

# Aroma profiling and olfactometric comparison of Chasselas wines at different ages

Lucie K. Tintrop<sup>1</sup>, Simon Wacker<sup>1</sup>, Marie Blackford<sup>2</sup>, Ágnes Dienes Nagy<sup>2</sup>, Pascale Deneulin<sup>3</sup>, Stefan Bieri<sup>2</sup>, Gilles Bourdin<sup>2</sup>, Pascal Fuchsmann<sup>1</sup>

<sup>1</sup>Aroma-Analytik, <sup>2</sup>Oenology, Agroscope, 3003 Bern, Switzerland, [www.agroscope.ch](http://www.agroscope.ch); <sup>3</sup>Haute Ecole de viticulture et Oenologie, Changins, Switzerland

**Introduction** Chasselas is a signature white grape variety in Switzerland. The produced wines are often fruity and floral when young, and in some cases have the ability to develop a qualitative bouquet after several years of aging in the bottle. [1] To date, very little research has been done on the ageing bouquet of Chasselas, it is therefore important to understand which substances are present in wines of different ages and, more importantly, which of these have an influence on the aroma and the ageing bouquet.



**Objectives** Determine differences in the aroma of young and aged Chasselas wines (2009-2022) by

- Aroma profiles (GC-MS) with Olfactometry
- Sensory analyses

## Results

### GC-MS Aroma analysis

Methods: 100 µL wine in 20-mL headspace vials prepared under N<sub>2</sub> atmosphere, headspace vacuum in-tube extraction (Tenax TA/Carbosieve S III) for 5 min at 40 °C, GC-MS full scan analysis

