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DEFINING AROMA AND FLAVORS OF OLIVE OIL

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Abstract

More and more people around the world are using extra virgin olive oil as a cooking oil because of its high nutritional as well as dietetic value, which would be attributed in part to the oil's high smoke point, presence of polyphenol compounds, as well as the optimal lipid profile in regards with saturated fatty acid levels. According to the findings of this research, switching to extra virgin olive oil in place of other fats and oils is beneficial for your health. People may decrease the risk of cancer, stroke, type 2 diabetes and other chronic illnesses by using olive oil in your diet. The health advantages of olive oil are also discussed in this article.

Keywords: Phenolic compound, aroma, saturated, antioxidants

1. Introduction

Since ancient times, spices and fragrant herbs have been used to enhance the taste, fragrance, colour, and shelf life of food and drink. Bioactive and functional substances abound in them, and many of their food-related characteristics may be traced back to them. With their broad range of biological properties including antioxidant, antibacterial, anti-inflammatory, anti-nociceptive as well as acaricidal effects among many others, essential oils have attracted special attention among the active components.

The taste and aroma of a plant are imparted by essential oils, which are a complex combination of volatile organic components. Among “essential oil-bearing plants”, there are about 400 different species

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that are treated for their basic materials, with 75 percent of them (or 300 different species) being prospective essential oil producers.

Aroma, cosmetics, pharmaceuticals, food and feed, and home products sectors all utilise essential oils because of their biological characteristics. Due to their antioxidant properties and ability to prevent lipid peroxidation, essential oils are often used in oil flavoring in the food industry. The popularity of flavored oils is on the rise, and they're being used to season seafood, chicken, and salads thanks to their delectable taste and appealing sensory note. Olive oil seems to be a super food with many health benefits, including anti-inflammatory, antioxidant, cardio-protective, neuro-protective, hepato-protective, lipid-regulating, as well as anti-diabetic characteristics. It is a staple in the Mediterranean diet. This is why olive oil is a valuable edible oil, valued for its distinct taste, distinctive fatty acid composition, and phenolic content, as well as its health advantages. It's all because of olive oil. A broad range of flavored olive oils is sold alongside the many other types of olive oil that are commercially accessible. (Cerretani et al., 2005)

The rising use of olive oil throughout the world is due to the oil's well-known distinctive taste and nutritional benefits. Tocopherols, squalene, and other flavor-enhancing compounds in olive oil contribute to its health benefits, as does oleic acid, which is the primary fatty acid in olive oil. Except for sesame oil, olive oil is unique in that it may be eaten in its raw state, retaining all of its beneficial compounds. There are a number of components in olive oil that combine to give it its distinct taste and fragrance. Minor polar components having an anti-oxidative effect are a subset of these constituents. Various researchers have looked at olive oil's taste components. The goal of this project is to examine olive oil's taste components and variables that influence them. (Kanavouras et al., 2004)

1.1. Olive Oil Composition

- Nutritional components of “olive oil (OO)” are divided into two groups based on their soapability: a large saponifiable fraction and a smaller nonsaponifiable fraction.
- Oleic acid, a “monounsaturated fatty acid (MUFA)”, accounts for 55 to 83 percent of total fatty acids, making it the most important component.
- Olive oil's minor constituents, such as triterpenes, sterols and tocopherols, are found in small amounts in “extra-virgin olive oil (EVOO)”, which accounts for less than 2% of the total weight.
- Pro-oxidative circumstances prevalent in southern European latitudes are combated by these minor constituents.
- EVOO's uniformity, consistency, as well as nutritional value are all influenced by the concentration of these small components.
- Recent scientific interest has been sparked by the presence of phenolic components in OO.
- The most common phenolic compounds are “hydroxytyrosol (3, 4- di-hydroxyphenyletherol) and tyrosol (p-4-hydroxyphenyletherol), as well as their derivatives such as the secoiridoids oleuropein (3, 4-dihydroxyphenyletherol elenolic acid), oleocanthal, and oleacein”.

2. LITERATURE REVIEW

(Dini & Laneri, 2021) Spices, condiments, and extra virgin olive oil (EVOO) have all played significant roles in human history and nutrition throughout history. They're flavour enhancers that are tacked on to meals. Some of them are utilised in traditional medicine and cosmetics as well as culinary flavouring. Using them regularly may help avoid chronic degenerative illnesses like cardiomyopathy and cancer because of their strong anti-inflammatory and antibacterial capabilities as well as antiviral and antibiotic characteristics. Natural goods have a strong customer following, therefore this area of research and development has a long history. In order to choose spices, condiments, & extra virgin olive oil related to the impact proven by scientific works rather than the mere illusion that plant products are suitable only because they are natural and not chemicals, this is critical to inform consumers about the potential benefits of daily consumption of these items. For starters, the researchers define spices, sauces, and extra virgin olive oil. There is also information on how a spicy diet may help to avoid disease, as well as the molecules responsible for their health benefits (phytochemicals) and how cooking changes them.

