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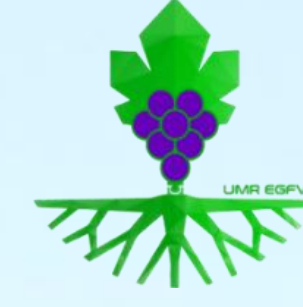
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# Exploring the variability of cuticular compounds in different grapevine cultivars

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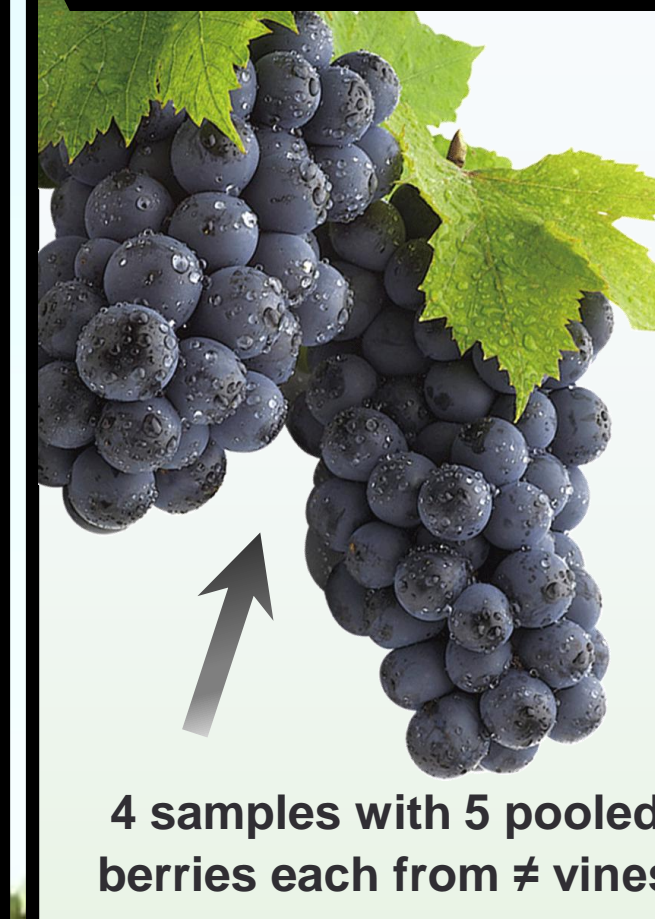


## I. Context and objectives:



Cuticle is the first shield of plant epidermis against the surrounding environment. This lipophilic barrier can be subdivided in two parts: (i) an external wax layer constituted of very-long-chain fatty acids (FA), primary alcohols (ALC), alkanes (ALK), aldehydes (ALD) and/or triterpenoids (TER), and (ii) a deeper cutin polymer made of hydroxy-epoxy-FA monomers, which is to a certain extent linked to the cell wall. Cuticular compounds identification and quantification are well established in different species such as grapevine, but rarely over a wide range of cultivars. We took advantage of the VitAdapt vineyard, in which about fifty varieties have been planted, to perform a global comparison of cuticle composition and provide a data set to establish potential links with any phenotypic trait or stress tolerance.

## II. Sampling performed in 2022



Sampling of berries located in the middle of cluster, shaded by leaves, and two weeks after middle veraison.

4 samples with 5 pooled berries each from ≠ vines



3 samples collected during the same week with 3 pooled leaves each from ≠ vines

Pool replicates in vineyard:

1 & 2: 3 & 4:

1: 2: 3:



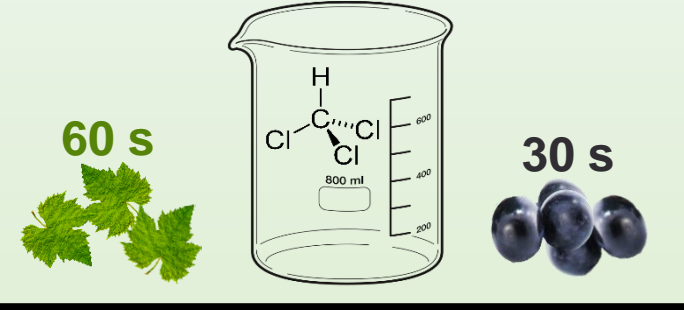
Varieties studied:

Alvarinho	Chenin	MPT 3156-26-1	Saperavi
Agiorgitiko	Colombard	MPT 3160-42-3	Sauvignon blanc
Aranhao	Cornalin	Muscadelle	Semillon
Assyrtiko	Cot	Nero d'Avola	Syrah
BX 648	Gamay	Petit Masing	Tannat
BX 9216	Grenache	Petit Verdot	Tempranillo
Cabernet Franc	Hibernal	Petit Arvine	Tinto Cao
Cabernet Sauvignon	Lilloria	Pinot noir	Touriga Franca
Carignan	Marselan	Prunelard	Touriga nacional
Camere	Mayrud	Riesling	Ugni blanc
Castets	Merlot	Rkatsiteli	Souzao
Chardonnay	Morastel	Roujane	Viognier
Chasselas*	Mourvedre	Sangiovese	Xinomavro

\*only leaves sampled

## III. Methods

Waxes extraction with chloroform containing docosane as IS



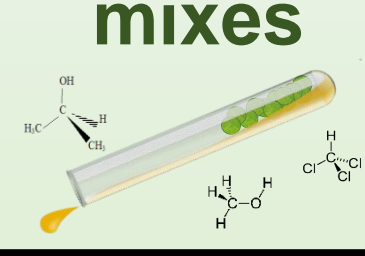
Silylation of the dried waxes extract

Foliar discs (5/leaf) & berry skin collected



Waxes/cutin dry pellet dissolved in hexane

Tissues delipidated in isopropanol at 85°C & chloroform:methanol mixes

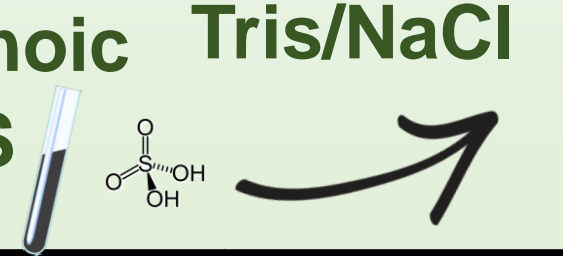


Compounds identification & quantification by GC-MS & GC-FID respectively.



