

Increased polyphenols in extra virgin olive oil produced in the Lleida region

Summary

One of the opportunities which the olive oil sector must take advantage of is its ability to adapt to changes in consumer demand. This demand is calling for increasingly sophisticated products, such as oils with a guarantee of origin, Premium and organic oils, and/or oils with health claims endorsed by European standards. Health claims confer recognition by permitting food products to use information related to the prevention of illness in their labelling and advertising. Using authorised health claims has been identified as an opportunity for the industry.

This project worked to establish procedures for obtaining extra virgin olive oil containing a higher concentration of polyphenols from the Arbequina olive variety. The project worked on the different parts of the olive oil production process: cultivation, milling, storage and conservation. A study of two campaigns in three mills established protocols for increasing the phenol content.

Objectives

The overall objective of the project was to develop techniques and methodologies for companies producing extra virgin olive oil which enable them to increase the level of polyphenols in their oil, and thereby make better use of the "health" vector as an added value in their production of olive oil. The aim was to obtain an oil from the Arbequina olive variety with a higher natural polyphenol content in extra virgin olive oil.

Description of the actions carried out in the project

Action 1: study of the oil extraction process

This activity aimed to determine the concentration of hydroxytyrosol and other compounds in the phenolic fraction of the extra virgin olive oil depending on the technological process involved in the extraction of the oil at two different stages in the campaign.

Action 2: quality of the oils produced with olives at different levels of ripeness and management of the olive grove

This action studied the oils extracted at different times to evaluate the effect of ripeness, and to produce a replica of the experimental part with oils from different sources and olive tree cultivation systems: dry, irrigated, super-intensive and biodynamic cultivation.

Action 3: filtration and conservation

The aim of this experiment was to determine how filtration affects the total phenol levels and the sensory assessment of oils during conservation.

Action 4: irrigation of the olive grove

A dossier was prepared with recommended reading about irrigation of olive groves. As a result of the study, recommendations for irrigation were made to ensure a higher polyphenol content in Arbequina oils in the Garrigues area.

Final results and practical recommendations

It is possible to produce oils from the Arbequina variety that contain enough polyphenols to use the health claim. The extraction, filtration and conservation process must be monitored to that end. In order not to lose any phenols, the decanting process, the temperature to which the paste is subjected, the amount of water that is added to the equipment and how it is regulated must all be monitored. An accessory to distribute the water more evenly during the process was tested, and this had a positive impact on phenol concentration levels.

The oils from biodynamic farming had higher polyphenol levels. The project aims to continue studying this issue to determine whether this trend will be repeated in subsequent campaigns.

Excessively early harvests do not guarantee a high polyphenol content. The time spent beating the paste also had an effect on the loss of phenols, which was more marked in olives that were less ripe. In this study, the highest levels of polyphenol concentration were achieved at intermediate levels of ripeness, and the synthesis of polyphenols at ripeness levels 2-3 was active.

A *screening* variable should be used. The variable of stability against oxidation should be used when selecting oils that can mention the benefits of polyphenols on the packaging. An Arbequina oil from the Lleida region that fulfils the claim must be stable for at least 15 hours at 120°C. After this requirement has been fulfilled, a more complex analysis based on a determination of the hydroxytyrosol and tyrosol secoiridoids can be performed, preferably by means of hydrolysis.

The oils should not be kept unfiltered. The oil conservation study showed that despite their natural development, pre-filtered oils still have more positive attributes and a higher polyphenol content after a few months than oils that have undergone delayed filtration. These results mean that this filtration strategy should be considered.

Nitrogen also had a significant effect. Despite the limitations involved in undertaking the project on a pilot scale, it confirmed the importance of conserving the oils in an inert atmosphere or in a tank that is always full.

Conclusions

The results of the experiments carried out show that it is possible to obtain oils from the Arbequina variety that meet the requirements of the health claim.

The participating companies were able to determine the composition of the phenolic fraction of their oils and the related sensory attributes in more detail, and to adapt their manufacturing process to raise the concentration levels. The oils with the highest concentration of phenols in each mill were oils with a level of ripeness that was not excessively low, and which were filtered immediately after centrifugation and stored in an inert atmosphere.

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- Agricultural production system
- Agricultural equipment and machinery
- Food quality/processing and nutrition

Geographical area(s) of application

PROVINCE(S):

Lleida

REGION(S):

EL SEGRIÀ, LES GARRIGUES, L'URGELL

Dissemination of the project: publications, seminars, multimedia, etc. (state links)

PATT - Seminar 28 October 2021. Technical seminar within the framework of the 7th Oil Fair, Granadella First Press (www.ruralcat.gencat.cat).

More information on the project

| PROJECT DATES | TOTAL BUDGET |
|--------------------------|--------------------------|
| Start date: July 2019 | Total budget: €55,666.96 |
| End date: September 2021 | DARP funding: €22,749.94 |
| Current status: executed | EU funding: €17,162.22 |
| | Own funding: €15,754.80 |

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