

Model ageing effects on the formation and evolution of minty terpenoids in red wine

Lisanti M.T.^a, Nioi C.^b, Moio L.^a, de Revel G.^b, Marchand S.^b.
mariaziana.lisanti@unina.it



^a Department of Agricultural Science
University of Naples Federico II
Italy



^b ISVV, EA 4577, INRA, USC 1366
OENOLOGIE
University of Bordeaux - France

Context and aim

A pool of **terpenoids** has been recently identified as possibly responsible for **minty odours** and **refreshing sensation** of the **ageing bouquet** of red Bordeaux wines [1,2,3]. In mint species these terpenoids arise from limonene by an enzymatic biotransformation pathway [4]. Their **chemical formation from limonene or other intermediates may not be excluded and could explain their increase during ageing.**

Through experiments of **model ageing**, this study investigates the **formation and evolution of minty terpenoids in red wine.**

Methods

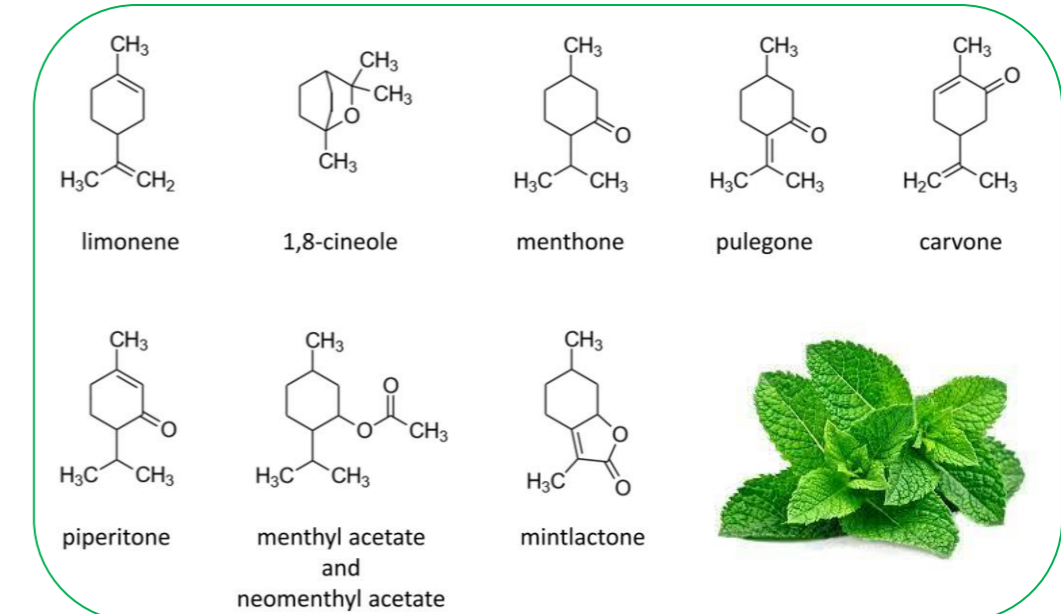


Cabernet Franc (CF)
Merlot (M)
1-year old



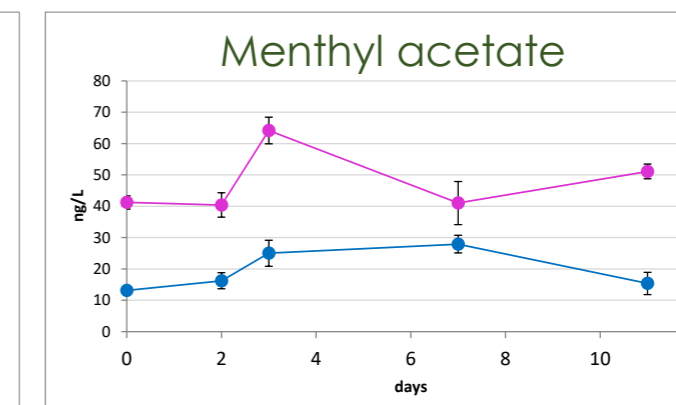
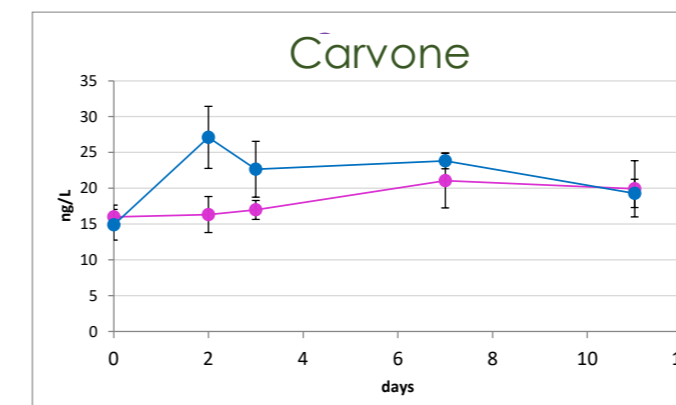
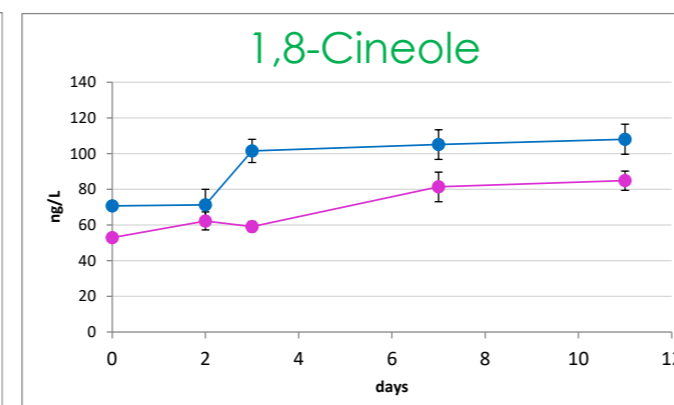
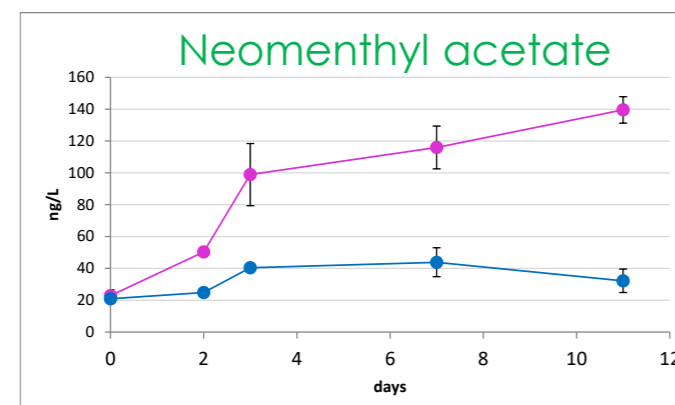
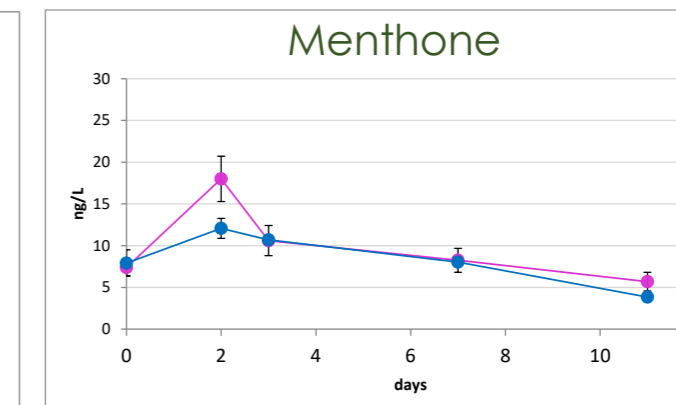
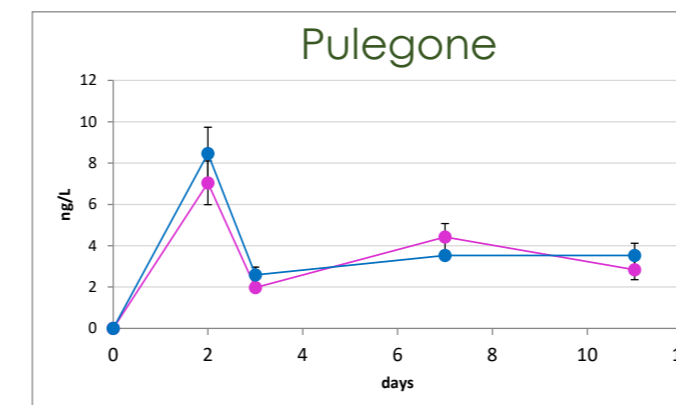
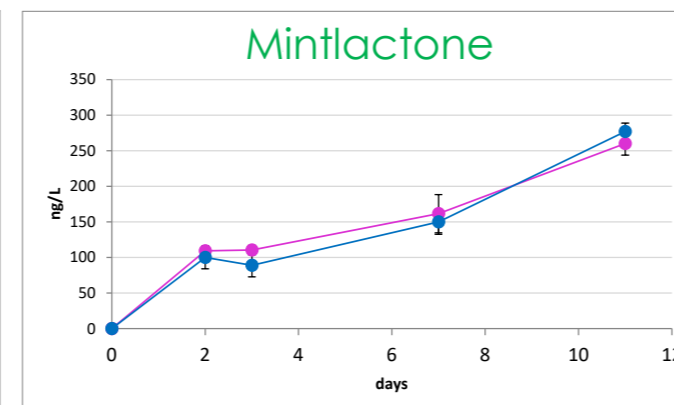
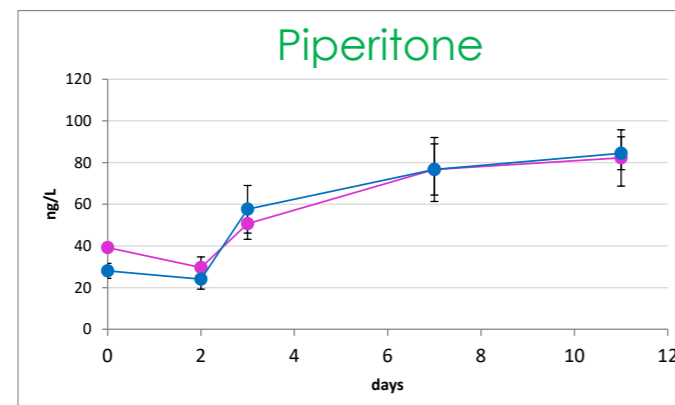
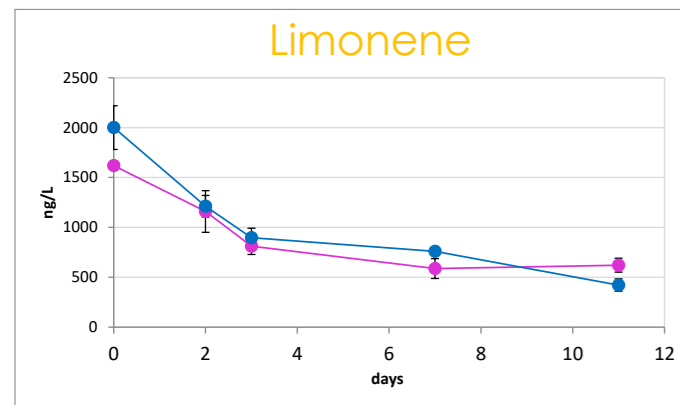
Model ageing: 60°C for 2-3-7-11 days
in duplicate

