1. GENERAL DESCRIPTION OF OLIVE GROWING IN TURKEY

1.1. Introduction

Figure 1. Location of Turkey (Source: UN)

The olive tree has been cultivated in Turkey since time immemorial. Its significance in the country's agriculture is apparent from the aid granted to the sector by the Turkish agriculture ministry, which has led to a 35% increase in the number of olive trees within the space of the last six years. Turkey's goal is to become the world's second biggest producer, after Spain. (Source: IOC)

Today, Turkey exports olive oil to more than 90 countries such as the United States, Canada, Italy, Japan, Saudi Arabia, Australia and the United Arab Emirates. (Source: Turkish Promotional Committee for Olives and Olive Oil, OOPC)

In Turkey, around 500 000 families (2-2.5 million people) earn a livelihood from olive cultivation. There are three cooperative associations – TARIS, MARMARABIRLIK and GUNEYDOGUBIRLIK – and agricultural sales cooperatives which operate in accordance with Act 4572. These cooperatives purchase, process, stock and sell the olives and olive oil produced by their members.

1.2. Socio-economic indicators

- **Area: 783 562 sq km (UN, 2008)**
- **Capital city: Ankara (UN)**
- **Currency: Turkish Lira (new) (TRY) (UN, 2008)**
- **Population: 74 815 703 (World Bank, 2009)**
- **Rural population: 30% (World Bank, 2010)**
- **Urban population: 70% (World Bank, 2010)**
- **Population growth rate: 1.2% (UN, 2005/10)**
- **Life expectancy: 74.3 years (women), 69.4 years (men) (UN, 2005/10)**
- **Main exports by quantity (tonnes): wheat flour (FAOSTAT, 2009)**
- **Main imports by quantity (tonnes): wheat and soybeans (FAOSTAT, 2009)**
- **GNI per capita, PPP (current international $): 15 180 (World Bank, 2010)**
- **GDP per capita, PPP (current international $): 15 340 (World Bank, 2010)**
- **Employment in agriculture: 22.9% (World Bank, 2008)**
- **Employees in agriculture, female: 15% (World Bank, 2008)**
- **Employees in agriculture, male: 17% (World Bank, 2008)**

2. BACKGROUND DATA

2.1. Olive oils

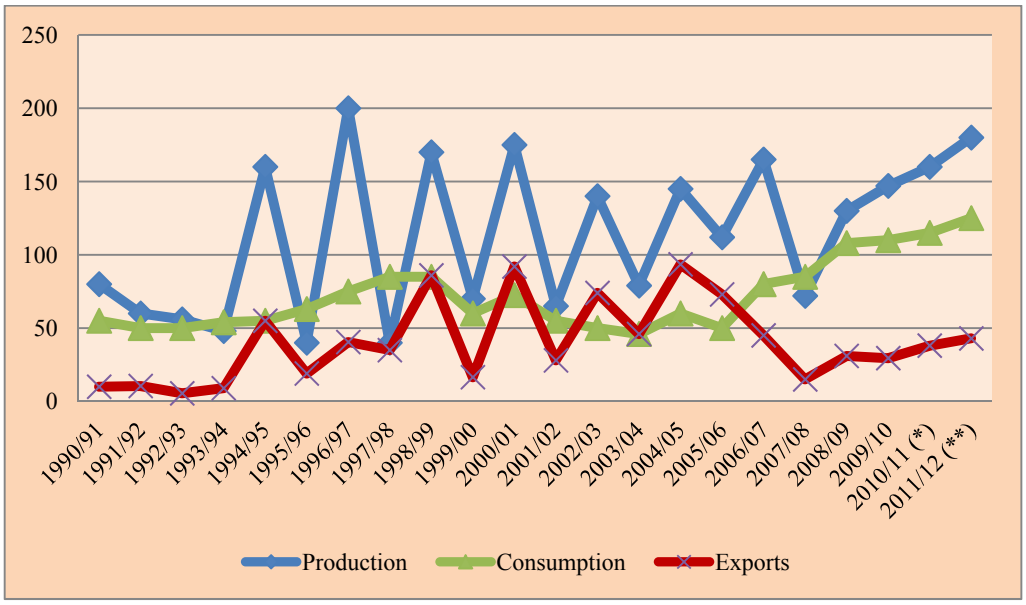

Figure 2. Olive oil production, consumption and exports 1990–2012 (1 000 tonnes)
* Estimates
** Forecasts (Source: IOC)

