1. GENERAL DESCRIPTION OF OLIVE GROWING IN ISRAEL

1.1. Introduction

Figure 1. Location of Israel (Source: UN)

About 8 percent of Israel's population lives in rural areas, mostly in villages in two unique cooperative frameworks, the kibbutz and moshav, which were developed in the country in the early part of the 20th century. (Source: Ministry of Foreign Affairs, Israel).

In 2010, the olive sector accounted for 1.02% of Israel's final agricultural production, excluding stockfarming products, and in 2009/10 it generated 400 000 work days in olive growing and roughly 2 000 in the olive oil/ table olive industry.

Between 2005 and 2011, olive crop area has inched up from 22 200 ha to 26 850 ha and is forecast to reach 30 500 ha by 2014.

Between 2000/01 and 2009/10, Israeli production of olive oil has peaked at 9 000 t on three occasions (Table 1) while table olive production reached a maximum level of 24 500 t in 2002/03 (Table 2).

1.2. Socio-economic indicators

- **Area: 22 072 sq km (UN, 2008)**
- **Capital city: Jerusalem (UN)**
- **Currency: Shekel (ILS) (UN, 2009)**
- **Population: 7 441 700 (World Bank, 2009)**
- **Urban population: 92% (World Bank, 2010)**
- **Rural population: 8% (World Bank, 2010)**
- **Population growth rate: 1.4% (UN, 2010/15)**
- **Life expectancy: 79.4 years (men), 83.4 years (women) (UN, 2010/15)**
- **Main exports by quantity: potatoes (FAOSTAT, 2009)**
- **Main imports by quantity: wheat and maize (FAOSTAT, 2009)**
- **GNI per capita, PPP (current international $): 27 630 (World Bank, 2010)**
- **GDP per capita, PPP (current international $): 28 546 (World Bank, 2010)**
- **Employment in agriculture: 1.7% (World Bank, 2009)**
- **Employees in agriculture, female: 1% (World Bank, 2008)**
- **Employees in agriculture, male: 3% (World Bank, 2008)**
- **Employment in olive growing: 400 000 work days (IOC, 2009/10)**

2. BACKGROUND DATA

2.1. Olive oils

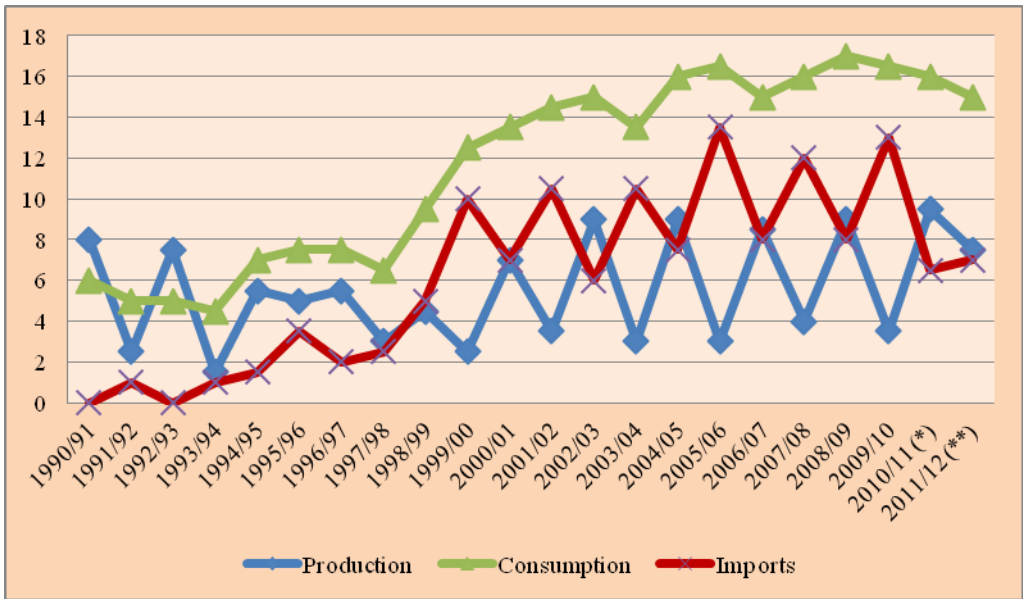

Figure 2. Olive oil production, consumption and imports 1990–2012 (1 000 tonnes)
* Estimates
** Forecasts (Source: IOC)

