SPEED

EVALUATION DE L'IMPACT ENVIRONNEMENTAL DE L'ORGANISATION COMMUNE DE MARCHE DES CULTURES PERMANENTES

ANNEXE 3 : OCM OLIVE
ETUDE NATIONALE GRECE et
ETUDE DE CAS PELOPONNESE

Novembre 2005

Averof 30, GR 10433, Athens, Greece
Tel: +30 210 8214407, Fax: +30 210 8225755

TABLE OF CONTENTS

TABLE INDEX

CHART INDEX

GLOSSARY

AGROCERT = AGROCERT is the standardization, inspection and certification authority in Greek Agriculture

ELEOURGIKI = Central Co-operative Union of Olive Products of Greece

E.P.A.A. – A.Y = Operational Program Rural Development - Reconstruction of Countryside

GFP = Good Farming Practices

K.O.R.E.P = Codes of Good Olive Culture Practice

MGQ = Maximum Guaranteed Quantity

NSSG = National Statistical Service of Greece

OPEKEPE = Payments Authority

SEVITEL = Greek Association of Industries and Processors of Olive Oil

SPDRD = Single Programming Document of Rural Development

UAA = Utilised Agricultural Area

1. CONTEXT OF OLIVE OIL AND TABLE OLIVES PRODUCTION IN GREECE

1.1 Mains characteristics of the olive oil production in Greece

1.1.1 Introduction

- **Olive growing sector in EU**

European Union is the major producer/consumer of olive oil in the world as it contributes by 80% in the worldwide production (more than 2 millions tons)and consumes the 70% of olive oil in a global level.

Olive growing is widely spread in the Mediterranean region. Oil is important for the rural economy, the cultural heritage and the local environment. In the EU Member States, the olive groves covered about 5,163,000 hectares, in 2000, or the 4% of UAA (from which the 48% in Spain and the 22.5% in Italy). About 2.5 millions producers – one third of all the farmers in EU – work in olive growing farms. From those farmers 1,160,000 come from Italy, 840,000 from Greece, 380,000 from Spain and 130,000 from Portugal. Olive-crop growing constitutes the sole economic activity and the main source of employment in a large number of regions and has shaped the landscape in the countries - producers for many centuries. Greece is the third olive oil producer country in the world (after Spain and Italy). but Greek olive oil has not gained yet the appreciation that its quality deserves in the international market. Tunisia, Turkey, Syria and Morocco have also an important share in the world olive oil production (500,000 tons, at the period of 2000/2001 or the 25% of EU production and the 20% of total world production).

European Union imported 127,000 tons of olive oil from third countries (mainly in bulk) and exported 290,000 tons mainly to the United States of America, Japan, Canada and Australia at the period 2000/2001. The olive oil is exported mainly in bottles.

The principal objective of EU policy concerning olive oil is the maintenance and the strengthening of its position in the world market with the encouragement of high quality products production, which benefits the producers, the processors, the tradesmen and finally the consumers.

The budget of Community policy for olive oil exceeds the 2.3 billions of Euros, annually. The promotion measures for olive oil production in European Union have changed considerably from 1966 when the first Common Organisation of Market (or "regime") was established in this sector through Regulation No 136/66/EEC. At that time, Italy was the only olive-oil producer among the six Member States of Community. The first measures aimed at the strengthened of the market price of olive oil, with the provision of special aid to the producers (mainly to the small producers) and the reinforcement of standardisation of olive oil. The Community:

1. defined limits with regard to the olive-groves that were eligible for aid (in the frame of the Maximum Guaranteed Quantity),
2. determined low limit prices,
3. established the protection of prices in the exterior borders,
4. organised the public reinvestment and the private reinvestment so that less surpluses exist in market, and
5. granted returns at the exports in order to facilitate olive oil sales to third countries.

With the accession of Greece (1981), Portugal and Spain (1986), European Union was transformed from an importer to a true exporter; more than that, it became the determinant actor in the olive oil world trade. Under this new situation, it was clear that the rules, foreseen in the initial Regulation, were outdated and for this reason Regulation modifications were introduced in 1984,1998 and 2001.

- **The "interim" olive regime**

The most important modifications of EEC Regulation No 136/66, in 1998, were the following:

- ↘ Reduction of the number of the policy tools; production subsidy became the basic aid instrument.
- ↘ Production subsidy is granted to all producers on the basis of

- the produced olive-oil quantities (and not on the number of trees) and
- a pre-determined olive-oil yield per production area (as it was in force for the small producers and it was abolished in 1998).

- The maximum guaranteed quantity of EU olive that is eligible for production subsidy was increased by 31.6% (from 1.35 millions tons to 1.78 millions tons per year). These 1.78 millions tons were distributed among the Member States in the form of national guaranteed quantities. In addition, the production subsidy was decreased from 142.2 Euros/ton to 132.5 Euros/ton
- The public reinvestment (intervention) was replaced by a system of private reinvestment contracts in order to abate the serious market disturbances.
- A GIS (geographic information system) should have been developed in all the olive-oil producing Member States and record olive trees areas.
- The new olive trees that were planted after 1st of May 1998, they would not be eligible for support.
- Olive producing Member States have the possibility to grant aid to the table-olive producers under the frame of their national guaranteed quantities.
- The consumption support was repealed.