Cutin depolymerized in 5% sulfuric acid containing heptadecanoic acid, 1-pentadecanol & 15-hydroxypentadecanoic acid as IS

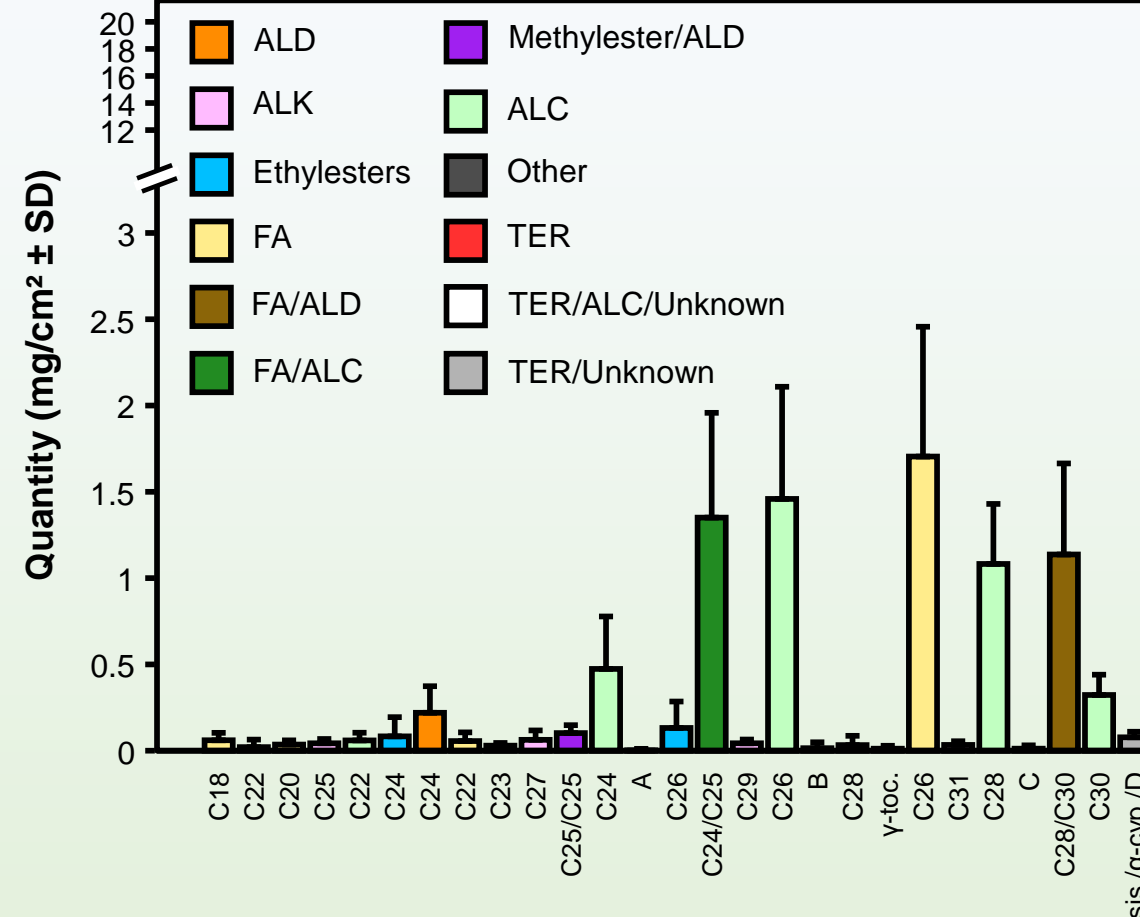
Cutin Extraction in MTBE by phase separation with Tris/NaCl



