Effect of interspecific yeast hybrids for secondary in-bottle alcoholic fermentation of English sparkling wines

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Background and Aim

In sparkling winemaking several yeasts can be used to perform the primary alcoholic fermentation that leads to the elaboration of the base wine. However, only a few *Saccharomyces cerevisiae* yeast strains are regularly used for the secondary in-bottle alcoholic fermentation [1]. Recently, advances in yeast development programs have resulted in new breeds of interspecific wine yeast hybrids that ferment efficiently while producing novel flavours and aromas [2]. **In this work, sparkling wines produced using interspecific yeast hybrids for the secondary in-bottle alcoholic fermentation have been chemically characterized.**

Materials and Methods

Three commercial English base wines have been prepared for secondary in-bottle alcoholic fermentation with different yeast strains, including two commercial and several novel interspecific hybrids derived from *Saccharomyces* species not traditionally used in sparkling winemaking (Table 1 & Figure 1). After 12 months of lees ageing, the 13 wines produced were analysed for their chemical and macromolecular composition [3,4], foaming and viscosity and sensory properties [5].

Table 1. Overview of the commercial yeast and interspecific hybrids used for the secondary in-bottle alcoholic fermentation.

Commercial name	Yeast strain	Producer
IOC 18-2007	*Saccharomyces cerevisiae*	IOC, France
AWRI 1616 (PDM)	*Saccharomyces cerevisiae*	AB Mauri Yeast, Australia
AWRI 2526 (Celebrate)	*S. cerevisiae x mikatae*	AB Mauri Yeast, Australia
AWRI 1572	*S. cerevisiae x bayanus*	AB Mauri Yeast, Australia
AWRI 1571	*S. cerevisiae x bayanus*	AB Mauri Yeast, Australia
AWRI 1502 (Fusion)	*S. cerevisiae x cariocanus*	AB Mauri Yeast, Australia

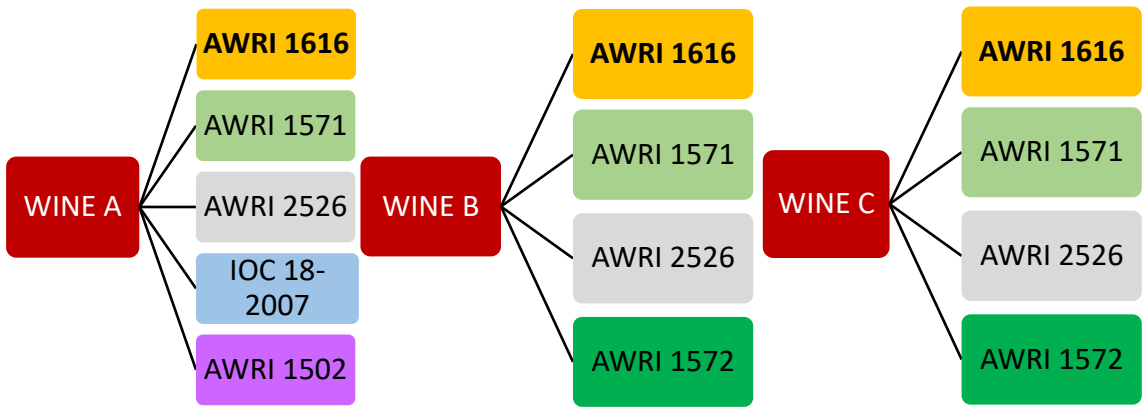

Figure 1. Schematic representation of the yeasts used for secondary in-bottle alcoholic fermentation of three base wines

Chemical and macromolecular composition

The different strains did not cause noticeable modifications on the **main wine chemical parameters** of the three wines (data not shown).
The yeast strain used resulted in significant modifications in the **proteins and polysaccharides' contents** (Table 2), and consequently also on the **viscosity** of the wines. Given that these parameters are linked to the foaming behaviour of sparkling wines, this was assessed (Figure 2).

Table 2. Viscosity, total protein and polysaccharide content of wines.