- **Production subsidy**

The production subsidy is granted to 2.2 millions out of the 2.8 millions of registered olive producers in the European Union. From an economic point of view, this is the most important measure regarding olive regime. The aid is granted exclusively according to produced quantity. A percentage of this subsidy is retained for measures of olive quality improvement and for assuring the producers organisations operation. Some of these measures are applied at national level.

- **Maximum guaranteed quantity**

The production subsidy in each Member State is limited to the national guaranteed quantity. A portion of 42.8% of maximum guaranteed quantity has been allocated to Spain, 30.6% to Italy and 23.6% to Greece.
If a Member State exceeds the national guaranteed quantity, the production subsidy, which is granted to the producers, decreases proportionally. If the production in a Member State exceeds the national guaranteed quantity, a percentage of 20% of this excess can be used for the compensation of excess of the national guaranteed quantity of another Member State, while the 80% can be moved to the national guaranteed quantity of the next campaign, taken into consideration the big annual fluctuations concerning olive production.

- **Olive growing and environmental issues**

Certain types of olive production are related with environmental problems, such as soil erosion, exhaustion of aquatic reserves and pollution from the excessive use of fertilizers. However, in a lot of European regions the cultivation of olive trees contributes to the maintenance of both natural environment and landscape. The rural-agriculture-development programs as well as the agri-environmental programs provide financial assistance for environmental protection and mitigating actions (for example by encouraging improved farming conditions, control of harmful substances, improved methods for harvesting and processing of olives, storage of olive-oil and disposal of waste).

- **The market of olive-oil in Greece**

The market of packaged olive oil in Greece presents a decrease the last years mainly because of the increased production of bulk olive oil. One of the most important problems that the sector of olive production faces is the illicit competition that is created by the sale of bulk olive oil, which is merchandised from the producer to the intermediary tradesman, who directs it to other channels of distribution, with final target the sale to the consumer. For the State, this means an enormous loss of income from the VAT not collected, whose order of magnitude is 0,16 –0,18 € per kilogram, from the tax evasion all people involved and from the added value of product. For the consumer this means danger for his health, as he is not aware of the composition of the product that he buys

and which, many times for speculative reasons, is adulterated. A study conducted by SEVITEL (Greek Association of Industries and Processors of Olive Oil) results that a reduction of 30% of the bulk olive oil will have as consequence the reduction of price at 0,29 € of packaged product because of the economies of scale that would be created in the enterprises of packaged products by the increase of the sales.

By ancient Greece up to today, the olive, the holier tree of Greece, is connected immediately with the culture and the diet of the country, as of most Mediterranean countries. In Greece, today, exist more than 150,000,000 productive olive trees that cover around 750,000 hectares. Most of them are found in Crete and Peloponnese and Western Greece, the Sterea Ellada and the Northern Aegean follow.

According to Ministry of Agricultural Development and Food data the distribution of arboriculture in Greece is given in the following Chart 1 : Distribution of arboriculture in Greece.

Chart 1 : Distribution of arboriculture in Greece

A comparison with similar maps of citrus fruits and other arborescent crops will reveal that olive trees are predominant in South Peloponnese, Crete, Lesvos Island and Sterea Ellada.

The sale of packaged product is conducted through the big chains of super markets that circulate, approximately the 80% of them, while the rest is circulated by medium and small shops.

1.1.2 Evolution of olive groves area in Greece

The growth of olive-groves in the period 1990 – 2003 is presented in

Table 1. A clear continuous increase of the cultivated area between the years 1990 – 2001 can be noticed. A light decrease has occurred in the last two years.