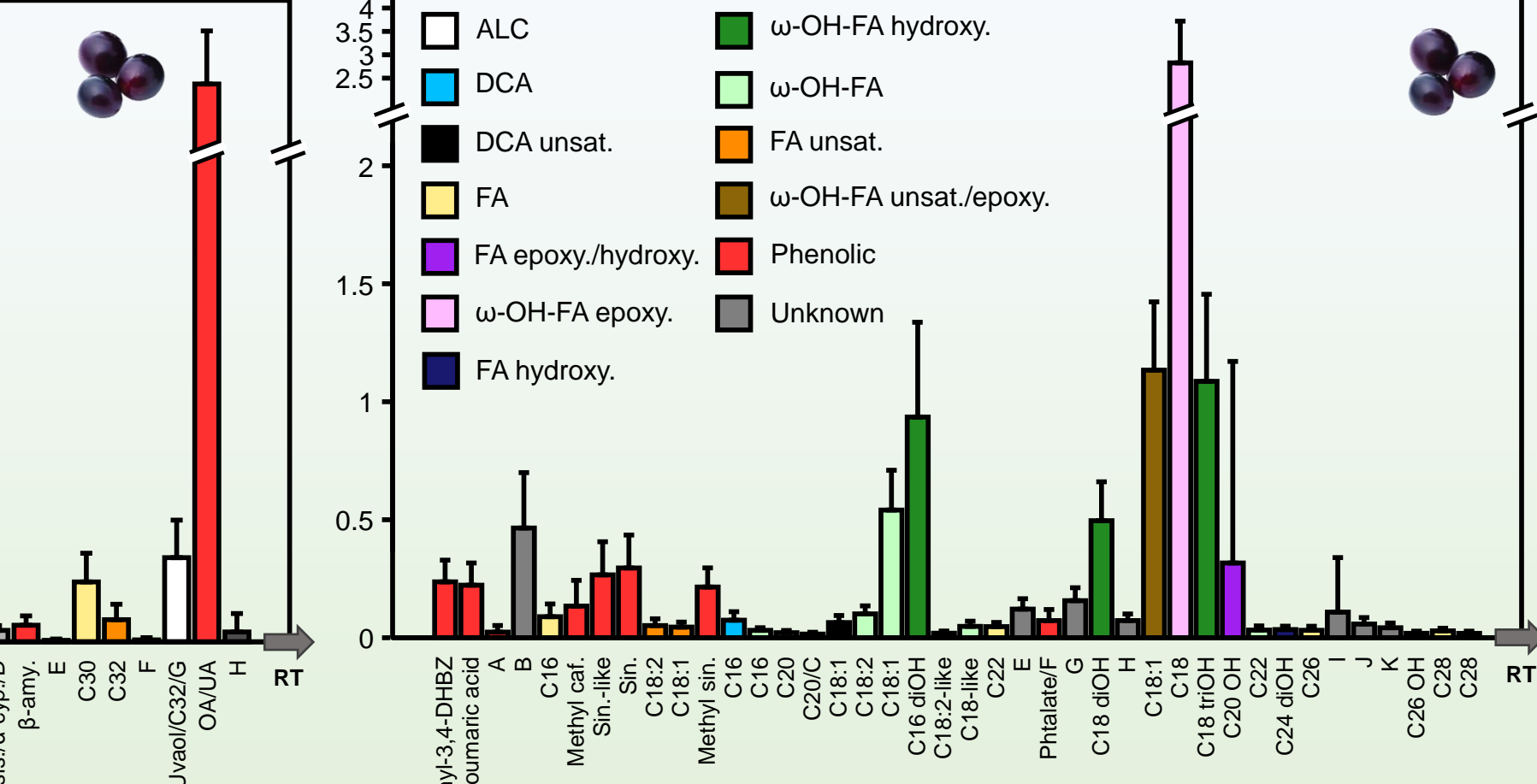
## IV. Overall cuticle composition

Abbreviation: toc.: tocopherol; amy.: amyirin; sis.:sistosterol; cyp.: stereoisomere of cypereene; OA: Oleoic acid; UA: Ursolic acid; DHBZ: Dihydroxybenzoate; caf.: caffeate; sin.: sinapate; tart.: tartarate. Single letter represent unknown compounds

