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Extra-Virgin Olive Oil: The Importance of Authentication and Quality Control

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Abstract

Olive oil is well recognized by its healthy and balance characteristics. Typical from the Mediterranean countries, its use has spread rapidly around the world due to the high nutritional value and the technological properties useful in the kitchen and food industry. Its economical importance is rising as global olive oil demand generally increases. This communication emphasizes the importance of the certification of virgin olive oils aiming at avoiding it from fakes and assuring the accomplishment and maintenance of high standards of quality. In addition, it is stressed the importance to improve continuously fine analytical methods to detect adulterations, thus contributing primarily to the food safety.

Key words: Olive Oil, Composition, Food Safety, Adulteration, Certification

Olive Oil Composition and Health

Olive oil is an exceptionally versatile food product. Long recognized by Mediterranean populations as essential for health and a key food element in their diet, it is widely appreciated throughout Europe and the rest of the world for its nutritional and organoleptic properties.

Olive oil is a food product obtained from the decanted and purified juice of the olive tree fruit, the olive, and which is part of the traditional Mediterranean diet – now being regarded as a health food promoter. Several studies show that this food product is closely associated with a low incidence of cardiovascular diseases [2,3] and some types of cancer, probably due to its high content of oleic acid (73-80%, w/w) and the antioxidant properties of polyphenols [7,5,6,4] concluded that the total amount of polyphenols in olive oils depends directly on the variety of olive, growth conditions and olive maturation and, consequently, the information on the composition of polyphenols in olive oil can have a useful contribution to the biochemical characterization of the various species, as well as for the control of the production process.

In terms of composition, olive oil is a complex food product, and may only be used in food when its natural characteristics are kept intact. Thus, only with a thorough knowledge of the physicochemical characteristics and physiological behaviour of the raw material and the final product, the production of olive oils of high quality can be achieved. During the production process, degradation reactions may occur, in particular hydrolysis (resulting in an increase in the levels of free fatty acids, with concomitant increase in the acidity of the olive oil), oxidation (giving rise to the development of odours and flavour of rancidity) and fermentation, putrefaction and contamination (causing changes in the organoleptic characteristics of the final product). Water and air are elements that favour the onset of degradation reactions in olive oil. However, since the presence of these elements is inevitable, only the accelerators of any chemical or biological reactions can be subject to the control.

Virgin olive oil and adulteration

Virgin olive oil is defined as the olive oil obtained from olive fruit solely through mechanical or other physical means, particularly thermal conditions, which do not lead to deterioration of the olive oil, and which is not subjected to treatments other than washing, decantation, centrifuging and filtration. Excluded from this definition are oils obtained by solvent or re-esterification and mixtures with food oils of other types. While considered a crime, the adulteration of olive oils can be a strong temptation, since the price of olive oil is much higher than that of other vegetable oils. Although legislation provides several mandatory analyses to detect the adulteration of olive oils, this illicit practice is unfortunately increasingly common – endangering public health. For example, it has been already reported the sale of tampered European oils in the US market as "extra virgin olive oil", which in fact contained more than 90% (v/v) of hazelnut oil. These improper practices are tempting due to both the high price of good quality olive oil and the high demand from the market.

Olive oil quality and Protected Designation of Origin

The quality of olive oil can be represented by the combination of the following factors: the absence of defects, purity (absence of residues), genuineness, chemical equilibrium and organoleptic characteristics. Besides, as for any other food, the quality of olive oil is based on certain explicit requirements – health, taste, and effects upon well-being – and implicit requirements – hygiene, food safety and safety regarding the market and nutritional value [1].

The final characteristics of food products such as olive oil result from the interaction between genetic, technical and procedural, and environmental factors. Typical characteristics of virgin olive oil of a certain geographical area may, therefore, be defined and controlled through a rigorous combination of laboratory and administrative instruments. The geographical boundaries that define the existence of a particular olive oil with unique and distinctive features from the other are created in order to establish homogeneous geographical areas for certain production and/or climate factors. Within these geographical areas, the techniques of production and extraction can be carefully controlled so as to obtain a product with well defined typical characteristics and clearly distinct from other olive oils, so that these characteristics and product quality may remain constant over time. This authentication as well as assurance and maintenance of quality can only be ensured by the certification of food products, which flows naturally through the definition of Protected Designation of Origin (PDO) olive oils – whose sale is governed by tighter controls than the standards used for normal trade.

