



# Yeast-bacteria compatibility in wine: It's complicated!



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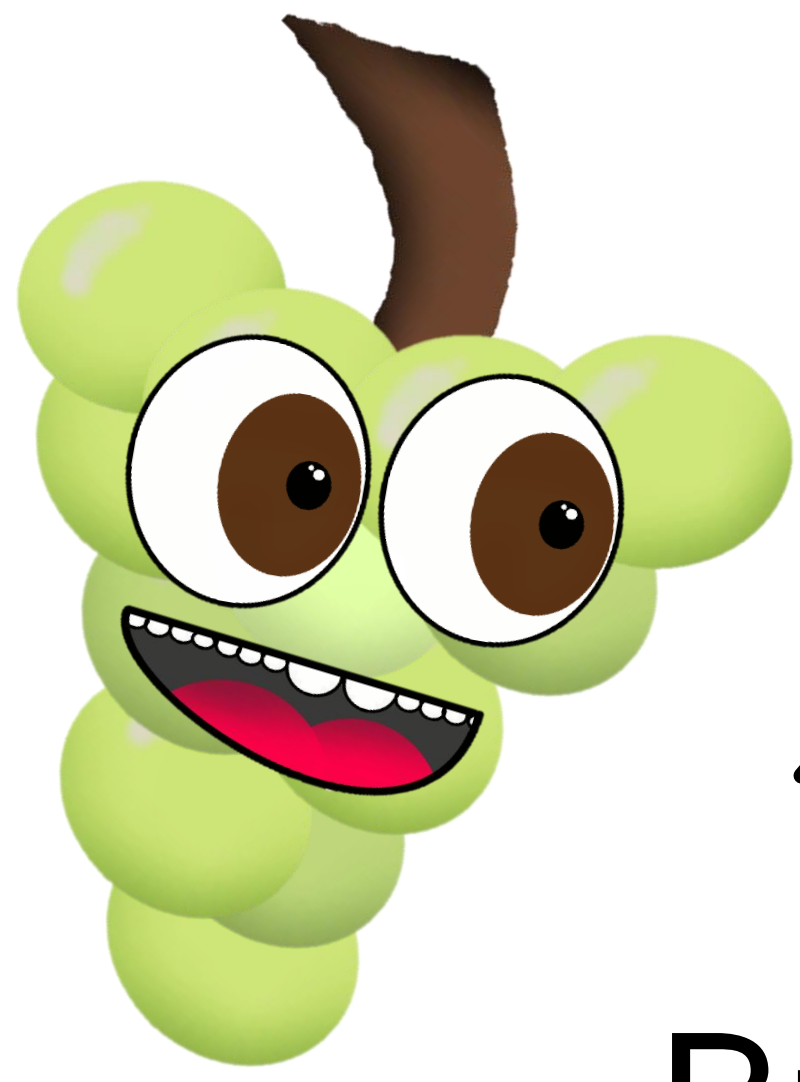


