Extraction and characterization of secoiridoid compounds of the most dominant varieties grown in Algeria: *Chemlal*, *Limli,* and *Oleaster*.

UMMTO

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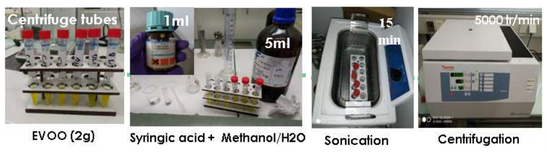
Introduction

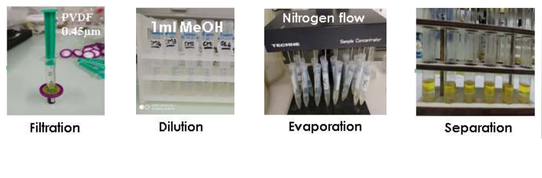
Secoiridoids represent almost ¾ of the phenolic fraction of olive oil. They are aglycone derivatives of oleuropein and ligstroside present in abundant quantities in the fruit, which accumulate during the ripening of the fruit and are released by the activity of b-glucosidase during crushing. The therapeutic virtues of olive oil secoiridoids have recently been recognised for their broad biological activity against cancer, inflammatory and cardiovascular diseases. The composition of olive oil is very sensitive to variations in varietal, geographical and technological factors, particularly in terms of secoiridoid content. The aim of this work is to extract and characterize the secoiridoid compounds from the most dominant Algerian varieties.

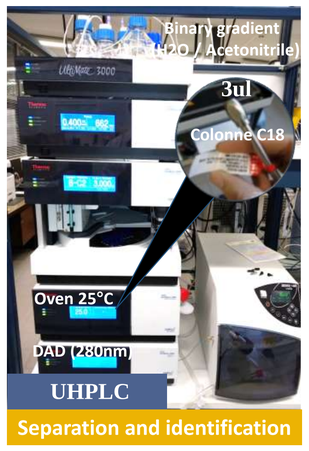
Materials and methods

Olive oils were obtained from two endemic Algerian olive cultivars, *Chemlal* (C) and *Limli* (L), cultivated in the growing region of Bouira, Algeria. The *Oleaster* oil was obtained from the wild olive (*Oleaster* (O)) population in the same region. The harvested campaign was carried out during the crop season of 2018, over a period of one month spread through four harvesting dates (D) and spaced out with ten days intervals between them (D1:November 25; D2:December 5; D3:December 15; D4:December 25). The olive samples were manually harvested in random and cleaned carefully by following the method described in the International Olive Council (2011). The oils were extracted 24 hours after harvest using a mini oil mill, operating with a two-phase extraction system (wet pomace, olive oil).

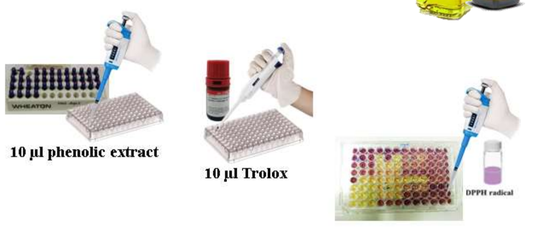


Polyphenols extraction
Method of International Olive Council (2015)

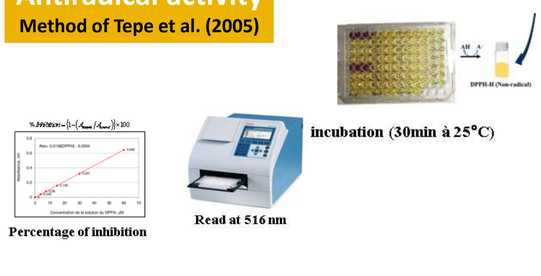




Separation and identification

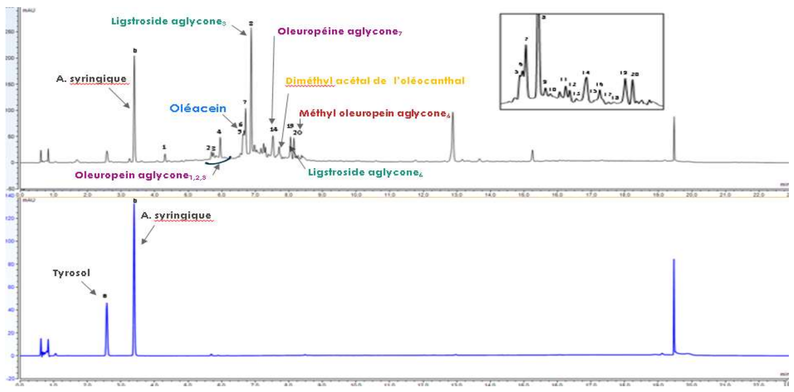


Antiradical activity
Method of Tepe et al. (2005)

