

Float or sink? The effect of flotation and cold-settling on non-volatile composition, taste/mouth-feel of white wine

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Background and research question

Floating grape solids from juice is a high-throughput continuous process that is more efficient than cold settling. But do wines made from floated juices differ in their non-volatile composition, and in their taste and mouth-feel compared with wines made from cold settled juices?

Methods

Chardonnay and Frontignac grapes from the Murray Valley were processed into juice by two large wineries using similar protocols. The juice clarification treatments were:

- 1) High solids (HS) excluding gross solids
- 2) Low solids by settling (LS-SE) cold settled at 0°C and racked
- 3) Low solids by flotation (LS-FL) by floating using nitrogen gas at 30 kL/hour

The juices were vinified the same way. Wine total phenolics (Folin-Ciocalteu), phenolic profile (targeted C18 HPLC), total polysaccharides (phenol-sulfuric), polysaccharide profile (SEC), and taste/mouth-feel (descriptive analysis) were quantified.



Results

Wine phenolics

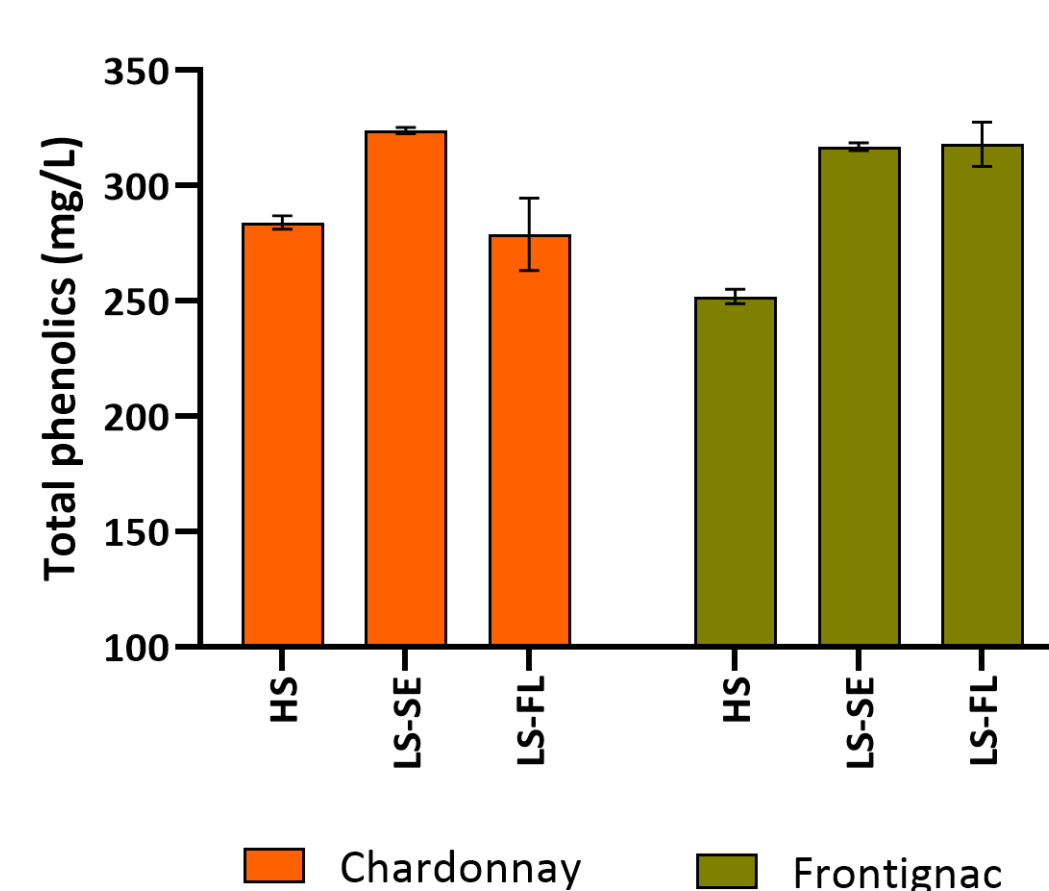


Figure 1. Total phenolic concentration

Wine polysaccharides

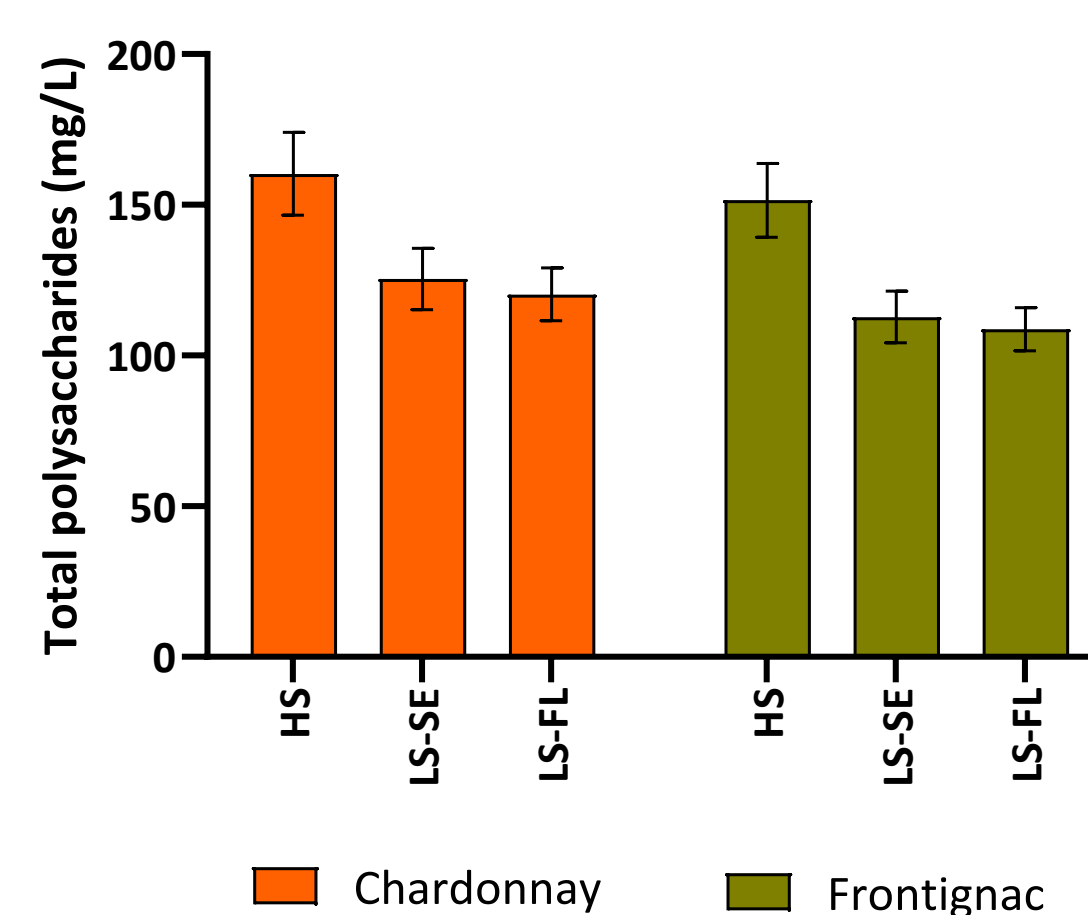


Figure 3. Total polysaccharide concentration

Wine taste and mouth-feel

The Chardonnay and Frontignac wines made from floated juices were perceived to be more viscous than those made from cold settled juices ($P < 0.1$). Perceived hotness, astringency bitterness and acidity were not consistently affected by juice settling methods.

