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Determination of Fatty Acid Composition and Olive Oil Quality Parameters of the Gemlik Olive Variety Grown in Adiyaman

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Abstract. Adıyaman province has a climate and soil structure that is extremely favorable for olive cultivation due to its ecological characteristics. The climate of Adıyaman Province is generally characterized by dry and hot summers and mild and rainy winters in the south, and dry and cool summers and rainy and cold winters in the north. For this reason, Adıyaman Province serves as a bridge between the Eastern Anatolia and Mediterranean regions. The average annual rainfall is around 715.1 mm. According to 2024 TÜİK data, the area planted with table olive varieties in Adıyaman is 11,186 decares, while the area planted with oil olive varieties is 31,269 decares. The annual production of table olives in the province is 2,237 tons, while the production of oil olives is 5,101 tons. Adıyaman produces approximately 5% of Türkiye's table olive production and approximately 20% of Türkiye's oil olive production. The dominant olive variety grown for oil in Adıyaman is Gemlik. Olive oils produced in Adıyaman are distinguished from other olive oils by their unique aroma, color, and chemical properties. For this reason, the olive oils produced in the province are candidates for geographical indication as “Adıyaman Olive Oil.” In this study, the sensory characteristics, fatty acid composition, and other quality parameters of oils obtained from the Gemlik olive variety grown in Adıyaman province were examined. It was determined that Adıyaman olive oil had a fruitiness score of 4.4±0.2, a bitterness score of 2.6±0.1, and a pungency score of 3.8±0.1, and that there were no sensory characteristics indicating low quality or deterioration in the oil. Additionally, the free fatty acid content of the examined olive oils was found to be 0.49±0.01%, the refractive index was 1.4683, peroxide content of 8.8±0.3 meq/kg, and UV-specific absorbance of K232=1.952, K270=0.1615, and ΔK=0.003. On the other hand, a total of 11 different fatty acids, including oleic acid, palmitic acid, and linoleic acid, were detected in the olive oils. In the olive oils examined, the oleic acid content was found to be 73.81 ± 0.19%, the palmitic acid content was 13.32 ± 0.52%, and the linoleic acid content was 6.41 ± 0.85%.

Keywords: Adıyaman, olive oil, sensory analysis, fatty acid composition, oleic acid

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1 Introduction

The olive is an important plant species, valued both for the oil obtained from its fruits and for the direct consumption of the fruits themselves, and is regarded as a source of healing with positive contributions to human health. In particular, due to its content of health-promoting phytochemicals, the global demand for olives and olive products has been steadily increasing. Worldwide, olives are predominantly cultivated in regions characterized by a Mediterranean climate or in countries along the Mediterranean coast. Owing to its climate and soil structure, Türkiye is one of the countries with ecological superiority and advantage in olive cultivation. Accordingly, Türkiye is recognized as one of the major producers of olives and olive oil worldwide. Based on FAO statistics, the country's total olive production amounted to 1,520,000 tons in 2023 (FAO, 2025). Of this total, 68% was comprised of olives designated for oil production (TUIK, 2024). In 2023, olive production across Türkiye decreased by 51% compared to the previous year. In contrast, table olive exports increased by 14.7% in the same year. The main export destinations were Iraq, Romania, and Germany. On the other hand, 98% of Türkiye's table olive imports originated from Syria. In terms of yield, the average yield per tree was 18 kg in 2022, but this value reduced to 9 kg in 2023. Table olive production is most concentrated in the Aegean Region. Between 2019 and 2023, olive oil production, yield levels, and changes in foreign trade volume in Türkiye were analyzed using graphical data. In 2019, the area cultivated for table olives was 6,450 thousand decares, and by 2024 it had reached 6,698,906 thousand decares. This increase indicates the continued interest in olive cultivation in Türkiye. However, total olive production has shown a fluctuating trend over the years. In table olive production, Türkiye is followed by Spain and Egypt. On a global scale, table olive production has generally remained stable compared to the previous year (Ministry of Agriculture and Forestry, 2024). Türkiye's olive oil imports rose from 26 thousand tons in 2019 to 63 thousand tons in 2023. Nevertheless, the most noteworthy development has occurred in the export sector. In 2023, olive oil exports reached 182 thousand tons, representing nearly a threefold increase compared to previous years (Figure 1). This trend underscores Türkiye's enhanced competitiveness in international markets and reflects the strategic orientation of production surpluses toward foreign markets (Özözen, 2024; FAO, 2025; TÜİK, 2024).