**Marker for young Chasselas:**

1. Isopentyl acetate
2. 3-Ethoxy-propanol
3. Phenylethyl alcohol

**Marker for aged Chasselas:**

1. Furfural

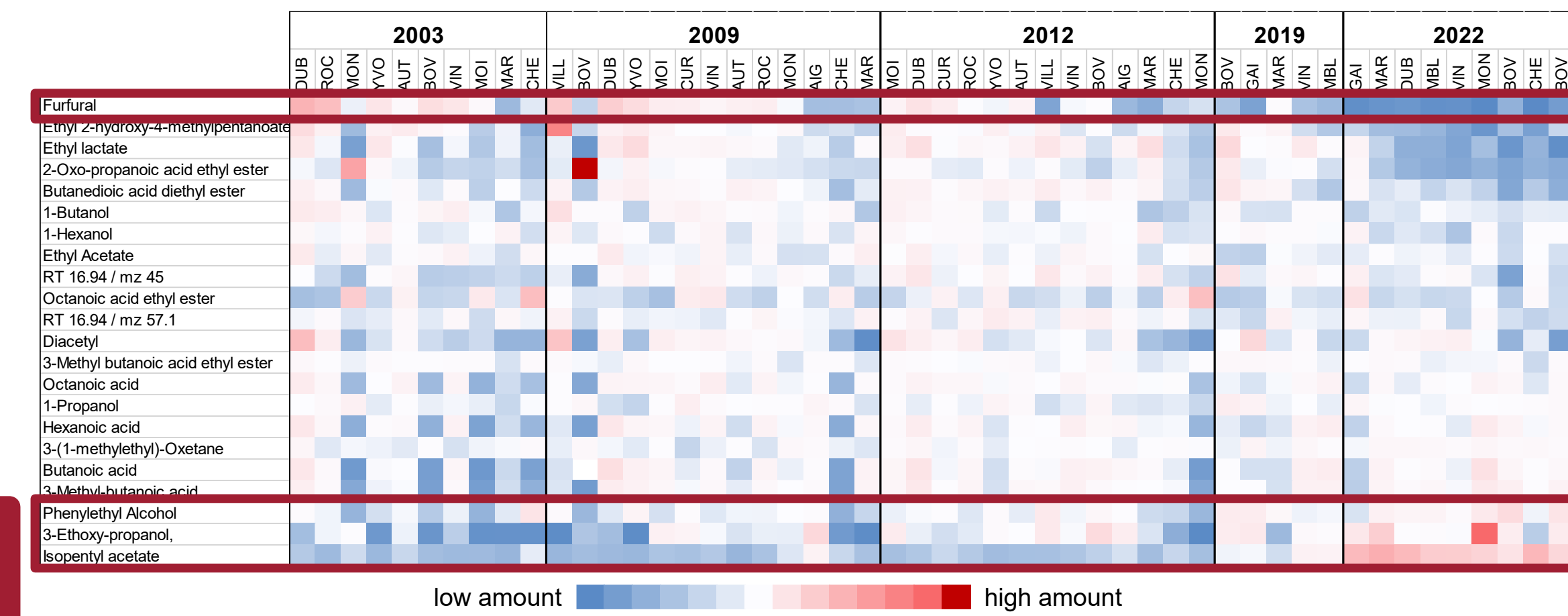
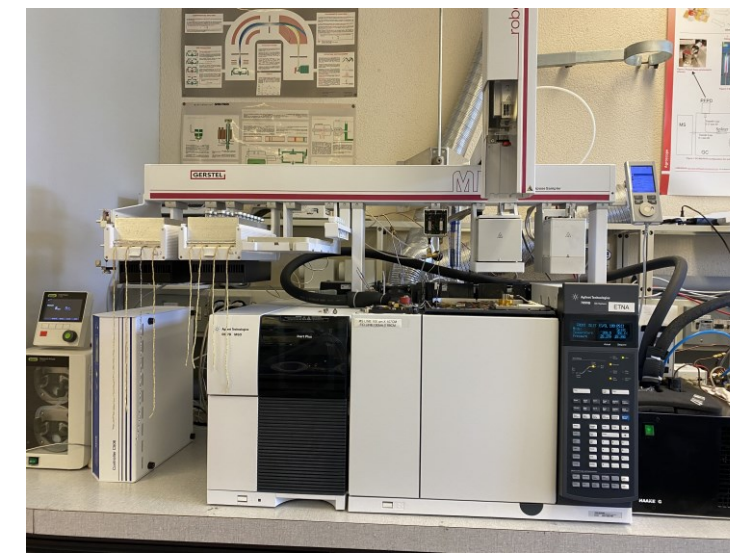
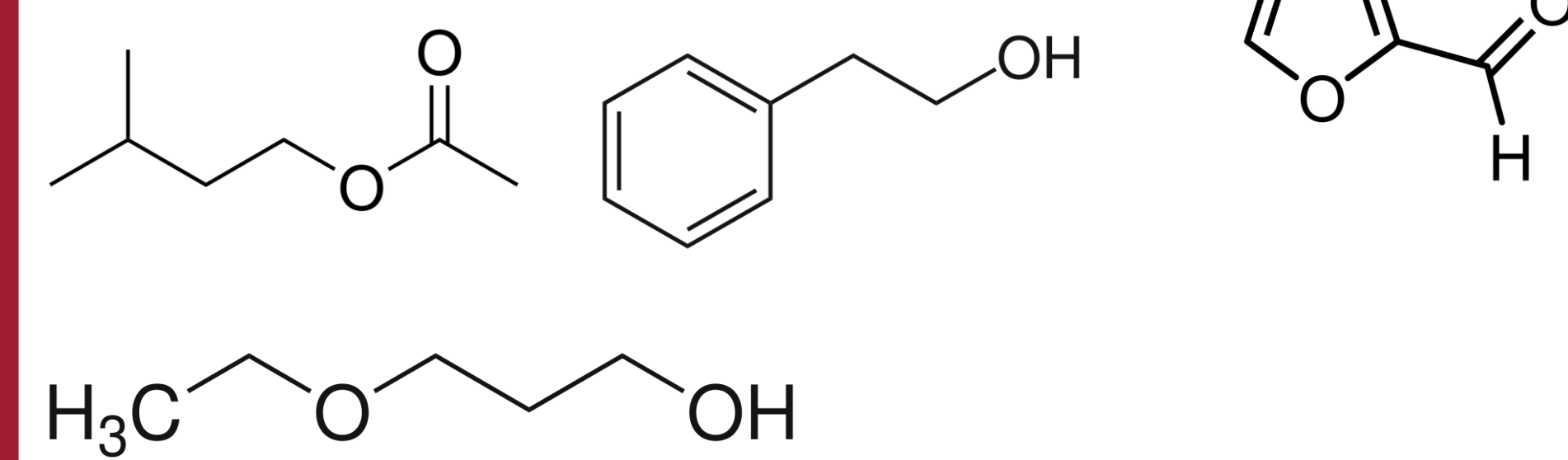


Fig. 1 Composition of volatile compounds of the different Chasselas wines (2003-2022) cultures displayed as heatmap.



