Can we improve western white pine microbiomes to promote resistance to blister rust disease?

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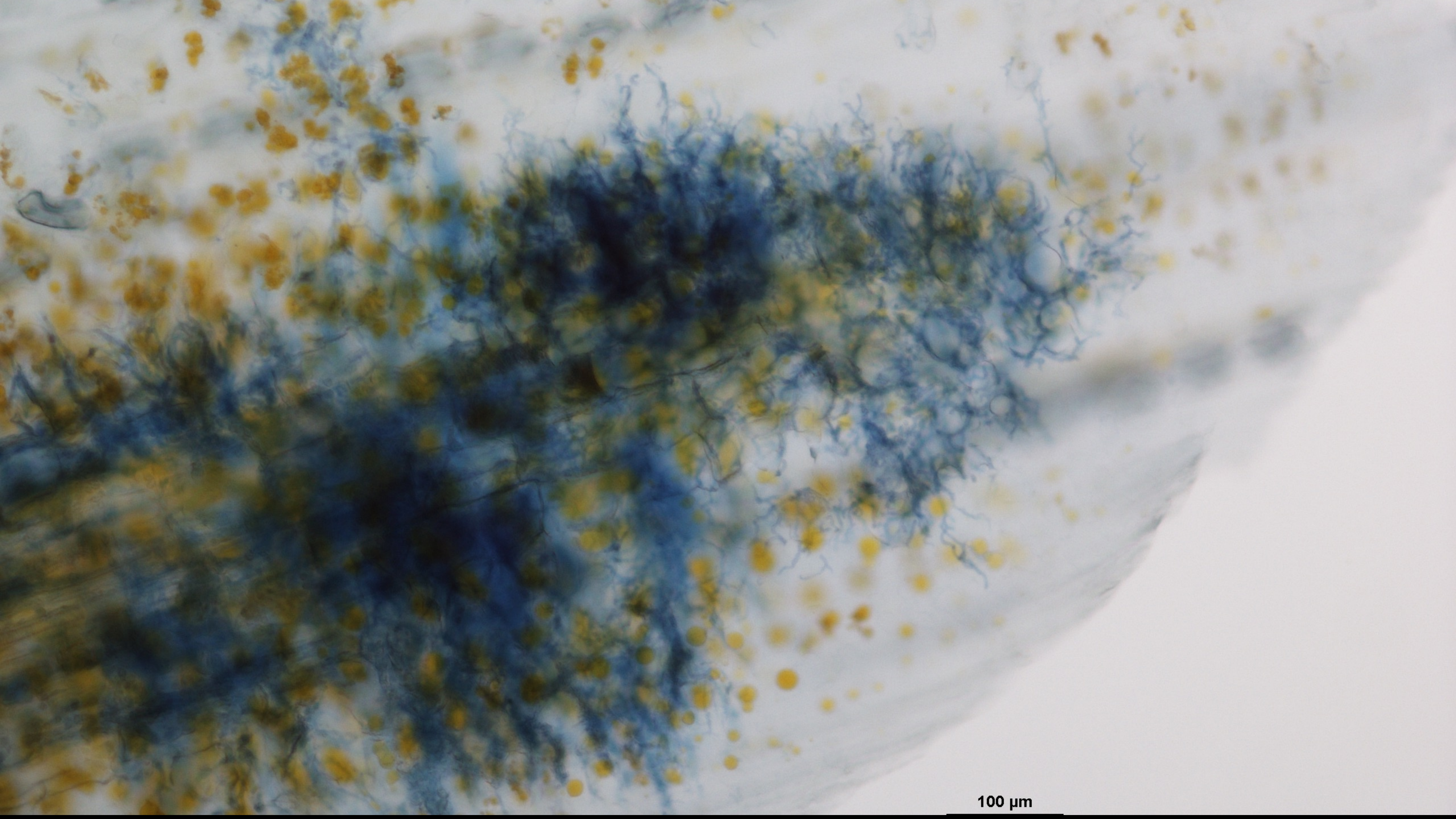
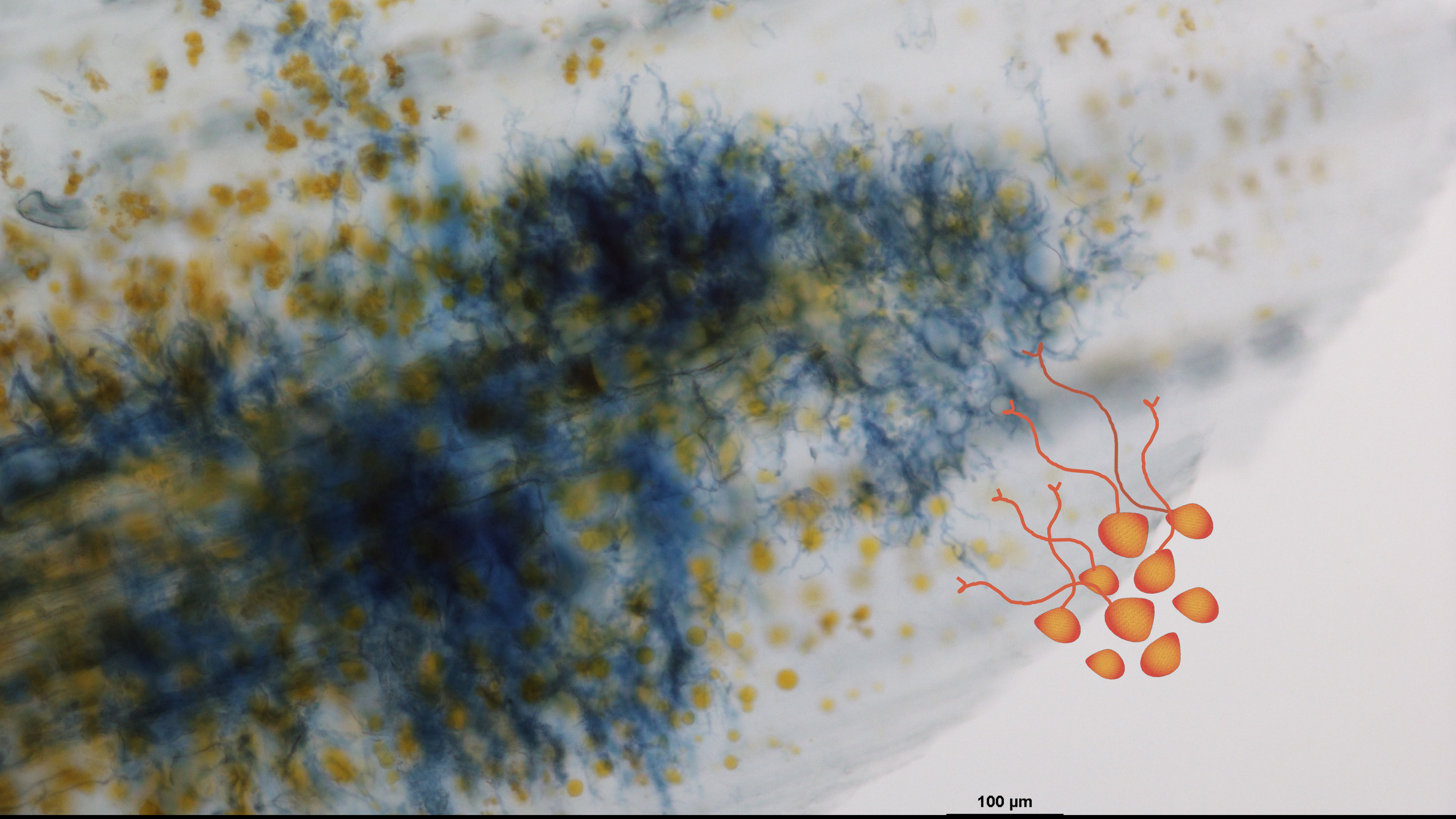
Lorinda Bullington


