

## **LONG RANGE EFFECTS OF SELECTION FOR BERRY COLOR ON GENETIC DIVERSITY ARE DETECTED IN GRAPE CHROMOSOME 2**

MARRONI F.\* , TREBBI D.\*\*\*, MICULAN M.\*\*\*\*, DI CENTA E.\*\*\*\*\* , DI GASPERO G.\*\*\*\*, MORGANTE M.\*\*\*\*

\*) Istituto di Genomica Applicata, 33100 Udine (Italy)

\*\*) Dipartimento di Biotecnologie Agrarie, Università di Padova, 35020 Legnaro (Italy)

\*\*\*) Dipartimento di Scienze Agrarie e Ambientali, Università di Udine, 33100 Udine (Italy)

\*\*\*\*) IGA Technology Services, 33100 Udine (Italy)

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Anthocyanin pigmentation in berry skin is a major determinant of grape berry color. Recent investigations provided evidence that a gene cluster of MybA transcription factors, located on the distal part of chromosome 2 at 14.2 Mbp, is responsible for most of the variation in the expression of UFGT, an enzyme critical to anthocyanin biosynthesis, and that color phenotype is due to the combined additive effects of MybA alleles. White berry is a derived trait from the ancestral colored berry state. Despite its importance, no study has yet investigated the long range effects of selection for berry color in chromosome 2. To this end, we compared the genetic structure of a large region of chromosome 2 around the berry color locus in 25 white-skinned and 34 red-skinned grape varieties, arbitrarily sampled to include much of the genetic diversity in the most widely cultivated varieties.

We sequenced 44 amplicons, spaced approximately every 100 kbp from position 14 Mbp to 18.8 Mbp of chromosome 2, identifying 576 single nucleotide polymorphisms (SNPs) and reconstructing the haplotypic structure of this portion of chromosome 2. One haplotype was shared by all white-skinned varieties analysed, and it was also present in the PN40024 line used for whole-genome sequencing. Fourteen white-skinned varieties (56%), were homozygous for this haplotype, while no red variety was homozygous for the derived white haplotype. Nevertheless, the majority of the most cultivated red varieties shared large portions of the distal end of chromosome 2 with white varieties. Specifically, two red-skinned varieties (Tempranillo and Carignan) share most of the amplicons (>80%) with white varieties in both homologous chromosomes, with the exception of the region surrounding the MybA gene cluster. Statistical tests for departure from neutrality detected selective pressure in white varieties only, and showed that strong signature of selection was extending for more than 2 Mbp from 14Mbp to 16Mbp, and some evidence was still present at 18Mbp.