### Sensory evaluation

Methods: Eleven trained wine experts

**Aged Chasselas:**

- More intense colour (yellow-orange)
- Aroma: candied fruits, nuts, honey, mushroom, dairy
- Reduction and oxidation

**Young Chasselas:**

- Less colour (yellow-grey)
- Aroma: fresh fruits, linden
- Minerality and sparkling sensation



### Olfactometry

Methods: GC-MS with Olfactometry, eight trained Panelists

**Aged Chasselas:**

- Cheesy and sweet notes, some fruity notes are missing or have lower intensity
- 3-Ethoxy-propanol (rancid, cheesy)
- Furfural (caramelic)

**Young Chasselas:**

- More light, sweet and fruity notes
- Ethyl acetate (fruity, grape)
- Isopentyl acetate (fruity, banana)
- Ethyl 4-(ethyloxy)-2-oxobut-3-enoate (Pop corn)

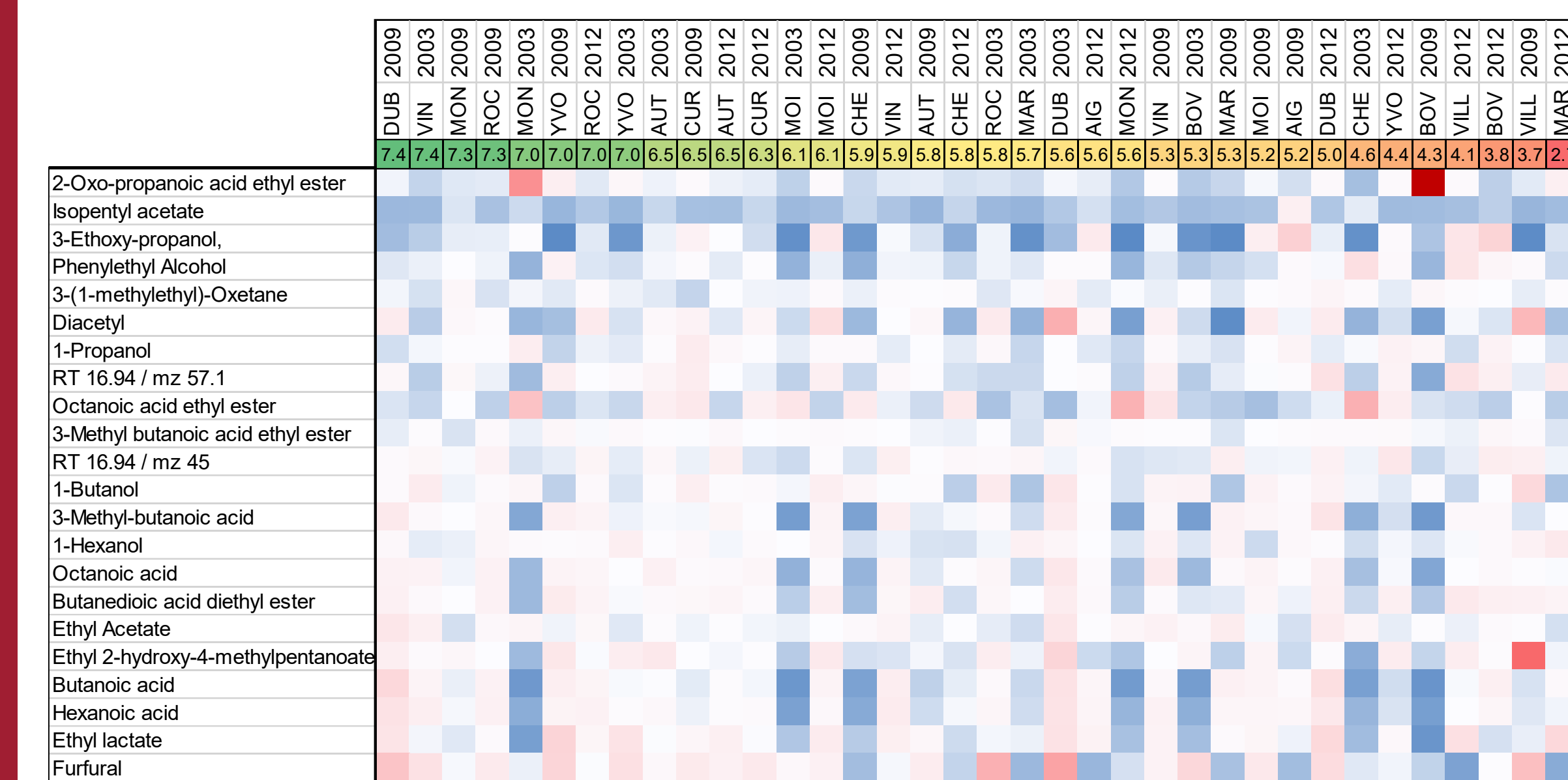


Fig. 2 Composition of volatile compounds of the different aged Chasselas wines (2003-2012) cultures displayed as heatmap sorted by their sensory evaluation grade from (good = green, bad = red)

**Grading:**

- No trend was seen between grading and age
- No correlation of aging quality and chemical composition
- But sensory difference between good and bad old Chasselas
- Like and dislike seems to be more individual

