

The Impact of Fungicides on the Phyllosphere Microbiome of Grapevines

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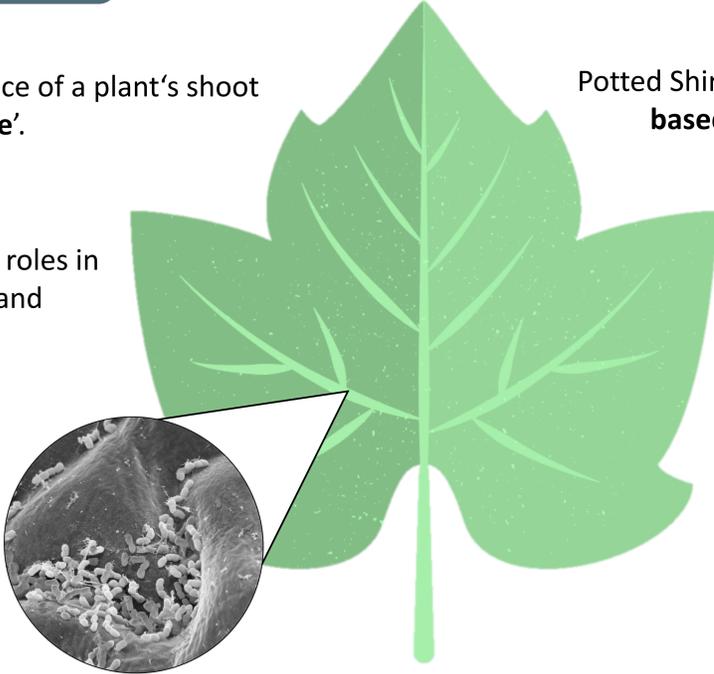
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Introduction

The microorganisms which inhabit the surface of a plant's shoot are known as the '**Phyllosphere Microbiome**'.

A diverse phyllosphere has many beneficial roles in both **plant health** (e.g., disease resistance) and **winemaking** (e.g., wild fermentation).

One factor which may impact the diversity of the phyllosphere could be the use of **broad spectrum fungicides**.



Methods

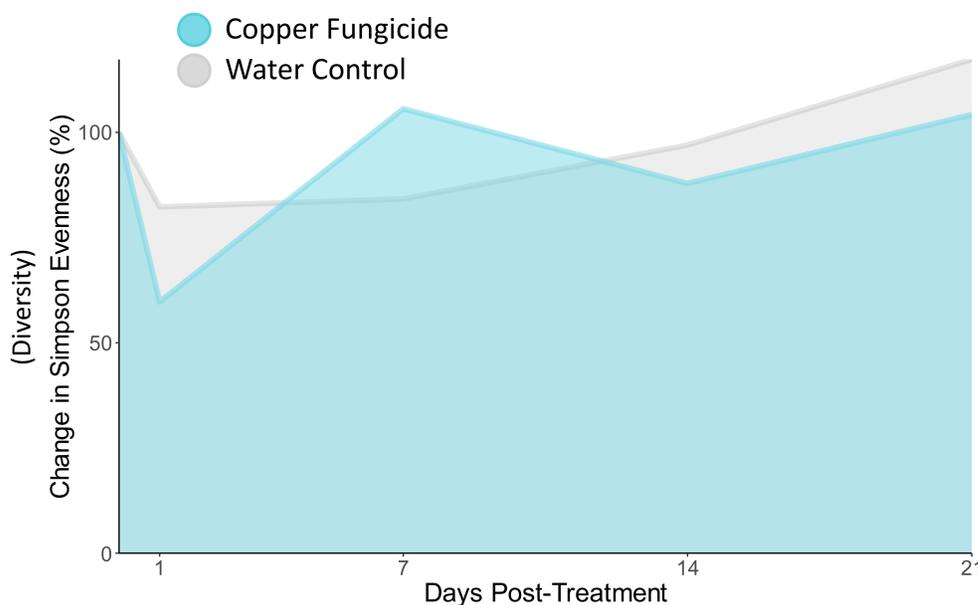
Potted Shiraz vines were subjected to both **Copper-** and **Sulphur-based** fungicide treatments and sampled over three weeks.

Using a **novel microbial harvesting technique**, as well as **16S gene target sequencing**, the **bacterial communities** were observed.

Changes in the bacterial community **structure and diversity** demonstrated the **off-target impact** of non-specific fungicides on the **Phyllosphere**.

QUESTION 1

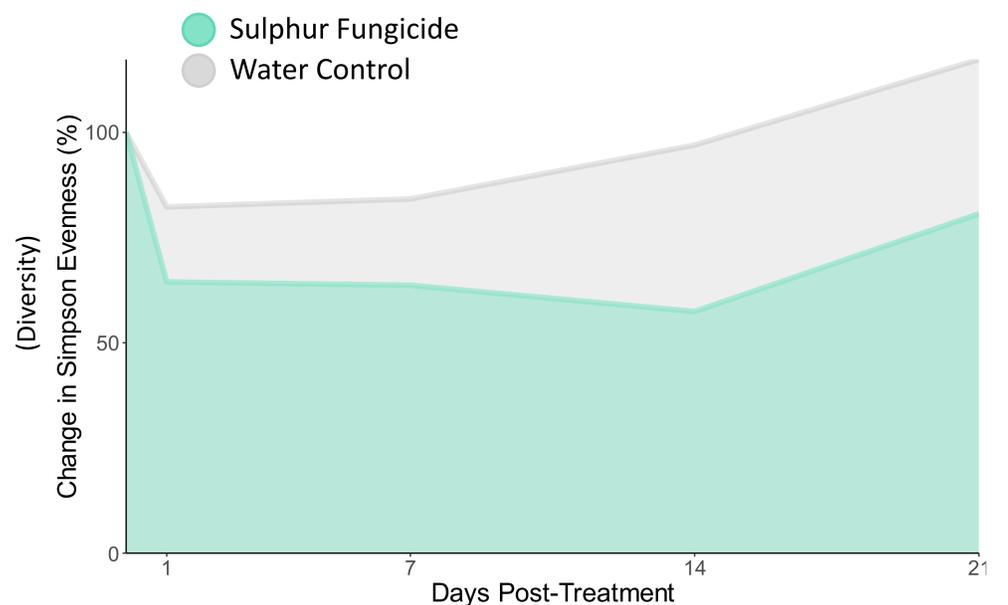
Do common fungicides impact the phyllosphere microbiome of grapevines?



➤ Copper-based fungicides appear to cause a sudden decline in bacterial diversity but drive a sharp increase over the first 7 days.

QUESTION 2

What effects do common fungicides have on the structure of the phyllosphere over time?



➤ Sulphur-based fungicides also appear to cause a sudden decline in bacterial diversity; however, this decline continues until day 14.

Conclusions

- Both fungicides appear to have immediate impacts on the diversity of the phyllosphere. However, Copper fungicides appear to drive an **increase** in diversity, perhaps due to Copper being a micronutrient to bacteria.
- As higher diversity is associated with a **healthy microbiome**, extended, high-input use of fungicides may have potential downstream consequences on **vine health** and **wine quality**.

Next Step...

- Observe the changes in **fungal** communities using ITS gene sequencing.
- Investigate the effects these changes have on the microbial communities during **wine fermentation**.

Acknowledgements:

Innerbner et al. 2009 (Leaf surface SEM image)
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