

# Analysis of color-related mutations in bud sports of *Vitis vinifera* L.

Franco Röckel, Ludger Hausmann, Erika Maul, Reinhard Töpfer  
Julius Kühn-Institut, Institute for Grapevine Breeding Geilweilerhof, Siebeldingen  
Email of corresponding author: franco.roeckel@jki.bund.de

Grapevines are one of the oldest agricultural crops and produce table fruits, dried fruits, juice and wine. The number of different varieties worldwide is estimated at 8000 to 10 000 and most of these cultivars belong to the domesticated European species *Vitis vinifera ssp. vinifera*. The increased breeding effort of the last centuries produced a lot of new varieties; however, most arose due to steady crosses between domesticated and wild grapes or growing seedlings from open pollination.

All known wild grapes have a blue/black berry color, whereas the cultivated grapes show a broad color spectrum ranging from green/white to blue/black. Responsible for the coloration of the berries is mainly the composition and concentration of five anthocyanins exclusively in the grape skin. The anthocyanin biosynthesis is controlled by a cluster of four MYB-related transcription factors located on chromosome 2 from which only two adjacent genes are considered as functional (*VvmybA1* and *VvmybA2*). At least one of these two genes needs to be functional for color expression. An insertion of a retrotransposon (*Gret1*) in the promoter region of *VvmybA1* and two amino acid-changing mutations in the coding sequence of *VvmybA2* lead

in combination to a non-functional “white” allele. It could be shown that white grapes are almost all homozygous for the non-functional allele variant.

Due to the fact that grapevine is vegetatively propagated, a lot of different somatic mutations can occur during planting from which only a few affect the phenotype. Because berry color mutations can easily be observed in the vineyard just by visual inspection, a lot of different color mutants have been selected since the rise of viticulture. These mutants can easily be vegetatively propagated by cuttings. The new resulting cultivars might differ not only in the color of the ripe fruits, but also in the coloration of autumn leaf or the prostrate hair of the young shoot. The most mutations found are from white to red berry color, but mutations from black to white can also rarely be found.

This study focuses on the molecular analysis and sequencing of color-related allele variants in berry color mutants of grapevine cultivars found in the German speaking area. Novel *myb*-related gene recombinations at the color locus were found and will be discussed.