100 µm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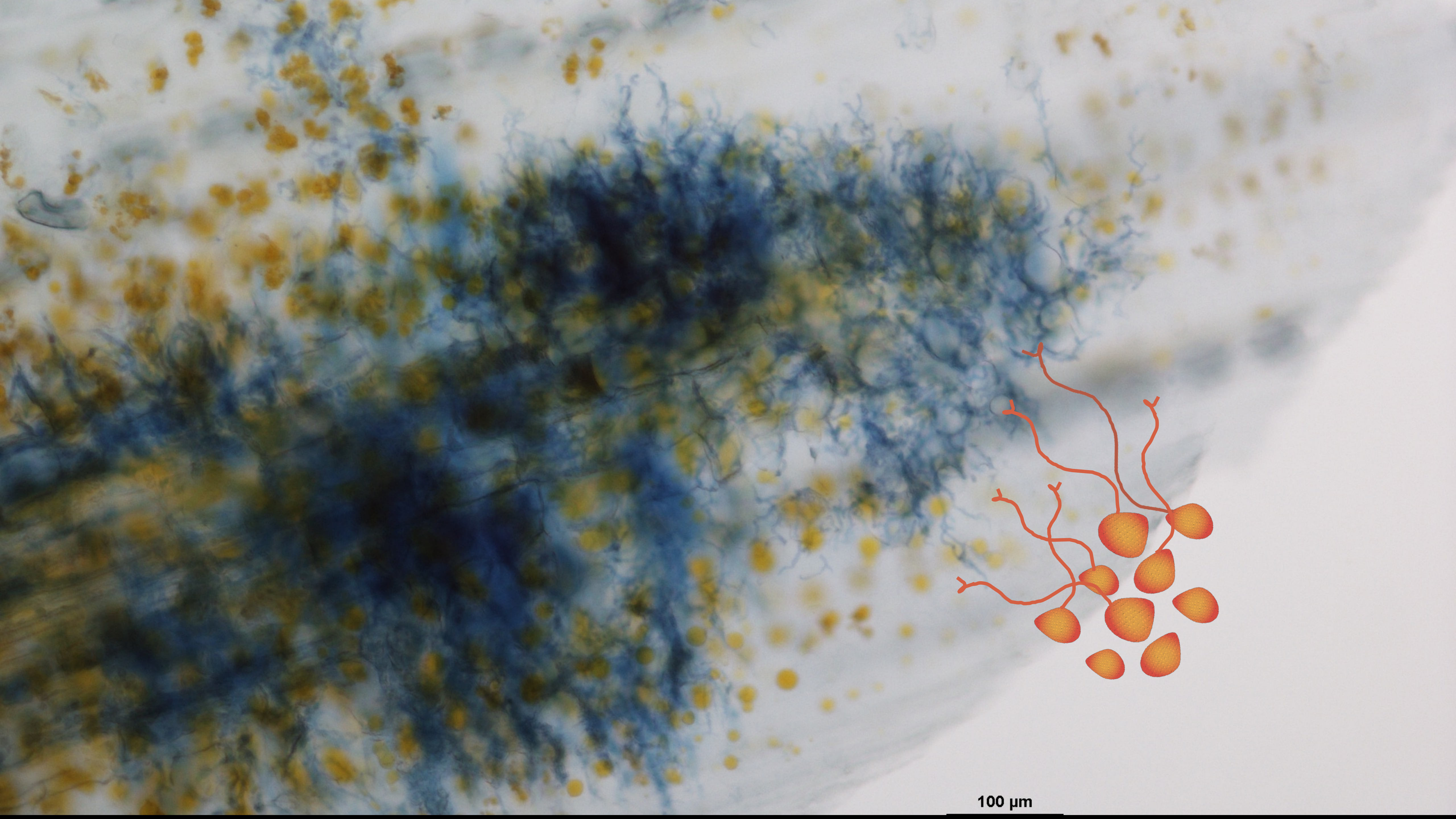
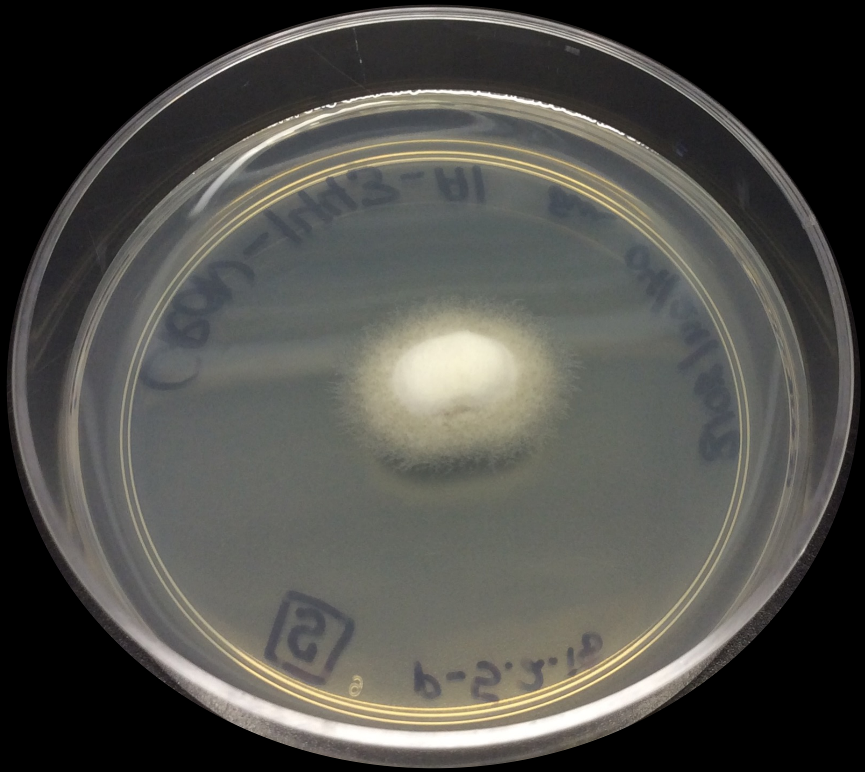

