ORGANIZED BY

Sveučilište u Zagrebu
Agronomski fakultet
University of Zagreb
Faculty of Agriculture

GBG 2026
XIV. International Symposium on Grapevine Breeding and Genetics
ZAGREB CROATIA

28 June – 3 July 2026 • Zagreb (Croatia)

Book of Abstracts

iVES Conference Series
vine & wine

XIVTH INTERNATIONAL SYMPOSIUM ON GRAPEVINE BREEDING AND GENETICS

INFORMATIONS

This book of abstracts comes from a collaboration between the XIVth International Symposium on Grapevine Breeding and Genetics, held in Zagreb, Croatia, from 28 June to 3 July 2027 and the International Viticulture and Enology Society. The book is available online with open access on the *IVES Conference Series* platform.

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https://ives-openscience.eu/category/ives-conference-series/grapevine-breeding-and-genetics/gbg-2026/

DOI:
10.58233/gbg-2026

e-ISSN of *IVES Conference Series*:
2777–9173

PDF and digital page layouts:
Lauranne Beret-Allemand (International Viticulture and Enology Society)
Louise Priou (International Viticulture and Enology Society)
Nicolas Ruault (International Viticulture and Enology Society)

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POSTER

Phenotyping of heat response traits in a grapevine segregating population (Rhine Riesling × Cabernet-Sauvignon)

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Keywords: *Vitis vinifera*, heat stress, chlorophyll fluorescence, thermal imaging, BLUPs

ABSTRACT

Climate change is increasing the frequency and severity of heat waves, posing a major challenge to grapevine cultivation across Europe. Therefore, the development of tolerant genotypes may represent a viable strategy to enhance the sustainability of viticulture.

In this context, a segregating population (Rhine Riesling × Cabernet Sauvignon) has been evaluated at the experimental fields of Fondazione Edmund Mach. Phenotyping of key physiological traits associated with heat stress responses was carried out, including stomatal conductance (gs), chlorophyll fluorescence (Fv/Fm and non-photochemical quenching, NPQ), leaf temperature, and environmental drivers such as ambient radiation (PAR) and vapor pressure deficit (VPD).

Proximal measurements were conducted using a LI-COR LI-600 porometer on both sides of the vine rows and at different times of the day to capture side-specific and diurnal variability in plant physiological responses to combined heat and radiative stress.

Preliminary analyses revealed consistent relationships among environmental variables and plant physiological responses; gs showed significant correlations with PAR and VPD, while leaf temperature was related to both radiation levels and stomatal behavior. These results highlight the interaction between atmospheric demand, stomatal regulation, and leaf thermal dynamics under field conditions. Thermal imagery of the vineyard canopy was reconstructed from UAV flights and will be integrated with proximal physiological measurements to evaluate the potential of canopy temperature as a proxy for vine physiological status. Additionally, NPQ was evaluated and compared with the relative reduction of Fv/Fm under heat stress conditions, allowing the estimation of genotypic performance using BLUP values. The associated standard deviation across years (2021–2023) was considered to assess the stability of genotypic responses over time.

This approach led to the identification of contrasting genotypes that will be used in further experiments under controlled conditions, aiming to improve our understanding of heat resilience mechanisms. These phenotypic evaluations are designed to complement QTL identification studies associated with heat stress tolerance, contributing to the development of scalable phenotyping strategies applicable both to vineyard management and grapevine breeding.

ACKNOWLEDGEMENTS

This doctoral research is supported by the Italian Ministry of University and Research under the PRIN 2022 program (Prot. 20227EXKME).