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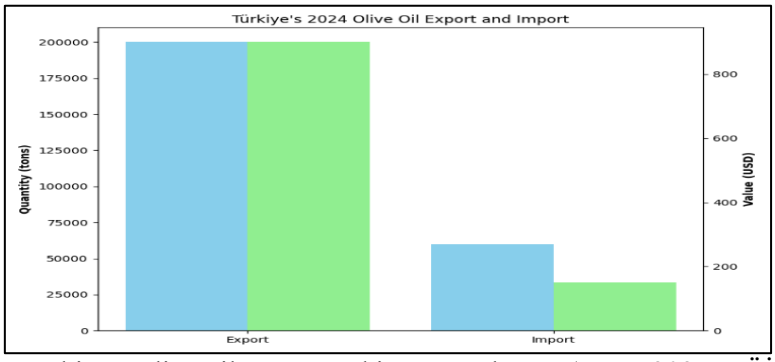

Figure 1. Türkiye's olive oil export and import volumes (FAO, 2025; TÜİK, 2024)

Considering the export markets, policies, and global trends of 2023, it is evident that Türkiye's olive oil sector demonstrated remarkable progress in terms of both production and exports. Due to high yields, a contraction in global supply, and increasing foreign demand, Türkiye has emerged as one of the leading countries in the global olive oil market. In this context, Türkiye's olive oil exports in 2023 amounted to approximately 182 thousand tons. As shown in Figure 2, this amount represents a significant increase compared to previous years. The main reasons behind this rise are estimated to be the 80% increase in olive oil production during the 2022–2023 season, reaching 422 thousand tons, and the global decline in production. In particular, drought and yield losses in traditional producer countries such as Spain and Italy positioned Türkiye as an alternative supplier. In terms of major export markets, Spain accounted for the largest share of Türkiye's olive oil exports with 48.9%, followed by the United States with 13.3%, Italy with 7.4%, Saudi Arabia with 3.9%, and Japan with 2.9%. The remaining 23.6% of exports were directed to other countries (Figure 2). This distribution demonstrates that Türkiye has become a strong player not only in European markets but also in American and Asian markets.

ISSN: 3062-3235
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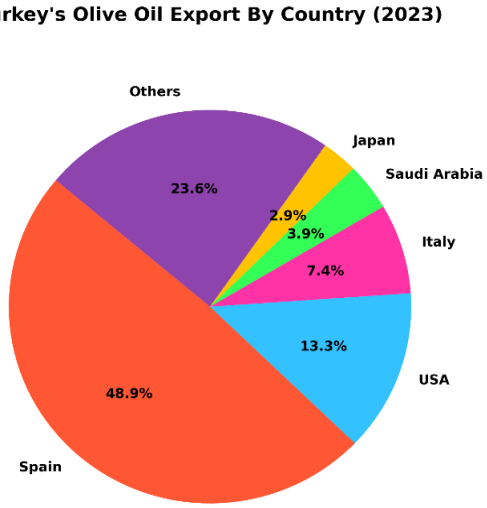

Figure 2. Distribution of Türkiye's olive oil exports by countries in 2023 (FAO, 2025; TÜİK, 2024)

Spain's rationale for purchasing olive oil in bulk from Türkiye can be explained by its re-export strategy, as well as its use of these products in its domestic market. Exports to distant markets like the US and Japan are the most significant indicator of the growing recognition of Turkish olive oil in the global market. A temporary restriction was imposed on bulk and barreled olive oil exports in 2023 to control price increases in the domestic market. It was determined that a three-month restriction was implemented in August of that year, during which time exports of packaged products were prioritized.

Following these restrictions, exports were reopened; however, it was noted that a more controlled export policy was adopted with consideration for domestic market balance. Meanwhile, in 2023, various supports and incentives were provided to olive oil producers by the Ministry of Agriculture and Forestry. These incentives and supports ensured the sustainability of production and played a significant role in increasing export capacity. Nevertheless, global trends and Türkiye's position indicate that world olive oil production decreased by 12.5% in the 2022/23 season. However, global trends and Türkiye's position led to a 12.5% decline in world olive oil production in the 2022/23 season. This reduction caused a sharp increase in global prices, with olive oil prices rising by 102% in Türkiye, 84% in Spain, and 58% in Italy. Owing to increased production, global supply shortages, and strategic market diversification, Türkiye is expected to strengthen its position in the global olive oil trade. In the coming years, through branding, packaging, and quality-oriented production strategies, Türkiye is anticipated to make its competitive position in olive oil production more sustainable (Ministry of Agriculture and Forestry,