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	2010/11	2011/12
Production	7.0	3.5	9.0	3.0	9.0	3.0	8.5	4.0	9.0	3.5	9.5	7.5
Consumption	13.5	14.5	15.0	13.5	16.0	16.5	15.0	16.0	17.0	16.5	16	15
Imports	7.0	10.5	6.0	10.5	7.5	13.5	8.0	12.0	8.0	13.0	6.5	7

2.2. Table olives

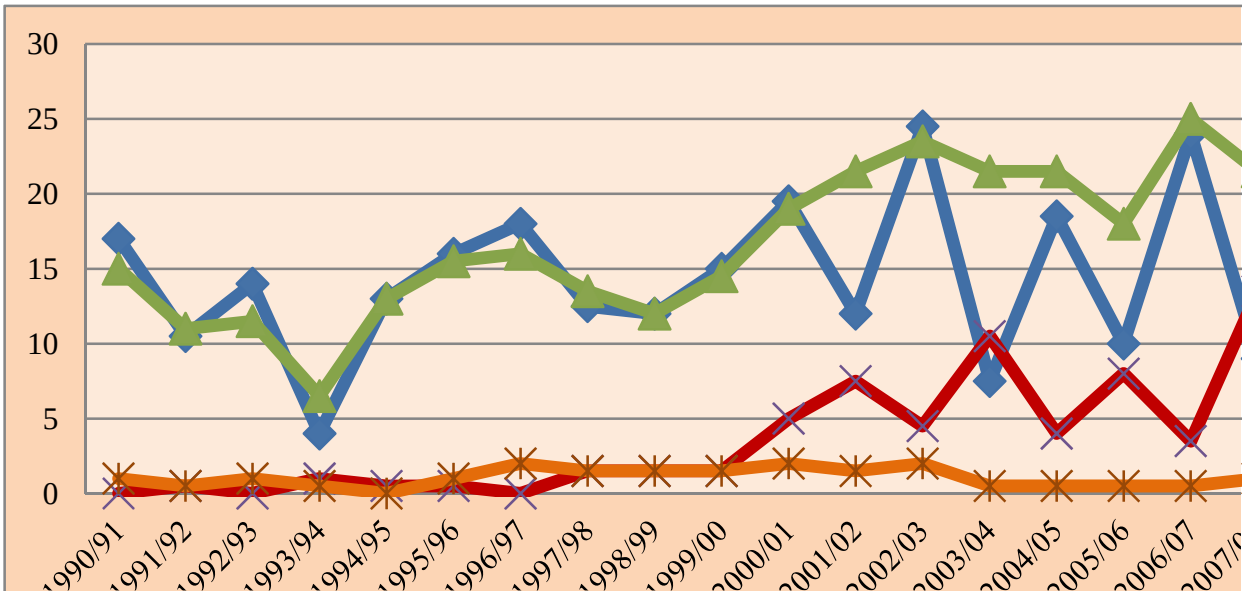

Figure 3. Table olive production, consumption, imports and exports 1990–2012 (1 000 tonnes)
* Estimates
** Forecasts (Source: IOC)

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	2010/11 (prov.)	2011/12 (est.)
Production	**19.5**	**12.0**	**24.5**	**7.5**	**18.5**	**10.0**	**24.0**	**9.0**	**17.0**	**9.5**	**19.0**	**9.0**
Consumption	**19.0**	**21.5**	**23.5**	**21.5**	**21.5**	**18.0**	**25.0**	**21.5**	**21.0**	**21.5**	**23.5**	**20.5**
Imports	**5.0**	**7.5**	**4.5**	**10.5**	**4.0**	**8.0**	**3.5**	**13.5**	**6.0**	**12.5**	**5.5**	**11.0**
Exports	**2.0**	**1.5**	**2.0**	**0.5**	**0.5**	**0.5**	**0.5**	**1.0**	**2.0**	**0.5**	**1.0**	**1.0**