100 µm

Fungal antagonist assays



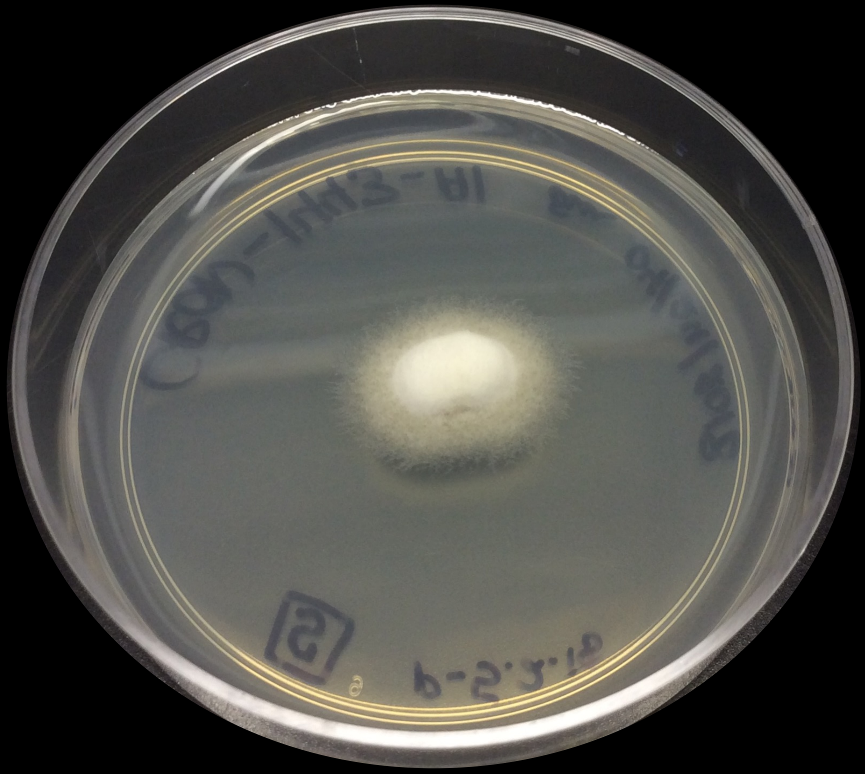
Cronartium ribicola (pathogen)

vs.

