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Determinant factors in olive oil accumulation for optimizing harvest time in a context of climate change

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Olive is a woody crop extended over 10 Mha around the world (FAOSTAT, 2019), being Spain the country with the largest area (2.7 Mha). Andalusia is located in the South of Spain, with 1.6 Mha cultivated with olive trees, most of them (around 90%) dedicated to olive oil production (MAPA, 2020). This region is characterized by a great diversity of weather conditions. This diversity greatly affects important agronomic parameters of olive as the pattern of oil accumulation. This influence is different depending on the cultivar considered. In addition, this pattern of oil accumulation is a key aspect since is the most relevant trait determining the optimal harvest time. For that reason, in the present study, the relative influence of cultivar and environment, and their interaction, have been evaluated for the full pattern of oil accumulation.

This study was carried out in four locations of Andalusia covering a wide range of weather conditions, and where olive trees are well established or under expansion: Antequera (Málaga), Córdoba, Úbeda (Jaén) and Gibraleón (Huelva). In 2008, five cultivars were planted in a randomized complete block design consisting in four blocks and four trees per elementary plot: Arbequina, Hojiblanca, Koroneiki, Picual and Sikitita-3 (a new registered cultivar from the olive breeding program developed by the University of Córdoba and IFAPA). The first two locations were monitored in 2018 and 2020 while the other two locations were monitored only during 2020 campaign. Fruits samples were collected periodically, starting 4 weeks after full bloom until the oil accumulation was finished. Then, in the laboratory, fruits' oil content was measured by nuclear magnetic resonance.

Results show sigmoid patterns regarding fruit oil accumulation and dry basis along each campaign in all genotypes, locations and years. There were significant differences of maximum olive oil accumulation among genotypes, recording the genotype Sikitita-3 the maximum ones. Furthermore, a significant genotype-environment interaction was also found for these. These results have relevant consequences regarding the selection of the optimal harvest time, to accomplish a desired balance between maximum oil accumulation and quality indicators which require early harvest dates.

References:

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