2.3. Total area planted

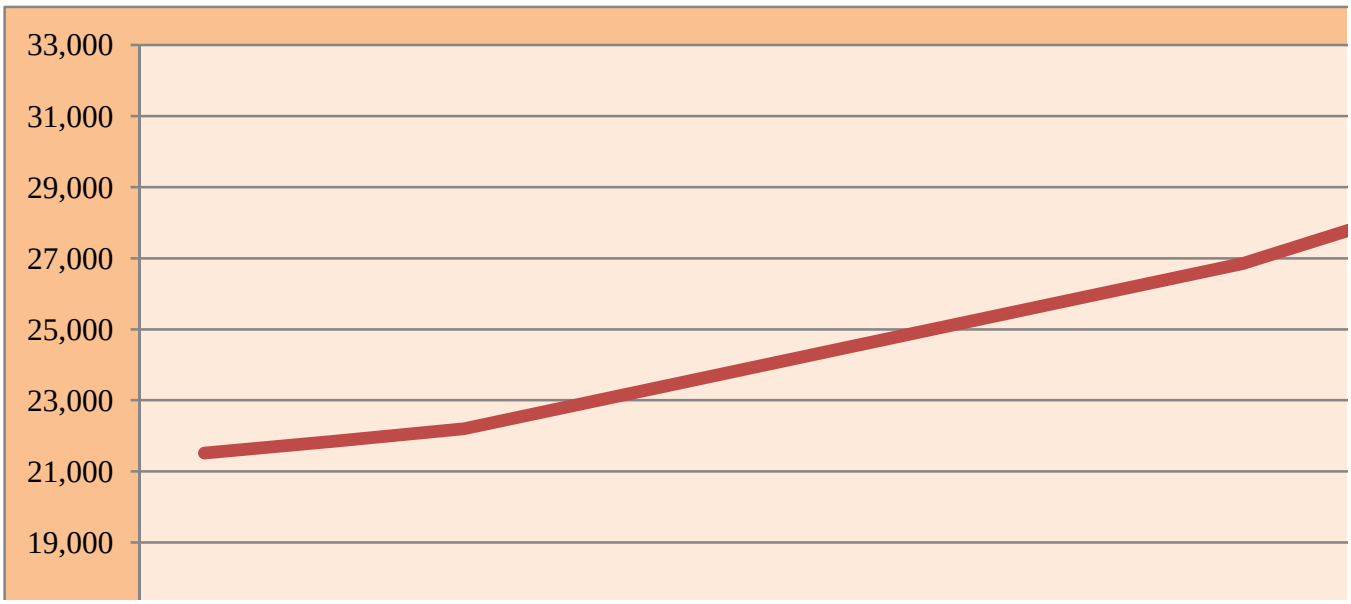

Figure 4. - Changes in area planted with olive trees (ha)

* Estimates
** Forecasts (Source: IOC)

3. OLIVE INDUSTRY IN ISRAEL

3.1. Historical background

The domestication of the olive started in the eastern end of the Mediterranean Basin, covering the present region of Syria, Lebanon and Israel, and the knowledge about how to use olive products in the human diet spread westwards with Western civilisation. In ancient Israel, where nearly every kitchen was equipped with a small press for extracting oil, the olive provided food and lighting fuel as well as cooking oil. By the time of the Roman conquest (first century BCE), the olive had become one of the most basic dietary items, and the meals of the poor consisted primarily of olives, beans, figs and cheese eaten with a porridge made from millet. Over the centuries the extent of the olive industry has experienced many ups and downs in the area of Israel.