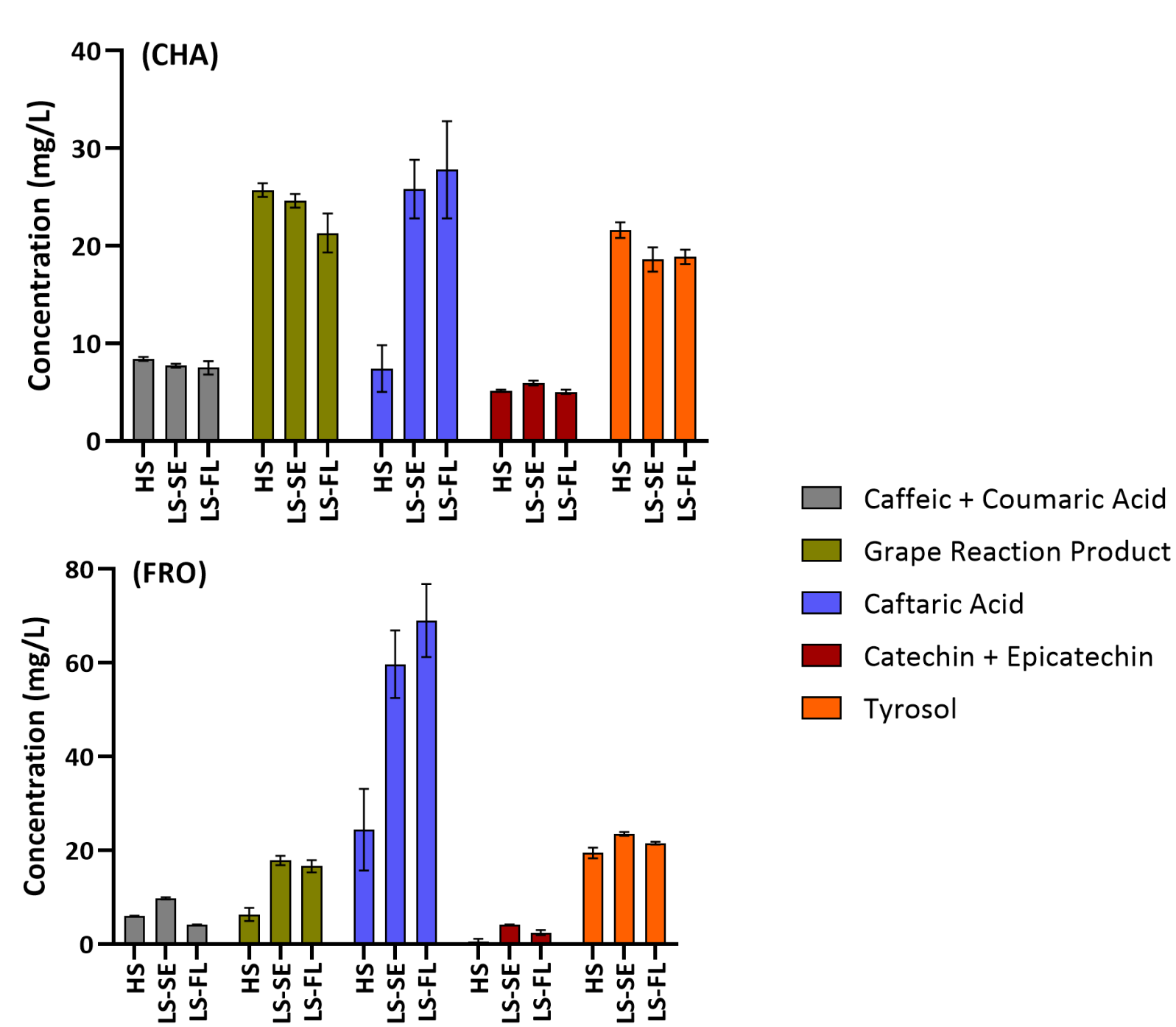


Figure 2. Phenolic profiles
CHA=Chardonnay, FRO=Frontignac

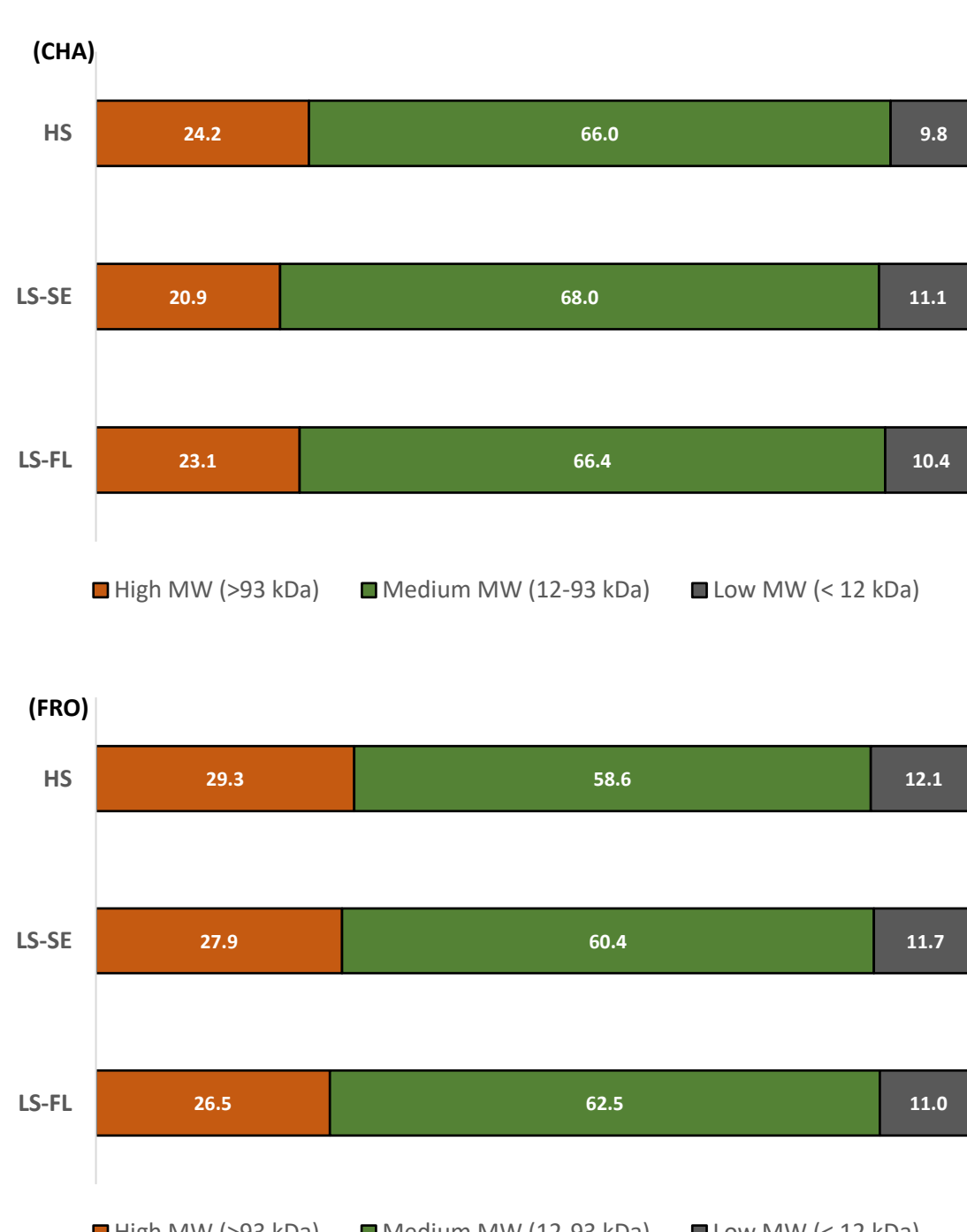


Figure 4. Polysaccharide molecular weight distribution. CHA=Chardonnay, FRO=Frontignac

	Total Polysaccharides	High MW PS	Med MW PS	Low MW PS	Glycerol	Glucose+Fructose
Viscosity	-0.595	-0.143	0.062	-0.045	0.032	0.159
Acidity	0.135	-0.102	0.359	0.358	0.061	-0.080
Hotness	0.445	0.049	-0.275	0.040	-0.029	-0.102
Astringency	-0.149	-0.294	-0.062	-0.072	-0.023	-0.011
Bitterness	0.023	-0.229	0.054	0.061	0.008	0.019

	Total phenolics	GRP	Gallic acid	Catechin+Epicatechin	Caffeic+Coumaric	Tyrosol
Viscosity	0.691	0.249	0.574	0.317	-0.094	-0.105
Acidity	0.007	-0.037	-0.161	-0.081	-0.222	-0.192
Hotness	-0.422	-0.150	-0.319	-0.079	0.111	-0.052
Astringency	0.137	0.052	0.079	0.130	-0.183	-0.157
Bitterness	0.063	0.009	-0.026	0.054	-0.242	-0.200

	pH	Total acidity	Tartaric acid	Malic acid	Lactic acid	Succinic acid
Viscosity	0.735	-0.130	-0.252	0.049	-0.118	0.013
Acidity	-0.079	-0.007	0.111	-0.200	-0.227	-0.015
Hotness	-0.371	0.082	0.181	-0.034	0.127	-0.032
Astringency	0.361	-0.124	-0.075	-0.036	-0.015	0.007
Bitterness	0.279	-0.139	0.001	-0.132	0.016	-0.005

Figure 5. Heat map showing the correlation (r) between taste and mouth-feel attributes and analytical parameters. Correlations in boxes were statistically significant ($P < 0.05$).

Summary

- The total phenolic and polysaccharide concentrations and profiles of wines produced using flotation were similar to those clarified by cold settling, which was reflected in their similar mouthfeel and taste properties.
- Wines made from floated juices were perceived to be slightly more viscous than the wines made from cold settled juices. Perceived viscosity was most strongly positively correlated with pH and total phenolics.