

Genetic and phenotypic diversity of the *Vitis vinifera* L. teinturier varieties

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The teinturier grapevines (also dyers) are characterized by a more or less intense red coloration of the complete habitus. The main feature regarding wine making, in contrast to classical red wine cultivars, is the colored pulp leading to a higher concentration of anthocyanins in the musts and therefore to wines much darker in color. Originally used to enhance the color of weaker red wines, some cultivars today are also used for wine making without blending.

The origin of these varieties lies probably in the area of the middle Loire (France), where they were already mentioned in the 17th century in the region around Orléans. Because of the lower wine quality of the ancestor 'Teinturier', Louis Boushet, a French grapevine breeder, already started 1824 with the breeding of new teinturier cultivars bearing improved viticultural traits. Based on the work of his son Henri, the teinturier variety with the worldwide highest acreage of approximately 19.398 hectares today is 'Alicante Henri Boushet'. Despite the French breedings, German breeders started in the 20th century with crossings in Geisenheim, Weinsberg and Freiburg leading to the known teinturier varieties grown in Germany 'Dakapo', 'Cabernet Mitos' and 'Dunkelfelder', respectively.

The anthocyanin biosynthesis in colored varieties is controlled by two MYB-related transcription factor genes, *VvmybA1* and *VvmybA2*, located adjacent on chromosome 2 at around 14.2 Mb. In contrast, due to loss-of-function mutations in both *VvmybA1* and *VvmybA2*, white cultivars lack the ability to produce anthocyanins in the berry skin during ripening.

The most observed color mutations in grapevine are from white to red. However, the mutation from black to gray is also a common phenomenon giving rise to periclinal chimeras with two genetically different cell layers. Although the mutation leading to the teinturier phenotype is unknown, there are evidences for the involvement of an ectopic *VvmybA1* overexpression. Nevertheless, already French ampelographes from the last century described 'Teinturier' clones only differing in the intensity of the red coloration leading to the conclusion of existing clonal diversity among clones of the ancestor 'Teinturier'.

This study focuses on the molecular background of the teinturier-specific mutation at the berry color locus and the influence on the phenotype based on clonal variation.