Today, the olive remains a popular food and its golden oil is a coveted commodity which is growing rapidly and undergoing modernisation, particularly intensification. The use of olive oil has become more popular since the discovery that it lowers cholesterol and has other health benefits. Israeli olive oil has attained a quality so high that it can compete in quality with the best oils of Europe.

(Source: adapted from Ministry of Foreign Affairs, Israel)

3.2. Orchard resources

As mentioned in the introduction, between 2005 and 2011, total olive crop area has increased from 22 200 ha to 26 850 ha. The same comparison for table olives shows a change in acreage from 2 100 ha to 1 850 ha.

In 2009, the benchmark year used in the IOC questionnaire, olive trees were grown on 25 300 ha in Israel, of which 1 800 ha were for table olives and 23 500 ha for oil. The oil acreage included 1 000 ha planted that same year. Olive orchards were dry farmed on 16 600 ha and irrigated on 8 700 ha.

As can be seen from Table 3, olives were grown on 7 660 agricultural holdings, mostly on an area of less than 1 ha.

Table 3. Number of agricultural holdings growing olive trees in 2009 (Source: IOC questionnaire)

Olive crop area on holding	No of holdings	Total olive crop area (ha)
< 1 ha	7 000	7 000
1– 5 ha	1 000	4 000
6–10 ha	600	4 800
11–20 ha	15	3 200
21–50 ha	10	3 500
> 50 ha	35	2 800
Total	7 660	25 300

Average orchard density varies depending on whether cultivation is dry farmed (100 trees/ha) or irrigated (360 trees/ha) or in high density hedgerow plantations (1 250 trees/ha).

The percentage breakdown of olive orchards by age reveals that:

- 70.8% (16 500 ha) are more than 50 years old;
- 16.3% (3 800 ha) are between 5 and 15 years old;
- 7.3% (1 700 ha) are between 16 and 50 years old; and
- 5.6% (1 300 ha) are under 5 years old.

(Source: IOC questionnaire)

3.3. Location

In Israel olive orchards occupy the largest area of any single fruit commodity.

Israel can be divided into six major geographical regions: the mountainous North, the coastal plain running North-South along the Palestinian mountains, the inland valleys, the southern plain, the desert highland and mountains and the East-South valley.

(Source: Israeli delegation to the IOC)

3.4. Varieties

There are five main local cultivars grown in Israel but the industry also includes about 10 widely introduced cultivars. The agronomic and commercial characteristics of these traditional and newly developed Israeli cultivars are detailed below:

Souri

This is the major cultivar in the traditional rain-fed olive industry, which is mainly concentrated in the north of the country. It is a slow growing tree which under dry-land conditions enters commercial production only after six years. Cv. ‘Souri’ is highly resistant to drought although fruit production will be low under water stress conditions. However, the oil content of the fruit from such orchards is usually very high, in the vicinity of 27–32% under commercial oil mill extraction. The rooting potential of cv. ‘Souri’ is low. Under rain-fed conditions it is quite resistant to olive fly but very sensitive to the peacock eye leaf disease. The oil is highly aromatic and appreciated by the local population. Cv. ‘Souri’ is also used for table olive processing in the East Mediterranean style.

Barnea

This newly bred cultivar was isolated from an undetermined number of seedlings. It is also known as “K18”, which was its original number in the breeding plot. It is the predominant cultivar in new irrigated orchards in Israel because of its high, constant productivity and its adaptability to mechanical harvesting.

It was bred for oil production but it can also be used for green or black table olives after suitable fruit thinning; the black olives it gives are highly rated. It gives good quality oil and yields about 20% oil at the mill, even under full irrigation; it also has a very high fruit yield.

It is a moderately hardy variety and it has a good rooting ability. When irrigated, plants grown on their own roots can come into commercial bearing as soon as the third year. Its time of flowering is intermediate. It is partially self-compatible and it has a medium pistil abortion rate. Its pollen production is usually good. Ripening is quite early when the fruit is intended for green pickling and intermediate when it is for black pickling; it is freestone. Cv. ‘Barnea’ has a very high fruiting potential and oil content under irrigated conditions. When it is not irrigated in the dry summers of Israel its development is weak. It is partially tolerant of olive leaf spot and recovers well from initial verticillium infection.