Table 1.Olive oils (1 000 tonnes) (Source: http://www.internationaloliveoil.org/estaticos/view/131-world-olive-oil-figures)

	2000/01	*2001/02*	*2002/03*	*2003/04*	*2004/05*	*2005/06*	*2006/07*	*2007/08*	*2008/09*	*2009/10*
Production	175.0	65.0	140.0	79.0	145.0	112.0	165.0	72.0	130.0	147.0
Consumption	72.5	55.0	50.0	46.0	60.0	50.0	80.0	85.0	108.0	110.0
Exports	92.0	28.0	74.0	46.0	93.5	73.0	45.0	15.0	31.0	29.5

2.2. Table olives

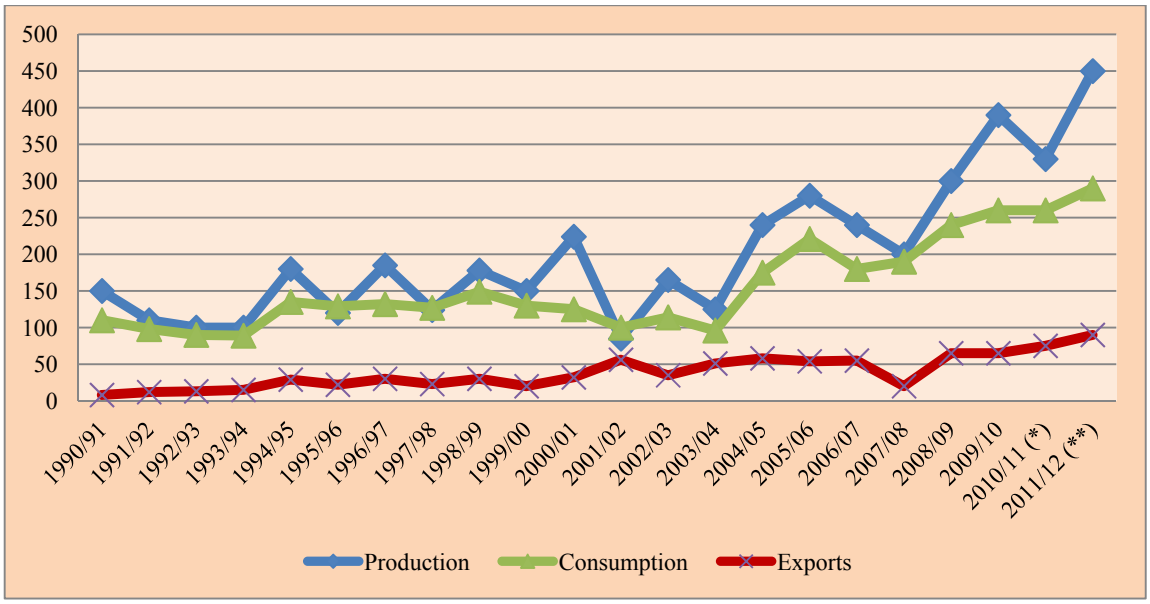

Figure 3. Table olive production, consumption and exports 1990–2012 (1 000 tonnes)
* Estimates
** Forecasts (Source: IOC)

Table 2.Table olives (1 000 tonnes) (Source: http://www.internationaloliveoil.org/estaticos/view/132-world-table-olive-figures)