Headspace SPME-Arrow extraction GC-MS/MS analysis [5]



Results

● Cabernet Franc ● Merlot



A progressive decrease of limonene concentration (up to 79%) was observed for both wines.

This suggests that limonene undergoes chemical transformations during ageing, which could contribute to the formation of minty terpenoids.

During model ageing, an increase was found for piperitone (+110% CF, +201% M), mintlactone (not detected in young wines) and 1,8-cineole (+61% CF, +53% M) in both wines and for neomenthyl acetate in CF wine (+511%).

Pulegone, menthone, carvone and menthyl acetate showed a different general trend: an initial increase was observed, with some differences between CF and M, then their concentrations dropped, probably due to chemical transformation following formation.

Conclusions

Through experiments of model ageing, for the first time the formation of some minty terpenoids was observed in red wines. In parallel, the decrease of their precursor, limonene, occurred. The chemical mechanisms involved will be further investigated.

[1] Picard et al., 2016, JAF, 64, 451; [2] Picard et al., 2017, Food Chem., 217, 294; [3] Picard et al., 2018, An Chim Acta, 1001, 168; [4] Mahmoud & Crôteau, 2003, Proceedings of the National Academy of Sciences, 100, 14481; [5] Lisanti et al., 2021, Food Chem, 361, 130029