The effect of glass type on the dissolution of oxygen and aroma release

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Introduction

The glass is a necessary tool for sensory analysis of wine, although the possible effect of glass shape on the sensorial perception of tasted wine is rarely evaluated. On the contrary, the choice of the best combination of "glass type" / "wine tasted" may be an important factor for the definition of the wine sensorial profile. On this base an experimental research was developed to evaluate whether, when and how a particular morphology of the glass could enhance or depress a specific wine taste sensation. Various steps are involved with wine tasting, sometimes referred as the five S: See Swirl Smell Sip Savour. Of those step, the swirling is necessary to release the bouquet of the wine and is usually obtained by a gentle circular movement of the glass. The wave generated by this movement propagates along the glass walls and enhances the oxygenation and the mixing. In this way, the impact of swirling on wine profile was also evaluated.
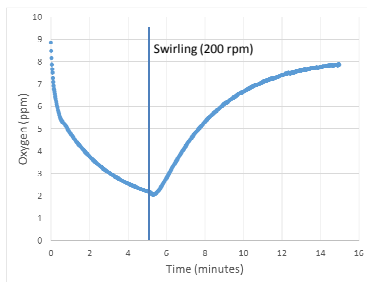
Chemical analysis

Fig. 1: profile of consumed and dissolved oxygen into model wine as a function of equilibration time

Wine glasses characterisation

- Evaluation of consumption and dissolution rate of oxygen in wine model.
- Oxygen measurement was made by oxo-luminescence technology.
- Two modes (static and dynamic).
- 10 different types of wine glasses were utilized in the experimental run.

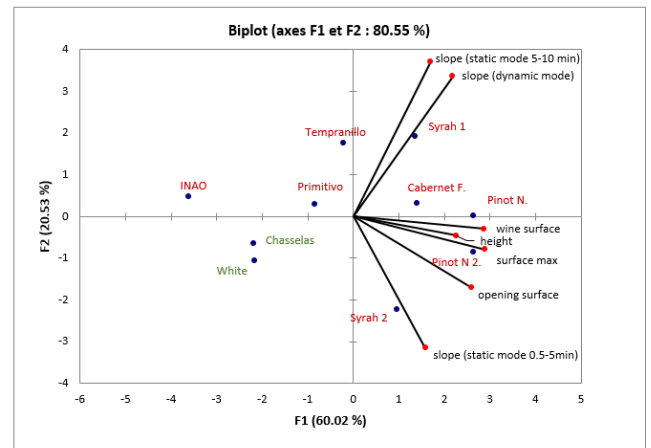| Wine surface (cm²)	Opening surface (cm²)	Height (cm)	Maximum surface (cm²)	Proposed for
75.43	37.39	11.9	90.43	Pinot noir
52.30	25.16	12.05	56.35	Tempranillo
73.59	40.04	12.3	99.58	Pinot noir
51.15	26.79	10.3	51.40	White
67.49	31.87	13.35	74.36	Syrah 1
59.45	37.61	14.51	71.78	Syrah 2
48.77	28.84	11.58	49.39	Zinfandel
58.63	42.89	13.56	69.69	Cabernet franc
47.29	29.22	10.98	49.02	Chasselas
33.08	18.86	9.54	33.70	INAO

Table 1: Glass shape parameters

Fig. 2: PCA for glass types distribution based on shape parameters and oxygen behaviour

- PCA allow to characterise each type of wine glasses.
- INAO glass show atypical characteristics in comparison with other glasses.

Sensory analysis

Wines, glasses and judges

- 3 white wines (Sauvignon blanc, Chardonnay and Melon)
- INAO glass
- 11 trained panellists

Protocol

1. Pouring 40 ml of wine into 2 different glasses
2. Waiting 5 min
3. Swirling glass during 5 min
3. Stay calm
4. QDA – 11 aroma attributes

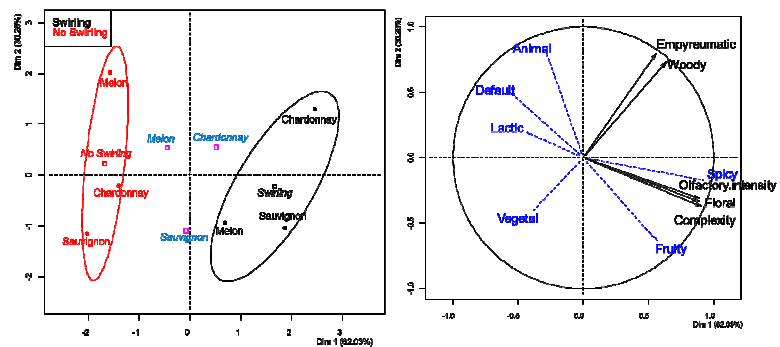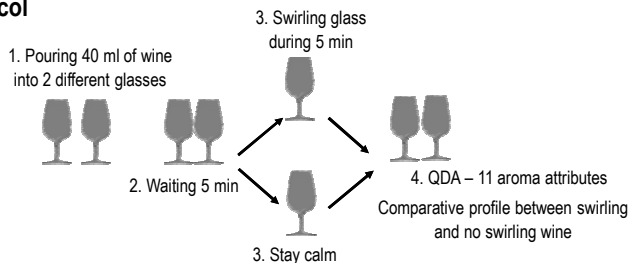Comparative profile between swirling and no swirling wine

Fig. 3: PCA for significant attributes (5% between swirling and no swirling wine). In blue illustrative attributes (NS)

- 1st axis opposes "No swirling" wines on the left to "swirling" wines on the right and represents 62% of variability.
- For each wine, swirling glass was more intense for all significant attributes.

Conclusion

The experimental results showed how the characteristics of a glass could affect wine's perception. The preliminary analysis of correlation among the geometrical characteristics of glasses and sensory, chemical and physical attributes of wine indicates that the wine evolution (sensorial, chemical and physical parameters) during tasting was greatly influenced by the glass shape. On the basis of the obtained experimental data, a new approach could be proposed to obtain the best combination of "glass type" / "wine tasted". This approach could finally represent a food for thought to design "the ideal glass" as a function of the type of beverage.

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