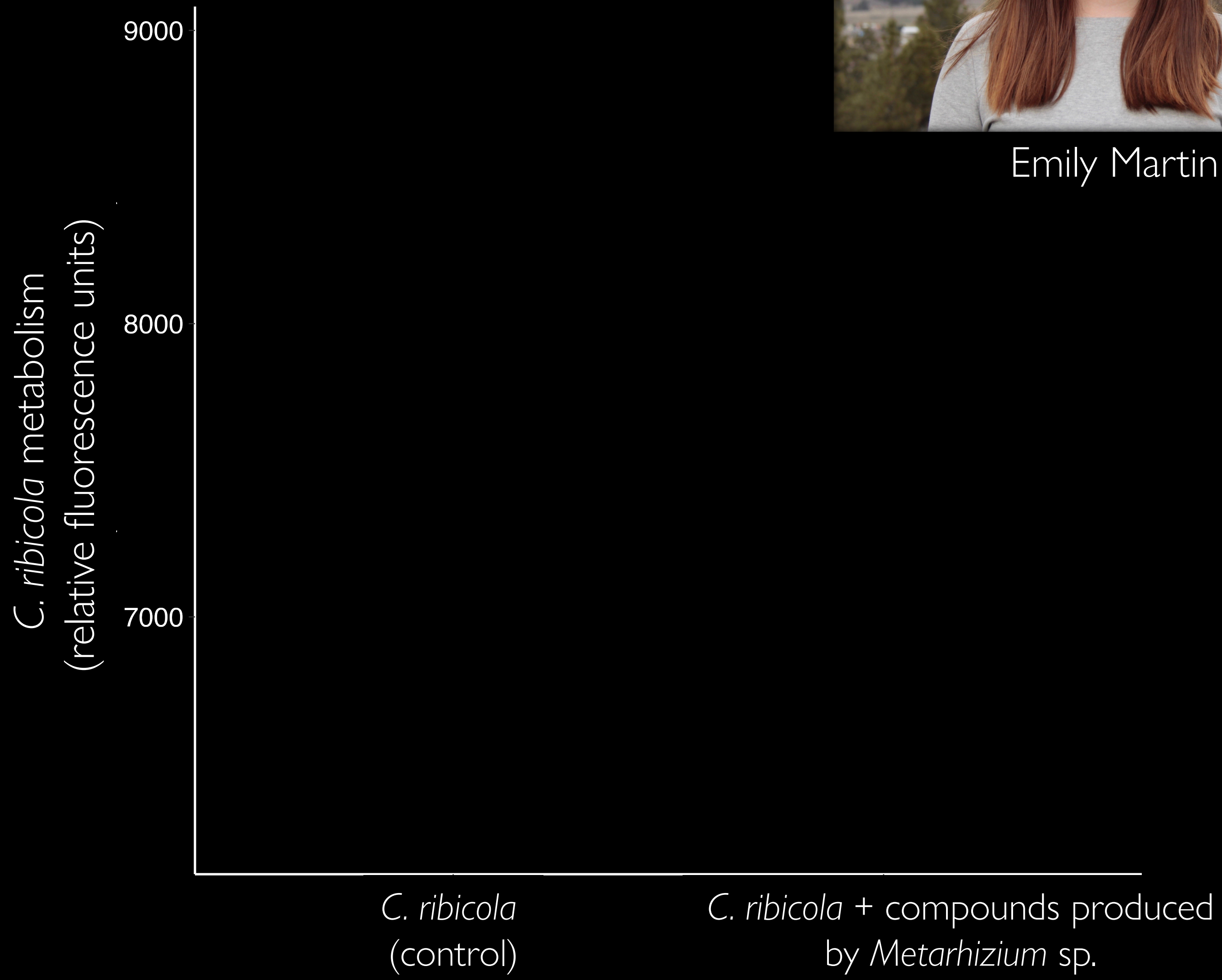
Fungal symbionts

Fungal antagonist assays

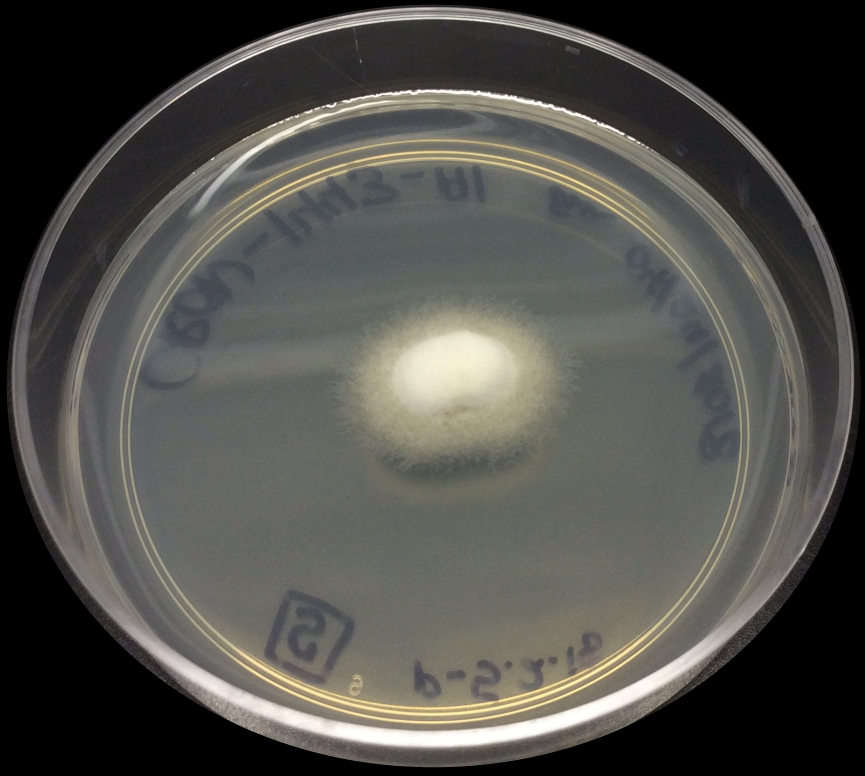
Emily Martin



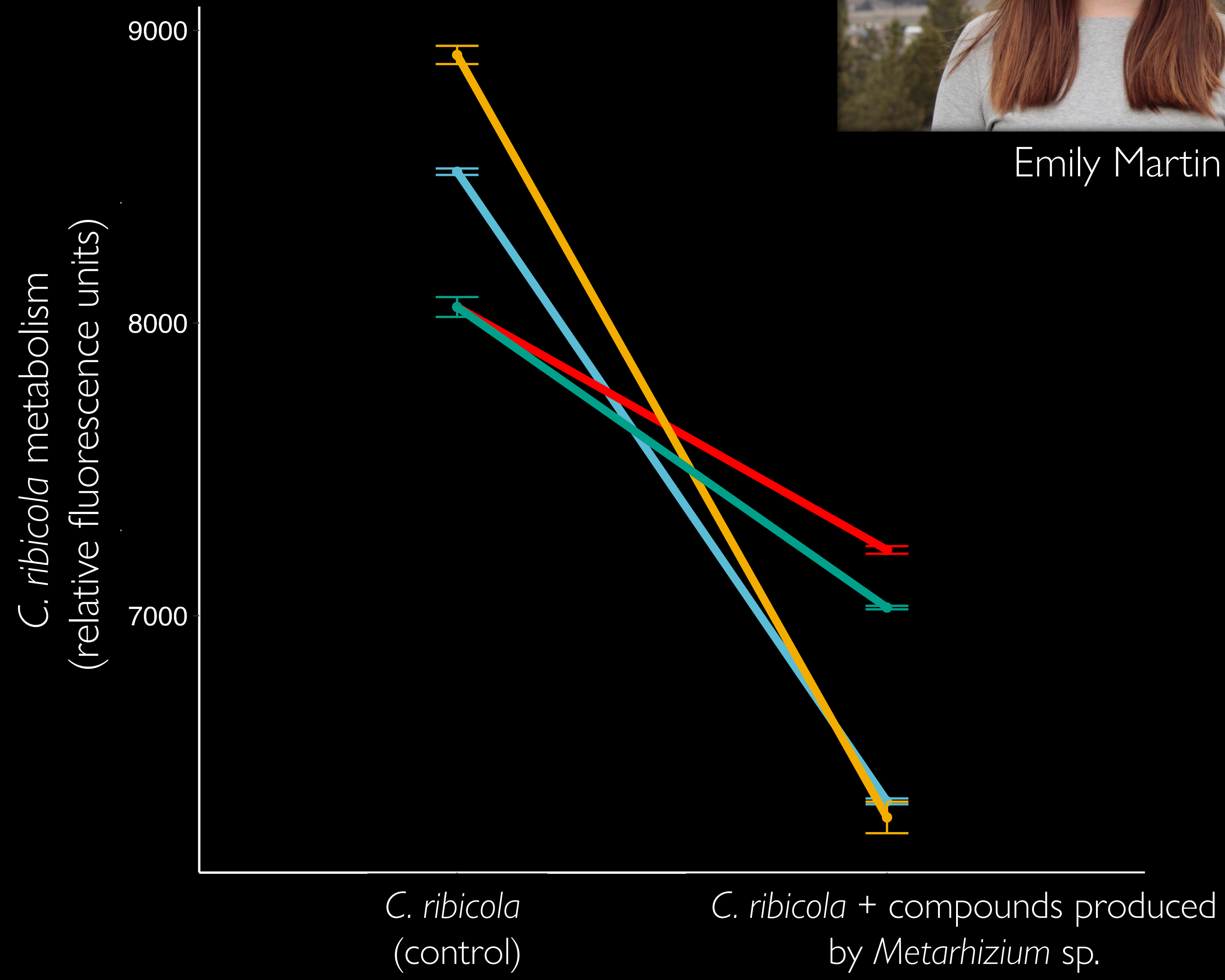
Cronartium ribicola



Fungal antagonist assays



Cronartium ribicola



Emily Martin

Suillus sibiricus

Full-factorial Experimental Design