	2000/01	*2001/02*	*2002/03*	*2003/04*	*2004/05*	*2005/06*	*2006/07*	*2007/08*	*2008/09*	*2009/10*
Production	224.0	85.0	165.0	125.0	240.0	280.0	240.0	200.0	300.0	390.0
Consumption	125.0	100.0	114.0	96.0	175.0	221.0	180.0	190.0	240.0	260.0
Exports	32.0	56.0	35.0	51.0	58.0	54.0	55.0	20.0	65.0	65.0

2.3. Total area planted

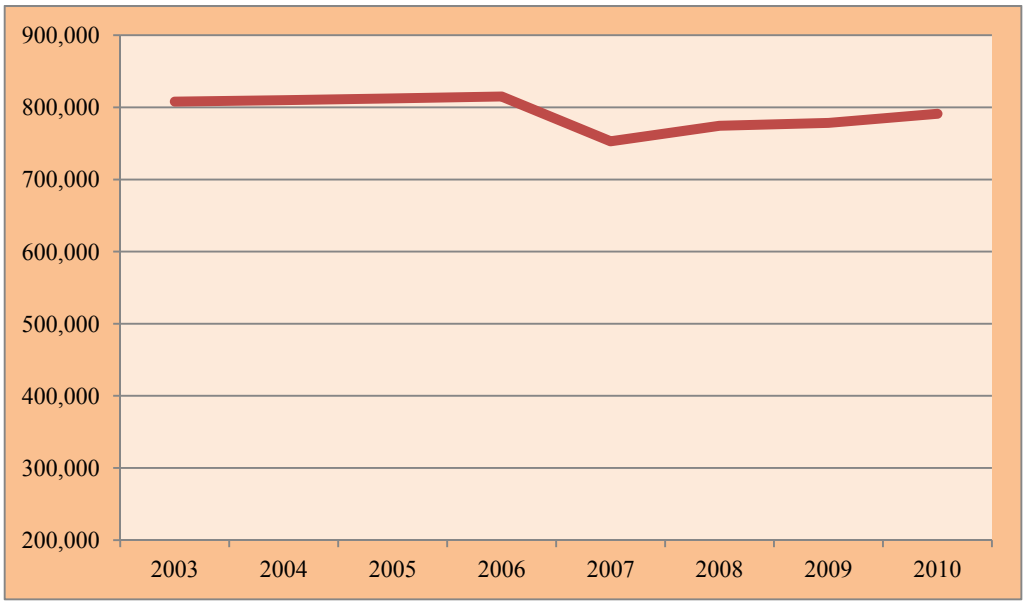

Figure 4. Changes in area planted with olive trees (ha) (Source: IOC)

3. OLIVE INDUSTRY IN TURKEY

3.1. Historical background

Views still differ on where the wild olive tree was first domesticated. According to the famous botanist Pelletier, its motherland is Anatolia where numerous wild olive trees grow in dense groves. De Candolle believed the olive originated from Asia Minor, spreading from Syria to Greece via Anatolia. Others cite the island of Crete as the birthplace of the olive tree while yet others claim this privilege for Southern Caucasia or Iran, the Atlas Mountains in North Africa, or Lower Egypt, Sudan or even Ethiopia.

The most solid hypothesis is that the Persians, Mesopotamians, Syrians and Palestinians were the first to domesticate the olive, a thesis strengthened by the fact that the oldest evidence of olive growing in the Near East dates back to the Chalcolithic Period (3700–3200 BC) in Israel and Jordan.

(Source: OOPC)

3.2. Orchard resources

In 2010, olives were grown on 791 000 ha of land in Turkey, of which approximately 10 500 ha were organic orchards and a further 7 300 ha were in the process of obtaining organic certification. Seventy-two percent of the total crop area was for oil production, versus 28% for table olives, although this percentage breakdown tends to vary from one season to the next.

Olive acreage has expanded by 129 000 ha (+19.5%) over the last five crop years and industry forecasts are for it to swell to 1 000 000 ha by 2015. (Source: IOC)

3.3. Location

Olives are grown in five regions of Turkey – Aegean, Marmara, Mediterranean, South-eastern Anatolia and Black Sea –, each with its own distinctive characteristics.