Picual

Cv. ‘Picual’ is an important introduced cultivar used in Israel’s intensive olive industry. The fruit of young trees is mainly used for table olive processing due to their low oil content and large size under irrigation. After a few years at full production, oil content increases, fruit size is reduced and the cultivar is then used for oil extraction. It is strongly alternating under Israeli environmental and cultivation conditions. However, the average oil yield of mature intensively grown trees is usually satisfactory. In intensive orchards it is sensitive to verticillium as well as to the peacock eye leaf spot disease.

Picholine, Leccino and Coratina

These three cultivars are partially spread in intensive orchards both as pollinators and for organoleptic purposes for the oil trade.

Arbequina, Koroneiki, and recently Askal

These are the three main cultivars in the high density hedgerow orchards which are developing rapidly and are already having a significant impact on intensive oil producing orchards in Israel. They produce well in these orchards where the spacing is 1.7–2 x 4 m. 'Askal' has a particularly high oil content (28–30% commercially) under intensive cultivation and gives high fruit yields. Its oil is aromatic and very stable in contrast with the oil obtained from cv. 'Arbequina'.

Muhasan

Cv. 'Muhasan' is a local, dual-purpose cultivar used in both rain-fed and intensive cultivation. It produces high quality oil that is very delicate though aromatic and quite sweetish. It is well adapted to the limiting, dry land growing conditions of the East Mediterranean region. Under intensive cultivation, the tree is vigorous and very productive and the fruit is rather large (5 g). The oil yield is quite low because the oil content drops considerably and is rather low under irrigation even in adult mature trees. It is sensitive to peacock eye leaf spot but easy to propagate. It is widely spread in rain-fed groves and in older intensive table olive orchards.

Manzanillo-TI

This cultivar is the major variety in the intensive table olive industry in Israel. It is a specific clone of the cv. 'Manzanillo' introduced from the US in the 1930s. All cv. 'Manzanillo' is fully irrigated, high yielding and planted on 5–6 x 6–7 m. It propagates well and enters into full production relatively early. It grows and fruits well also in hot regions with low winter chilling. Lately some of the cv. 'Manzanillo' orchards are also used for oil extraction after reducing the level of irrigation. Most of the fruit of this cultivar is cured green using the Spanish lye method. The growth habit of the tree is quite spreading and it is somewhat sensitive to verticillium and leaf spots.

Novo

This cultivar is a clone of the Italian cv. 'Uovo di piccione' and serves as the main pollinator for the cv. 'Manzanillo'. Its fruit is very large (8–12 g) and is used as a table olive (both green and darkened) in the hotel catering industry. The tree grows strongly and alternates in yield but produces enough pollen to pollinate cv. 'Manzanillo' even in its 'off' years. Its propagation is rather difficult and needs special care.

Many other introduced cultivars are used in Israeli orchards but on a small scale.

3.5. Olive oil: production and yield

Israel's production of olive oil has fluctuated over the crop years from 2000/01 to 2009/10. During this period, it reached a high of 9 000 t in 2002/03, 2004/05 and 2008/09 (Table 1). Comparison of the averages for the two decades reported in Table 4 (1990/91–1999/00 and 2000/01–2009/10) shows an upward trend from 4 550 t/year to 5 950 t/year, translating into 30.77% growth.

Average production yields for oil-olives can vary, ranging for instance from 2 500 kg/ha in 2008/09 to 1 500 kg olives /ha in 2009/10 in both conventional and organic orchards.

Cultural practices and harvesting cannot be mechanised on 16 300 ha of the country's olive orchards (70%). Partial mechanisation is possible on 2 000 ha (8.6%) while the remaining 5 000 ha are fully mechanised (21.4%).