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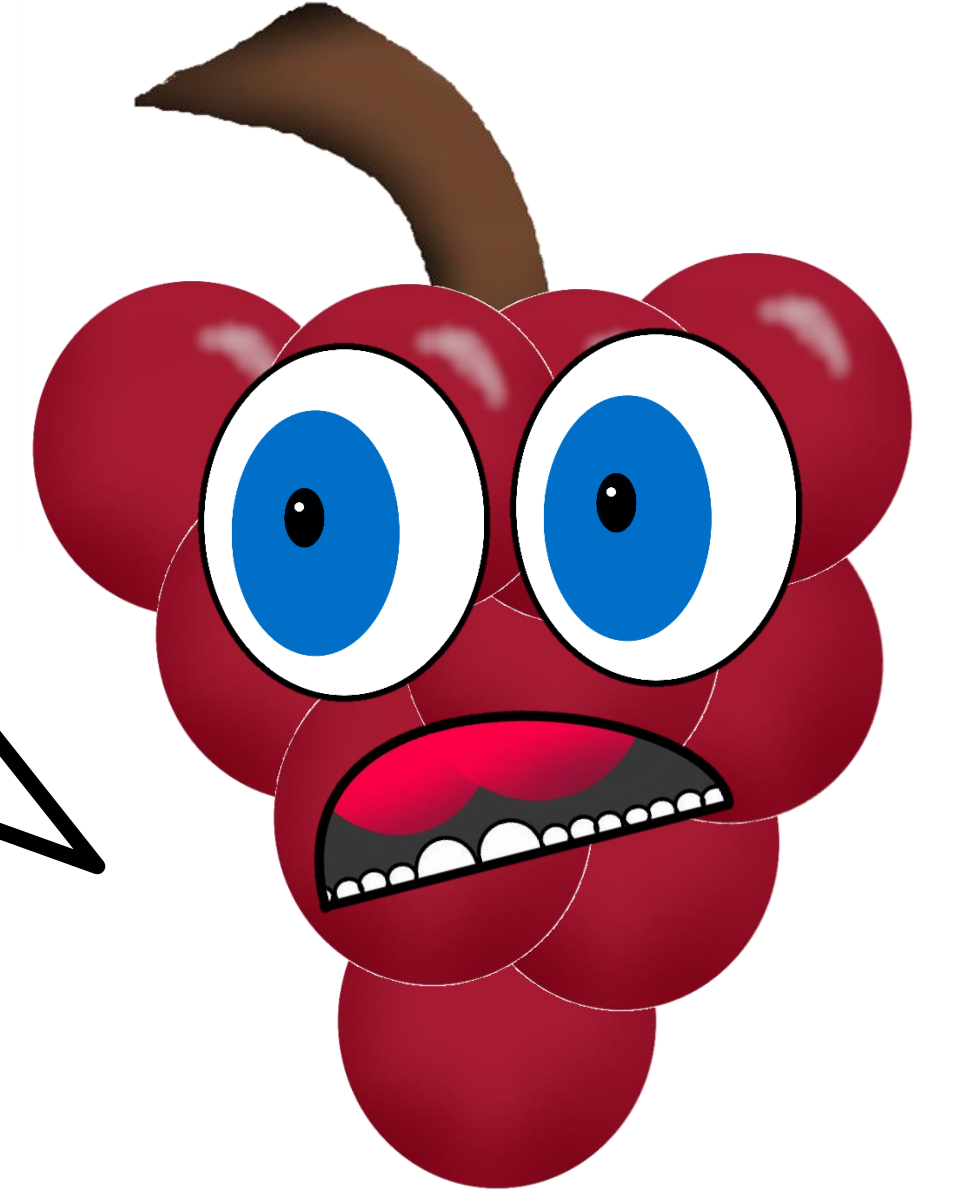
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Woohoo!  
I'm ready for harvest.  
I'm going to be the  
**BEST**  
white wine!

Uh-oh!  
I'm going to be ready in a very short time too.  
I sure do hope the **yeast** and **bacteria** will work  
together to achieve efficient fermentation.  
The white wines need to be fermented before I'm  
ready to be picked!



But how do we know that the yeast and bacteria  
will work well together in co-inoculations?!

We looked at a number of yeast-  
bacteria pairs (in controlled  
conditions) to see if;

yeast could finish alcoholic  
fermentation (AF)

**and**

bacteria could finish malolactic  
fermentation (MLF)

		O 1	O 2	O 3	O 4	O 5	O 6	O 7	Lp 1	Lp 2
S. cerevisiae	SC 1	-	-	+	-	-	+	+	-	-
	SC 2	+	-	-	-	-	+	-	-	-
	SC 3	-	-	-	-	-	-	-	-	-
	SC 4	-	+	-	+	+	-	+	-	-
	SC 5	-	-	-	-	-	-	-	-	-
S. uvarum	SU	+	-	+	+	-	+	+	-	-
	LT	+	+	+	-	+	+	-	-	-
Non-Saccharomyces	TD	+	+	+	-	+	+	-	-	-

