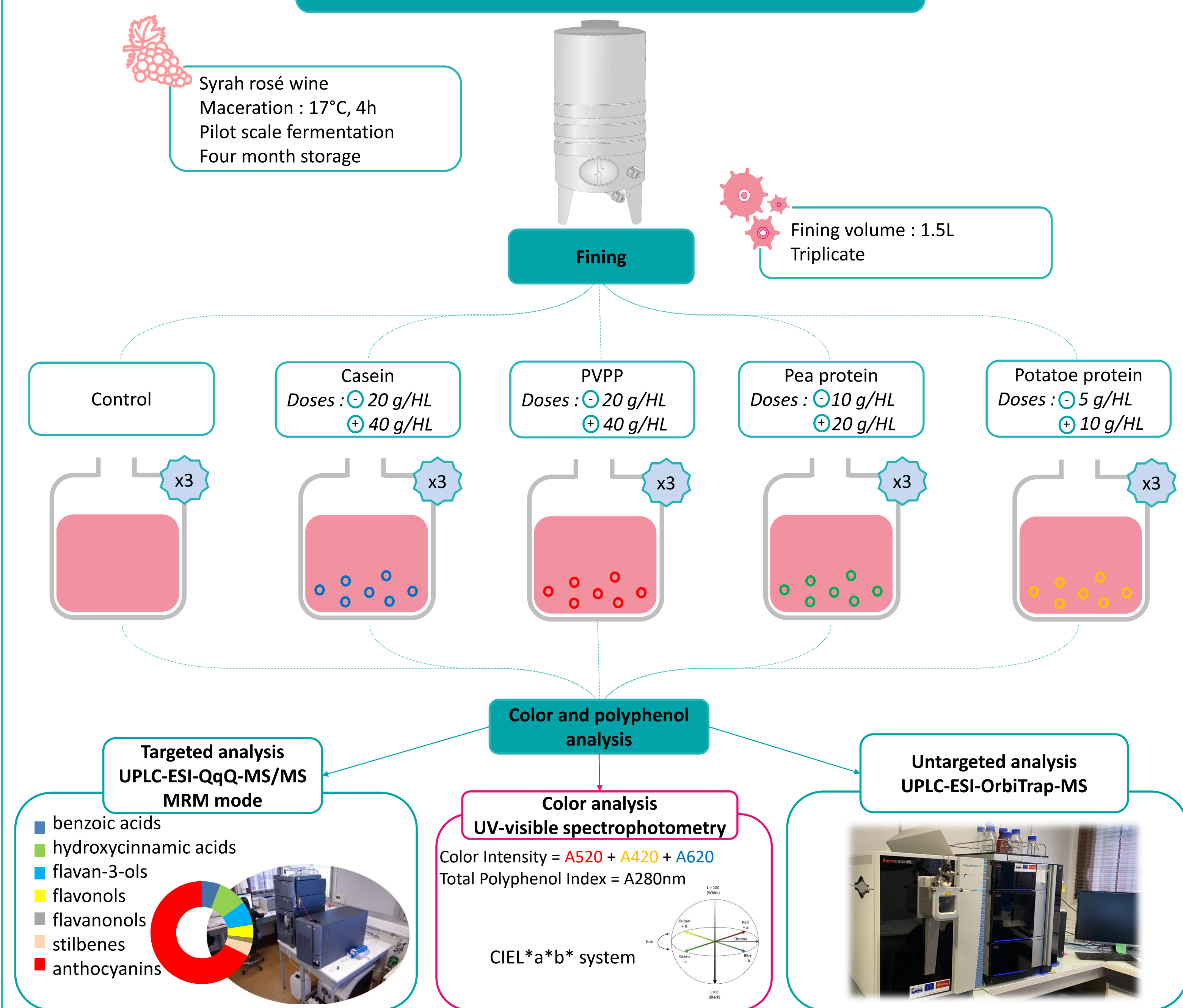


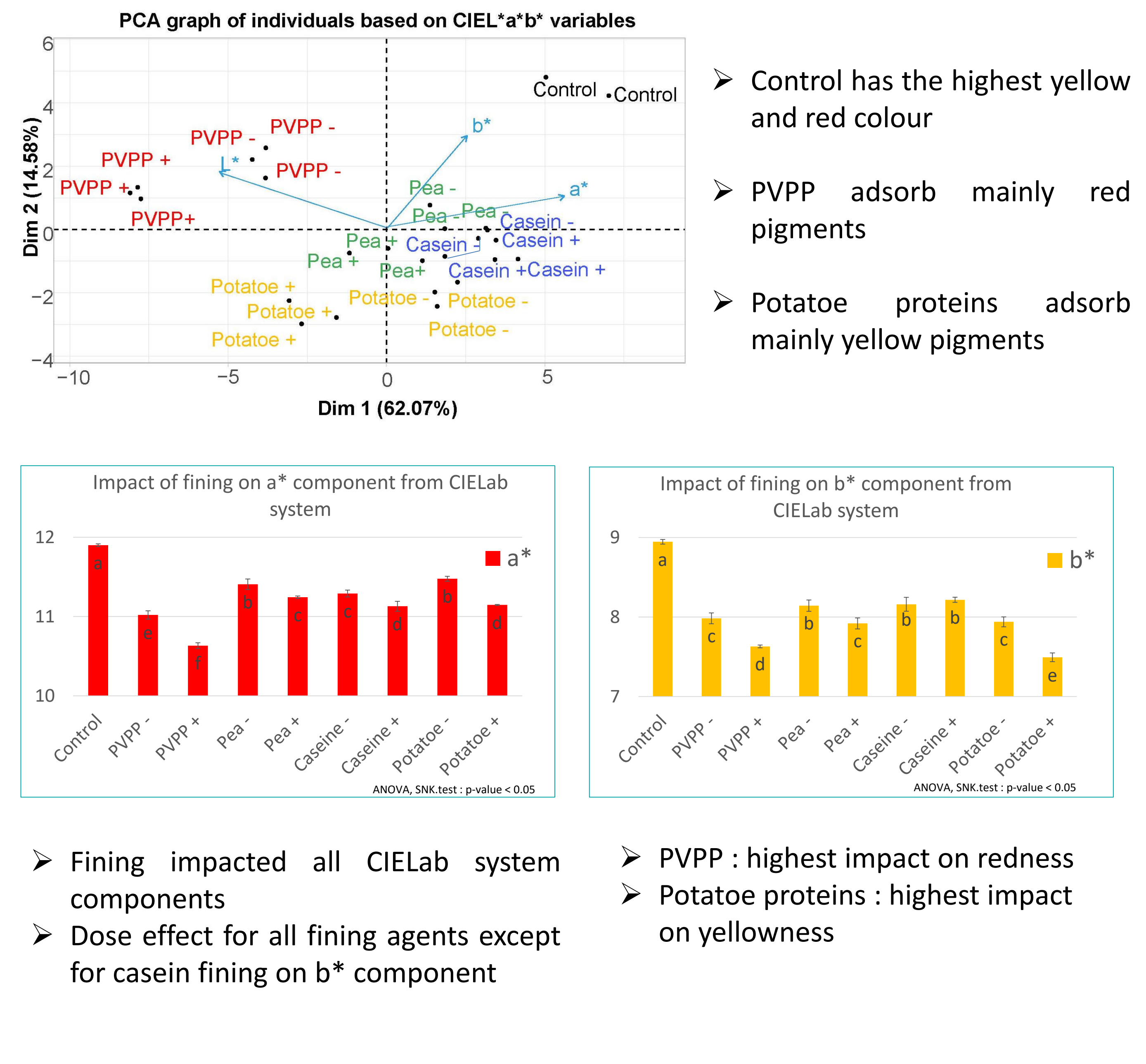
## Introduction

Color is one of the key elements in the marketing of rosé wines. Their broad color range is due to the presence of red pigments (i.e. anthocyanins and their derivatives) and yellow pigments, likely including polyphenol oxidation products. Clarifying agents are widely used in the winemaking industry to enhance wine stability and to modulate wine color by binding polyphenols. In the present study, the impact of four different fining agents (i.e. two vegetal proteins, potatoe and pea proteins, an animal protein, casein, and a synthetic polymer, polyvinylpolypyrrolidone, PVPP) on Syrah Rose wine color and phenolic composition (especially pigments) was investigated.

