Paolinelli, M., Martínez, L., Brond, V., García, R., Sari, S., Catania, A., … Mercado, L. A. (2026). Wild microbial communities shaping the spontaneous fermentation of biodynamic Malbec wine. *OENO One*, *60*(1).
https://doi.org/10.20870/oeno-one.2026.60.1.9441

SUPPLEMENTARY DATA

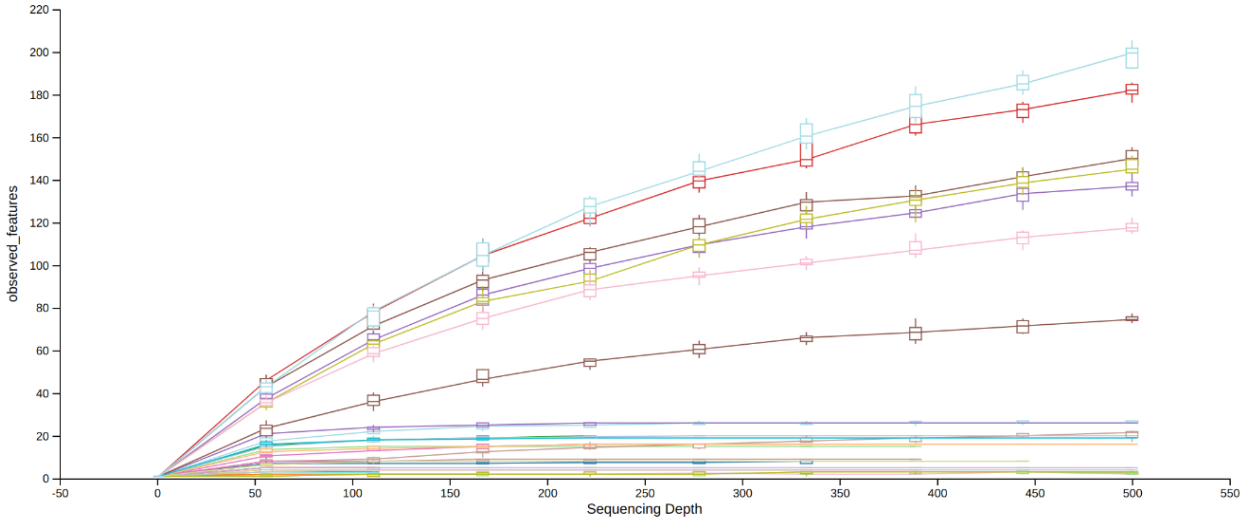


Figure S1. Rarefaction curves obtained for 16S-V3–V4 reads sequenced from bacterial community at 75 % of Malbec wine fermentation.

