Proceedings of the LXVI SIGA Annual Congress
Bari, 5/8 September, 2023
ISBN: **978-88-944843-4-2**

Poster Communication Abstract – 2.25

GENETIC CONTROL OF PHYSIOLOGICAL RESPONSES TO HEAT STRESS IN GRAPEVINE

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grapevine, thermotolerance, linkage map, phenotyping, QTLs

Grapevine (*Vitis spp.*) is the most widely cultivated perennial fruit crop in the world and has a high economic importance due to wine production. In recent years, climate changes, such as the increased frequency of intense phenomena like heat waves, negatively affect grape yield and berry composition, with subsequent detrimental effects on wine quality. Thus, studying the genetic, physiological and metabolic factors that are involved in grapevine response to high temperatures is crucial to improve the knowledge of mechanisms underlying thermotolerance, with the aim of supporting plant breeding programs and the advance of vineyard management strategies.

Here we report preliminary results of a QTL mapping experiment conducted on a segregating population obtained from the crossing of ‘Rhine Riesling’ and ‘Cabernet Sauvignon’. A high-density linkage map (average distance between adjacent markers 0.78 cM) was developed using genotype information from 139 individuals.

The progeny was evaluated in the field on various hot summer days at different phenological stages, especially at flowering and véraison, when grapevine is known to be more susceptible to high temperatures.

Phenological traits were assessed along the season and physiological parameters, such as chlorophyll fluorescence and stomatal conductance, were measured in the early morning (*control*) and in the afternoon during hot hours (*stress*). Phenotyping was repeated over three years. A wide variability in the quantitative value of the above traits was observed among the progeny individuals. Moreover, significant correlations were observed between years and between phenotyping rounds along each season, which highlights a genetic component in trait determination. These data were used as input dataset in QTL analysis, by considering the difference between control and stress evaluation sessions in the case of physiological measurements.

Selected individuals, chosen for their divergent behaviour to high temperatures in the field, were also evaluated in controlled conditions. Volatile organic compound and metabolomic analysis were performed, together with physiological measurements, in order to characterize individual response to heat stress. Preliminary results of this characterization are also reported.