## Materials and Methods

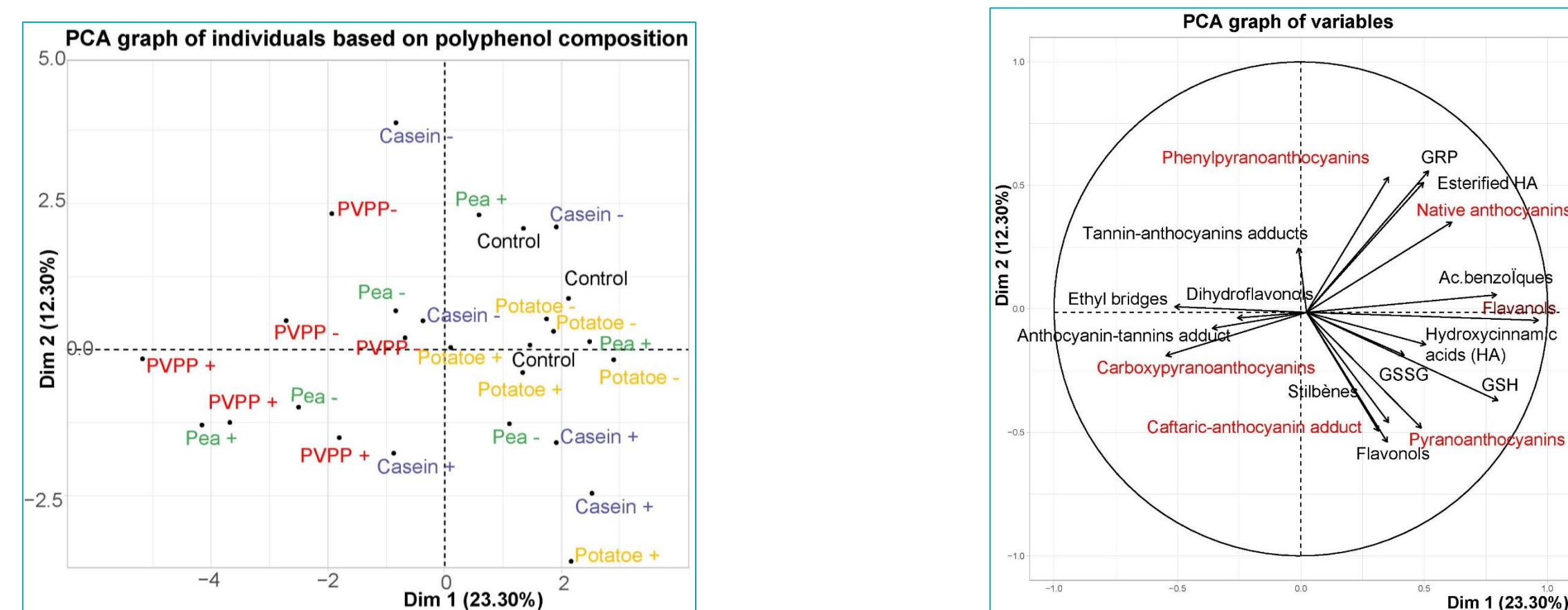


## Color analysis

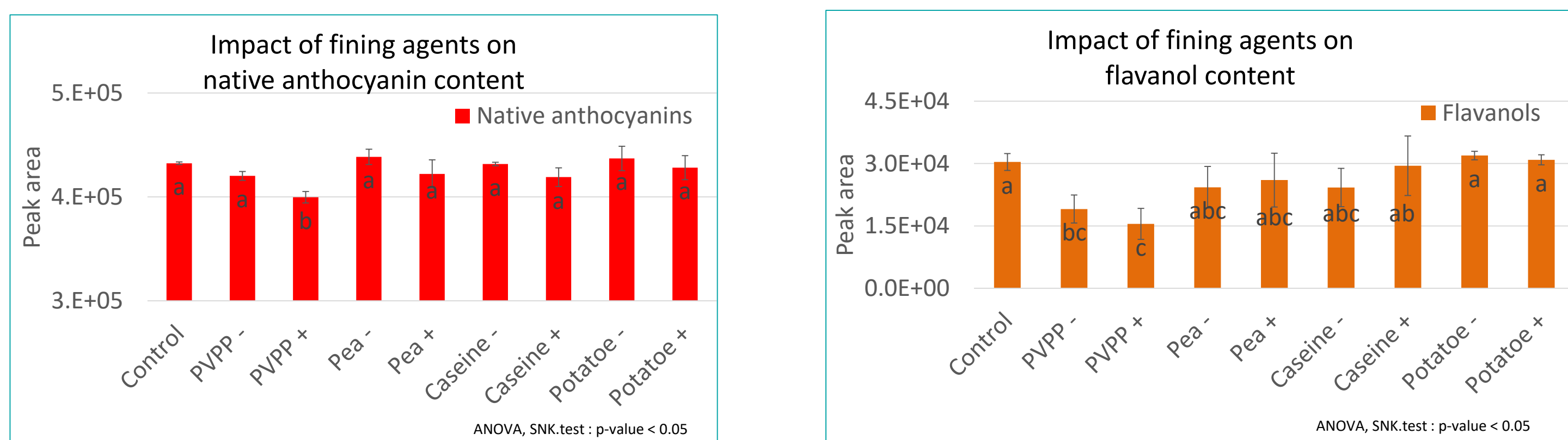


## Polyphenol analysis

### Targeted analysis (UPLC—Qq-ESI-MS in the Multiple Reaction Monitoring mode) [1]

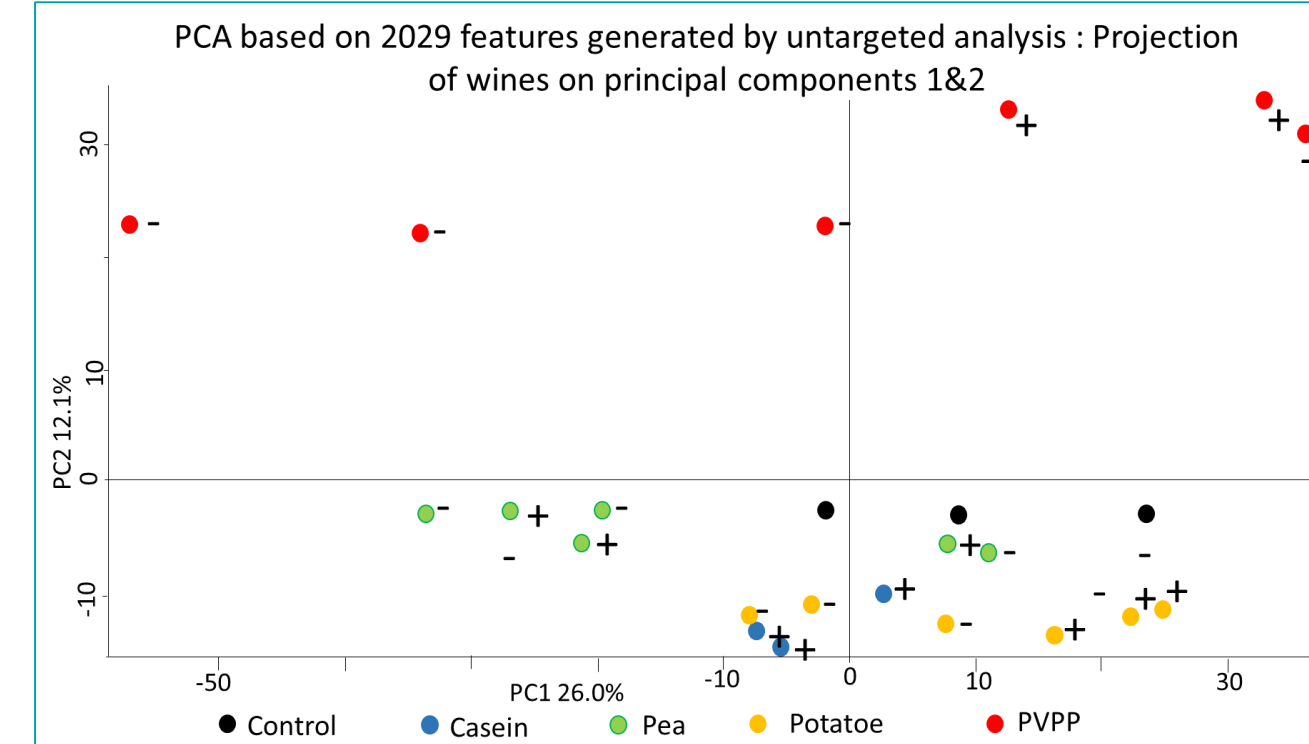


- PVPP fining seems to reduce contents in flavan-3-ols, benzoic acids and anthocyanins
- No discrimination between wines fined with potatoe proteins (less yellow) and control wines (yellow) → yellow molecules missing in the targeted method

