



Culinary Concept

# Application of molecular gastronomy principles to the development of a powdered olive oil and market study aiming at its commercialization

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## Abstract

The molecular gastronomy is a science that is increasingly expanding, allowing the transformation of traditional food products into innovative products, thereby raising their sensory characteristics, appreciated by the population. In this way, the present work was developed having in mind the creation of an innovative product, the powdered olive oil. For that, different variations were created: natural, with oregano, with parsley, with garlic, with paprika and with natural red coloring.

The product was then presented to the public, and a market study was conducted to identify if the product would be bought by the potential consumers. The respondents admitted to have intention of buying the product, especially in the flavored form, more than 70% of the inquired, thus allowing to see this as a positive signal for the acceptance of the product by the consumers.

Having in mind that the launching of a new product has some risks, a SWOT analysis was performed and some threats were identified, namely the economic situation and the price.

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## Introduction

### Olive oil

Olive oil is an integral ingredient of the Mediterranean diet. Its consumption dates back to biblical times, and the cultivation of the olive tree as well as the production of olive oil from the mature olives constitute an essential component of farming practices in the Mediterranean basin (Alonso-Salces et al., 2010). Olive cultivation is widespread throughout the

Mediterranean region being important for the rural economy, local heritage as well as for the environment (Haddada et al., 2007; Kandylis et al., 2011).

Virgin olive oil, obtained from the fruit *Olea europaea* L., is the only edible oil produced in large scale world-wide by mechanical or physical methods. Its consumption has been increasing in the past years due to its unique sensory characteristics, besides the nutritional and therapeutic properties reported (Kandylis et al., 2011). In fact, olive oil is a very versatile product, long known to many generations in the Mediterranean areas as essential to the population's health and diet. However, at present its use is no longer limited to the Mediterranean countries, being widely appreciated around the world for its nutritional, health and sensory properties (Haddada et al., 2007). Virgin olive oil possesses singular sensory attributes, being characterized by a unique flavor, which represents one of its most important qualitative aspects, paying a major role in consumer approval (Haddada et al., 2007).

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Olive oil is a product of great importance due to its nutritional value, which has been acknowledged internationally (Christopoulou et al., 2004). Furthermore, olive oil appears to be a functional food with various biocomponents. Among these are monounsaturated fatty acids that may have special health benefits and also phytochemicals (Oi-Kano et al., 2007). Olive oil contains natural antioxidants such as tocopherols, carotenoids, sterols and phenolic compounds that represent 27% of the unsaponifiable fraction (Kachouri and Hamdi, 2004). Evidence showed that olive oil is a source of at least 30 phenolic compounds, which are strong antioxidants and radical scavengers. Recent findings confirm that olive oil phenols are powerful antioxidants, both in vitro and in vivo, besides possessing other potent biological activities that could in part account for the health benefits of the Mediterranean diet (Oi-Kano et al., 2007). In fact, they have been suggested to play a preventive role in the development of cancer and heart disease (Kachouri and Hamdi, 2004). Moreover, apart from the antioxidant activity, phenolic compounds from olive oil have other roles, namely relating to nutritional properties and sensory quality (Kachouri and Hamdi, 2004).

Over the years, the so-called Mediterranean diet has become widely associated with improved health and well-being as well as protection against cardiovascular diseases and colon, breast and skin cancers (Yamada et al., 2008). The Mediterranean diet includes an important consumption of fruits and vegetables complemented with a high intake of olive oil and other olive products. The beneficial effects are attributed to a favorable fatty acid profile and to the presence of some minor components that are also responsible for the unique flavor and taste of olive oil (Yamada et al., 2008). Accumulating evidence suggests that olive oil may have several health benefits that include a reduced risk of coronary heart disease, the prevention of several varieties of cancers and the modification of immune and inflammatory responses (Oi-Kano et al., 2007). Furthermore, olive oil contains compounds with potent antimicrobial activities against bacteria, fungi, and mycoplasma (Yamada et al., 2008). In addition, olive oil has anti-inflammatory activities, having been demonstrated that newly pressed extra-virgin olive oil contains oleocanthal, with similar pharmacological activity as the drug ibuprofen (Yamada et al., 2008).

### *Molecular gastronomy*

In 1969 Professor Nicholas Kurti, Hungarian from origin but Professor of Physics at Oxford University since 1967, gave a talk at the Royal Society titled “The physicist in the kitchen”, amazing the audience by using the recently invented microwave oven to make a “reverse Baked Alaska”, which was cold outside but hot inside (Sanders, 2000). Later, in 1988, began the movement that gave rise to the branch of science called ‘Molecular Gastronomy’, when Nicholas Kurti, and a French chemist, Hervé This, initiated a collaboration with the aim of studying the chemical and physical processes that occurred during the seemingly banal act of cooking. This has shown that many of the phenomena in cooking could be explained

scientifically based on food composition and physical and chemical changes occurring during food preparation. Another of the important names related to molecular gastronomy is undoubtedly Harold McGee, author of books like “On Food and Cooking” dated from 1984 or “The Curious Cook: More Kitchen Science and Lore” from 1990, and co-organizer of the groundbreaking 1992 Erice Workshop on molecular gastronomy.

Molecular gastronomy is distinguished from traditional food science because the object of study is the preparation of food in small scale rather than large scale (industrial). But more than that, the molecular gastronomy treats food as a whole: the ingredients, following preparation and finally how food is appreciated by consumers. It is therefore a highly interdisciplinary subject involving physics, chemistry, biology and biochemistry, but also physiology and psychology.

Molecular gastronomy is a culinary trend created by the cooperation of chefs and scientists and it has been defined as the scientific study of deliciousness. Mistakenly seen as a cooking style, molecular gastronomy is a scientifically oriented approach towards understanding the basic mechanisms occurring during cooking. This has been rising and has received significant publicity and media coverage during the last few years. It is described as the most exciting development within haute cuisine. New products, combinations, creative methods, techniques and tools are used in the process of producing the food (Mielby and Frøst, 2010; Vega and Ubbink, 2008).

Science-based cooking is closely associated with the design of stimulating and novel dishes that provide an explosion of sensations. The evolution and history of gastronomy has been clearly influenced by the social and economic backgrounds. In the past a diet was seen as a means of providing the adequate nutritional components, a concept that has evolved into a desire of maintaining or improving health through food. Likewise, the evolution of gastronomy into haute cuisine has led to the utilization of new ingredients and technologies that could interact with nutrients and alter the contribution of the dishes to the overall diet. The main goal of haute cuisine cooks is to innovate and design delicious dishes with new textures and flavors, which promote new sensations in customers (Navarro et al., 2012).

### **Product development**

#### *Materials*

Virgin olive oil from a commercial brand was used to produce the powdered olive oil. Additives were also used to produce different variations of the product, namely garlic, parsley, oregano, paprika and food coloring (red).

In this work maltodextrin from Hugestone Enterprise Co., Ltd., with  $15 \leq DE \leq 20$  was used to produce the powdered olive oil by forming tiny capsules of oil which, when placed in an aqueous medium, turned back to its original liquid structure. Maltodextrins consist of beta-D-glucose units linked mainly by glycosidic bonds (1–4) and are usually classified according to their dextrose equivalency (DE). The DE of a maltodextrin

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