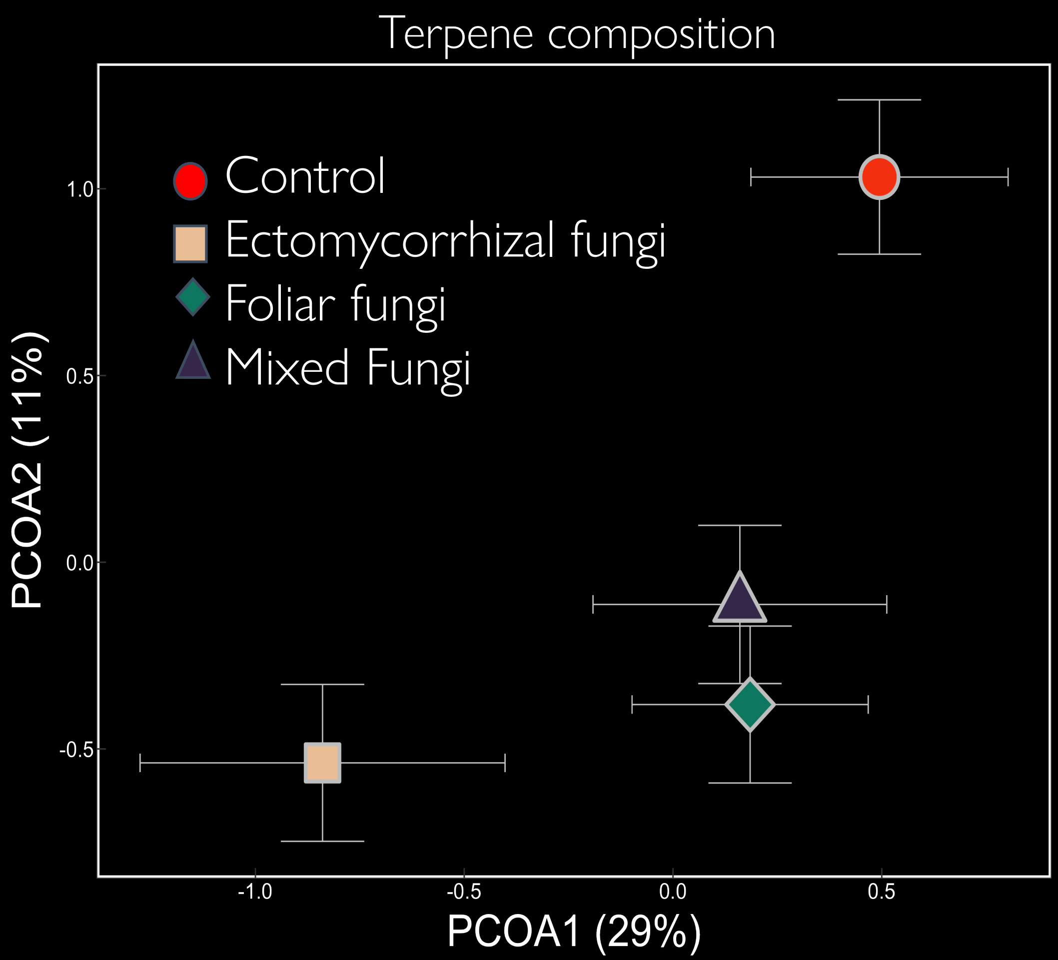
	Pathogen Inoculation	No Pathogen
Foliar Fungi	150 seedlings	150 seedlings
Ectomycorrhizal Fungi	150 seedlings	150 seedlings
Mixed Fungi	150 seedlings	150 seedlings
water (control)	150 seedlings	150 seedlings

Inoculation with *Cronartium ribicola*

