Is your wine attracting flies on purpose?

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Introduction

- Insects and microorganisms co-exist in nature, and may influence the fermentation microbiome and thus wine quality.
- The common vinegar fly *Drosophila melanogaster*, is known to harbour both desirable and spoilage (i.e. *Brettanomyces*) microbes, which could be transported to grapes and fermentations as part of this interaction.
- Here we investigate traits of yeast that may affect this interaction, in particular attraction of and dispersal by flies.
- Yeast traits investigated include cell morphology (filamentation) and impact of the yeast derived and wine industry relevant volatile compound hydrogen sulfide.
- Attraction of flies to *Brettanomyces* has also been investigated.

Impact of yeast cell morphology on yeast dispersal by flies

- Filamentous and non filamentous yeast were presented to flies and after time yeast were quantified from the fly body, gut, and experimental arena.
- More filamentous yeast were found on and in flies and were more likely to be dispersed (Figure 1).

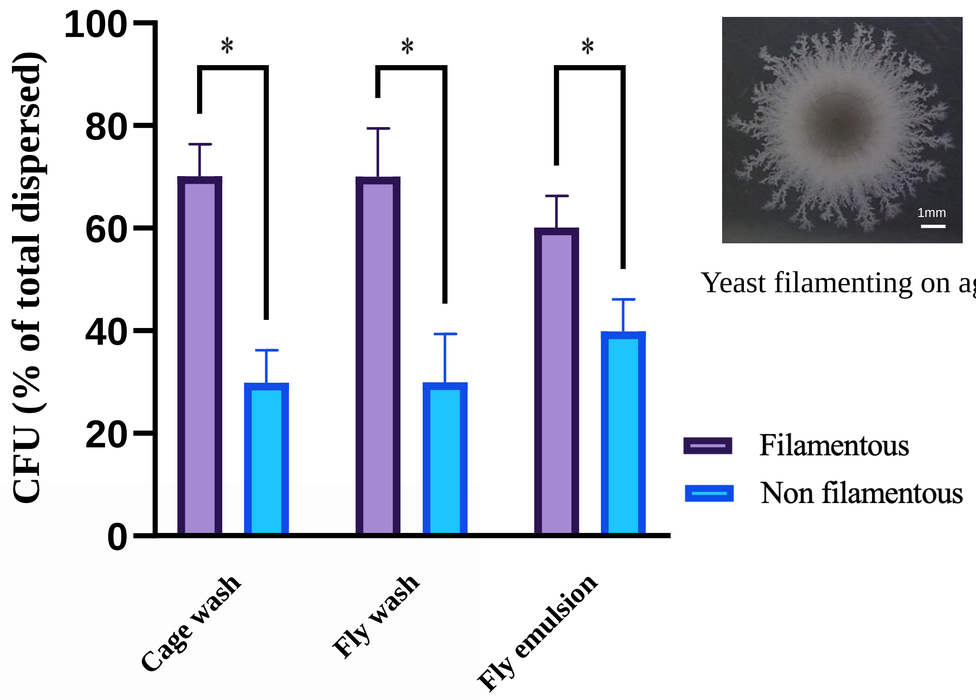

Figure 1. Percentage of colony forming units (CFU) of filamentous and non-filamentous yeast found on the flies bodies (wash), in the gut (emulsion), and on the experimental arena (cage). *significantly different ($p<0.05$)

Impact of H_2S on attraction of flies

- Attractiveness of flies to hydrogen sulfide was tested in a T-maze.
- H_2S has a bimodal affect on flies, the lowest concentration is attractive and highest repellent (Figure 2).

Figure 2. Percentage of flies in T-maze arm with increasing H_2S concentrations. *significantly different ($p<0.05$).

Impact of yeast species on fly attraction

- In a T-maze *Brettanomyces* (5 strains) and *Saccharomyces* yeast were presented to measure fly preference.
- Flies were more attracted to *Brettanomyces* than *Saccharomyces* yeast.

Conclusion

- Filamentous yeast are more likely to be dispersed by flies, H_2S has a bimodal attraction/repulsion affect on flies and flies are attracted to *Brettanomyces* yeasts.
- These results highlight that a fundamental understanding of this interaction is important to help industry modulate processing where flies as a yeast vector may impact wine quality.Also, the control of flies in the winery may help prevent the spread of *Brettanomyces*.

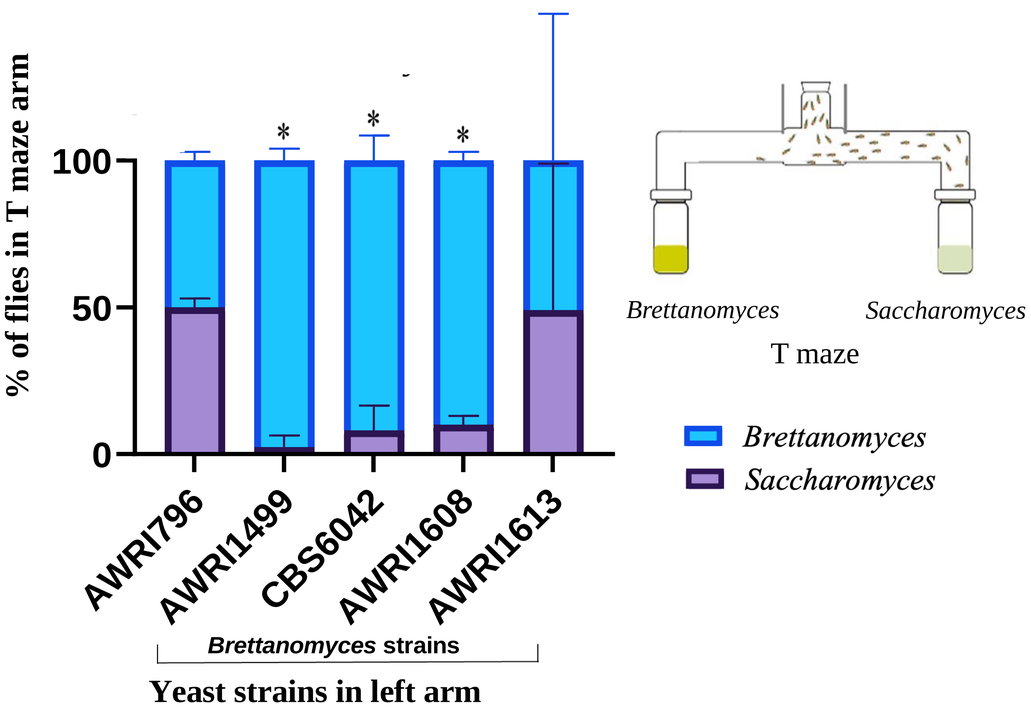

Figure 3. Percentage of flies in each T-maze arm when presented with 1 of 5 *Brettanomyces* strains (or control: AWRI796) in one arm and *S. cerevisiae* (AWRI796) in the other. *significantly different ($p<0.05$).

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