A comparison of cuticular wax composition in fruit of three olive cultivars

Clara Diarte 1, Agustí Romero 1, Jordi Graell 1, Markus Riederer 2, Isabel Lara 1
1 Universitat de Lleida, Unitat de Postcollita-XaRTA, AGROTÈCNIO, Lleida, Spain
2 IRTA-Mas de Bover, Programme on Olliculture, Ealliototechnic and Nuts, Constantí, Spain
3 Universität Würzburg, Julius-von-Sachs Institut für Biowissenschaften und Botanischer Garten, Würzburg, Germany

INTRODUCTION AND EXPERIMENTAL

Olive (Olea europaea L.) growing has outstanding economic relevance in Spain, the country being the main olive oil producer and exporter in the world. In spite of the relevance of fruit skin properties for overall quality, water loss and susceptibility to mechanical damage, rots and infestations, very few published studies have addressed the cuticle composition of the intact olive fruit.

RESULTS AND CONCLUSIONS

Fruit samples of the cultivars ‘Arbequina’, ‘Argudell’ and ‘Sevillenca’ were harvested at the black stage from the experimental orchards at the IRITA-Mas de Bover research center located in Constantí (41°09′N; 1°12′E), Spain. Water permeance of whole fruit was determined as in Huang et al. (2017). Cuticular membranes were isolated enzymatically from skin disks excised from the fruit (Fig. 1), and cuticular waxes extracted in chloroform, analysed (GC-FID) and identified (GC-MS). All procedures were adapted from those described elsewhere (Belge et al., 2014). In order to visualize pores, cracks or defects on the fruit surface, samples at the green stage were submitted to the toluidine blue (TB) test (Tanaka et al., 2004).

The TB test revealed SURFACE DIFFERENCES among the three cultivars assessed (Fig. 2A). ‘Argudell’ and ‘Sevillenca’ showed discontinuities on fruit surface, while ‘Arbequina’ did not. However, while ‘Argudell’ fruit displayed the highest WATER PERMEANCE values, consistent with the presence of surface pores, those for ‘Arbequina’ and ‘Sevillenca’ fruit were similar despite the differences revealed by the TB test (Fig. 2B).

Detailed compositional analysis of cuticular waxes showed that ‘Sevillenca’ fruit displayed the highest RATIO OF ACRYLIC TO CYCLIC compounds in comparison with ‘Arbequina’ and ‘Argudell’. Wax analyses showed that these ratio differences arose from lower triterpene and higher fatty acid percentages in ‘Sevillenca’ cuticles as compared to the other two cultivars (Table 2). The weighted AVERAGE CHAIN LENGTH (ACL) of acyclic wax components was similar for all three cultivars, and thus apparently not related to differences in water permeance in these samples.

ACKNOWLEDGEMENTS

REFERENCES

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Data suggest that water permeance of olive fruit may be modulated by different cuticle-related factors, none of which appear to have a major role on this trait by itself. These would include:

 Presence of surface discontinuities
 Total wax coverage
 Ratio of acyclic to cyclic waxes, the former potentially providing more efficient barriers against water loss
 Wax to cutin ratio

This work was funded through grants AGL2015-64235-R (MINECO/FEDER, Spain), and TR265 (Universitat de Lleida, Spain). C. Diarte is the recipient of a predoctoral scholarship granted by the Universitat de Lleida.