- Six seedling families (seeds collected from the same parent tree) were included to determine the genetic variation of fungal microbiome interactions.

- Seedling families represented seed lots with known resistance to Cronartium, as well as those with known susceptibility.

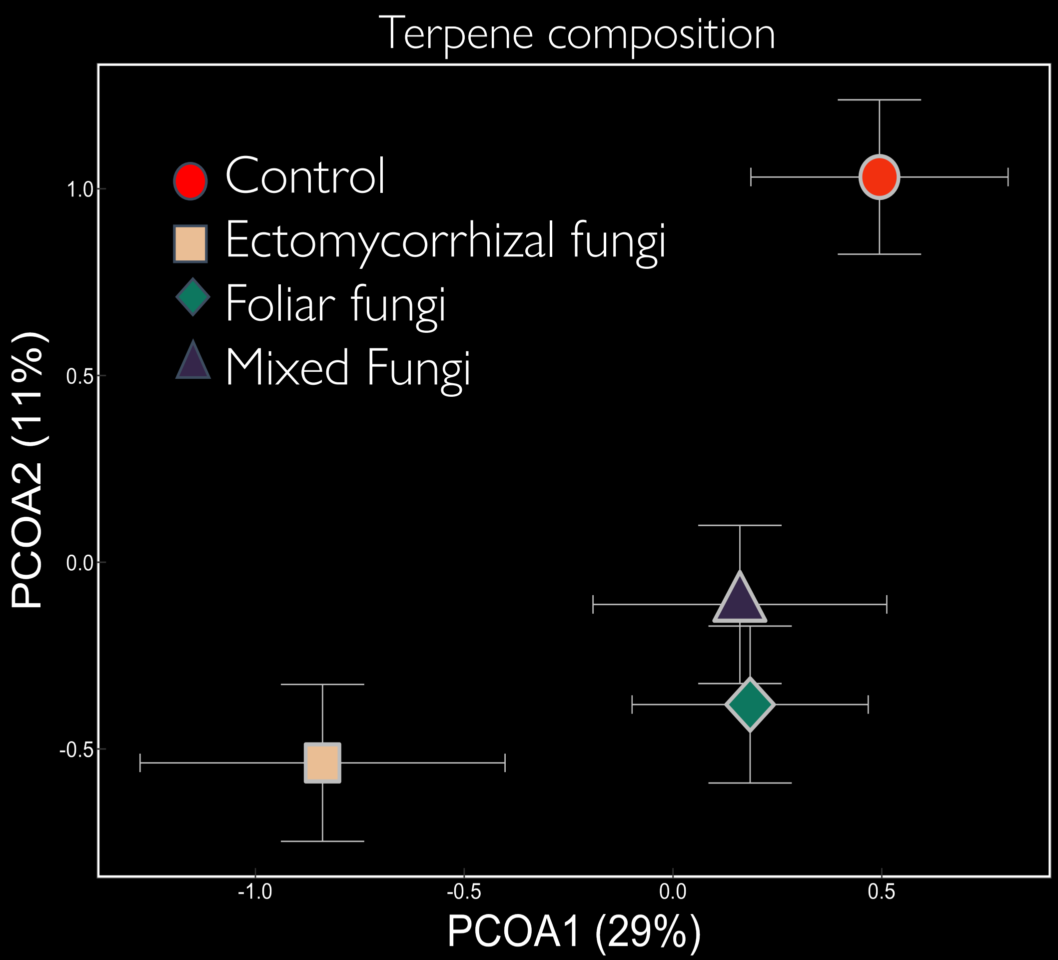
Fungal treatments changed seedling defensive chemistry