Beginning with the Aegean Region, 80% of the olives produced are processed into olive oil and 20% go for table production.

In the Marmara region, wedged in between the Mediterranean and the Black Sea, the shares are the other way around: 90% of production goes for table olives and 10% for oil. This explains why this region accounts for a significant 40% of all the table olives produced in Turkey, with a focus on cured black olives.

Olive cultivation in the Mediterranean region is located between the coast and the Taurus Mountains up to an altitude of 850 m. Sixty-eight percent of the olives grown are channelled into oil extraction and 32% into table olive processing. Hatay (Antakya), İçel, Adana and Antalya are the top producing areas. Interestingly, orchards planted with the Ayvalık variety (a cold-resistant cultivar with high chilling requirements) are spreading to villages at higher altitudes as an attractive source of extra income.

In South-eastern Anatolia, where 86% of olive production goes for oil and 14% for table olives, olive growing is concentrated in those parts of Gaziantep, Kilis, Şanlıurfa, Kahramanmaraş and Mardin where the climate is Mediterranean. Recent improvement measures include the distribution to growers of Ayvalık and Gemlik varieties from regional nurseries. In Adıyaman and Kilis particularly, the number of saplings planted in recent years exceeds the number of trees in production.

Lastly, in the Black Sea region, table olives are usually grown for self-consumption along a small coastal strip and in secluded river valleys (Artvin) where there is a Mediterranean microclimate and the areas are protected from the northerly winds.

(Source: OOPC)

3.4. Varieties

A description follows of the agronomic and commercial characteristics of the main varieties cultivated in Turkey.

Ayvalik

This very vigorous cultivar is hardy and adapted to relatively arid areas. The second most important variety of Turkey, it is found along the entire Aegean coast where it accounts for about 25% of olive acreage.

It has a high rooting ability and an intermediate start of bearing. Its time of flowering is also intermediate. It is self-compatible and has a low pistil abortion rate. It is considered an optimal polliniser for all the varieties of the Aegean region, except for the 'Izmir Sofralik'. Its productivity is high and alternate and its time of fruit ripening is intermediate. The fruit has a high oil content (24%). Owing to the quality of the oil, which is aromatic and has distinctive chemical characteristics, it is considered to be the most promising of Turkey's oil cultivars. Its erect growth habit makes it particularly suited to mechanical harvesting. It is also used for producing split green olives and black olives. It has a flesh to stone ratio of 5.6 and it is clingstone. It is tolerant of olive fly.

Çekiste

This variety originates from the area of Ödemis in the Izmir region and has become consolidated along the Aegean coast, where there are some 1 300 000 trees. It is hardy, with a medium rooting ability, and an intermediate start of bearing. It flowers early and its productivity is high and constant.

When the fruit is for green pickling, the time of ripening is intermediate whereas when it is for black pickling it is late. It has a flesh to stone ratio of 5.6 and it is clingstone. The fruit is suitable for processing split green olives. However, because of its high oil content of over 26% at full maturity, it is considered a good dual-purpose variety.

It is resistant to periods of low rainfall and cold. For this reason it can be used in areas that are considered borderline for olive cultivation.

Çelebi

This variety originates from the area of Lake Iznik, on the eastern side of the Sea of Marmara. Numbering some 400 000 trees, it accounts for 5% of the Marmara region's olive growing acreage. It is hardy and has a low rooting ability, which means it is propagated by grafting.

It has an intermediate start of bearing and an intermediate-to-early time of flowering. Its productivity is medium and alternate. When intended for green pickling, the time of fruit ripening is intermediate whereas when it is for black pickling it is intermediate to late. It is grown mainly as a table olive. Nevertheless, small fruit that cannot be used for this purpose is channelled into oil production. For this reason it is considered a dual-purpose variety.

The fruit is large and has a flesh-to-stone ratio of more than 6 and a medium oil yield of about 20%; it is freestone. It is moderately tolerant of cold.

