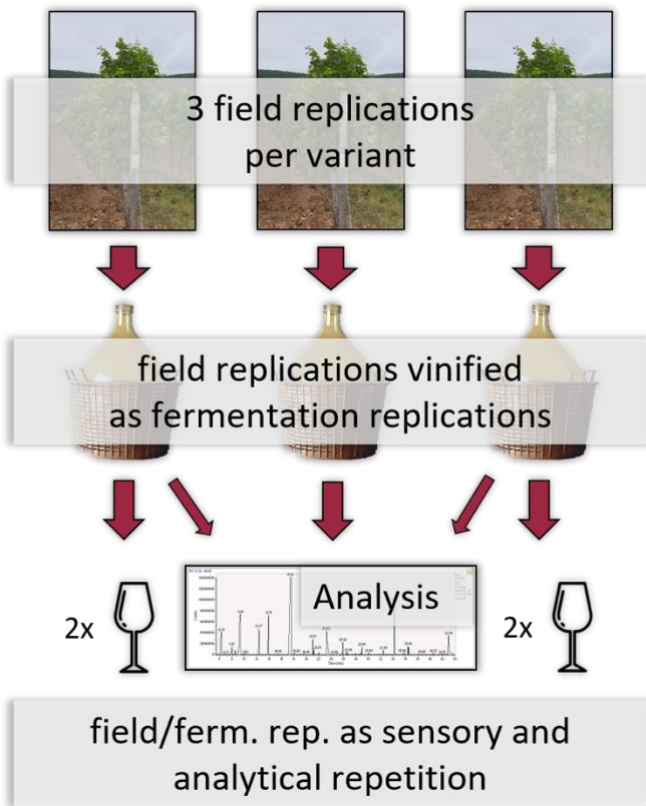
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11 **Supplementary Figure 1. Weather conditions in 2020 in Neustadt, Germany.**



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13 **Supplementary Figure 2. Scheme of the replications.**