ISSN: 3062-3235
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2024; Özözen, 2024; FAO, 2025; TÜİK, 2024). The Southern Aegean Region (especially Aydın, Muğla, and İzmir) stands out as the region with the highest potential for olive oil production in Türkiye by 2025 (Figure 3). This region leads Türkiye in terms of both production volume and quality. In Türkiye, regions such as the Southern Aegean Region (Muğla, Aydın, İzmir), the Marmara Region (Balıkesir, Bursa), the Gulf Region (Çanakkale, Edremit), the Gediz Region (around Manisa), and the Coastal and Eastern Mediterranean Region (Antalya, Mersin, Hatay) are highly suitable for olive cultivation in terms of their climate, soil structure, and traditional production culture. By 2025, the Southern Aegean Region (especially Aydın, Muğla, and İzmir) stands out as the region with the highest potential for olive oil production in Türkiye. This region leads Türkiye in both production volume and quality. While the Aegean and Marmara regions lead the way in this area, olive and olive oil production has also gained significant momentum in Southeastern Anatolia in recent years. This has been achieved thanks to both the emergence of new production areas due to climate change and regional development policies. Furthermore, Southeastern Anatolia's climate, particularly its location within the Mediterranean climate transition zone, allows for the cultivation of many fruit species, including olives, in addition to citrus fruits.

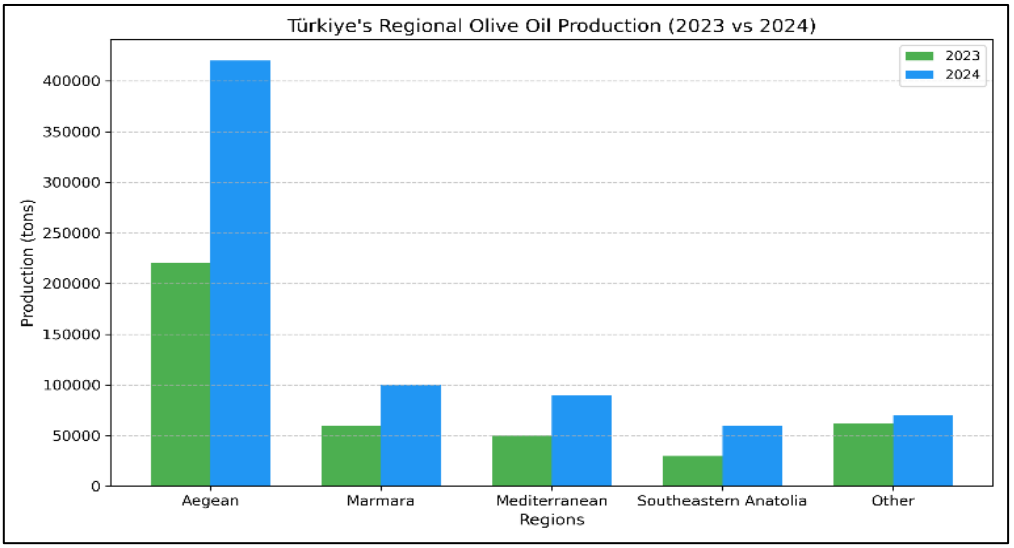

Figure 3. Olive oil production by region in Türkiye (TÜİK, 2024, Ministry of Agriculture and Forestry Reports, 2024)

Olive oil varieties commonly grown in Türkiye are preferred for their high yields and quality in olive oil production. The Ayvalık (Edremit) variety is Türkiye's most well-known olive oil variety. Other prominent olive oil varieties include Memecik, Gemlik, Erkence, and Uslu. Furthermore, the olive varieties most suited to the climate conditions of Southeastern Anatolia are those originating in this