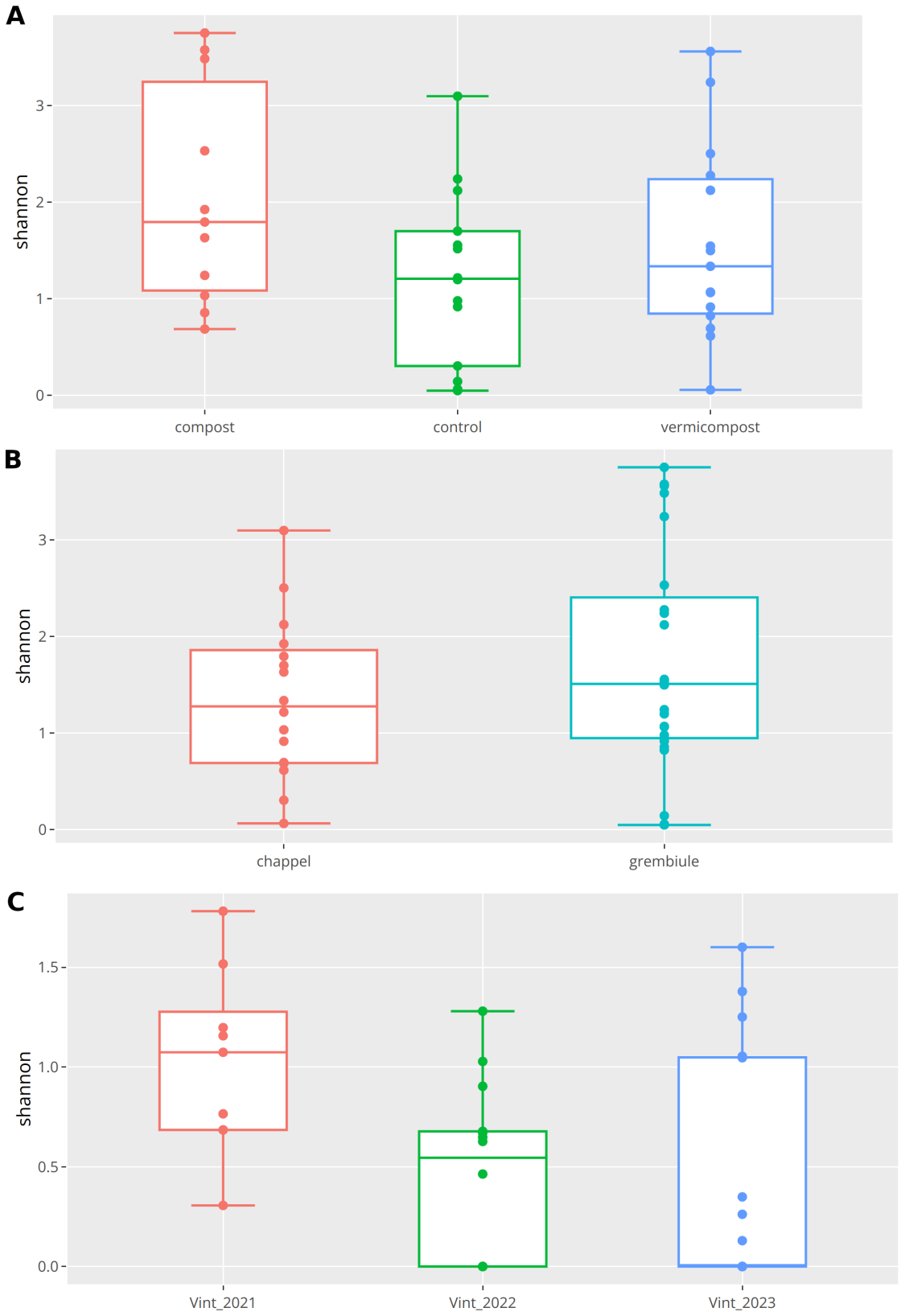


Figure S2. Shannon bacterial diversity compared between amendment applications (A), anti-hail net configuration (B), and vintages (C).

Paolinelli, M., Martínez, L., Brond, V., García, R., Sari, S., Catania, A., … Mercado, L. A. (2026). Wild microbial communities shaping the spontaneous fermentation of biodynamic Malbec wine. *OENO One*, *60*(1).
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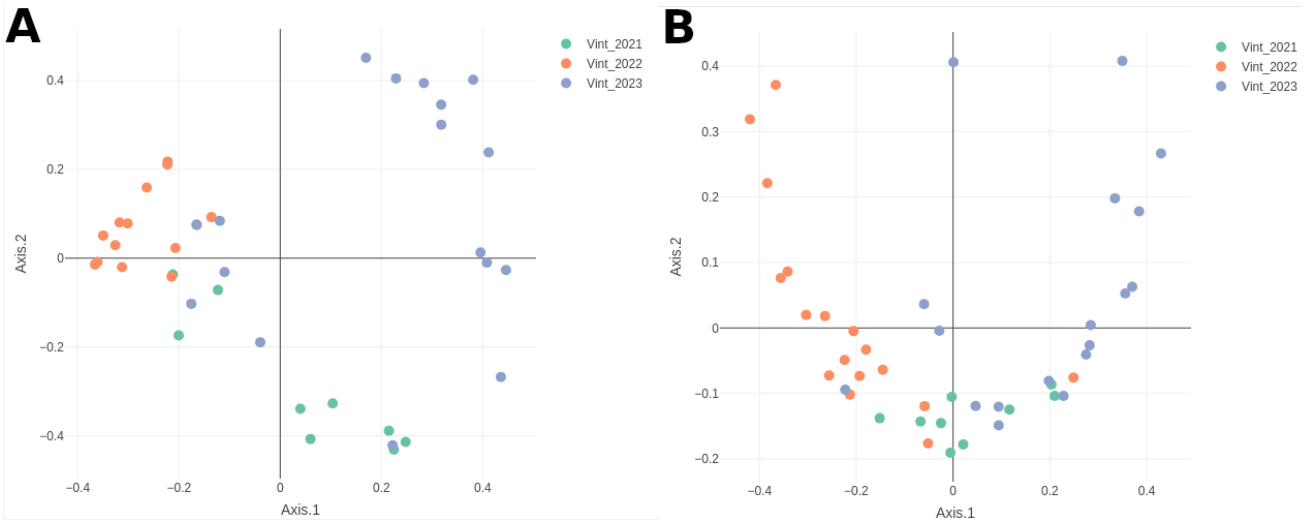