Domat

This vigorous cultivar gives particularly large fruit. It is distributed unevenly throughout the Aegean region, with Akhisar at the centre of the growing area.

Owing to its high and constant productivity and early bearing, it is very suitable for intensive irrigated orchards. It is not very hardy and its rooting ability is rather low.

It flowers early. It produces abundant pollen with a high germination capacity, which is why it is used as a polliniser. It has a low pistil abortion rate. The fruit ripens late and it does not turn fully black. It has a medium removal force and medium oil content. Its characteristics make it particularly suitable for processing green olives with a variety of stuffings. It has a flesh to stone ratio of 5 and it is clingstone. It is sensitive to cold, but considered partially resistant to olive knot and leopard moth.

Erkence

There are about 3 000 000 trees belonging to this large, very vigorous variety in Turkey. It is considered of medium hardiness and it has a medium rooting ability.

It has an intermediate start of bearing. It flowers early and it is partially self-compatible. The 'Ayvalik' variety is used as a polliniser for it. The pollen has a high germination capacity. Productivity is medium and alternate. The fruit gives an oil yield of 25%. It is used primarily for producing oil of good but inferior quality to that obtained from the 'Ayvalik', 'Memecik' and 'Memeli' cultivars. It can also be used for green or black pickling. The fruit has a low removal force and natural fruit drop occurs prior to harvest. It is freestone.

In areas affected by frequent wet winds during ripening, the fruit is susceptible to *Phoma oleae*, which lessens its bitterness and causes a brown colouring to develop. In this case, the fruit can be eaten straight from the tree. When the fruit turns this particular colour it is known in Turkey as 'Hurma', which means date.

Gemlik

This is the variety used the most for black 'Gemlik- style' olives. It has a high rooting ability and an intermediate time of flowering. It is partially self-compatible; the 'Ayvalik', 'Çakir' and 'Erkence' are used as pollinisers. It comes into bearing early and its productivity is high and constant. The fruit ripens very early, irrespective of whether it is for green or black pickling. It turns a very glossy black colour and has a good taste and texture. It has a flesh-to-stone ratio of 5.6 and it is freestone. Owing to its high oil content (29%), any fruit that cannot be used for pickling is used for oil production, which is why it is considered dual-purpose. It is partially resistant to low temperatures.

Izmir Sofralik

This variety is only found in old olive orchards located in monoculture areas of Izmir. Crop acreage is declining owing to its low productivity and marked alternate bearing. One of the major problems affecting this variety is the formation of parthenocarpic fruit. It is not very hardy, but has a good rooting ability. It comes into bearing late and its time of flowering is intermediate to late. It is self-incompatible and has a high pistil abortion rate. It lacks adequate pollinisers, the best ones being 'Memecik', 'Gemlik' and 'Erkence'. Its productivity is low and alternate. The fruit is used for green pickling. It is clingstone, gives an oil yield of about 20% and has a flesh-to-stone ratio of 7. The fruit is not firm and is damaged during transportation and handling. Owing to its poor vegetative growth, it does not tolerate drastic pruning. It is sensitive to olive fly and olive moth.

Memecik

This variety is hardy and adapts readily to different soil and climate conditions. It has a good rooting ability and its start of bearing and time of flowering are intermediate. It is partially self-compatible and has a moderate pistil abortion rate. The 'Ayvalik', 'Gemlik', 'Erkence' and 'Memeli' cultivars are considered good pollinisers for this variety.

Its productivity is high and alternate. Time of harvesting is intermediate when the fruit is intended for green pickling and for the production of good quality, very fruity oil. It has a high oil yield and a high flesh-to-stone ratio; it is clingstone. The green olives are processed as Spanish-style olives. This variety is also gaining prominence for black pickling. It is tolerant of cold and bears in conditions of extreme drought. It is moderately susceptible to olive fly.

Memeli

This variety is widespread in the province of Izmir and surrounding areas where some 80 000 trees are grown. It has a medium rooting ability.

