

Potential benefits of kaolin and salicylic acid on olive tree performance and mineral composition of fruits under rainfed conditions

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The projected changes in climate in the Mediterranean region, that include low rainfall, excessive heat load and high daily irradiance, are of utmost relevance for rainfed olive orchards, since are expected negative consequences on physiology, growth, productivity and quality. To overcome these problems, it is imperative to develop adjustments in agronomic practices. Young olive trees of a rainfed orchard in Bragança, Northeast Portugal, were sprayed with 100 µM salicylic acid (SA), a stress signaling phytohormone, or with 5% kaolin (KL), a heat and irradiance reflecting clay. Both protective agents demonstrated a significant positive effect on net CO₂ assimilation rates, especially in the most stressful period of the summer season, due to lower stomatal and non-stomatal limitations. The positive response of the photosynthetic activity, as well the improvement of tree water status, contributed to the higher fruit yield presented by the trees treated with SA, and in higher extent with KL. The mineral characterization of fruits demonstrate that SA and KL treatments influenced some mineral levels positively, highlighting the Mg, Ca, Zn and Mn concentrations in response to SA and K, Mg, Ca and Zn concentrations in reaction to KL application. These responses suggest an improvement of the nutritional value of the olives that may be associated with the best water status presented by those trees. Additionally, the application of SA and KL did not contribute to the increase in the

levels of heavy metals, verifying even a reduction in a few of them. It is noteworthy that Al concentration did not increase in fruits from KL treated trees, what could be a concern due to their presence on the product ($\text{Al}_4\text{Si}_4\text{O}_{10}(\text{OH})_8$). Based on these results, KL and SA revealed to be effective on olive tree performance and mineral composition of fruits under rainfed conditions. Future studies are needed to strengthen these promising results and to clarify the mechanisms behind these potential benefits.

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