region, such as Halhalı (Derik Halhalı), Nizip Yağlık, and Kilis Yağlık (Sakar and Ünver, 2011). Some producers in the region with irrigation facilities and land suitable for mechanized harvesting have also begun to prefer Arbequina, an oil olive variety originating in Spain. The Arbequina olive variety is an oil olive variety whose planting area has rapidly increased worldwide in recent years. This variety is particularly notable for its suitability for super-dense planting systems and its early yield (Atmaca and Ülger, 2017). However, its most significant disadvantage is that, due to its shallow root system, it is not as drought-resistant as native varieties (Gemlik, Halhalı, Nizip Yağlık, and Kilis Yağlık, etc.) (Ay, 2018; Özkul, 2018; Mete et al., 2019; Şahin and Şeker, 2022). Orchards established in the region must be irrigated. Due to the topographic structure of olive growing areas in Adıyaman province and the limited irrigation opportunities, Gemlik is the preferred olive variety for oil production throughout the province. Among the provinces leading olive oil production in Türkiye are Aydın, Muğla, İzmir, Balıkesir, and Manisa (Figure 4). In the Southeastern Anatolia Region, the province of Adıyaman has recently shown an increasing trend in olive and olive oil production. According to TÜİK (2024), olive cultivation in Adıyaman covers a total area of 42,455 decares. In terms of cultivated area, Besni district ranks first with 13,950 decares, followed by Kâhta district with 12,520 decares and the Central district with 10,750 decares. The olive cultivation areas in other districts of Adıyaman range between 460 and 1,780 decares. In Adıyaman, olive production decreased from 5,750 tons in 2022 to 4,102 tons in 2023, representing a 29% decline, and then increased to 7,338 tons in 2024, marking a 179% rise. This increase can be attributed both to the annual expansion of areas cultivated with oil olive varieties in the province and to yield fluctuations caused by alternate bearing, which has not been fully mitigated in olive cultivation. Olive oil holds significant economic and cultural importance in Türkiye's agricultural production. According to TÜİK (2024), olive oil production reached approximately 1,040,000 tons, reflecting a remarkable 146.7% increase in line with the growth in olive production.

ISSN: 3062-3235
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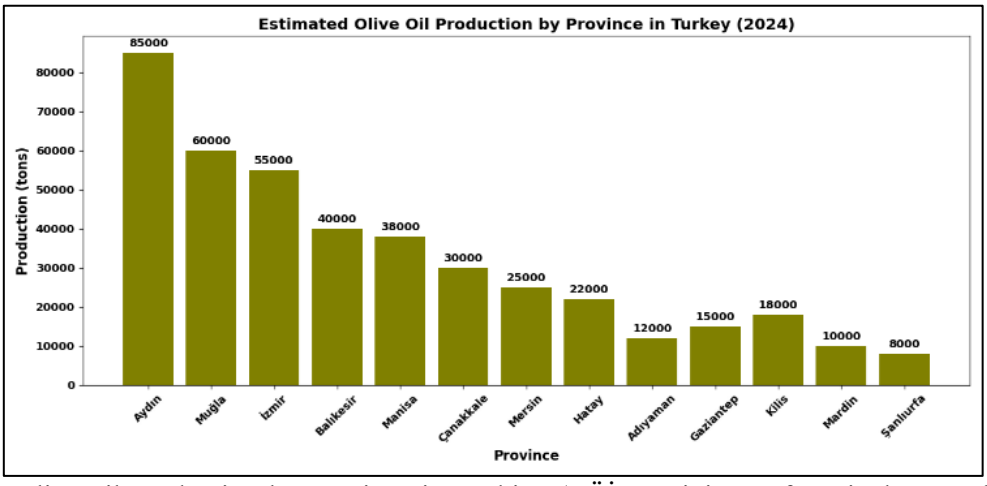

Figure 4. Olive oil production by province in Türkiye (TÜİK, Ministry of Agriculture and Forestry Reports, 2024)

Different analytical methods are employed to determine the quality parameters of olive oil. One such method, sensory analysis, is a scientific approach used to perceive, measure, monitor, and interpret the characteristics of foods as detected through auditory, tactile, olfactory, and visual senses. In chemical analysis methods, the chemical composition of olive oil is examined to obtain information about its quality and purity. The most assessed criteria in these analyses are free fatty acid content, peroxide value, and total phenolic compounds (Özkaya et al., 2010). On the other hand, the fatty acid composition of olive oil is also considered among the evaluated parameters, as it provides significant indicators regarding both the quality of the oil and its storage conditions. From a sensory perspective, extra natural olive oil exhibits a distinctive characteristic profile, attributable to the presence of more than one hundred flavor and aroma compounds. This profile is influenced by numerous factors, including the olive cultivar, ecological conditions, geographical origin, tree nutritional status, seasonal variations, processing techniques, fruit maturity stage, harvest time, storage conditions, and several other determinants. In Adıyaman, a Southeastern Anatolian province, olive groves are rapidly expanding, particularly in the Kahta and Besni districts. Production has increased by 2024, and boutique olive oil production has begun through local cooperatives. However, the lack of modern pressing facilities and limited marketing channels make commercialization of this production difficult. The Nizip district of Gaziantep is known throughout Türkiye for its geographically indicated "Nizip Olive Oil." In the province, olive oil production increased in 2024, serving both domestic consumption and export markets. Although olive oil factories in Nizip contribute to the regional economy, producers are still not sufficiently competitive in the export of packaged and branded products. Kilis Province is distinguished