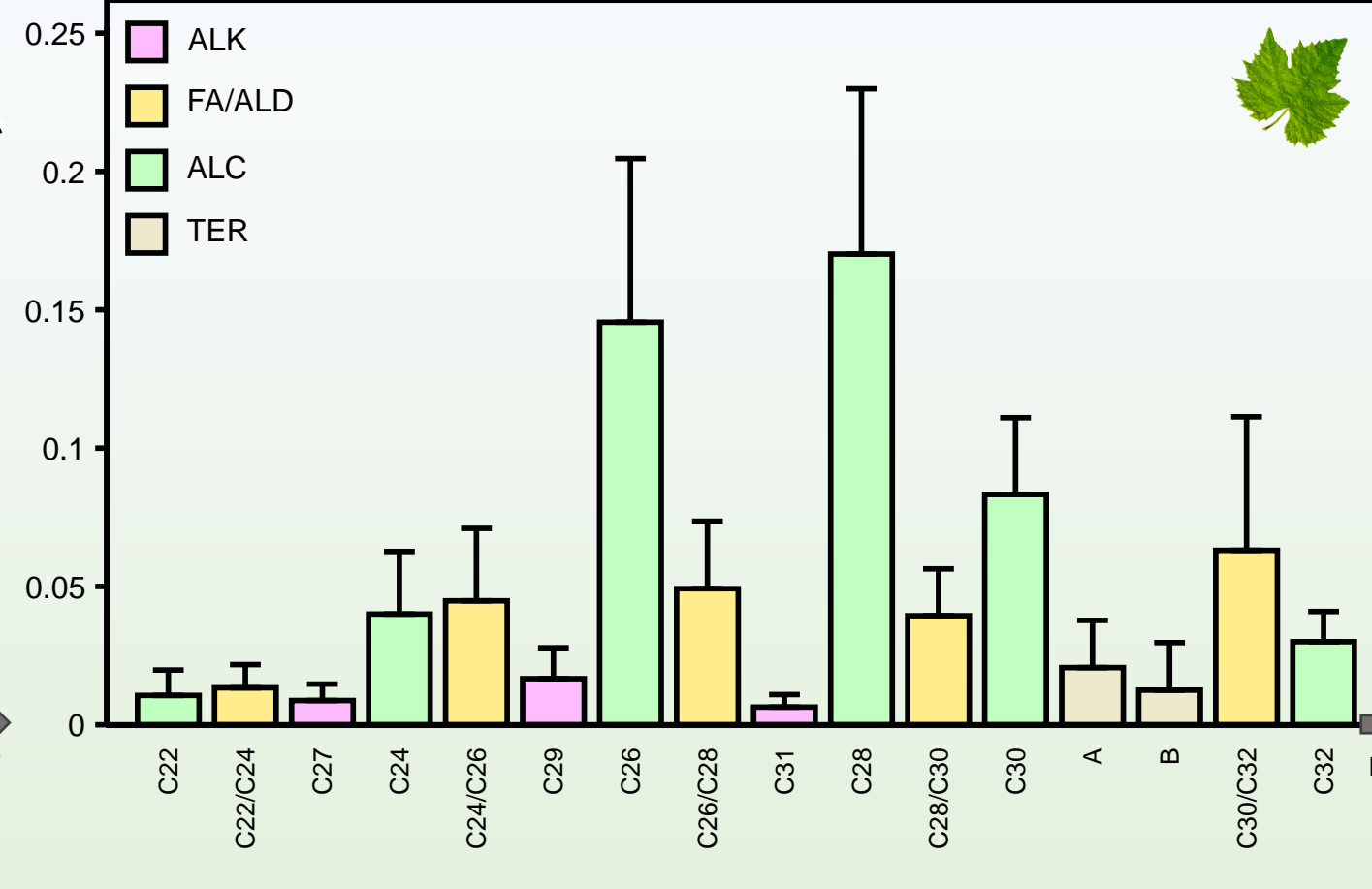
### Berries waxes



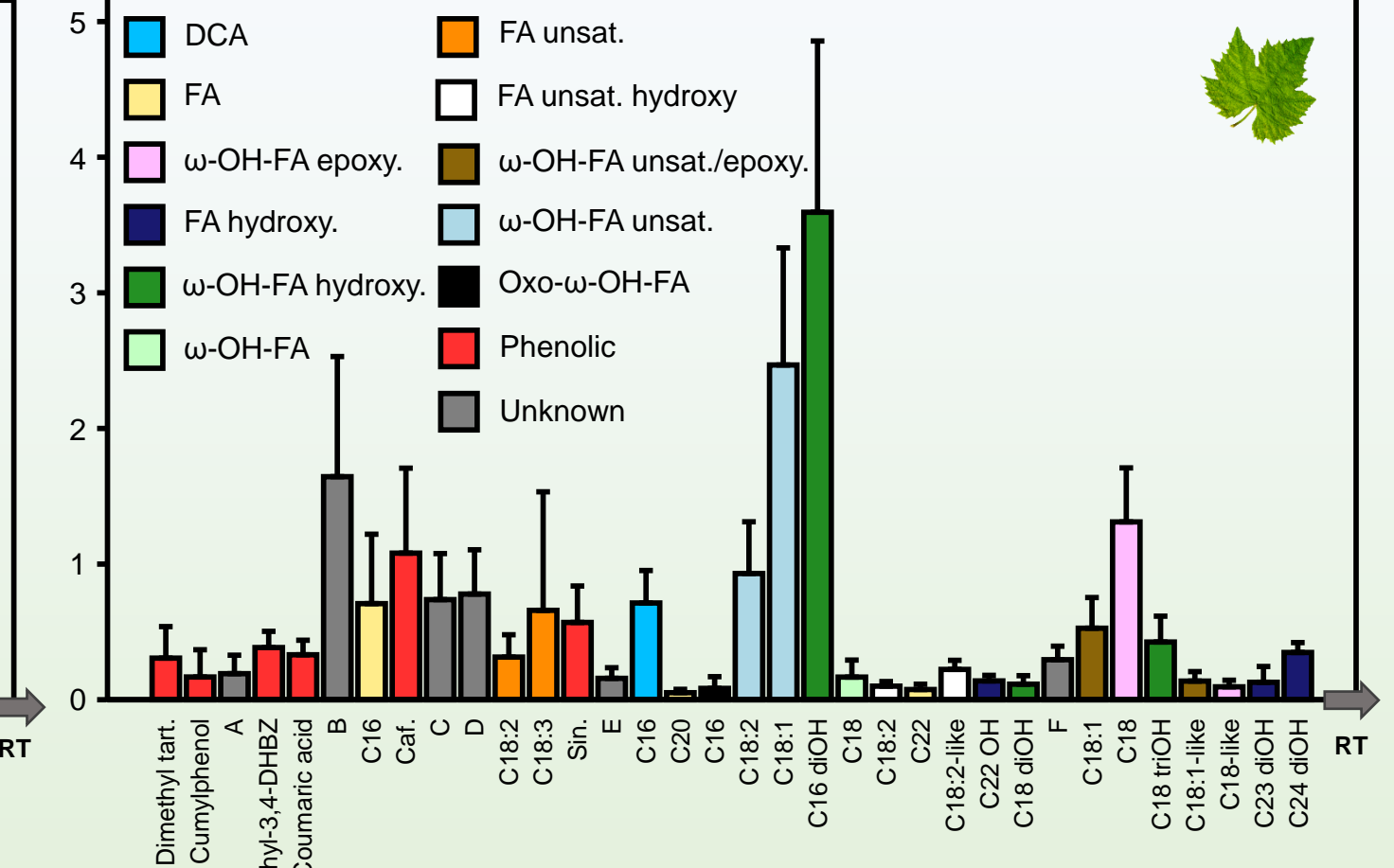
### Berries cutin



### Leaves waxes



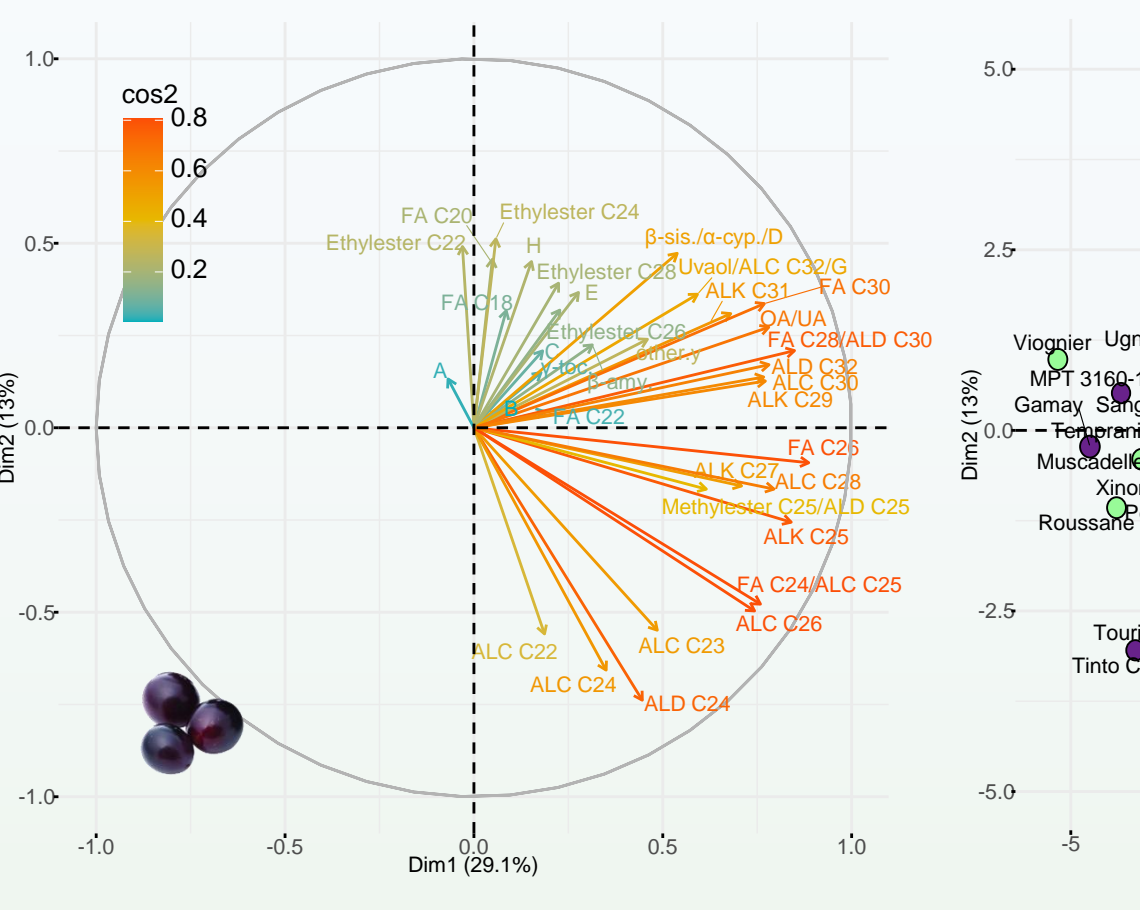
### Leaves cutin



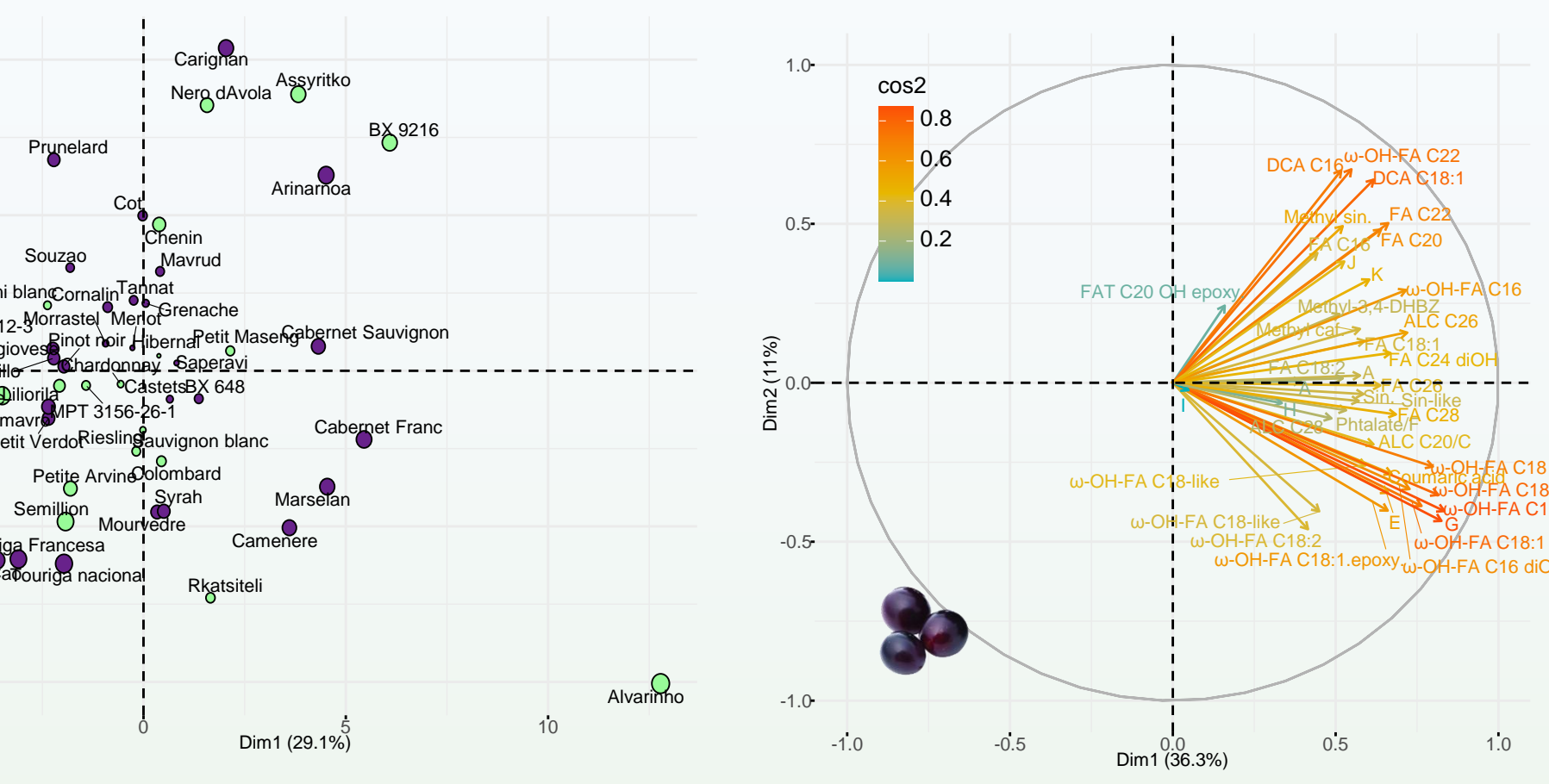
Grapevine waxes are mainly constituted of aliphatics, ALC, FA and ALD, for both organs, apart a specific high amount of OA/OA deposited only on berries. Major cutin compounds are ω-OH-FA hydroxy, epoxy, unsat. or not for berries and ω-OH-FA hydroxy or unsat. for leaves.