(Benkhoud et al., 2021) Using six different essential oils, this research explores the impact of EVOO's volatile profile; sensory characteristics, oxidative stability, fatty acid content, and nutritional quality after the oils have been added. In this study, researchers found that its aromatizing essential oils in the flavoured EVOO were mostly made up of “carvacrol, 1,8-cineole, -caryophyllene, trans-anethole, -phellandrene, and limonene”, which are all found in the major components of the aromatizing essential oils. Customers prefer EVOO flavoured with fennel, according to sensory analysis. The oxidative stability of EVOO flavoured with thyme, fennel, and Brazilian pepper tree was shown after a 12-month storage period. Additionally, the amount of each individual fatty acid in the flavoured EVOO remained nearly constant, preserving the EVOO's natural nutritional value. The current findings may pave the way for the creation of flavor-enhanced EVOO that has better oxidative stability while maintaining nutritional quality.

(Ciafardini & Zullo, 2018) This article outlines what is known about the yeasts found in virgin olive oil. Yeasts multiply in the vegetal water in the newly generated olive oil, forming the characteristic micro biota of olive oil. More than a dozen yeast species have been found in various kinds of olive oils and byproducts, with six of them being novel to science. While certain yeast species help to improve the new olive oil's sensory qualities, others are regarded detrimental because they may degrade the oil's quality by producing disagreeable odours and hydrolyzing triacylglycerol. Extra virgin olive oil has been shown to have flaws when it has been treated with certain yeast strains such as “Candida diddensis”, whereas other strains of yeast used in the treatment of olive oil were found to be defect-free after four months in storage and therefore classified as extra virgin. “Brettanomyces acidodurans sp. nov.”, a novel acetic acid-producing yeast species discovered from olive oil, may be to blame for the product's wine-vinegary fault. It's also explained how the yeasts that produce lipase and survive in flavoured olive oils interact with one other.

(Khushbu Vaishnav; et al., 2017) Today's competitive climate necessitates a well-designed industrial architecture that maximizes production while minimizing costs. A lot will rely on the production operations, including the volume and diversity of goods produced, when choosing a plan. Generating a plant layout is difficult, particularly if the layout is process-oriented. A well-organized plant structure is now required to make the most of the organization's fundamental resources. This report compares the layout of the old and new plants in great detail. New techniques and technologies are used in plant layout to improve production, and this report offers useful information about the new layout.

(Dahl et al., 2016) There are many health advantages of using extra virgin olive oil. Higher use of olive oil in the diet is linked to a lower overall mortality risk. The 2015–2020 Dietary Guidelines for Americans recommends 5 tablespoons of oil per day for a 2,000-calorie diet as a general rule of thumb (USDHHS and USDA 2015). This is much less than the Mediterranean diets recommended daily intake of up to 4 tablespoons (12 teaspoons) of extra virgin olive oil.

(Caporaso, 2016) Many people across the globe are interested in olive oil because of its distinctive fatty acid composition, phenolic compounds that have health benefits for humans, and a well-liked fragrance. This is important to note that the VOO's composition may shift significantly based on factors such as olive type, field management, and maturity of the olive fruit, harvesting, as well as production, all of which can influence the final flavour. When extracting phenolic and volatile chemicals in the industrial setting, extraction circumstances may have an impact on their concentration and composition, which can lead to undesirable effects such off-flavor development. VOO's flavour may be affected by a number of processes, including crushing, malaxation, centrifugation, filtering, and storing. With an emphasis on fragrance components, biophenols, and the resultant sensory profile, this review article explores the variables that influence virgin olive oil composition. We focused on volatile and phenolic chemicals, and how they affect and are described by our taste buds. Finally, further research is needed to completely grasp this product's complicated composition and interactions. Researchers and industry alike may benefit from this information since it allows manufacturers to alter the final VOO's features.

(Escuderos, 2011) Quality and authenticity were both checked using the virgin olive oil's fragrance assessment. Volatile components of olive oil taste have been identified and quantified using several analytical techniques. Gas chromatography is the most widely used of these techniques. This research does a thorough and comprehensive assessment of all published studies on olive oil aroma analysis that have used gas chromatography technology since the 1980s. Techniques for extracting and concentrating olive oil volatile components, as well as separation & identification procedures, have received particular attention.

(Manai et al., 2008) Using a headspace solid-phase micro extraction technique linked to GC–MS and GC–FID, the volatile content of virgin olive oil (VOO) from six Tunisian novel cultivars was analysed. Aldehydes, alcohols, esters, ketones, terpenes, & carboxylic acids were discovered, among other chemical classes. C6 aldehydes were shown to be the most significant contributors to the olive oil's fragrance. The lipoxygenase pathway converts polyunsaturated fatty acids to these molecules in the body. They also noted that linolenic acid oxidation predominates over linoleic acid oxidation. Many C6 derivatives, such as (E)-hex-2-enal, (E) hex-2-enol, and (E) hex-2-enol, were found in the oil samples.