by the “Kilis Oil Olive” cultivar, which is notable for its high oil content and aromatic profile. Olive production in Kilis also increased in 2024. However, cultivation in the province is predominantly carried out by small family farms and cooperatives. Although the quality is high, branding and access to international markets remain limited. In Mardin, olive production increased significantly in 2024, largely associated with the expansion of olive groves in the Derik district. Olive and olive oil production in the province is primarily directed toward domestic consumption. If modern agricultural techniques are more widely adopted, the region has the potential to become a significant production center. In Şanlıurfa, olive production has increased in recent years; however, the production volume still falls considerably short of its potential. Olive cultivation areas have been expanding in nearly all districts, particularly in Birecik, Bozova, Hilvan, and Halfeti. On the other hand, insufficient irrigation infrastructure and limited producer knowledge remain among the key challenges facing olive cultivation in the province. The sectoral problems of olive cultivation in Southeastern Anatolia can be summarized as follows. The inadequacy of modern pressing and storage facilities reduces the quality and yield of olive oil. The increasing effects of arid climate conditions and the lack of irrigation infrastructure limit olive tree yields. Most of the product is sold in bulk, with almost no packaged or branded products. Producers lack knowledge of modern agricultural techniques, quality control, and organic production. Cooperatives are not sufficiently institutionalized and have limited financial and managerial capacity. To solve these problems, it is necessary to establish at least one modern pressing and storage facility in each province, develop special irrigation projects for olive groves, organize quality, hygiene, organic production and marketing training for producers, provide financial support to cooperatives and increase their managerial capacity, increase the promotion of geographically indicated products, create regional brands, and carry out R&D projects in collaboration with local universities. The Southeastern Anatolia Region has the potential to become one of Türkiye's emerging regions for olive oil production. The provinces of Adıyaman, Gaziantep, Kilis, Mardin, and Şanlıurfa are both climatic and culturally suitable for this type of production. However, transforming this potential into sustainable success requires strategic investments in infrastructure, education, marketing, and institutionalization (Korkmaz and Ak, 2018; Sakar, 2018; Süygün and Can, 2025). Adıyaman is a province that aims to make progress in olive cultivation. It aims to leverage its potential and geographical advantages in marketing olive oil produced by processing olives grown in the province. Indeed, the olive oils produced in Adıyaman possess qualities that will attract both regional and national demand. In this respect, it is a candidate for a geographical indication. This study, conducted to determine the quality characteristics of Adıyaman

olive oil, explored the sensory and chemical properties of olive oils obtained from the Gemlik olive variety grown in Adıyaman province.

2 Material and Method

This study used olive oil samples obtained through cold pressing from the Gemlik olive variety, a widely cultivated olive oil variety used in the production of table olives and olive oil in Adıyaman province. Two 1-liter olive oil samples were collected from three different olive oil processing plants in the province, each stored in lacquered cans. One liter of each olive oil sample was transported to the Adıyaman University Central Laboratory for chemical analysis. The remaining one liter was sent to the İzmir Olive Research Institute for sensory analysis.

2.1 Sensorial Analysis

The olive oil samples for sensory evaluation were presented to the panelists in appropriate standard tasting glasses. Approximately 12.8–14.6 g (14–16 ml) of olive oil samples were placed in the tasting glass, covered with a watch glass, and allowed to stand. The olive oil samples were then placed on a heater set at 28ºC ± 2ºC and heated. Because morning hours are the best time to taste olive oil, tasting sessions took place between 10:00 and 12:00 in the morning. The tasting laboratory was air-conditioned to maintain a constant temperature and good hygrometric conditions. Before the tasting analysis, the room temperature was set at a constant 20–25ºC. Tasting analyses were conducted with a minimum of eight tasters, and the results were then statistically evaluated and tabulated by the panel leader (Arucu, 2013).

