

TOLERANCE TO SUNBURN: A VARIABLE TO CONSIDER IN THE CONTEXT OF CLIMATE CHANGE

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Abstract:

Context and purpose of the study - Climate change effects on grapevine phenology and grape primary and secondary metabolites are well described in recent literature. Increasing frequency and intensity of heat waves may be responsible for important yield losses in the future. However, the impact of this event is not so well described in literature. The present study highlights the importance of grape variety tolerance as a mitigation tool to climate change.

Material and methods – Sunburn intensity was evaluated in an ampelographic field, located at Alentejo, the warmest region of Portugal, after a strong heat wave that occurred in the first week of August of 2018. The vineyard, planted in 2011, has 189 grapevine varieties (125 plants per variety), grafted on 1103P, with a plant density of 2222 plants ha⁻¹ (distance in the row = 1.5m; distance between rows = 3.0 m). Row orientation is N-S. Sunburn intensity was visually evaluated in both sides of the canopy and the results converted into varietal tolerance to sunburn (intensity ranging from 1 to 5, being 1 very tolerant and 5 very sensitive). Standard meteorological variables were measured at the experimental plot, namely air temperature, vapor pressure deficit, wind speed and direct solar radiation (hourly data). Canopy height and width was estimated from digital images perpendicular to the rows (12 images per variety) and from remote imagery (Micasense Rededge).

Results – The heat wave observed in August was characterized for a period of 6 consecutive days with maximum air temperatures above 40°C (T_{max} ≈ 45°C), minimum temperatures around 25°C and extremely dry air and the maximum DPV higher than 8.4 kPa. From the 103 white varieties under study, only 3 varieties were classified as extremely sensitive and 5 as very sensitive. From all the evaluated white varieties, 44% (with different geographic origins) behaved as extremely tolerant. Relatively to the 82 red varieties, there was an increase in the varieties classified as extremely sensitive and very sensitive varieties (17%) and a reduction on the varieties classified as extremely tolerant (30%). Only 4 rose varieties were studied and Ahmeur bou Ahmeur stands out. This variety was very sensitive to sunburn despite its North African origin.

The increase of sunburn intensity in red varieties highlights the contribution of berry color on berry energy balance. When comparing the bunch exposition, it was observed that sunburn intensity in exposed grapes on the West facing side of the canopy was around two times bigger than in the East face, either for white and red cultivars, which highlights the importance of row orientation in new plantations.

Keywords: Grapevine, Variety, Sunburn, Heat wave, Climate change.

1. Introduction

