The sensorial perception of astringency: prediction models based on UV spectroscopy

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The sensorial perception of astringency : prediction models based on UV spectroscopy.

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Astringency is a major characteristic of wines sensorial perception, classically ascribed to tannins. Astringency is assessed by sensory analysis, which is time-consuming, costly and poorly repeatable unless performed by trained panels. So alternative methods such as the Gelatin Index, the Bovine Serum Albumin assay (BSA), the Methyl-Cellulose assay (MC) or the Saliva Precipitation Index have been proposed.

This study: (1) evaluates the capability of the BSA and MC assays to predict astringency;
(2) proposes alternative methods which involve: wine absorbance at 230nm; total oligosaccharide and polysaccharide content.

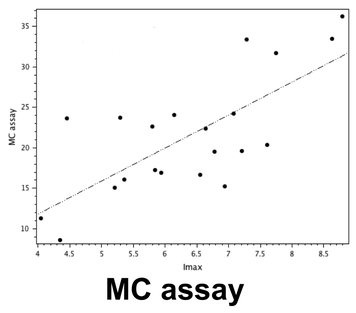
EXPERIMENTATION

Twenty-one wines of different grapes and vintages were selected, mainly from the Languedoc-Roussillon region. Sensory analysis was performed with a panel of 20 judges, selected and trained to astringency description, using time-intensity profiling. Chemical analysis included: classical parameters, polyphenol composition determined by HPLC-DAD, performed after phloroglucinolysis for proanthocyanidins, oligosaccharide and polysaccharide composition determined by GC–MS analysis of individual glycosyl residues after hydrolysis, reduction and acetylation after separation by gel permeation chromatography. The BSA or Adams-Harbertson tannin assay was performed as described by Boulet et al (2015). The MC assay was also performed as described by Sarnekis et al (2006).

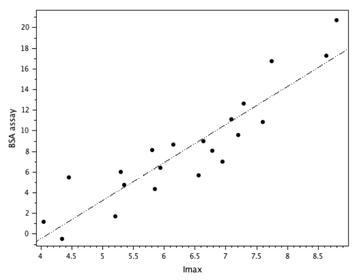
RESULTS

Astringency (noted Imax) was predicted by the MC and BSA assays, and by analytical variables including: UV absorbances, classical enological parameters, oligosaccharide and polysaccharide analysis. Multiple linear regressions models were also built with two to four of variables. The best predictions are presented below.

MC vs. BSA



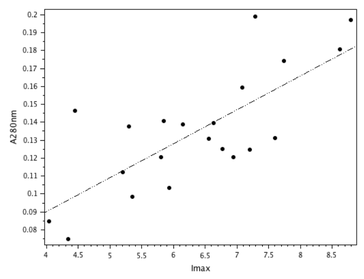
MC assay



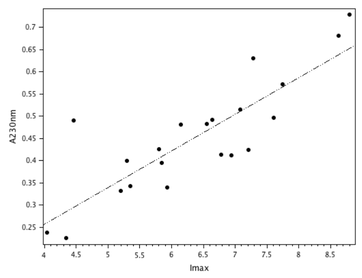
BSA assay

Better prediction with BSA than MC

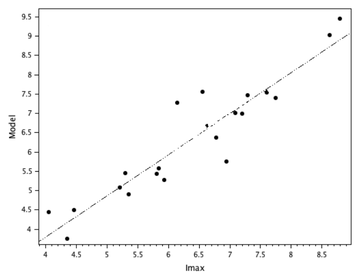
A280, A230, A230 + oligos + polysaccharides



A 280



A 230



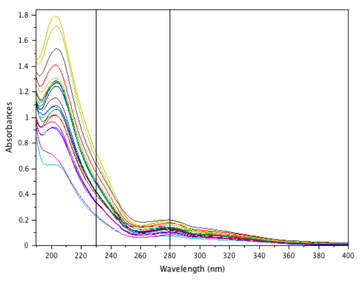
Model

- **bad prediction with A280nm**
- **better prediction with A230nm (but 2 outliers)**
- **even better prediction with a model including: A230, oligos and polysaccharides**

= 10.2 A230
+ 0.0096 oligosacch.
- 0.0036 polysacch.

UV spectra of the 21 wines

Wine spectra after a 400 x dilution into pure water



A280 is located in an absorbance peak, not A230nm for whitch the measurement is sensitive to the bandwidth.

Astringency is better predicted by the BSA assay than by the MC assay; by A230nm than by A280nm.
The BSA assay outperforms A230nm because of two outliers. These outliers are corrected including oligosaccharide and polysaccharide contents in the model. The positive and negative coefficients of oligosaccharides and polysaccharides indicate that the former increase astringency, and that the latter decrease it.
A230nm is not located in an absorbance peak. Studies are underway to explain why this wavelength has been selected as the best compromise among the UV spectra.

CONCLUSIONS

→ The BSA assay confirms its capability to yield a good prediction of astringency.
→ The absorbance at 230nm is proposed for a quick estimation of astringency
→ Polysaccharides decrease astringency, as already reported
→ Oligosaccharides increase astringency.

REFERENCES

- Boulet, J-C., Trarieux, C., Souquet, J-M., Ducasse, M-A., Caillé, S., Samson, A., Williams, P., Doco, T., Cheynier, V., 2015. Models based on ultraviolet spectroscopy, polyphenols, oligosaccharides and polysaccharides for prediction of wine astringency, *Food Chemistry*, doi: http://dx.doi.org/10.1016/ j.foodchem.2015.05.062.
- Sarnekis,C, Dambergs, R., Jones,P., Mercurio M., Herderich M., Smith P., 2006. Quantification of condensed tannins by precipitation with methyl cellulose: development and validation of an optimized tool for grape and wine analysis. Australian Journal of Grape and Wine Research, 12, 39-49.
- Harbertson, J., Kennedy, J., Adams, D., 2002. Tannins in skins and seeds of Cabernet-Sauvignon, Syrah and Pinot noir berries during ripening. *American Journal of Enology and Viticulture*, 53, 54-59.

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