2.2 Chemical Analysis

For the determination of free fatty acids in the olive oils studied, 5 g oil samples were taken and dissolved by adding 50 ml of a 1:1 ethyl alcohol-diethyl ether mixture. A few drops of phenolphthalein were added to the prepared samples and titrated with a 0.1 N ethyl alcohol-potassium hydroxide (KOH) solution until a permanent pink color was obtained. The results were expressed as oleic acid (%). (AOCS, 2017).

For peroxide determination, 10 ml of chloroform was added to 2 g of oil sample, mixed thoroughly, and the oil sample was dissolved. 15 ml of glacial acetic acid (CH_3COOH) and 1 ml of saturated potassium iodide (KI) solution were added sequentially. The samples were homogenized for 1 min and then kept

in the dark for 5 min. 75 ml of distilled water was added to the samples, followed by a few drops of 1% starch solution, and a titration was performed with 0.01 N sodium thiosulfate ($Na_2S_2O_3$) solution. The analysis results were expressed as milliequivalents/gram (meq) of active oxygen per kg of oil (AOCS, 2017). The refractive indices of the olive oil samples were determined according to Nas et al. (2001), and the results are presented for 20 °C.

The specific absorbances of the olive oils examined within the scope of the study were measured at 232 nm and 270 nm wavelengths with a spectrophotometer (Shimadzu UV-1205) and were obtained by calculating the absorbance at a concentration of 1 g/100 ml (IOOC, 2001). ΔK values were then calculated (Çelik et al., 2021).

2.3 Determination of Fatty Acid Composition

For the determination of fatty acid composition of the oliveoils, fatty acid methyl esters were prepared (Bligh et al., 1959). Briefly, 0.1 g of oliveoil was mixed with 10 mL of n-hexan and 0.5 mL KOH (0.2 N, in methanol). Then, the ensemble was centrifugated at 500 rpm for 10 min and hold at least two hours in dark place. Then, the clear upper phase was passed through the 0.45 µm PTFE filter and transferred to the vials (Tanacı, 2015). A GC-2010 Plus gas chromatograph (Shimadzu Corporation, Kyoto, Japan) equipped with flame ionization detector (FID) and a TR-CN100 (Teknokroma, Barcelona, Spain) capillary column (100 m x 0.25 mm x 0.20 µm) was used for analyses. Hydrogen was used as the carrier gas and the flow rate was controlled at 30 ml min^{-1} . The detector temperature was kept at 260 °C and the injection amount of the sample was 2.0 µL. The initial temperature procedure was 140 °C (6 min), then raised to 200 °C at 3 °C per min, and reached at 240 °C for 20 min. The peaks were identified with Supelco 37 component FAME mix (Sigma–Aldrich). The results were expressed as percentage (Bligh et al., 1959; Tanacı, 2015).

3 Results and Discussion

The results of the sensory and chemical analyses obtained from the examined olive oil samples are presented in Table 1. According to the findings, the unique characteristics of the olive oil obtained from the Gemlik olive variety grown in Adıyaman are noteworthy. Generally, the fatty acid composition of olive oil is most affected by environmental conditions. Due to this ecological advantage of Adıyaman province, Adıyaman olive oil is particularly characterized by its low free fatty acidity, balanced aroma,

desirable sensory properties, and bright color. In sensory tests, Adıyaman olive oil was scored as 4.4±0.2 for fruitiness (green), 2.6±0.1 for bitterness, and 3.8±0.1 for pungency. Furthermore, considering the scores of other sensory quality parameters examined (heat, moldiness, vinegaryness, etc.), it is understood that the handling and storage conditions of the olives before production, the pressing conditions, and the storage and storage conditions after production were all adequate.

Studies have shown that aromas do not influence the fruitiness of olive oils, while biophenols influence bitterness and pungency. The Memecik variety has a higher pungency value, while the Gemlik variety has lower bitterness and pungency than other varieties. Furthermore, it has been reported that malaxation temperature is insignificant on phenol content in Gemlik olive oils at different temperatures and holding times. However, it was found that malaxation temperature was significant at 30 minutes, and malaxation temperature was not significant on fruitiness. However, a 60-minute holding time was significant, and neither temperature nor duration of malaxation were significant on bitterness.