Figure S3. Principal coordinates analysis plot for bacterial (A) and fungal community (B).

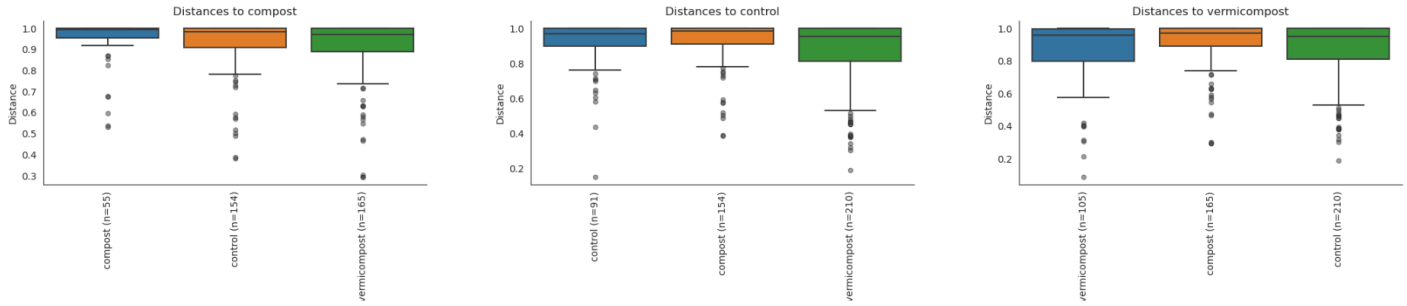
SUPPLEMENTARY DATA
Paolinelli, M., Martínez, L., Brond, V., García, R., Sari, S., Catania, A., … Mercado, L. A. (2026). Wild microbial communities shaping the spontaneous fermentation of biodynamic Malbec wine. *OENO One*, *60*(1).
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A

PERMANOVA results	
method name	PERMANOVA
test statistic name	pseudo-F
sample size	40
number of groups	3
test statistic	0.878653
p-value	0.639
number of permutations	999

Group significance plots

Download raw data as TSV

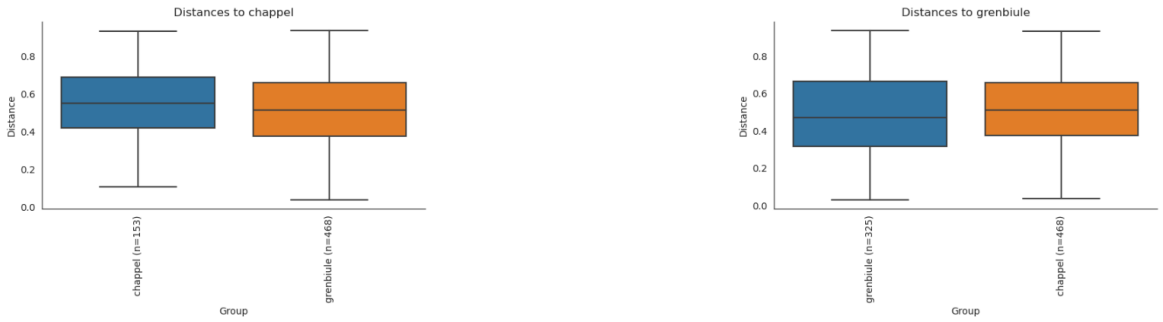


B

PERMANOVA results	
method name	PERMANOVA
test statistic name	pseudo-F
sample size	44
number of groups	2
test statistic	1.167839
p-value	0.298
number of permutations	999