Treatment: R^2 = 0.07, p <0.005

Seedling family: R^2 = 0.14, p <0.005

Fungal treatments changed seedling defensive chemistry



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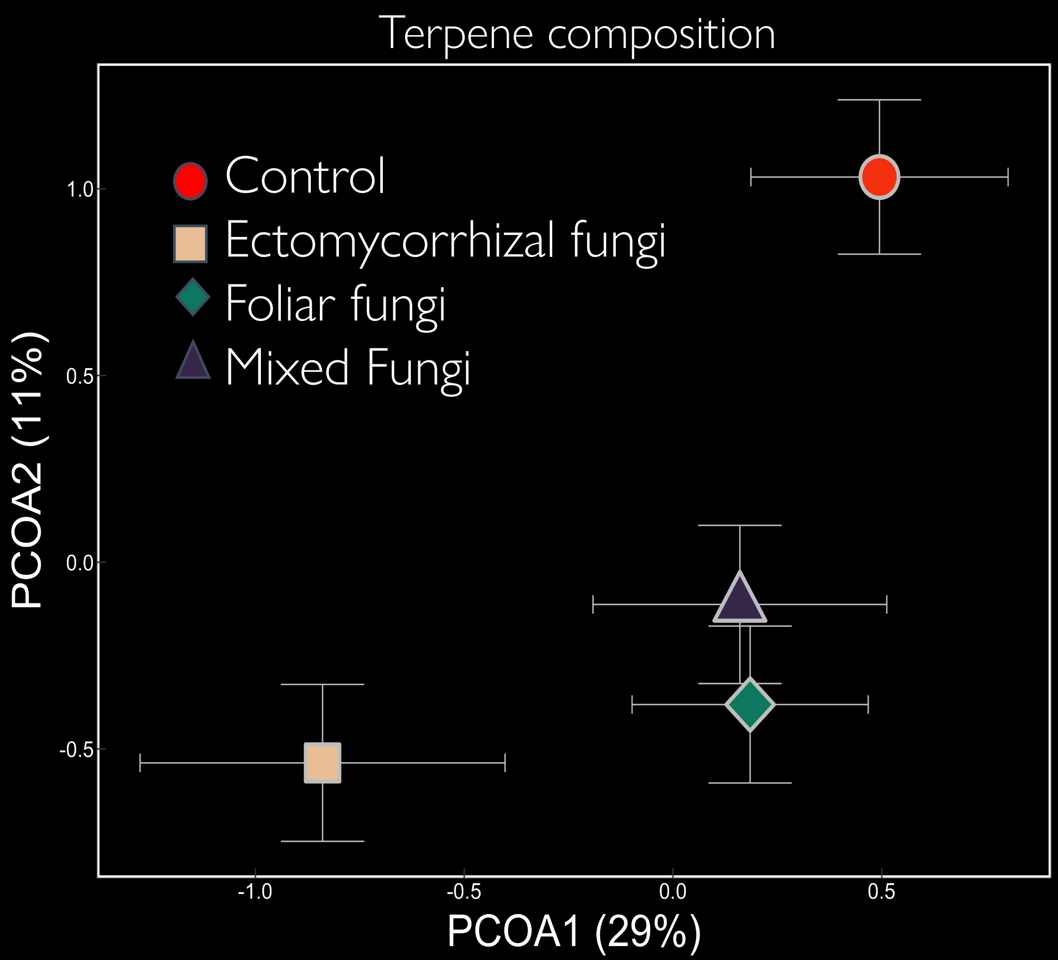
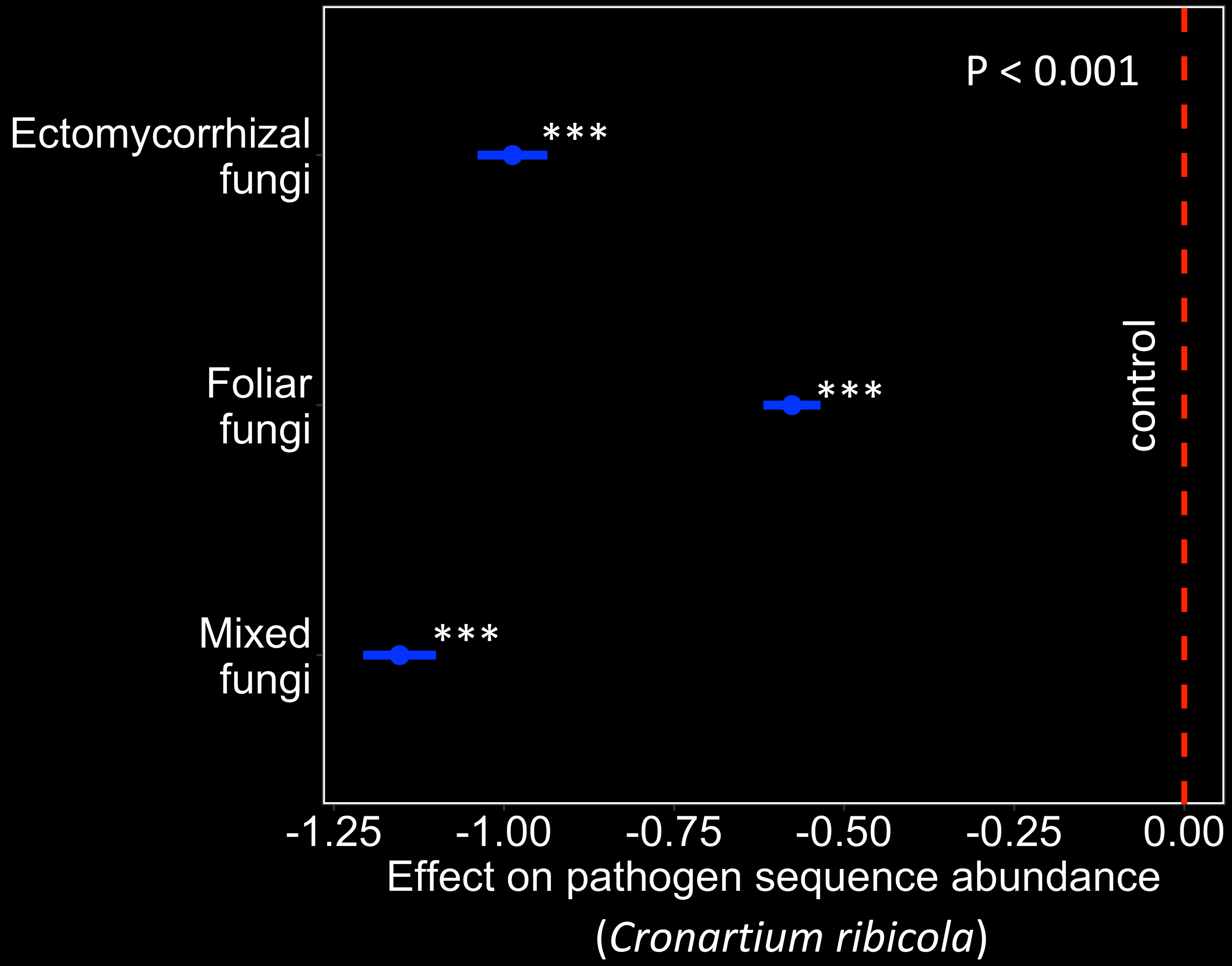


