

The effect of forest fire smoke and potentially mitigating sprays on fungal communities of grapes in three vineyards

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Introduction and Objectives

Background:

- 'Smoke taint', which results in ash tray aromas and flavors, can arise when grapes are exposed to large amounts of forest fire smoke.
- Understanding how the fungal communities in vineyards change in response to forest fire smoke and mitigating agricultural sprays can help wineries manage this problem and influence the wine-making process in a positive way.

Objective:

- To determine the effect of forest fire smoke and mitigating sprays on the alpha and beta diversity of fungal communities of grapes in three vineyards.

Conclusion:

- Differences in fungal diversity and composition were more prevalent when comparing control treatments among different vineyards than when comparing smoke and mitigating spray treatments on a single vineyard. Differences among vineyards in the control treatments were attributed to a powdery mildew outbreak in one vineyard and differences in geography or agricultural practices among the vineyards.



Acknowledgements



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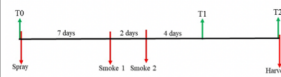
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Materials and Methods

Experimental Design:

4 Treatments: 1) No smoke (control); 2) Smoke; 3) 3 different sprays (1 spray type per vineyard); 4) Spray + Smoke

3 Sampling times: T0; T1 (4 days after 2nd smoking), T2 (immediately before harvesting)

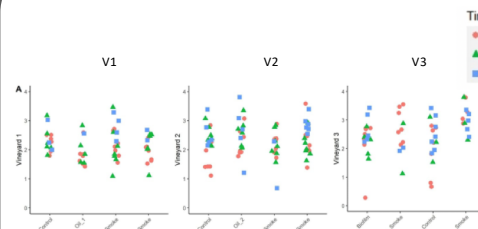


Replication: n = 7 vines (one cluster processed per vine).

Methods:

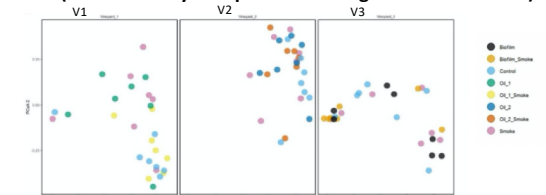
Implementation of treatments: Sampling of Grapes: DNA Extraction: DNA Prep: MiSeq Illumina Sequencing; QIIME II analysis, Statistical Analysis (Shannon and Simpson diversity indices, Bray Curtis Dissimilarity Index)

Results (Alpha Diversity Comparison Among Treatments)



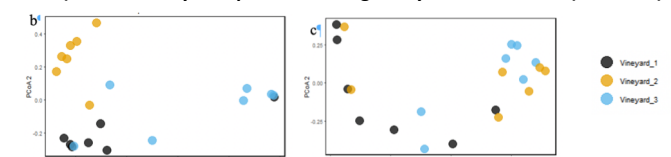
No difference in alpha diversity among different treatments ($P \leq 0.05$) for Shannon-Weiner diversity index at each vineyard. (Note: same result for Simpson index).

Results (Beta Diversity Comparison Among Treatments at T1)



No differences detected in Beta diversity among different treatments at each vineyard at timepoints 1 & 2 as indicated by PCoA of Bray Curtis dissimilarity indices.

Results (Beta Diversity Comparison Among Vineyard Controls at b) T1 and c) T2)



Differences in Beta diversity among different vineyards as indicated by PCoA of Bray Curtis dissimilarity indices (driven partially by powdery mildew outbreak).

Results (Individual Taxon Comparison Among Vineyards)

Erysiphe necator (Powdery Mildew Outbreak in Vineyard 2 at T1)