3.6. Olive oil: processing sector

Israel has a significant olive oil processing infrastructure, with a total of 125 processing facilities in all, split between continuous-process mills (110), traditional mills (10) and press mills (5). Mean production capacity works out at approximately700 t/day.

In recent years, production of organic olive oil has been on the rise in Israel. According to forecasts, by 2011/12 it is expected to be double (200 t) the tonnage recorded in 2006/07 (100 t).

The olive oil produced in Israel belongs preponderantly to the extra virgin category. Taking the 2008/09 and 2009/10 seasons as an example, 90% of the oil produced was extra virgin grade (up to 0.8º) and 10% was virgin (up to 2º).

(Source: IOC questionnaire)

3.7. Olive oil: domestic consumption and foreign trade

As can be seen from Table 4, olive oil consumption in Israel has climbed steeply (116.20%) over the two 10-season periods compared. Production has risen too, although only by 30.77%. As a result, imports have soared by +262.26%. Per capita consumption of olive oil worked out at 2.4 kg/head in 2010.

Table 4. OLIVE OIL (Source: IOC)

	Average (t) 1990/91–1999/00	Average (t) 2000/01–2009/10	Change (%)
Production	4 550	5 950	30.77
Consumption	7 100	15 350	116.20
Imports	2 650	9 600	262.26

3.8. Table olives

According to the data contained in the IOC questionnaire, in 2010 there were 1 800 ha of table olive orchards in Israel. Table olive production tends to alternate sharply from season to season as can be seen from the figures shown in Table 2. In the 2009/10 crop year, Israel produced 9 500 t of table olives, compared with 17 000 t the season before, and peaks of 24 500 t in 2002/03 and 24 000 t in 2006/07. In average terms, the table olive sector has recorded moderate growth between the last two decades (Table 4).

The prices paid to growers vary according to type. Growers receive €0.68/kg for green olives and olives turning colour, and slightly more (€0.70) for black olives. The prices paid for processed product also differ, ranging from €2.05/kg for green olives to €2.30 for olives turning colour and €2.50 for black olives. Green table olives are the preponderant type produced in Israel, accounting for 88% of production in 2009/10, followed by table olives turning colour and black olives, each with a 6% share.

There are 13 table olive processing plants and the same number of packing plants, both with an average production capacity of 1 500 t.

Over the seasons between 2000/01 and 2009/10 (Table 2) domestic consumption of table olives has fluctuated within an interval going from 18 000 t to 23 500 t, except in 2006/07 when it peaked at 25 000 t. In average terms, it has experienced 66.54% growth between the two ten-year period reported in the table below. Per capita consumption of table olives came to 3.2 kg/head in 2010.

Table 4.TABLE OLIVES (Source: IOC)

	Average (t) 1990/91–1999/00	Average (t) 2000/01–2009/10	Change (%)
Production	13 200	15 150	14.77
Consumption	12 850	21 400	66.54
Imports	700	7 500	971.43
Exports	1 050	1 100	4.76

The pattern of Israeli imports and exports is strongly influenced by the level of domestic production, as can be seen from Table 2, and reflects a marked up/down tendency. When converted into averages for the two decades reported in Table 4, the spectacular growth in imports (971.43%) is very striking.

3.9. Recent measures

Olive orchard improvement is based on direct improvement via research projects and both the olive oil and table olive industries continuously take on board new research results to improve crop production and oil quality.

Israel also takes action to promote olive oils and table olives such as:

- Annual olive festival in growing regions coinciding with the olive harvest
- Quality competitions
- Courses on olive oil uses and tasting for the general public
- Special workshops for chefs
- Media advertising and semi-scientific lectures targeted at the general public

(Source: IOC questionnaire)

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

Israel Ministry of Foreign Affairs

http://www.mfa.gov.il/MFA/Government/Communiques/2008/Increased_revenues_2008_olive_harvest+_West_Bank_13-Nov-2008.htm?DisplayMode=print