Treatment: $R^2 = 0.07$, $p < 0.005$

Seedling family: $R^2 = 0.14$, $p < 0.005$

Fungal treatments reduced pathogen sequence abundance



C. ribicola sequence abundance is positively correlated with disease characteristics

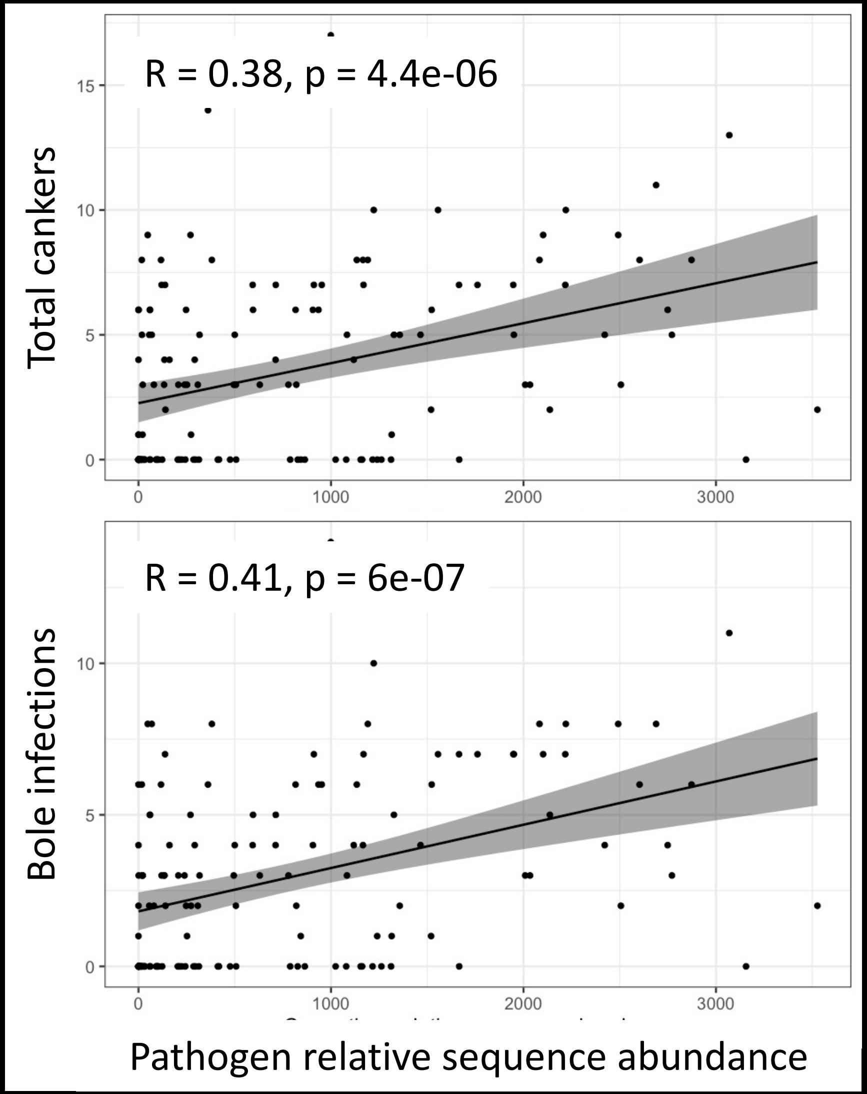


Photo: Richard Sniezko

Summary

- Inoculations with fungal endophytes and ectomycorrhizal fungi altered tree defensive chemistry and reduced pathogen sequence abundance in foliar tissue
- Pathogen sequence abundance was positively correlated with the total cankers and number of stem infections on each seedling
- **Treatment effects vary among seedling families.** Families known to have greater genetic resistance to *C. ribicola* appear to respond more positively and more strongly to fungal treatments

Thank you for listening!

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