Table 1. Some Sensory Properties of Adıyaman Olive Oil

Sensory Properties	
Fruitiness	4.4±0.2 - Green
Bitterness	2.6±0.1
Pungency-Burning Sensation	3.8±0.1
Fusty-Muddy Sediment	0
Musty-Humid-Earthy	0
Winey-Vinegary-Acid-Sour	0
Wet Wood	0
Rancid-Stale	0
Other	0

It has been determined that both the temperature and the duration of malaxation are not significant for the pungency value in sensory analysis (Nebioğlu, 2020). The quality of olive oil is significantly influenced by geographical factors such as proximity to the sea or inland areas, topography, latitude, longitude, and climatic conditions including precipitation and winds. Therefore, differences in olive oil quality are observed among regions. In Türkiye, olive varieties grown in the Southeastern Anatolia region have a high oil content in the fruit. This increases both the quality and the commercial value of the olive oil produced in the region. Climatic factors have a strong impact on the ripening time of olives and the chemical composition of the oil in the fruit. Consequently, they considerably affect the natural antioxidants, phenols, tocopherols, and the oxidative stability of the oil (Özdoğan and Tunalıoğlu, 2017). In olive oil samples obtained from the Gemlik variety, no defects such as fusty/muddy sediment,

musty/humid, winey-vinegary, metallic, or rancid were perceived by the panelists. In the study, the fruitiness value of Gemlik olive oil samples was determined by the panelists to range between 2.90 and 4.02. According to these values, it was concluded that the oil obtained from the Gemlik variety is classified as extra natural olive oil based on the criteria of the Turkish Food Codex (Zeytin et al., 2008). Considering all studies, when compared with the sensory analysis results of Adıyaman olive oil, it is evident that Adıyaman olive oil possesses superior qualities according to the Turkish Food Codex criteria. Furthermore, the chemical properties of Adıyaman olive oil were also found to meet the standards required for extra natural olive oils. Indeed, the average values obtained from the analyzed oils were as follows: free fatty acidity 0.49 ± 0.01%, refractive index 1.4683, peroxide content 8.8 ± 0.3 meq/kg, specific UV absorbance K232 = 1.952, K270 = 0.1615, and ΔK = 0.003 (Table 2).

Table 2. Some Chemical Properties of Adıyaman Olive Oil

Chemical Properties	
Free Fatty Acid (%)	0.49±0.01
Refractive Index	1.4683
Peroxide Value (meq/kg)	8.8±0.3
Specific Absorbance in UV	K232=1.952
	K270=0.1615
	ΔK=0.003

Table 3 presents the fatty acid composition of Adıyaman olive oil. Accordingly, 11 different fatty acids were identified in the olive oils. Previous studies by various researchers have determined that olive oils may contain more than 60 fatty acids. However, our study examined only 37 fatty acids, and 11 of these were identified in the olive oils. The fatty acids we identified in the olive oils are as follows: Palmitic acid (C16:0), Palmitoleic acid (C16:1), Heptadecanoic acid (C17:0), Stearic acid (C18:0), Oleic acid (C18:1n9c), Linoleic acid (C18:2n6c), Arachidic acid (C20:0), Eicosenoic acid (C20:1n9), Gamma-linolenic acid (C18:3n3), Behenic acid (C22:0) and Lignoceric acid (C24:0).

Among the fatty acids detected in olive oils, the most abundant fatty acid was oleic acid with a percentage of 73.81 ± 0.19%. This was followed by palmitic acid (13.32 ± 0.52%), linoleic acid (6.41 ± 0.85%), stearic acid (3.30 ± 0.05%), and palmitoleic acid (1.40 ± 0.28%). On the other hand, the percentages of other fatty acids detected in the oils were quite low. Indeed, arachidonic acid was determined as 0.46 ± 0.01%, eicosenoic acid as 0.26 ± 0.03%, gamma-linolenic acid as 0.69 ± 0.02%, behenic acid as 0.12 ± 0.00%, and lignoceric acid as 0.09 ± 0.01%.

Table 3. Fatty Acid Composition of Adıyaman Olive Oil

Fatty Acids	Content in Oil (%)
Palmitic acid (C16:0)	13.32 ± 0.52
Palmitoleic acid (C16:1)	1.40 ± 0.28
Heptadecanoic acid (C17:0)	0.15 ± 0.03
Stearic acid (C18:0)	3.30 ± 0.05
Oleic acid (C18:1n9c)	73.81 ± 0.19
Linoleic acid (C18:2n6c)	6.41 ± 0.85
Arachidic acid (C20:0)	0.46 ± 0.01
Eicosenoic acid (C20:1n9)	0.26 ± 0.03
Gamma-linolenic acid (C18:3n3)	0.69 ± 0.02
Behenic acid (C22:0)	0.12 ± 0.00
Lignoceric acid (C24:0)	0.09 ± 0.01