Group significance plots

Download raw data as TSV



C

PERMANOVA results	
method name	PERMANOVA
test statistic name	pseudo-F
sample size	40
number of groups	3
test statistic	4.795871
p-value	0.001
number of permutations	999

Group significance plots

Download raw data as TSV

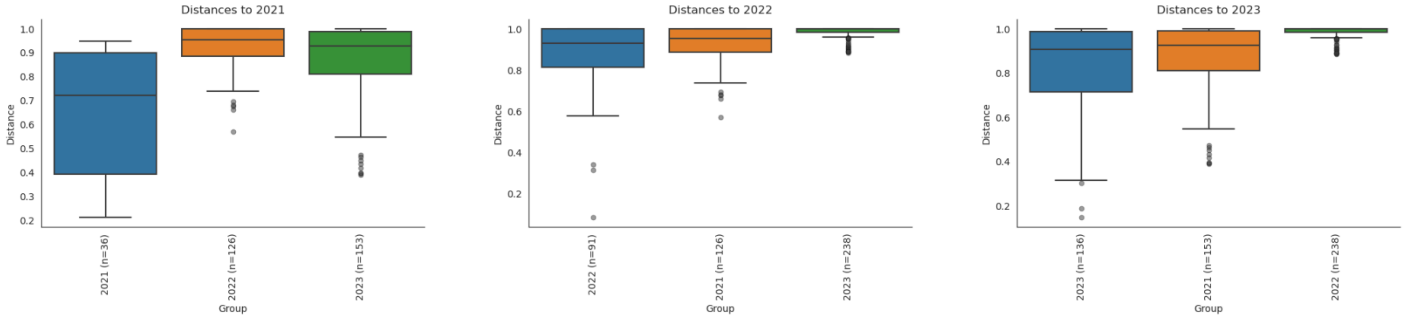


Figure S4. Screenshot of QIIME 2 view for PERMANOVA test results when evaluating the effect of amendments applications (A), anti-hail net (B), and vintage (C) on bacterial beta-diversity.

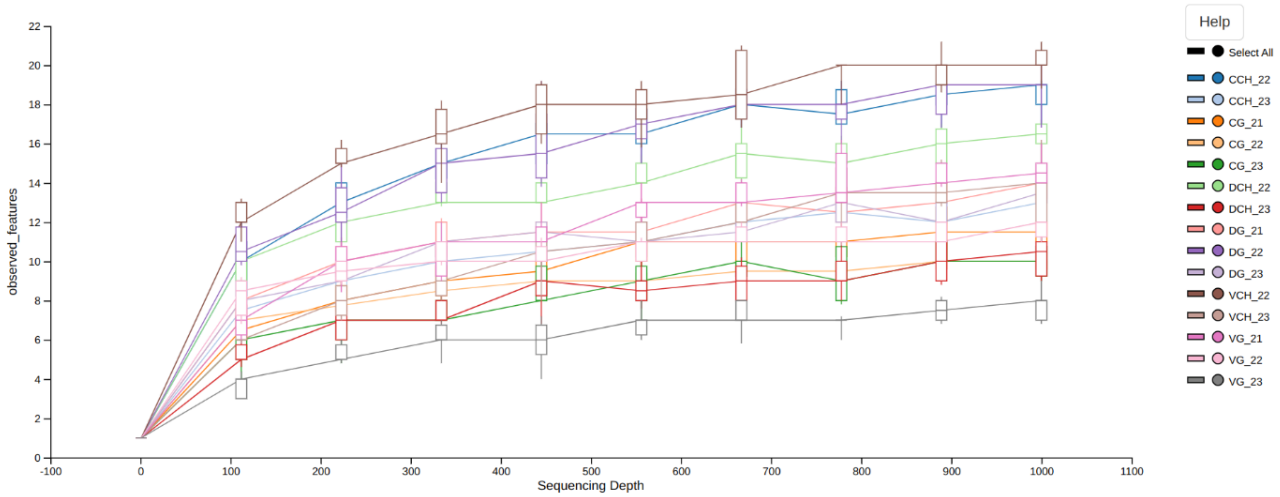


Figure S5. Rarefaction curves obtained for full-length ITS reads sequenced from fungal community at 75 % of Malbec wine fermentation.