## V. Varieties comparisons

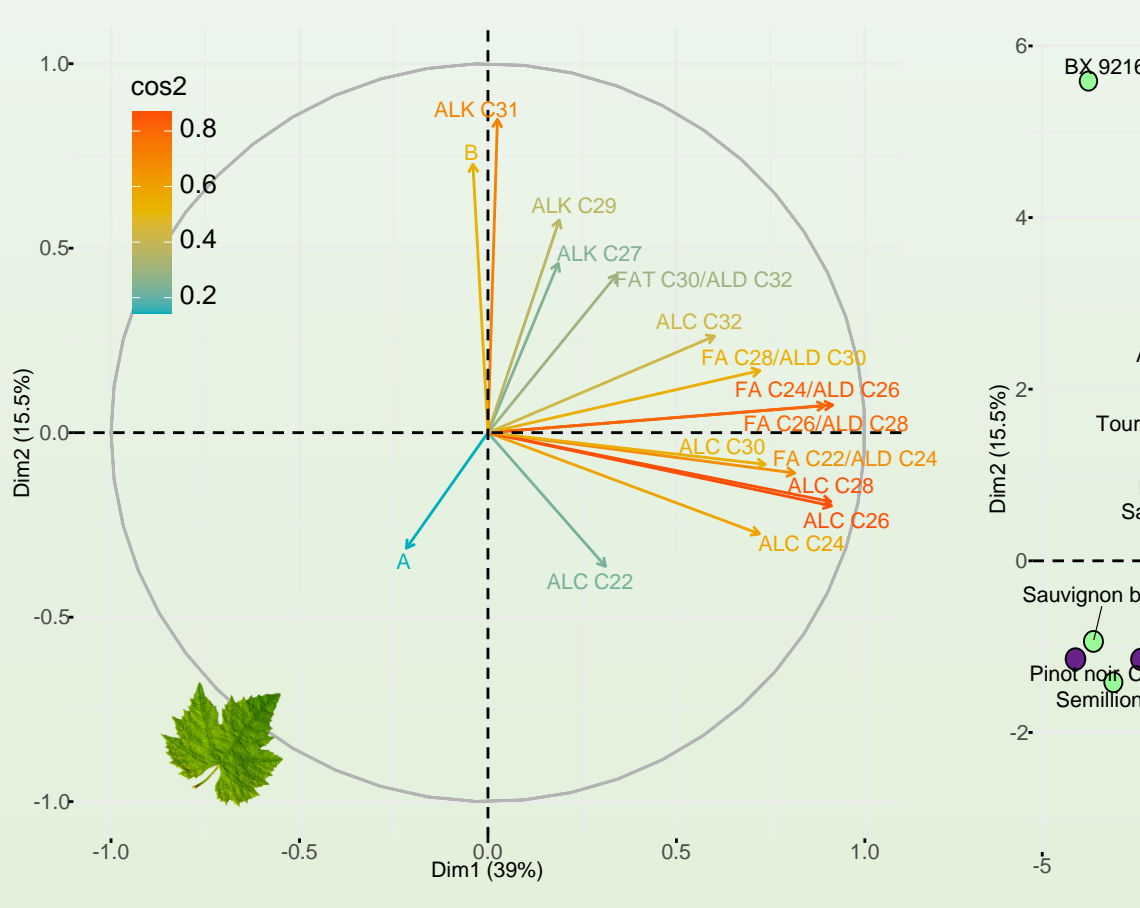
### Berries waxes



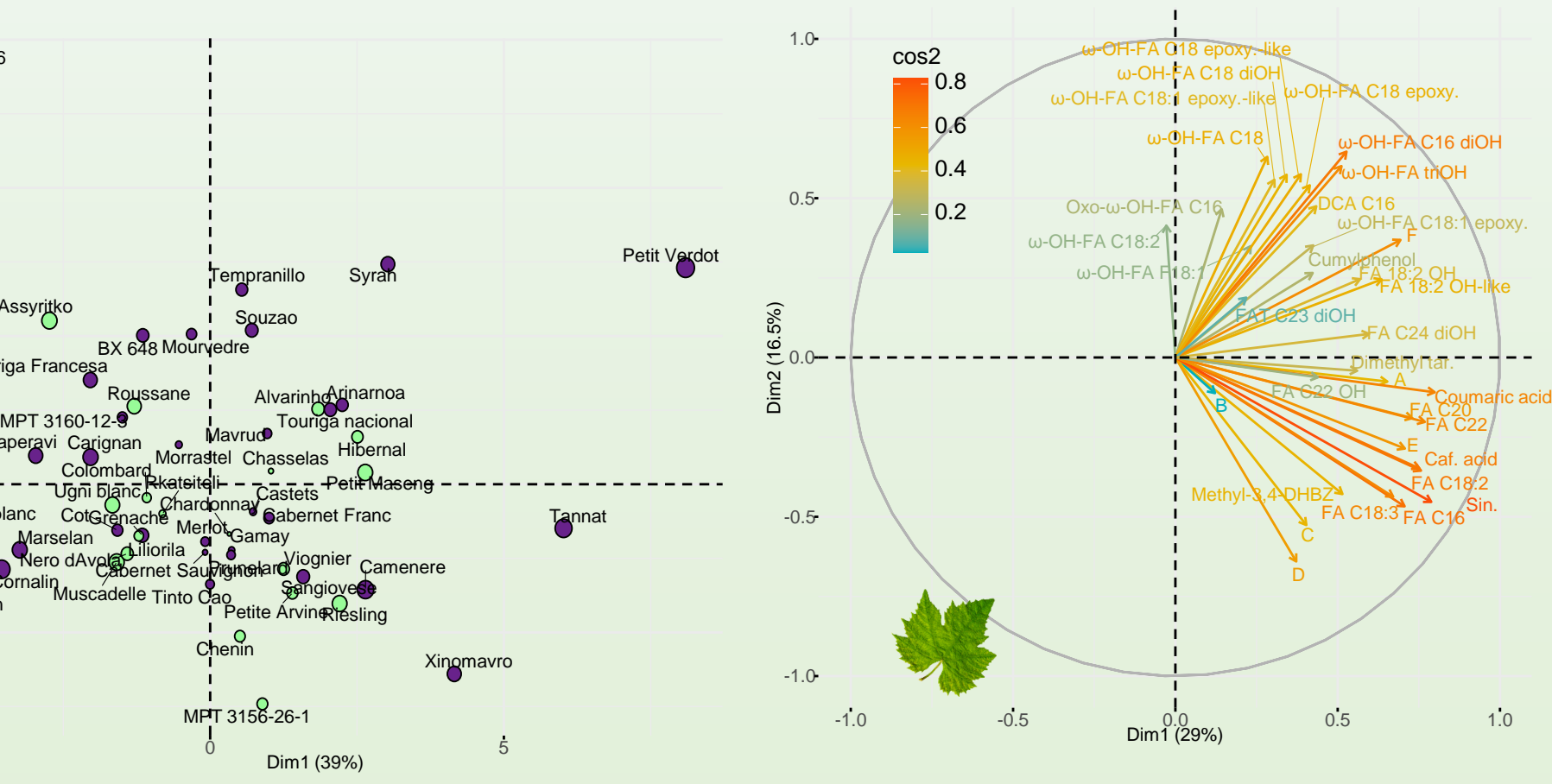
### Berries cutin



### Leaves waxes



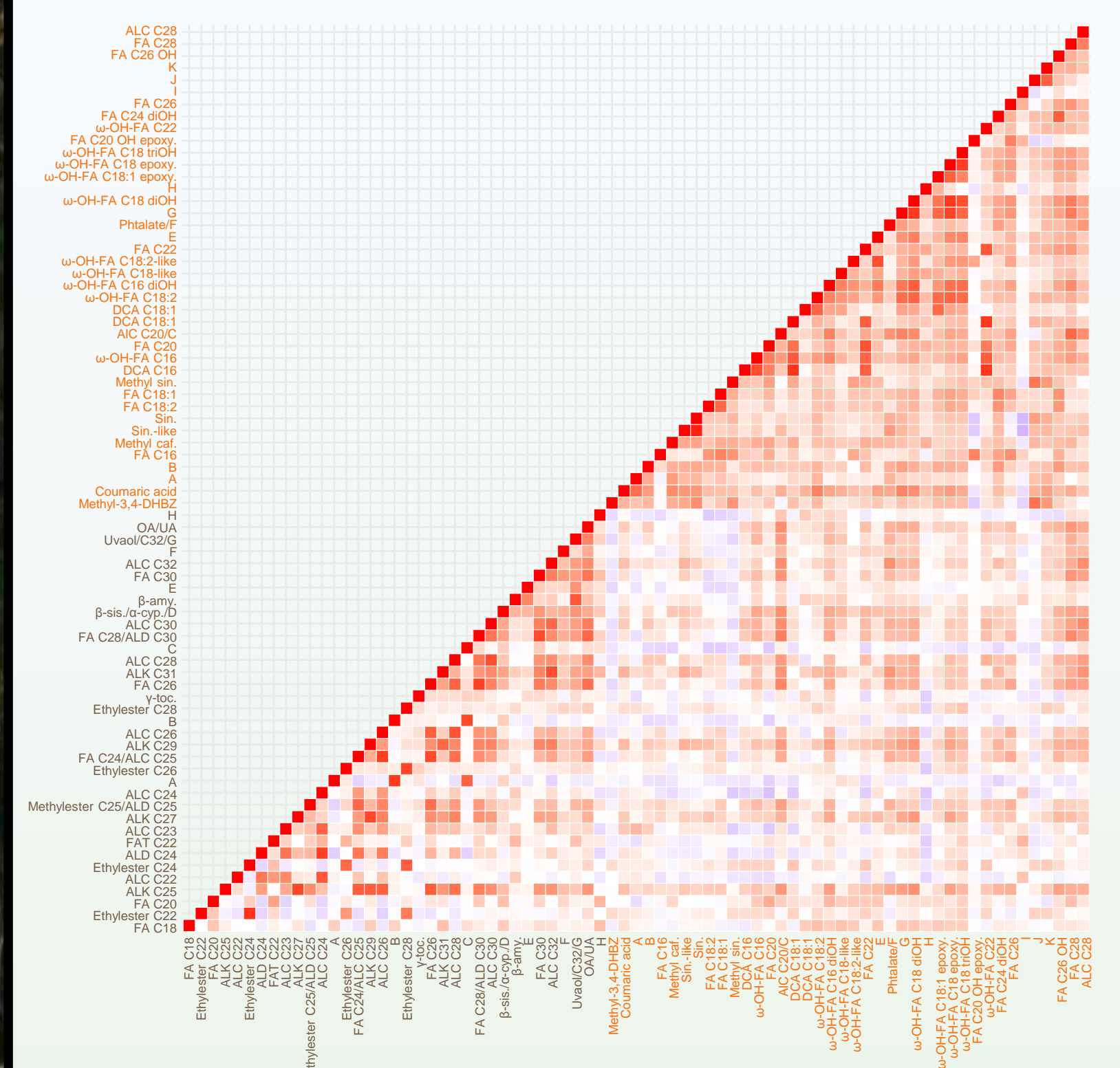
### Leaves cutin



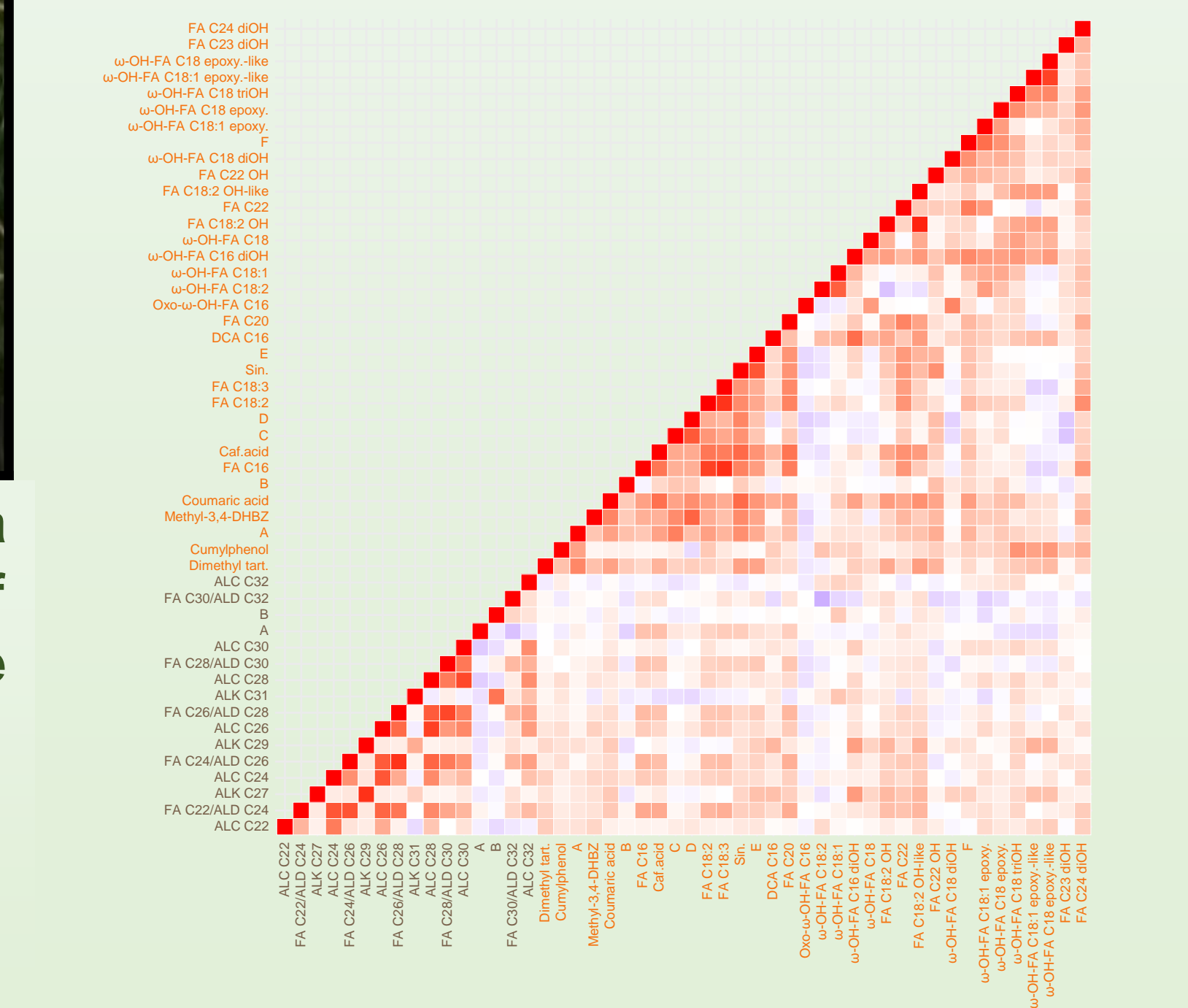
PCA give an overview of cultivars distribution according to their compounds accumulation in each cuticle compartment and each organ. The color of the grape is not clearly linked to the cuticle composition.

## VI. Compounds interactions

### Berries waxes x cutin



### Leaves waxes x cutin



## VII. Conclusions and perspectives

We provide one of the largest comparison of cuticle compounds between different grapevine cultivars. In addition to highlight compounds signature for each cuticle layer in each organs, this data set allows us to decipher their differential accumulation within a plant species. This data set will be used to investigate their relationship with some agronomic traits as cluster compactness or with tolerance against stresses as heat/drought and Botrytis infection, measured during the sampling years.

Correlation matrixes reveal a synergic accumulation of compounds from the same cuticle layer.

Correlations between waxes and cutin for each organ appear less evident.