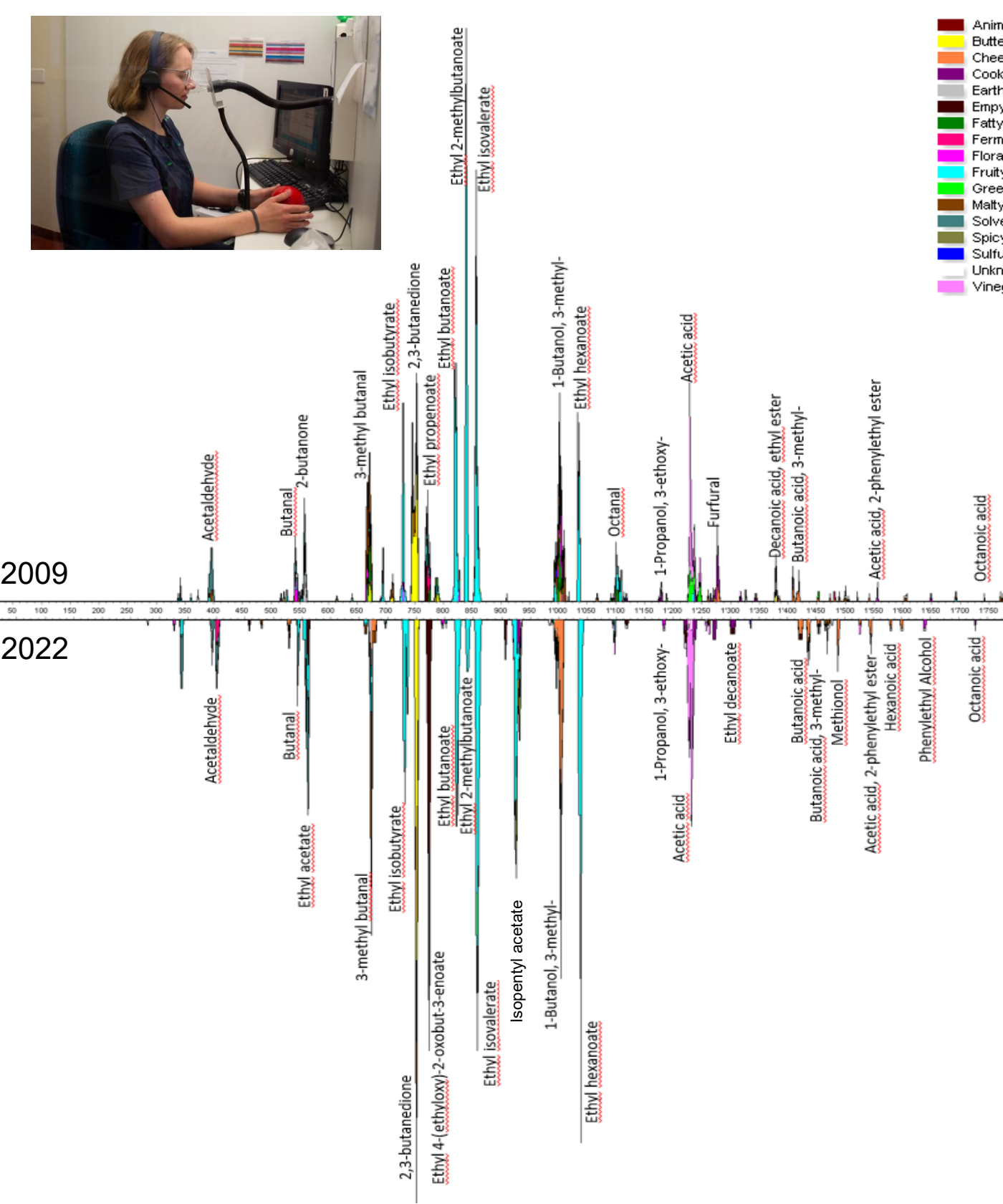


Fig. 3 Exemplary aromagram of young (2009) and aged (2022) Chasselas. Colors represent sensory description of the panelists.

Tab. 1 Odor descriptions of aroma-active compounds detected by olfactometric analyses of all Chasselas wines.

Compound	Panelist identification	Literature odor description [2]
Acetaldehyde	Solvent, chemical	etheral, green
2-Methyl-Butanal/Propanal	Floral	floral, green malty
Ethyl acetate	Fruity	grape, rum-like, cherry nuance
2-Butanone	Fruity	fruity camphor, acetone-like
3-Methyl butanal	Fruity	nuttily, malty, chocolate
Ethyl isobutyrate	Buttery	fusel rummy, egg nog-like
2,3-Butanedione	Fruity	buttery, creamy
Ethyl propionate	Floral	rum, grape, pineapple
Isobutyl acetate	Fruity	banana-like, harsh
1-Butanol	Fruity	banana solvent
Ethyl 2-methylbutanoate	Fruity	Apple peels, pineapple skins
Ethyl isovalerate	Fermented	Pineapple, tutti frutti
Isopentyl acetate	Fruity	banana solvent
3-Methyl-butanol	Floral	fermented, fruity banana, whiskey, cognac, cheesy
Ethyl 4-(ethyloxy)-2-oxobut-3-enoate	Vinegar	pop corn
Ethyl hexanoate	Cooked, grilled	Pineapple
Octanal	Cheesy, rancid	orange, citrus
3-Methyl pentanol	Cooked, grilled	cognac, cocoa
1-Octen-3-one	Cheesy, rancid	metallic, mushroom-like
3-Ethoxy propanol	Cheesy, rancid	fermented, fruity banana, whiskey, cognac, cheesy
3-Hexen-1-ol	Floral	fresh green, cut grass
Acetic acid	fatty, waxy	vinegar
