

Circular microbial biotechnology for improving colour and aroma in rosé wines produced in warm climates

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BACKGROUND

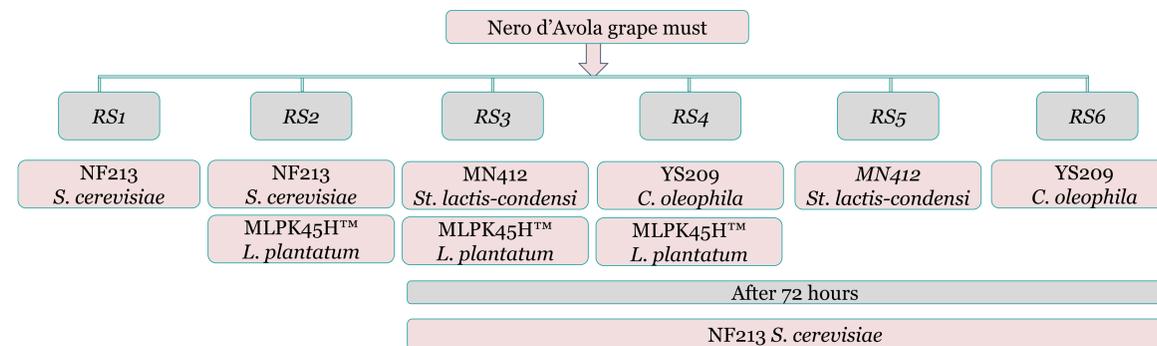
- ❖ Global rosé wine production has increased in recent years.
- ❖ Climate change reduces wine freshness, promotes cooked-fruit aromas, and affects wine colour.
- ❖ Microbial strategies may modulate wine characteristics during fermentation.

OBJECTIVE

To evaluate the effect of co-inoculation of non-*Saccharomyces* yeasts and lactic acid bacteria (LAB), followed by sequential inoculation of *Saccharomyces cerevisiae*, on the colour and aromatic profile of rosé wines.



METHODOLOGY



Starmerella lactis-condensi MN412 isolated from Sicilian manna; *Candida oleophila* YS209 isolated from honey by-products; *Saccharomyces cerevisiae* NF213 from grapes; *Lactiplantibacillus plantarum* MLPK45TH commercial strain

- ❖ Fermentation trials were carried out in 500-L tanks.
- ❖ Colour was evaluated using the CIELab color system.
- ❖ Microbial populations were monitored on WL agar, MRS, GM17 media.
- ❖ Sensory analysis was performed by a trained panel.

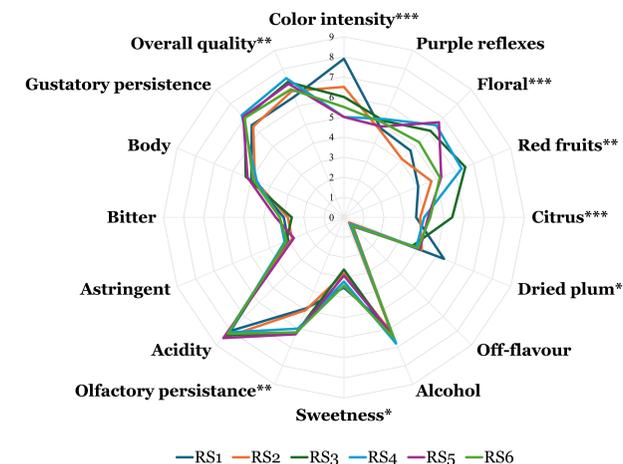


RESULTS AND CONCLUSIONS

Samples	L*	a*	b*	C	h
RS1	57.67 ± 0.53 d	20.93 ± 0.51 a	12.77 ± 0.46 a	24.52 ± 0.67 a	31.38 ± 0.36 a
RS2	62.15 ± 0.96 c	19.55 ± 0.31 ab	9.93 ± 0.54 b	21.93 ± 0.44 b	26.92 ± 1.15 ab
RS3	61.65 ± 0.32 c	19.15 ± 0.61 bc	10.25 ± 0.93 b	21.74 ± 0.13 b	28.17 ± 2.93 ab
RS4	66.46 ± 0.61 a	16.05 ± 0.79 d	6.30 ± 0.18 d	17.24 ± 0.79 d	21.45 ± 0.62 c
RS5	67.20 ± 0.17 a	14.97 ± 0.57 d	8.02 ± 0.84 c	17.00 ± 0.19 d	28.19 ± 3.36 ab
RS6	63.95 ± 0.48 b	17.96 ± 0.27 c	7.66 ± 0.21 cd	19.53 ± 0.27 c	23.10 ± 0.65 bc
p-value	≤ 0,0001	≤ 0,0001	≤ 0,0001	≤ 0,0001	≤ 0,001

L*:lightness (0= black, 100= white); a*: redness (a* +) → greenness (a* -); b*: yellowness (b* +) → blueness (b* -); C: color saturation and intensity; h: hue angle (color nuance); ΔE: total color difference (human perception threshold ΔE > 2.7). ↑L*: Lighter color; ↓ C: lower saturation.

	ΔE					
	0	3	5	7	9	12
RS1	0.00					
RS2	5.48	0.00				
RS3	5.04	0.72	0.00			
RS4	11.96	6.63	6.95	0.00		
RS5	12.20	7.08	7.30	2.16	0.00	
RS6	8.62	3.30	3.66	3.43	4.43	0.00
	RS1	RS2	RS3	RS4	RS5	RS6



- ❖ Mixed fermentations modulated wine colour, resulting in paler rosé wines.
- ❖ Co-inoculation of non-*Saccharomyces* yeasts and LAB enhanced aromatic complexity.
- ❖ Microbial strategies may help control rosé wine characteristics in warm climates.
- ❖ This approach supports more sustainable winemaking by reducing the need for chemical corrections.