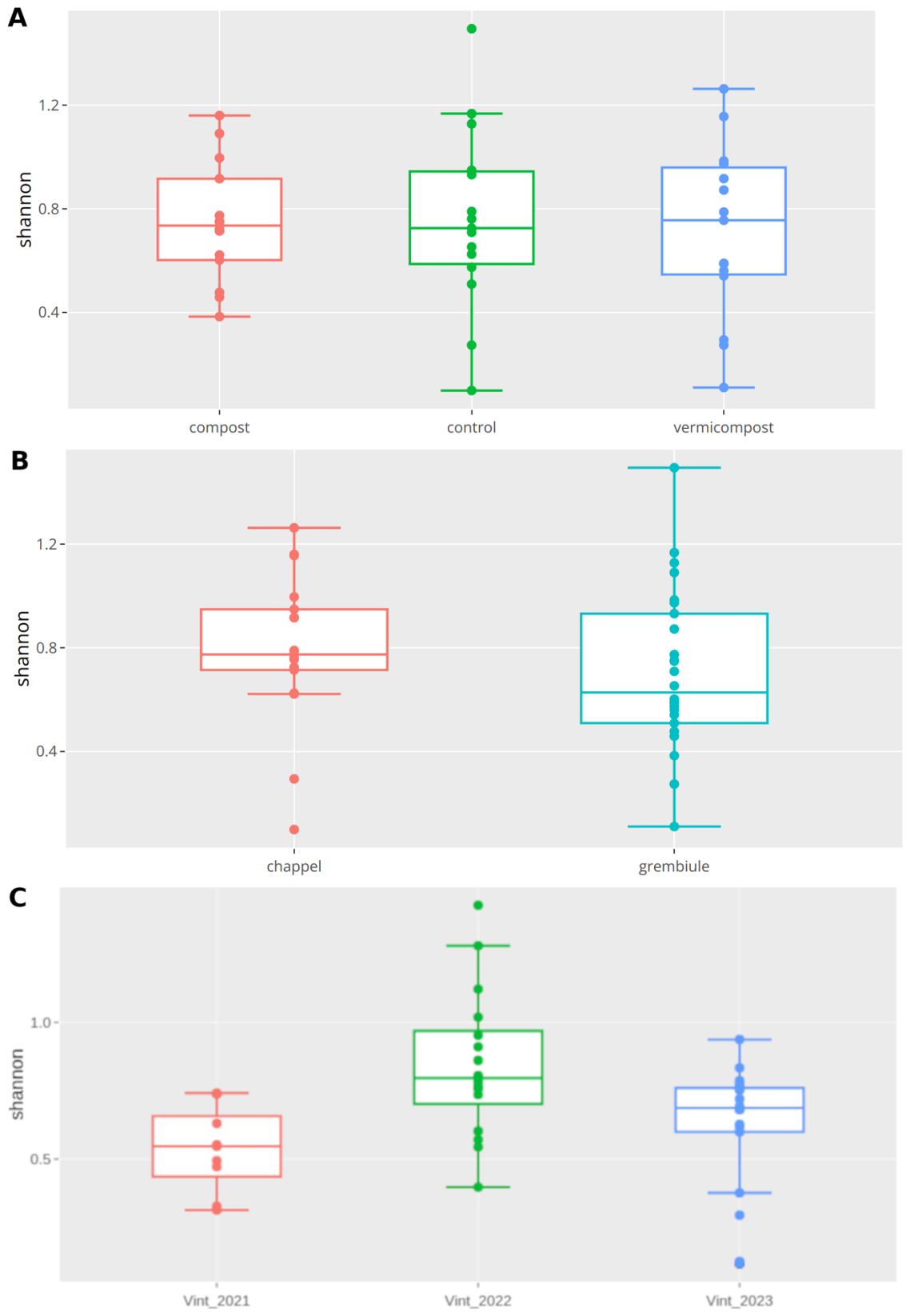


Figure S6. Shannon fungal diversity compared between amendment applications (A), anti-hail net configuration (B), and vintages (C).