Studies have shown that the most important characteristic used in characterizing olive oils is their fatty acid composition, and that olive oils are characterized by their high oleic acid content (Erinç and Kıralan, 2008). A study on the fatty acid composition of the Gemlik olive variety found that the oleic acid content in their fatty acid composition ranged from 62.12% to 63.89%. It was also reported that this fatty acid was followed by palmitic acid (14.51-14.83%), linoleic acid (11.46-12.56%), stearic acid (3.78-4.65%), and linolenic acid (0.11-0.15%). In a study titled "Obtainment of New Olive Varieties by Hybridization" at the Atatürk Horticulture Central Research Institute, the composition of fatty acids in the oils of GE122, GE123 and GE124 types obtained by hybridizing Gemlik and Edincik Su varieties was investigated. Of these olive types that can be registered for oil production, it has been reported that there is no difference in linoleic acid content between GE123 and GE124, but the linoleic acid content of GE122 differs from that of other candidate varieties. On the other hand, when the candidate varieties were compared according to maturity index, it was determined that the oleic acid content ranged from 74.63% to 77.57% at the 3rd maturity index, while the oleic acid content ranged from 71.20% to 73.34% at the 5th maturity index (Özdemir et al., 2016; Didin et al., 2021). In another study conducted on the determination of the quality characteristics and aroma composition fatty acid composition of Gemlik olive variety fruit grown in Adana, which can be processed as both table olive and oil, it was determined that oleic acid had the highest proportion with 66.1% among the fatty acids, followed by palmitic acid and linoleic acid, respectively. In addition, 46 aroma compounds were identified in the fruit of Gemlik olive variety and their total amount was found to be 2681.29 µg/kg. It was stated that the groups with the highest number and amount of compounds were higher alcohols, volatile acids, aldehydes, ketones and volatile phenols. While the aroma compound group found at the highest rate was higher alcohols

(44.61%), the most dominant compounds in the composition were determined to be 4-hydroxy-4-methyl-2-pentanone, 2-butoxyethanol and (E,E)-α-farnesene, respectively (Koyuncu and Cabaroğlu, 2020). In the light of the given literature information; It was observed that the findings obtained from our study were parallel to the findings of previous researchers.

4 Conclusion

Sensory analyses indicate that Adıyaman olive oil's fruitiness (4.4±0.2), bitterness (2.6±0.1), and pungency (3.8±0.1) scores indicate high quality in accordance with the Turkish Food Codex criteria. No negative sensory characteristics (moldy, damp, winey, etc.) were observed in the olive oils examined. Chemical analyses indicate that the olive oil's free fatty acidity (0.49%), peroxide value (8.8 meq/kg), and UV absorbance values (K232=1.952; K270=0.1615; ΔK=0.003) meet the quality standards. The fatty acid composition has the desired balanced distribution in olive oils. Indeed, when the fatty acids in olive oils are ranked proportionally, they are oleic acid (73.81%), palmitic acid (13.32%), and linoleic acid (6.41%). This composition presents a positive profile in terms of olive oil's high nutritional value and oxidative stability. Furthermore, the lower oleic acid content in the fatty acid composition of one of the olive oil production facilities compared to the other facilities suggests that the olive oils from this facility are subject to some storage problems.

Adıyaman's ecological conditions (climate, geographic structure, distance from the sea, etc.) positively affect the quality of the oils obtained from olives grown in the province. The characteristics of olive oil obtained from Gemlik olives, unique to the Adıyaman region, are valuable for establishing a regional brand. Therefore, it is necessary to support local producers and accelerate geographical indication studies. To increase fruitiness, a malaxation time of 60 minutes is recommended in pressing facilities. Integrating this time into production processes can improve the quality of olive oil production. Furthermore, training programs should be organized at regular intervals to enable panelists to take a more active role in sensory analyses in sensory training programs, thus making quality control processes more reliable. Considering the fatty acid composition, the high oleic acid content once again demonstrates that olive oil is a highly valuable food for health. Regular monitoring of the fatty acid composition during the production process is recommended. Adıyaman's climatic and geographical advantages directly affect olive oil quality. Therefore, it is important that agricultural activities in the region be carried out in accordance with sustainability principles. In conclusion, this study; This study is significant as it is the first to identify the characteristics of Adıyaman olive oil and promote it to a

wider audience. The findings will also inform future studies aimed at determining olive oil quality parameters.

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