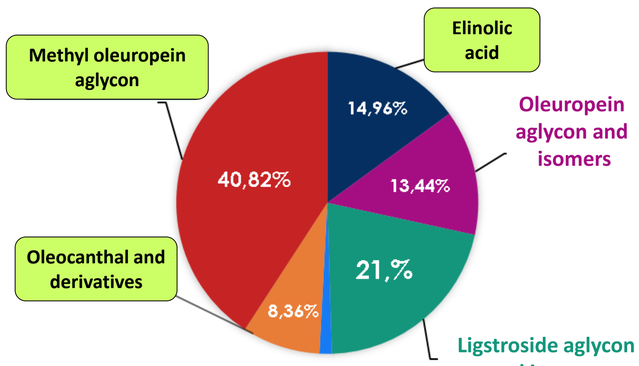


Results and discussions

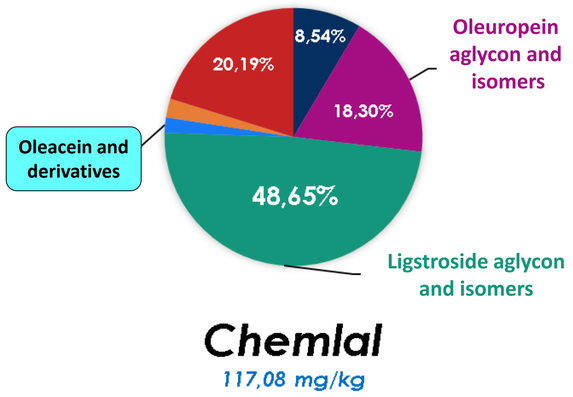
The study showed that early harvest dates of the fruits produced oils richer in phenolic and secoiridoid compounds, with high antioxidant activity registered in both wild and cultivated varieties. Moreover, all oil samples showed high values of secoiridoids exceeding 60-90% of total biophenols, with higher values found in *Oleaster* oils, which are correlated with high resistance to oxidation attacks. UHPLC-DAD and UHPLC-HRMS analyses showed that the secoiridoids composition is dominated by a profile rich in several isomers of oleuropein and ligstroside aglycons, which in turn represent more than 60% of the total secoiridoids in olive and *Oleaster* oils. Furthermore, chemometric analysis on the data allowed a better appreciation of the sensitivity of the virgin olive oil composition to the changes in genetic and ripening factors.



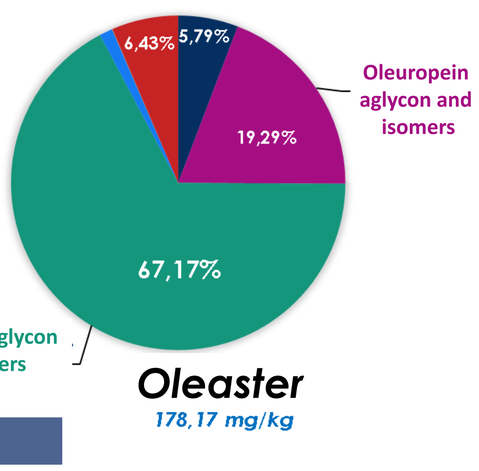
Secoiridoids composition of olive oil samples