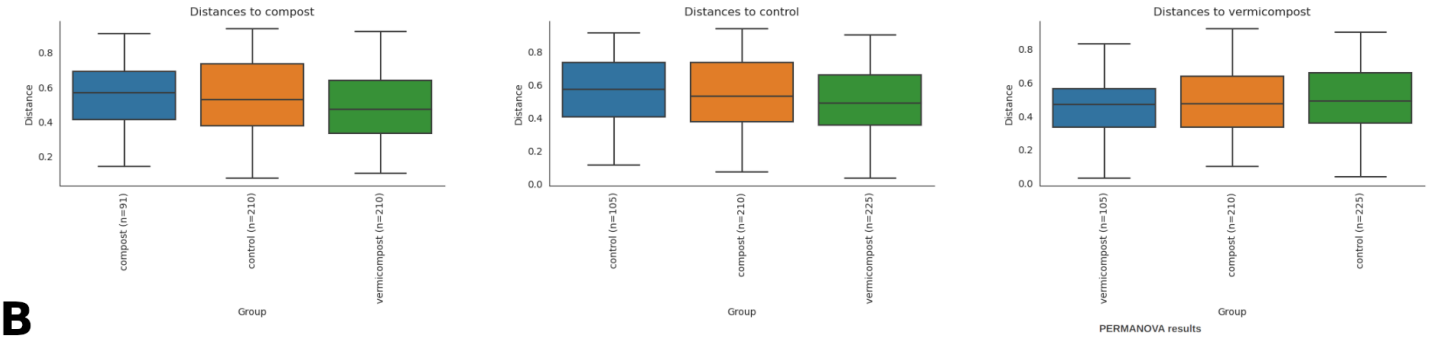
SUPPLEMENTARY DATA
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A

PERMANOVA results	
method name	PERMANOVA
test statistic name	pseudo-F
sample size	44
number of groups	3
test statistic	0.424549
p-value	0.949
number of permutations	999

Group significance plots

Download raw data as TSV

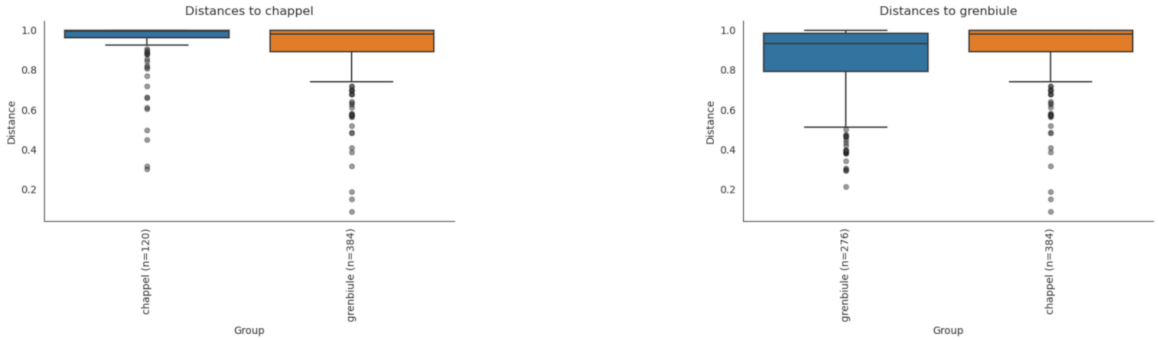


B

PERMANOVA results	
method name	PERMANOVA
test statistic name	pseudo-F
sample size	40
number of groups	2
test statistic	1.737115
p-value	0.043
number of permutations	999

Group significance plots

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C

PERMANOVA results	
method name	PERMANOVA
test statistic name	pseudo-F
sample size	44
number of groups	3
test statistic	7.971846
p-value	0.001
number of permutations	999