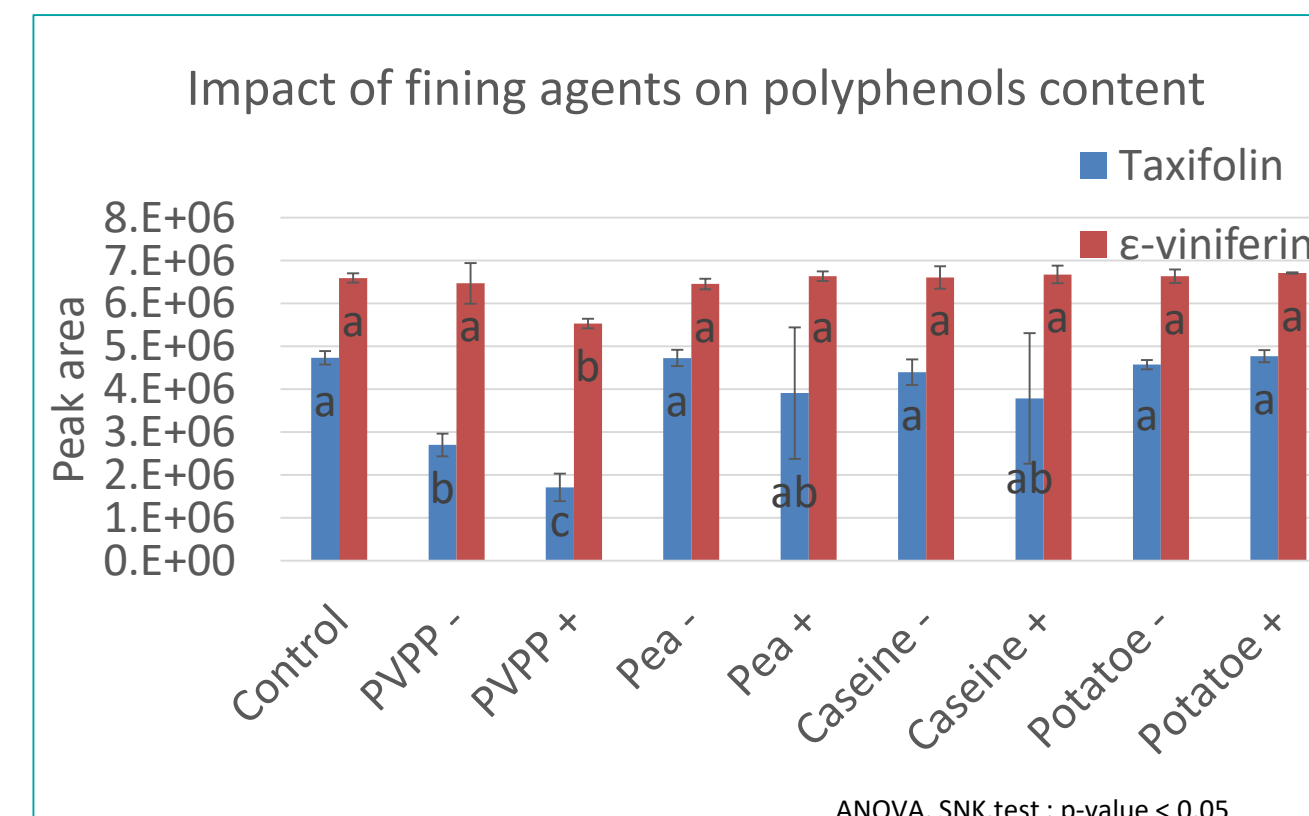


- ANOVA analysis confirms PVPP affinity for native anthocyanins and flavanols [2]