Certification of a virgin olive oil in a certain geographical region means giving to the producer a reliable certificate to its manufacturing process and to the final product, which also involves the maintenance of high quality standards, only possible after a thorough understanding of the genetic, processing and environmental factors that determine the quality of the product (Figure 1). Thus, the definition of an Appellation d'Origine Protégée (PDO) means to be able to typify a product and know the characteristics that make it different from other (similar) ones (or from other geographical regions).

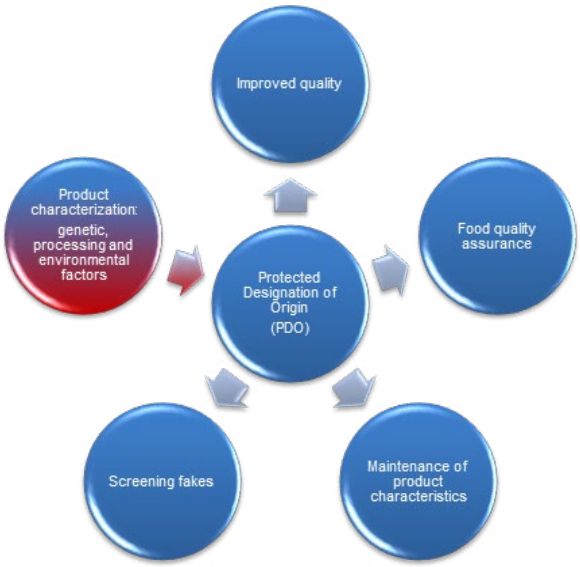

Figure 1. Schematic representation of food certification.

Olive oil and economy

Given the strong positive image of olive-derived products and the increasing consumption of olive oil, the policies for olive oil have to go inevitably through the continuous improvement of product quality – aiming at a general increase in consumer's confidence. It is recognized that the quality of olive oil depends mainly on the combination of environmental factors (climate and soil), genetic (variety of olive trees), agronomic (cultivation techniques) and processing (extent and pattern of mechanical pressing). Thus, it is important to establish awareness efforts among farmers and olive processing enterprises, so as to improve the conditions of cultivation and harvesting, olive processing, storage of the produced olive oil and treatment and disposal of wastes.

Since the global olive oil demand has been increasing gradually and consistently, its importance has growing increasingly to the economy of the producing regions of olive oil and, ultimately, contributing further and positively to the economic activities (measured by the Gross Domestic Product, GDP) and the trade balance of olive oil-exporting countries. Moreover, the olive tree cultivation also contributes positively to the maintenance of rural areas and, therefore, has an inestimable natural and landscape value and a key contribution to the environmental sustainability.

The illegal activity of olive oil adulteration with edible oils of low quality has been increasing all over the world, and, at the same time, detection of some contaminants in the chemical composition of the putative extra virgin olive oil is becoming more and more difficult. Consequently, the development and implementation of new analytical methods to improve the detection of prohibited oils in olive oil is essential to reduce the incidence of tampering and ensure food safety. Moreover, the need for diversification of the market has led to the appearance of new olive oil-based products. It stands out, in particular, the aromatic olive oils, i.e. olive oils added with herbs (e.g. rosemary, thyme, sage, basil, oregano) and even the existence on the market of innovative products such as olive oil with gold leafs. Hence, characterization of the potential interactions between herbs and the actual olive oil during shelf-life is particularly desirable.

Hence, it becomes important to develop and implement techniques aiming at controlling and certifying the quality of the olive oil throughout its entire row of production, aiming at preventing the occurrence of potential adulterations harmful to both food quality and safety of the final product. Furthermore, it is necessary to authenticate the new olive oil-based products in order to keep the high levels of food safety and quality. Therefore, certification of olive oil products is presented as a fundamental tool with the purpose of making it possible to screen potential counterfeits, ensuring food quality and turning this food product of excellence into a more competitive one.

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