Group significance plots

Download raw data as TSV

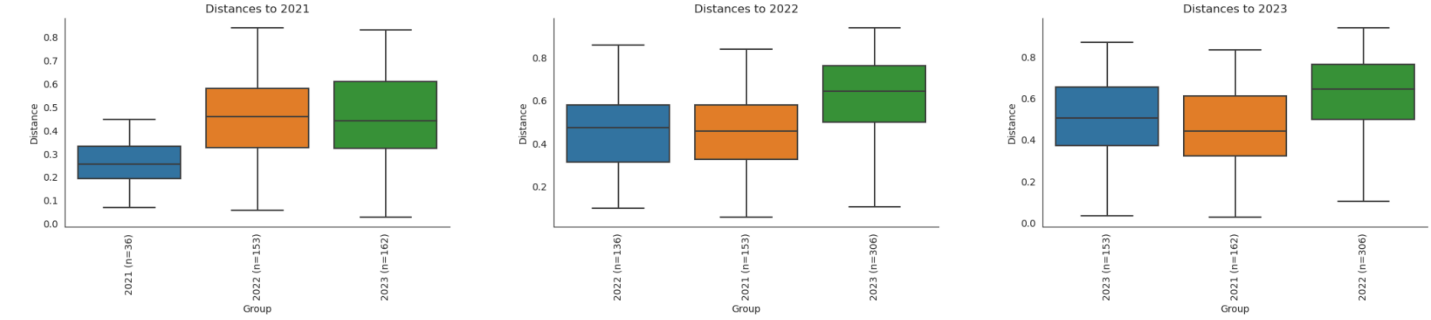


Figure S7. Screenshot of QIIME 2 view for PERMANOVA test results when evaluating the effect of amendments applications (A), anti-hail net (B), and vintage (C) on fungal beta-diversity.

Table S3. Mean values (± STD) of physicochemical and microbiological characteristics of musts according to treatments in three grape harvests studied.

Vintage	Treatment	TSS	Density	pH	TA	Viable yeasts CFU/mL
2021	CG	24.3 ± 0.1b	1.1035 ± 0.006b	3.56 ± 0.01b	5.15 ± 0.43	1.54 10^4 ± 0.12
	VG	23.97 ± 0.8b	1.0987 ± 0.004b	3.54 ± 0.07b	4.97 ± 0.31	1.78 10^4 ± 0.09
	DG	24.63 ± 0.4b	1.1021 ± 0.002b	3.61 ± 0.05b	5.00 ± 0.35	8.13 10^4 ± 0.41
2022	CG	22.63 ± 0.4a	1.0915 ± 0.002a	3.40 ± 0.04a	3.82 ± 0.07	1.98 10^4 ± 1.37
	VG	22.2 ± 0.9a	1.0896 ± 0.004a	3.40 ± 0.07a	4.99 ± 0.83	7.86 10^4 ± 4.66
	DG	22.63 ± 0.3a	1.0913 ± 0.002a	3.4 ± 0.03a	5.12 ± 0.42	1.05 10^5 ± 0.31
	CCH	21.17 ± 2.5a	1.0918 ± 0.002a	3.43 ± 0.03a	4.62 ± 0.46	1.03 10^5 ± 0.24
	VCH	22 ± 0.3a	1.0913 ± 0.002a	3.39 ± 0.08a	5.12 ± 0.68	1.53 10^5 ± 1.03
	DCH	22.2 ± 0.2a	1.0914 ± 0.001a	3.45 ± 0.02a	5.17 ± 0.20	2.78 10^4 ± 2.16
2023	CG	23.93 ± 0.8b	1.099 ± 0.004b	3.60 ± 0.07b	4.09 ± 0.7	2.31 10^4 ± 2.78
	VG	24.50 ± 0.1b	1.101 ± 0.001b	3.59 ± 0.08b	4.61 ± 1.14	8.33 10^3 ± 1.34
	DG	24.43 ± 0.1b	1.100 ± 0.001b	3.60 ± 0.06b	4.99 ± 1.17	3.4 10^4 ± 3.14
	CCH	24.40 ± 1.3b	1.100 ± 0.006b	3.58 ± 0.0b	3.86 ± 0.96	2.41 10^4 ± 0.69
	VCH	24.60 ± 0.7b	1.101 ± 0.003b	3.67 ± 0.04b	3.52 ± 0.25	2.39 10^4 ± 0.99
	DCH	24.03 ± 0.3b	1.099 ± 0.002b	3.57 ± 0.01b	4.48 ± 0.428	1.40 10^4 ± 0.42

C: compost application; **V:** vermicompost application; **D:** no amendments application; **G:** Grembiule hail netting disposition; **CH:** Chapelle hail netting disposition; **TSS:** total soluble solids in Brix degrees; **Density:** g/mL; **TA:** total acidity, g/L tartaric acid; **CFU:** colony forming units, different letter within each column account for statistical significance (Tukey test, $p < 0.05$).