Its start of bearing and time of flowering are intermediate. It is partially self-compatible and considered a good polliniser for the 'Memecik', 'Ayvalik', 'Gemlik', 'Izmir Sofralik' and 'Erkence' varieties. Its productivity is medium and alternate and its time of harvesting is intermediate for fruit intended for both green and black pickling. The fruit is large and is used for green olives in brine, split green olives and black olives. It is also suitable for oil production. It has an oil yield of about 20% and a fruit-to-stone ratio of 7%; it is clingstone. In the Aegean region it is the third most important variety in terms of oil quality after the 'Ayvalik' and 'Memecik' varieties. Its versatility means it is used for household purposes. It responds well to pruning, even when severe, owing to its great vegetative growth. It is sensitive to cold.

Uslu

This cultivar numbers some 900 000 trees in Turkey. It is considered hardy and very vigorous, and it has a low rooting ability. It comes into bearing early. Flowering is early and it has a low pistil abortion rate. Its productivity is medium and constant. The fruit ripens very early and has a low removal force. The flesh is soft and therefore subject to damage during transportation and handling. It is freestone, and it has a high flesh-to-stone ratio.

It is sensitive to olive knot and leopard moth. It is susceptible to cold, which means it has to be harvested in advance of the first winter cold to avoid pre-harvest fruit drop and the ensuing decrease in quality. (Source: World Catalogue of Olive Varieties, IOC)

3.5. Olive oil: production

Olive oil production in Turkey often oscillates sharply from season to season, mainly because of the characteristic alternate bearing pattern of the olive, rainfall and cultural techniques. This is evident from the figures reported in Table 1. The range of fluctuation is also considerable, extending from 65 000 t to 175 000 t. Comparison of the ten-season averages for the last two decades (see Table 4) shows that mean annual production in 2000/01–2009/10 (123 000 t) was +33.11% higher than the previous decade (92 400 t).

3.6. Olive oil: processing sector

Turkey's olive oil processing industry has undergone extensive modernisation in recent years. According to data supplied by the Ministry of Agriculture (see Table 3 below), there is a total of 1 250 mills with a total average production capacity of 28 800 t/day. Of these, 1 100 are modern two or three-phase facilities, 50 operate presses or super-presses and 100 are traditional mills. On top of this, there are 400 olive oil packing plants and nine olive pomace oil extraction plants.

Table 3. PROCESSING SECTOR (Source: adapted from the Ministry of Agriculture)

Units	Number	Average production capacity
Traditional oil mills	100	2 000 t/day
Oil mills with presses or super presses	50	1 000 t/day
Continuous-process oil mills (two or three-phase)	1 100	33 000 t/day
Total oil mills	**1 250**	**28 800 t/day**
Table olive processing plants	8 000	25-100 t/year
Olive pomace oil extraction plants	9	60 000 t/year
Table olive packing plants	1 000	100 000 t/year
Olive oil packing plants	400	80 000 t/year

3.7. Olive oil: marketing, domestic consumption and foreign trade

As can be seen from Table 1, olive oil consumption in Turkey has moved at a lower level than production, varying between 46 000 t and 110 000 t in the ten crop years between 2000/01 and 2009/10.

In fact, according to industry sources, despite the excellent outlook for olive oil production in Turkey, olive oil accounts for a small 9% of the 1.3 million t of vegetable oils consumed in the country. This low level is due to poor consumer awareness of the health-promoting attributes of olive oil. However, the Turkish health authorities have started to advise Turks to include olive oil in their diet, which has revived consumer interest in the benefits of olive oil. As a result, between the two decades reported in Table 4, annual domestic consumption increased from an average of 63 200 t to 71 650 t. Per capita consumption has also risen, reaching 1.4 kg in 2010.

On the export front, Turkish olive oil exports go up and down quite significantly because they are closely linked to crop production performance. For instance, during the ten crop years reported in Table 1, they have varied within an interval between 15 000 t (2007/08) and 93 500 t (2004/05). However, if export figures are analysed in terms of ten-season yearly averages (Table 4), it emerges that they increased by 83.62% from 28 700 t in 1990/91–1999/00 to 52 700 t in 2000/01–2009/10.