	WINE A – BLANC DE BLANCS					WINE B – BLANC DE BLANCS				WINE C - ROSÉ			
	AWRI 1616	*AWRI 1571*	*AWRI 2526*	*AWRI 1502*	*IOC 18-2007*	*AWRI 1616*	*AWRI 1571*	*AWRI 2526*	*AWRI 1572*	*AWRI 1616*	*AWRI 1571*	*AWRI 2526*	*AWRI 1572*
Protein (mg/L)	63.1 ^{a}	60.83 ^{a}	63.69 ^{a}	91.1 ^{b}	69.3 ^{a}	1.5 ^{ab}	0.4 ^{a}	2.9 ^{b}	5.1 ^{c}	20.9 ^{b}	15.1 ^{a}	21.9 ^{b}	20.5 ^{b}
Polysaccharides (mg/L)	352.4 ^{a}	332.8 ^{a}	327.2 ^{a}	334.5 ^{a}	361.3 ^{a}	218.5 ^{a}	227.9 ^{ab}	246.4 ^{b}	246.1 ^{b}	243.7 ^{a}	243.1 ^{a}	263.9 ^{a}	241.5 ^{a}
Viscosity (mPa/s)	1.91 ^{a}	1.92 ^{a}	1.98 ^{a}	1.96 ^{a}	2.02 ^{a}	1.96 ^{a}	1.98 ^{a}	1.98 ^{a}	1.96 ^{a}	1.99 ^{a}	1.98 ^{a}	2.00 ^{a}	1.97 ^{a}

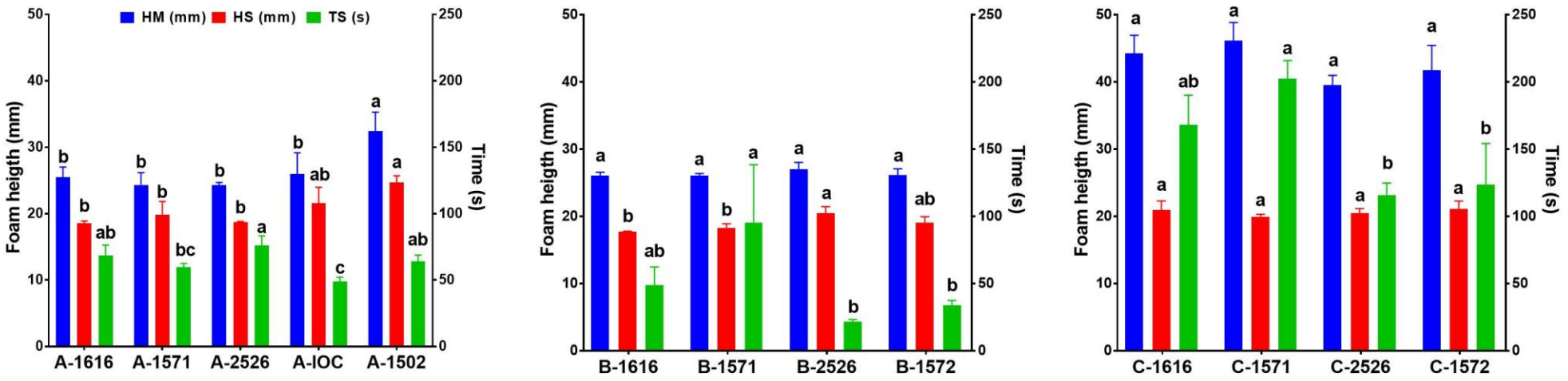

Figure 2. Effect of yeast type on mean foam height (HM, blue bars), foam stability (HS, red bars) and time stability (TS, green bars).

- The base wine used had a bigger impact on the average **HM** reached than the yeast used for secondary fermentation.
- Within each set of wines, the yeast adopted generally did not have a significant impact on **HM**, except for yeast AWRI 1502 in wine A
- The highest **HM** of the rosé wine of the study (wine C) can be explained by the positive correlation between HM and anthocyanins shown in rosé wines [6].
- Foam stability (**HS**) was significantly higher in wine A re-fermented with the yeast AWRI 1502 and wine B re-fermented with yeast AWRI 2526. For wine A this finding can be ascribed to its higher amount of proteins, while for wine B this could be due to the higher amount of polysaccharides (Table 2).
- **TS** was more heterogeneous among wines, with wine C showing the highest average TS (152.5 s), followed by wine A (63.4 s) and wine B (38.7 s).

Preliminary **sensory assessments** have shown that wines produced with hybrid yeasts, especially AWRI2526, obtained the highest overall preference scores when compared to wines produced with commercial strains (AWRI 1616 and IOC 18 2007).

Conclusions and future perspectives

Novel interspecific yeast hybrids can be used for the elaboration of sparkling wines as they provided wines with novel flavour and aroma attributes which affected sensory characteristics while retaining wine chemical characteristics similar to those of commonly used commercial *Saccharomyces cerevisiae* strains.

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