SUPPLEMENTARY DATA
Paolinelli, M., Martínez, L., Brond, V., García, R., Sari, S., Catania, A., … Mercado, L. A. (2026). Wild microbial communities shaping the spontaneous fermentation of biodynamic Malbec wine. *OENO One*, *60*(1).
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Table S4. Mean values (± STD) of physicochemical characteristics of wines according to treatments in three grape harvests studied.

Vintage	Treatment	Density	Ethanol	Su	TA	AA	MA	LA	pH
2021	CG	0.9971 ± 0.0075	13.36 ± 1.44	15.66 ± 15.34	6.03 ± 0.25	1.15 ± 0.38	0.56 ± 0.49ab	1.14 ± 0.26bcd	3.55 ± 0.03
	VG	0.9916 ± 0.0021	13.86 ± 0.45	4.53 ± 4.4	5.33 ± 0.37	0.96 ± 0.085	nd	1.7 ± 0.37d	3.6 ± 0.09
	DG	1.0059 ± 0.0124	12.33 ± 1.59	34.06 ± 25.23	5.33 ± 0.23	1 ± 0.072	nd	1.51 ± 0.105cd	3.6 ± 0.03
2022	CG	0.9945 ± 0.0029	13.22 ± 0.52	7.1 ± 11.66	6.4 ± 0.5	0.7 ± 0.13	2.13 ± 0.18abc	nd	3.56 ± 0.04
	VG	0.9924 ± 0.0003	13.13 ± 0.52	0.15 ± 0.27	5.58 ± 0.79	0.82 ± 0.09	0.6 ± 0.49ab	0.42 ± 0.6ab	3.63 ± 0.06
	DG	0.999 ± 0.01	12.12 ± 1.06	22.2 ± 21.49	5.61	0.55 ± 0.51	1.4 ± 1.45abc	0.55 ± 0.48abc	3.64 ± 0.18
	CCH	0.9979 ± 0.0044	12.35 ± 0.96	16.9 ± 15.32	6.52	0.72 ± 0.14	2.46 ± 0.16c	nd	3.59 ± 0.06
	VCH	0.9973 ± 0.01	12.49 ± 1.22	17.36 ± 21.08	5.93 ± 0.21	0.63 ± 0.59	0.43 ± 0.4ab	0.72 ± 0.34abc	3.69 ± 0.1
	DCH	0.995 ± 0.0033	13 ± 0.55	8.78 ± 13.07	6.42 ± 0.29	0.72 ± 0.1	2.36 ± 0.08c	nd	3.58 ± 0.02
2023	CG	0.99 ± 0.001	14.28 ± 0.55	nd	5.91 ± 0.11	0.68 ± 0.06	1.07 ± 0.39abc	nd	3.57 ± 0.01
	VG	0.99 ± 0.004	14.77 ± 0.45	nd	5.88 ± 0.21	0.44 ± 0.18	1.16 ± 0.38abc	0.08 ± 0.15a	3.52 ± 0.1
	DG	1 ± 0.002	14.11 ± 0.73	11.37 ± 12.29	5.93 ± 0.34	0.63 ± 0.25	0.81 ± 0.07abc	0.15 ± 0.24a	3.61 ± 0.111
	CCH	1 ± 0.001	13.64 ± 1.21	15.64 ± 20.31	5.99 ± 0.3	0.88 ± 0.12	1.03 ± 0.9abc	0.15 ± 0.29a	3.68 ± 0.1
	VCH	0.99 ± 0.004	14.16 ± 0.93	9.41 ± 16.1	6.49 ± 0.24	0.71 ± 0.17	1.49 ± 0.83abc	0.17 ± 0.29a	3.55 ± 0.14
	DCH	0.99 ± 0.008	13.91 ± 0.44	8.54 ± 5.85	6.53 ± 0.11	0.66 ± 0.16	1.38 ± 0.5abc	0.15 ± 0.21a	3.43 ± 0.03

C: compost application; **V:** vermicompost application; **D:** no amendments application; **G:** Grembiule hail netting disposition; **CH:** Chapelle hail netting disposition; **Density:** g/mL; **Ethanol:** % *v/v*; **Su:** total sugar, g/L; **TA:** total acidity, g/L tartaric acid; **AA:** acetic acid, g/mL; **MA:** malic acid, g/L; **LA:** lactic acid, g/L; **nd:** not detected, different letter within each column account for statistical significance (Tukey test, $p < 0.05$).