



Summary

Olive oil is a vegetable oil that is used for over centuries in many different ways. Nowadays it is often used in the kitchen and it is considered to be an important part of the Mediterranean diet. The oil is made by pressing olives from the *Olea Europaea* tree and is well known for its health benefits. There are different grades of olive oil: extra virgin, virgin, lampante, pomace, olive oil and refined olive oil. Olive oil consists for 98%-99% of triacylglycerols, esters of a glycerol with 3 fatty acids. The other 1-2% consists of about 230 small components like free fatty acids, sterols, peroxides, volatile compounds and pigments.

Spain is responsible for the biggest part of the olive oil production, followed by Italy and Greece. A disappointing harvest in Spain and/or Italy may lead to a descent in available olive oil and an increase in prices. This makes the product more vulnerable to fraud, especially the extra virgin olive oil.

Olive oil fraud can be done in different ways, namely [1] adulterating with other vegetable oils, [2] adulterating of extra virgin olive oil with lower quality (refined) olive oil and [3] fraud with origin.

The aim of this research is to determine wheatear there could be adulterated olive oils in the Dutch supermarkets. The first part was a literature research for the different ways of committing fraud, the components of olive oil and analytical methods. Based on these results it was decided to focus on determining polymerized triacylglycerols and pyropheophytin. These components are formed during heating, as is done in the refining process. Refining is not allowed for extra virgin olive oil and can therefore be used as an indicator for heat treatment. Polymerized triacylglycerols is commonly used for dimers, trimers and polymers of triacylglycerols. Dimers are formed by the binding two acylgroups of two different triacylglycerols or between two acylgroups within a triacylglycerol. The maximum amount of polymerized triacylglycerols in crude vegetable oil according to German standards is 1,0%, however a limit of <0,05 can be postponed for extra virgin olive oil. Pyropheophytin originates from chlorophyll that is converted into pheophytin. Pheophytin is than converted into pyropheophytin. The maximum amount of pyropheophytin in extra virgin olive oil is according to German and Australian standards <15% and <17%.

Six extra virgin olive oils were analysed: 5 from Dutch supermarkets and 1 reference from Germany.

Results showed that olive oil 1 had one parameter just at the limit and one below the limit, olive oils 1, 2 and 3 had both parameters above the limit, olive oil 5 had one parameter above the limit and one parameter below the limit and olive oil 6 had both parameters below limits. Six unexperienced tasters carried out a sensorial test. Their opinions were very different, but in all cases bad characteristics were found.

Concluding it can be said that according to the used indicators for heat treatment there is a change that something is wrong with the extra virgin olive oils from the Dutch supermarkets. The reference olive oil from Germany was indeed extra virgin olive oil.

Advices for more research are: analysing more brands of olive oil and analysing the used olive oils for more parameters, analysing flavoured extra virgin olive oil and research of fraud with other oils like truffeloil and arganoil.



Results

The results of the analyzed olive oils are shown in table 1. The olive oils with numbers 1-5 are from Dutch supermarkets, olive oil number 6 is Jordan Olivenöl. The maximum amount for polymerized triacylglycerols is according to German standards 1,0%, but for extra virgin olive oil a percentage of <0,05 can be postponed. For pyropheophytin the maximum amount according to German and Australian standards <15% and <17%.

The color red indicates that the analyzed olive oil is above the limit, the orange color indicates that the analyzed olive oil is at the limit and the green color indicates that the analyzed olive oil is below the limit.

Sample	Polymerized triacylglycerols	Pyropheophytin**
Olive oil 1 Extra vierge	0,05	11,6
Olive oil 2 Extra vierge	0,26	28,9
Olive oil 3 Extra vierge	0,09	21,8
Olive oil 4 Extra vierge	0,14	28,1
Olive oil 5 Extra vierge	0,10	11,8
Olive oil 6 Extra vierge	< 0,05	11,1

Table 1 Laboratory results

** Results with 95% certainty

Conclusion

Concluded it can be said that olive oils 1, 2, 3, 4 and 5 show levels that could indicate that it may not be extra virgin olive oil. Only olive oil 6 (Jordan Olivenöl) has both indicators below the maximum levels.

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