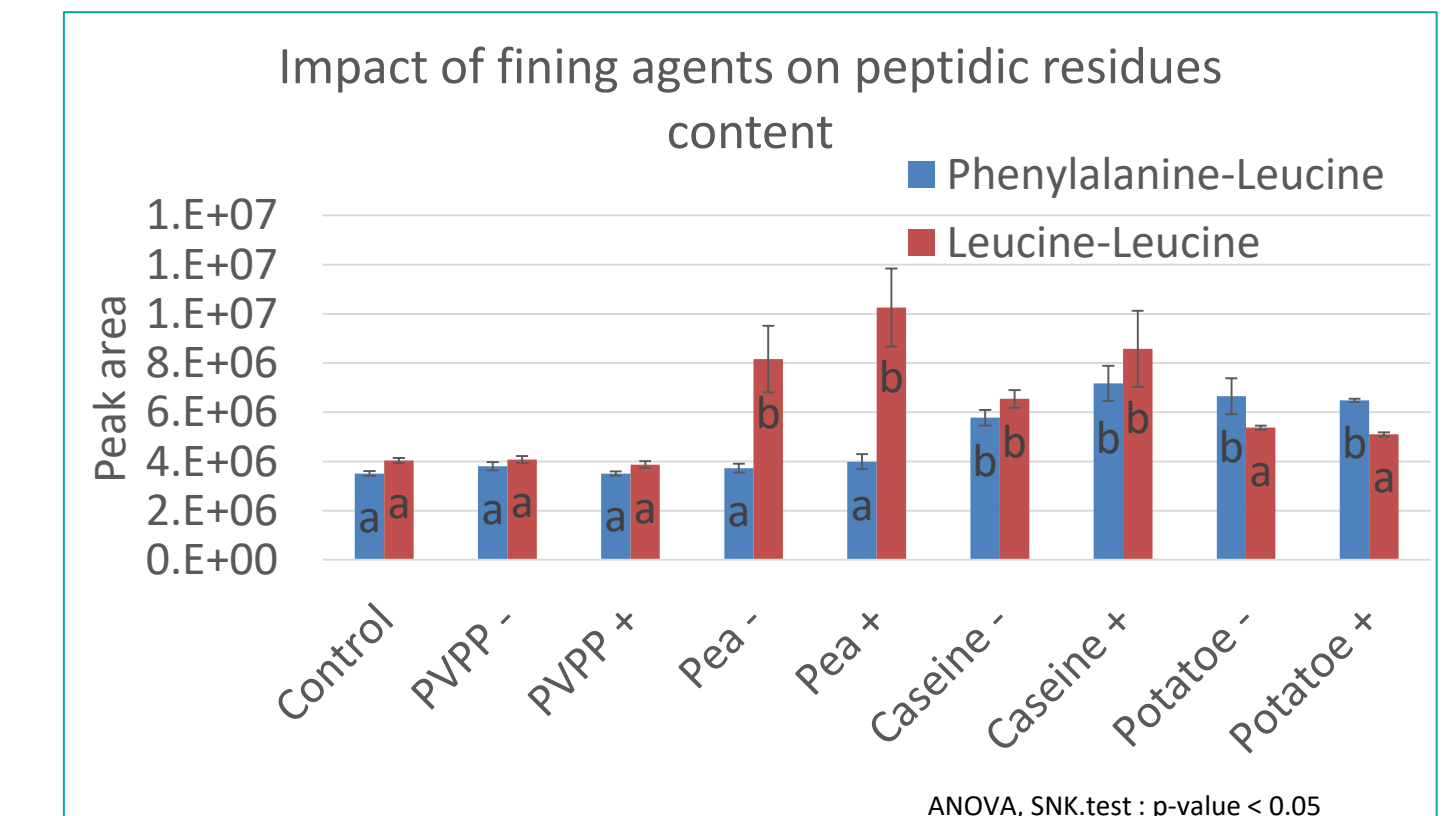
### Untargeted analysis (UPLC-Orbitrap-ESI-MS)



- Discrimination of PVPP fined wines on PC2
- Selection of 224 features based on significant differences between fining agents (ANOVA, SNK test)



- confirms results of targeted analysis, i.e. adsorption of anthocyanins and flavanols on PVPP
- shows adsorption of additional compounds : flavanols, dihydroflavonols and stilbenes



- detects peptidic residues allowing identification of each protein fining agent

## Conclusion

Fining treatments have a large effect on rosé wine color, impacting Lightness (L\*), redness (a\*) and yellowness (b\*). These impacts on color are linked to changes in polyphenol composition and appear to be stronger with polyvinylpolypyrrolidone (PVPP) treatment. Specific adsorption of certain families of polyphenols such as native anthocyanins, flavanols and flavonols was evidenced. Untargeted analysis revealed the affinity of PVPP with dihydroflavonols and stilbenes. Moreover, the non-targeted data showed the presence of protein peptide residues that can serve as markers of the fining treatment used. However, these analysis did not enable detection of the yellow pigments specifically adsorbed by potatoe protein.

[1] Lambert, M., Meudec, E., Verbaere, A., Mazerolles, G., Wirth, J., Masson, G., Cheyner, V., and Sommerer, N. (2015). A High-Throughput UHPLC-Qq-MS Method for Polyphenol Profiling in Rosé Wines. *Molecules* 20, 7890–7914.

[2] Gil, M., Louazil, P., Iturmendi, N., Moine, V., Cheyner, V., and Saucier, C. (2019). Effect of polyvinylpolypyrrolidone treatment on rosés wines during fermentation: Impact on color, polyphenols and thiol aromas. *Food Chemistry* 295, 493–498.