The fragrance of the investigated VOOs includes acceptable quantities of different C5 component classes in addition to C6 chemicals. Different volatile profiles were found in the oil samples that were analysed. Components that appear only in certain oil samples may be utilised to demonstrate compositional distinctions in the beginning. All of the findings show that the amount of olive oil fragrance component varies depending on the cultivar.

3. HEALTH BENEFITS OF OLIVE OIL

3.1. Cardiovascular Disease (CDV)

Higher consumption of fruits, vegetables and legumes provides substantial health advantages and protection against cardiovascular disease, but olive oil is also beneficial. The FDA granted olive oil a qualified health claim in 2004 after reviewing the evidence. The "Qualified Health Claim Statement" reads: "Limited and not conclusive scientific evidence suggests that eating about 2 tablespoons (23 grams) of olive oil daily may reduce the risk of coronary heart disease due to the monounsaturated fat in olive oil. To achieve this possible benefit, olive oil is to replace a similar amount of saturated fat and not increase the total number of calories you eat in a day".

Health claims about the beneficial effects of extra virgin olive oil can only be made for a limited number of specific meals. Some examples are olive oil-based products, salad dressings contains approximately 6 grams of olive oil but no more than 4 grams of saturated fat for each serving, margarines contains approximately 6 grams of olive oil but no more than 10 grams of cholesterol, & foods like sauces and baked goods that contain olive oil. (Ciafardini & Zullo, 2018)

Olive oil might have had a function in hypertension prevention and therapy (high blood pressure). Men with coronary heart disease were given three tablespoons each of virgin as well as refined olive oil to see which was better. Phenolic components in virgin olive oil have antioxidant effects and lower blood pressure in these individuals, research shows.

3.2. Diabetes and Metabolic Syndrome

Type-2 diabetes may be prevented by consuming olive oil (T2D). Adults with a high risk of cardiovascular disease were given extra-virgin olive oil, which decreased their risk of T2D by 40% in only four years. Researchers in Spain found that those who drank olive oil instead of sunflower oil were less likely to have problems with poor glucose control, which may lead to type 2 diabetes. (Khushbu Vaishnav; et al., 2017)

3.3. Cancer Prevention

Some scientific data suggests that consuming olive oil may help prevent cancer. People who consume the most olive oil have a lower chance of developing any form of cancer than those who consume the

least. In addition to decreasing the risk of colon cancer, olive oil consumption has been linked to a decreased risk of breast cancer and malignancies of the digestive system, including oral, pharyngeal, and esophageal (throat) cancers. Olive oil use does not seem to be associated with an increased risk of prostate, lung, or ovarian cancer, but it may reduce the risk of laryngeal, and stomach cancer.

4. FACTORS AFFECTING THE FORMATION OF FLAVOUR COMPONENTS

There are many factors that affect the appearance of flavour components in olive oil, among them:

- Distinct cultivars may yield oils with different flavour components and sensory qualities under identical environmental and agricultural circumstances.
- The three cultivars had significant similarities in terms of variability and phenolic component concentrations.
- It was found that the distributions of esters, alcohols, and aldehydes varied similarly among the three cultivars throughout the maturation period
- Climate, cultivation techniques, fruit ripeness, storage conditions, and production procedures all have an impact on the synthesis and inclusion of flavour (volatile and phenolic) components in olive oil.
- Because of this, olive oil's flavour and consistency may vary widely.
- Virgin olive oil's flavour is a source of concern for both producers and consumers today.
- There hasn't been enough study done on these aspects yet.
- It's unclear how much the cultivar, environment, or other factors affect olive oil's flavour and aroma.
- Variety of chemical profiles in olive oil according to cultivars, orchard pedoclimatic conditions, agricultural practises, maturity of olives, and methods of olive oil extraction. (Caporaso, 2016)

5. CONCLUSION

When it comes to health benefits and distinctive sensory notes, olive oil stands out from other vegetable oils due to its distinct features, such as its unique fragrance and taste.

There should be a better understanding of the agronomic and technological factors that influence the presence and amount of beneficial aroma compounds, as well as the generation of volatile compounds associated with off-flavors, in order to produce Olive Oil with enhanced sensory and nutritional properties. There are a number of variables that may affect the final taste and content of the product. This included the harvest, smashing, malaxation, centrifugation, filtering, as well as storage conditions. All of these important factors have been thoroughly examined in this article in order to get a comprehensive

understanding of the complexities of this product, with a focus on the volatile chemicals associated with the fragrance of Olive Oil.

In order to produce consistently high-quality olive oil, it is necessary to grow olives with exceptional characteristics and to make sure that these good traits are transmitted to the oil itself. To improve the quality of olive oils, it's essential to know how volatile chemicals are produced.

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