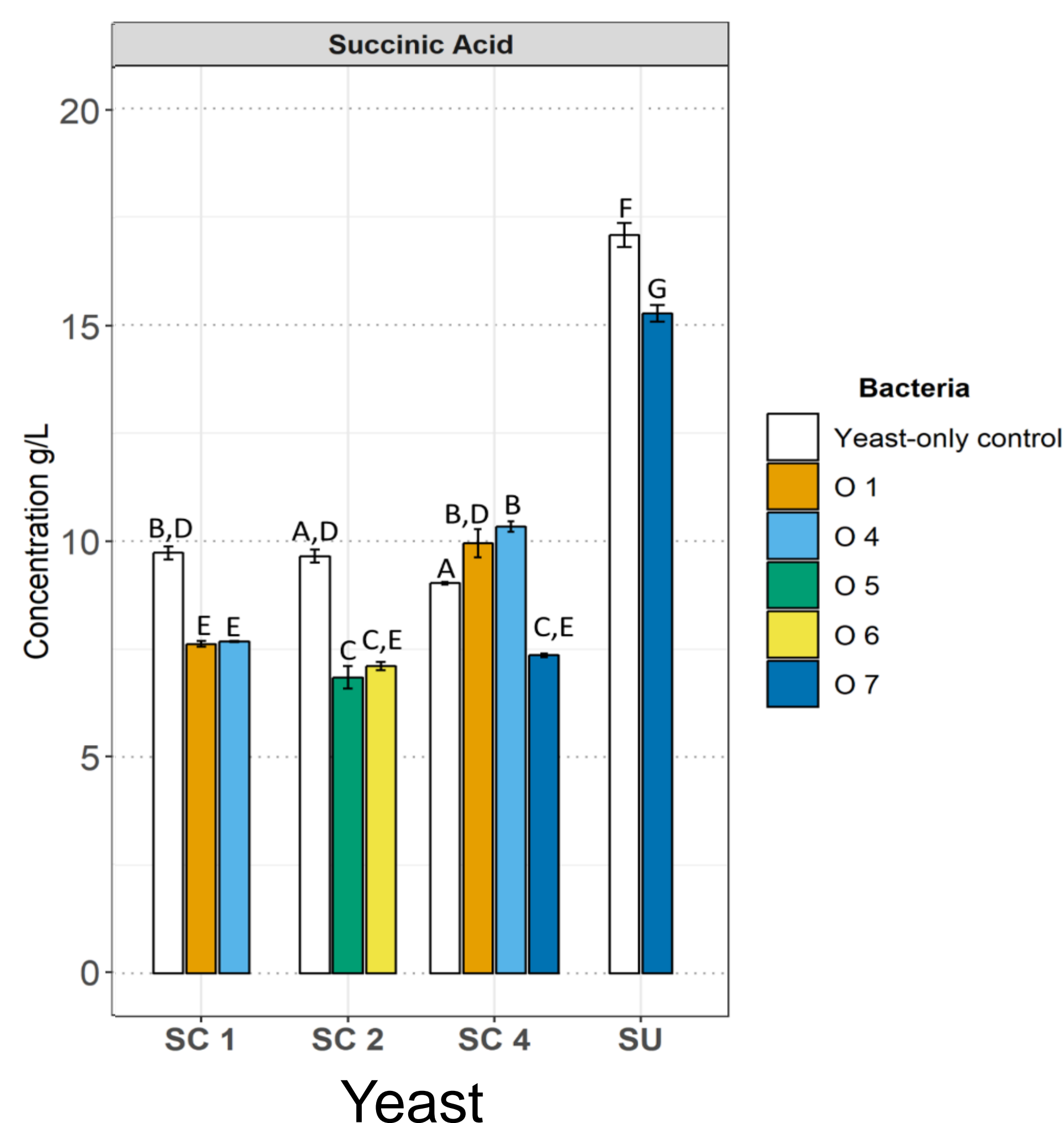
+ : yeast and bacteria were able to complete AF\* and MLF  
Green shading = compatible yeast and bacteria

- : Bacteria could not complete MLF

\*Non-Saccharomyces did not finish AF, but end residual sugar was unaffected

We further analysed a subset of compatible and  
incompatible yeast-bacteria pairs in juice for AF and  
MLF completion. Analyses included: yeast and bacteria  
viability, HPLC (organic acids), amino acid analysis and  
GC-MS (volatile compounds).

Yeast	Bacteria	Compatibility	MLF speed
S. cerevisiae	O 1	+	Slow
	O 4	+	Slow
	O 5	+	Fast
	O 6	+	Slow
S. uvarum	O 1	-	-
	O 4	-	-
	O 7	+	Fast
SU	O 7	+	Slow



We found succinic acid concentration  
correlated with compatibility, but not  
MLF speed.

Succinic acid is a competitive  
inhibitor of the malolactic enzyme.

However, during successful co-  
inoculation, succinic acid was lower  
than the yeast that fermented alone.

This could mean that bacteria  
modulate succinic acid production by  
yeast

OR

Bacteria take up succinic acid from  
the environment.

## What did we find out?

- Bacteria need to maintain a critical cell density to perform malolactic fermentation
- Compatibility between yeast and bacteria is strain dependent
- Ethanol was not solely responsible for yeast-bacteria incompatibility
- Succinic acid, a competitive inhibitor of the malolactic enzyme, may contribute to overall yeast-bacteria compatibility

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