Furfural	Malty, caramel, cereal, woody	caramellic, tobacco
Butanoic acid	fruity	cheese, sharp, acetic
Decanoic acid ethyl ester	Cooked, grilled	oily, brandy apple
3-Methyl butanoic acid	Cheesy, rancid	fatty, cheese, tropical
Butyrolactone	Cheesy, milky	peach-like, milky, creamy
3-(Methylthio)propanol	empyreumatic, plastic	onion-like, bouillon
Hexanoic acid	Earthy, mushroom	sour, fatty, cheese
Acetic acid 2-phenylethyl ester	Green, grassy	nectar fruity honey, floral rosy
Phenylethyl Alcohol	fermented	breadly with a rosey honey nuance
Octanoic acid	Malty, caramel, cereal, woody	rancid soapy cheesy fatty brandy

## Conclusion

- Volatile markers were found for young and aged Chasselas
- Volatile markers can be used to distinguish aged and young Chasselas
- Ageing has a significant impact on the formation and degradation of volatile compounds and the aroma
- Aged Chasselas has more complex and severe aromas
- Young Chasselas has more light and fruity notes
- There was no clear chemical difference in good or bad grading of aged Chasselas of 2003-2012



## References

- [1] Chevalley B. Evolution sensorielle du Chasselas au fil du temps. Journal of Industrial Microbiology. Travail de Bachelor. 2018.
- [2] The Good Scents Company Information System Providing information for the Flavor, Fragrance, Food and Cosmetic industries. [Available from: <https://www.thegoodscentscompany.com>.]