Limli
127,31 mg/kg

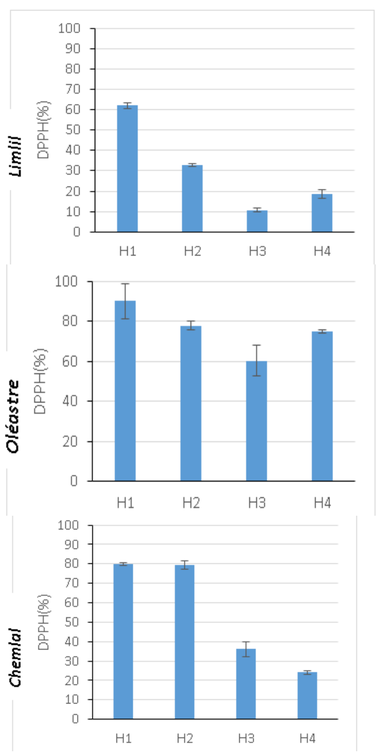


Chemlal
117,08 mg/kg

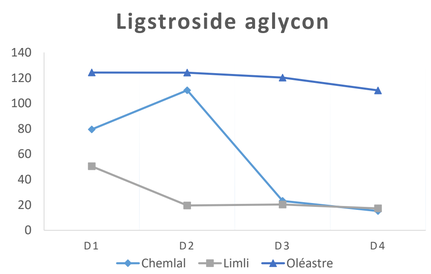


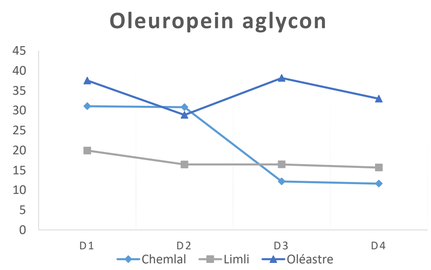
Oleaster
178,17 mg/kg

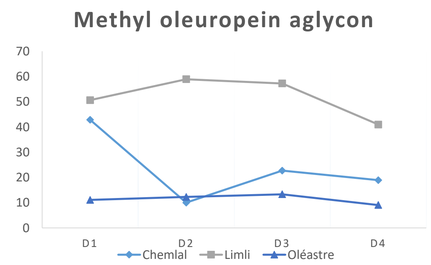
Secoiridoid contents

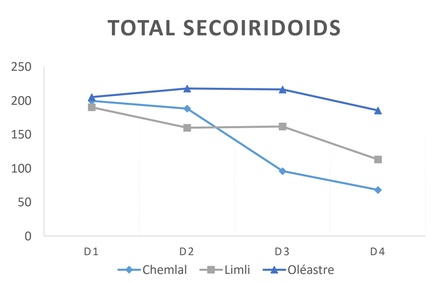


Antioxidant activities of the samples

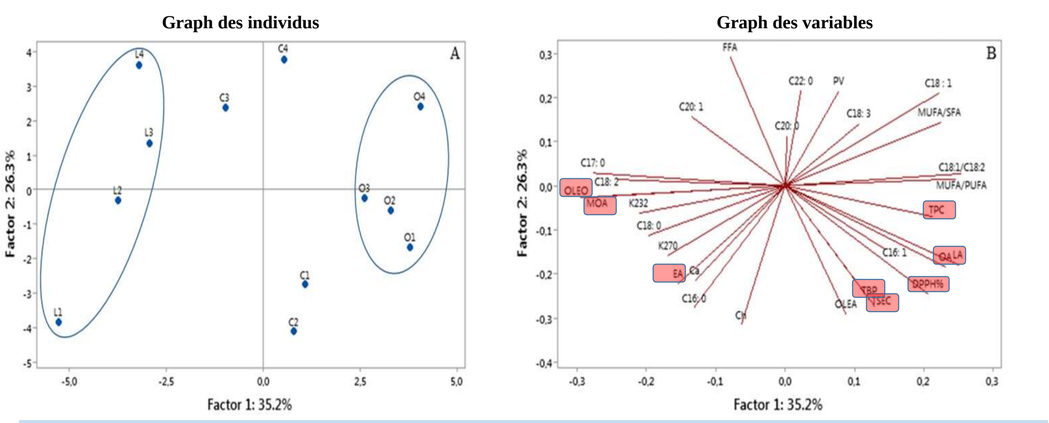








Secoiridoid levels during olive maturity



PCA performed on all physico-chemical parameters of the oils

Conclusion and perspectives

This investigation on one of the main dietary intakes has led to a better understanding of the effect of changes in varietal source and fruit ripening on the quality of virgin olive oil. The influence of both factors was observed in the considerable differences between the oil samples in terms of secoiridoid contents. The extracts of wild olive oils were characterized by a higher level of bioactive compounds and strong antiradical scavenging capacity. The variation of antioxidant capacity of the oil samples was strongly correlated with their content on the phenolic compound, particularly the secoiridoids fraction that represents approximately 60-90% of total biophenols. The composition of the latter was dominated by a profile rich in several isomers of oleuropein and ligstroside aglycons. Further studies are needed for a more precise characterization of the individual secoiridoids composition of olive oil, particularly the oleocanthal and oleacein derivatives.