In 2009/10, the base year for the IOC questionnaire, Turkey exported 29 500 t of olive oil, chiefly to the 27-Member European Union, the United States, Saudi Arabia and Japan, by descending order of volume. In 2009, olive sector exports (olive oil *and* olives) accounted for 1.8% of total Turkish agricultural exports, only to drop to 1.5% in 2010, although this dip in exports has been offset by higher domestic consumption.

Table 4. OLIVE OIL (Source: IOC)

	Average (t) 1990/91–1999/00	Average (t) 2000/01–2009/10	Change (%)
Production	92 400	123 000	33.11
Consumption	63 200	71 650	13.37
Exports	28 700	52 700	83.62

3.8. Table olives

In 2009, 218 118 ha of the 778 413 ha of land under olives were planted with table olive varieties. Olives for table production fetched a farm gate price of €0.79/kg in 2009/10 when from conventional orchards and €0.85/kg when organic product (EUR 1 = 2.24 TL) (Source: IOC questionnaire)

Despite year-to-year fluctuations, the table olive sector in Turkey has expanded significantly in the last decade, recording increases in the levels of production, consumption and exports (Table 2).

Table olive production has been rising, albeit with ups and downs. The 2009/10 crop year stands out in this respect with a tonnage of 390 000 t (Table 2). The same upward trend is apparent from the percentage changes in the averages for the two ten-season periods reported in Table 5 where it can be seen that mean yearly production climbed by 60.98% between 1990/91–1999/00 (139 700 t) and the following decade (224 900 t).

Like production, table olive consumption has oscillated through the last decade (Table 2) within an interval going from 96 000 t (2003/04) to 260 000 t (2009/10), but the general trend has been upwards. This can be seen from the values for mean yearly consumption in the two periods reported in Table 5, which equate with 43.06% growth. Per capita consumption of table olives in Turkey came to 1.6 kg in 2010.

Exports have moved upwards too, hitting a high of 65 000 t in 2008/09 and 2009/10. During the period between 2000/01 and 2009/10 they averaged 49 100 t, which represents 143.06% growth on the previous ten-year period as can be seen from Table 5. In short, the data for the mid to late 1990's and early 2000s confirm the expansion of the Turkish table olive sector.

Table 5.TABLE OLIVES (Source: IOC)

	Average (t) 1990/91–1999/00	Average (t) 2000/01–2009/10	Change (%)
Production	139 700	224 900	60.98
Consumption	118 900	170 100	43.06
Exports	20 200	49 100	143.06

3.9. Future measures

Following the second National Olive Summit held in Izmir on 8–9 December 2004 with the participation of the Ministry of Agriculture and public and private sector stakeholders to discuss issues in the Turkish olive sector and potential solutions, a series of targets were fixed for 2014. These are summarised in Table 6 below:

Table 6. OBJECTIVES FOR OLIVE GROWING
(Source: Ministry of Food, Agriculture and Livestock, Republic of Turkey)

Olive area	1 million hectares
Number of olive trees	180 million
Production of table olives	650 000 tonnes
Production of oil-olives	2.5 -3 million tonnes
Production of olive oil	650 000 tonnes
Exports of olive oil	200 000 tonnes
Exports of table olives	150 000 tonnes
Yield per tree	25 kg
Consumption of olive oil per capita	5 kg

4. SOURCES

IOC questionnaire

IOC database

http://www.internationaloliveoil.org/estaticos/view/130-survey-and-assessment-division

United nations

http://data.un.org/Default.aspx

World Bank

http://data.worldbank.org/country

FAOSTAT

http://faostat.fao.org/site/342/default.aspx

OOPC, Olive & Olive Oil Promotion Committee

http://www.olivetolive.com/Asp/Content.Asp-MS=1&Content=1&MN01=2&MN02=0&MN03=0&MN04=0&MN05=0&ID=35.htm