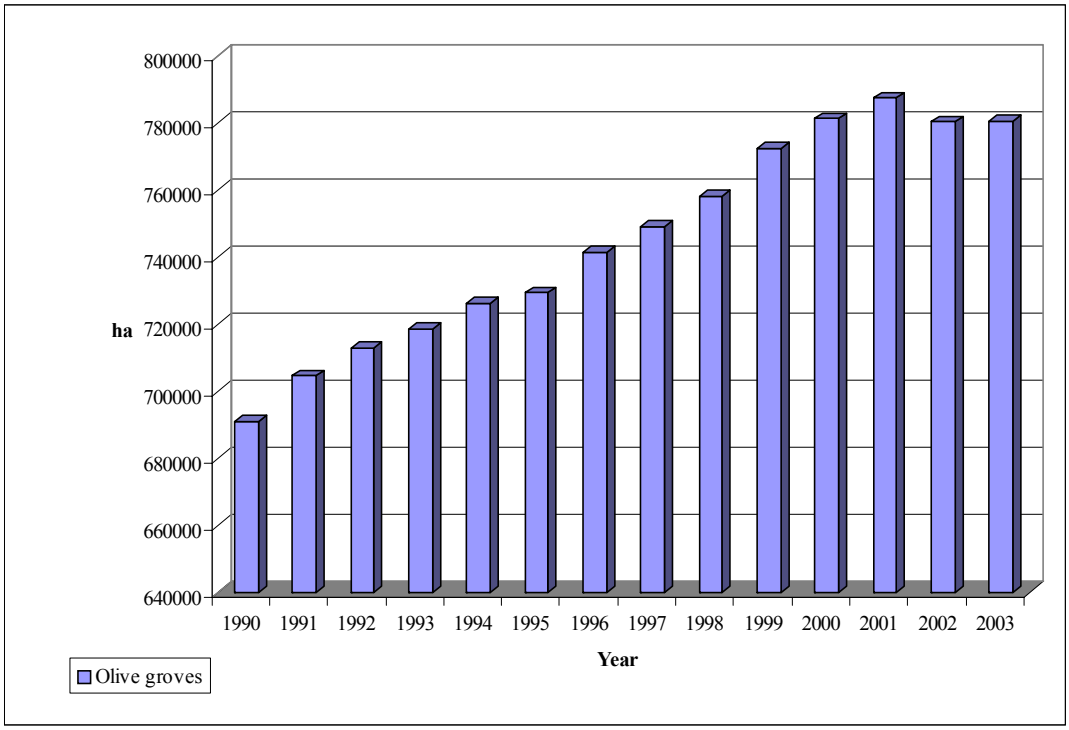
Table 1: Olive-groves in Greece

Area, in ha	Year														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	change 1990-2003
olive groves	690801	704538	712751	718514	726073	729344	741458	749090	758138	772480	781257	787500	780291	780552	12,99%

Source: NSSG

This trend is well portrayed in the next chart.

Chart 2: Olive-groves in Greece



Unfortunately data on new plantations (number of trees) are not available; neither from NSSG nor the Ministry of Agriculture. The only available data-series are the number of olive-trees, information however that is not adequate for estimating the number of new plantations.

1.1.3 Evolution of oil-producers in Greece

The number of organised producers has been continuously increased, with the exception of the last farming period. There are no available data concerning individual producers for all the years.

Table 2: Oil-producers in Greece

	Farming period						
	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
Organised producers	754920	783073	782370	795505	808991	817100	747114
Individual producers		53322	46304				
Total	**754920**	**836395**	**828674**	**795505**	**808991**	**817100**	**747114**

Source: OPEKEPE

1.1.4 Evolution of olives and olive oil production

The growth of olive-oil and table-olive production is given in Table 3 and Chart 3.

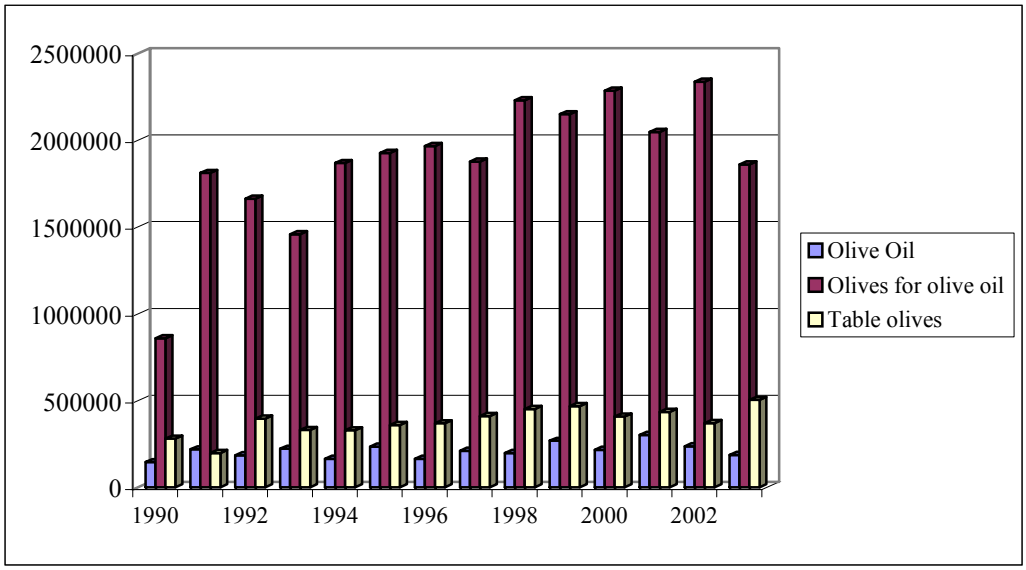
The annual fluctuations of olive-oil production can be observed, mainly due to biennial phenomenon. However, olive production has a continuously increasing trend.

Table 3: Olive oil and table-olive production

Production, in tons	Year														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change 1990-2003
Table olives	144909	219019	184127	222375	164158	234960	164266	210498	197107	268406	216109	302230	236300	186619	28.78%
Olives for olive oil	858818	1811519	1663061	1458704	1868634	1926774	1967364	1876667	2230508	2150646	2285963	2047704	2337535	1860638	116.65%
Olive Oil	281749	197850	396155	331199	329386	359967	370114	411285	451892	467918	408375	434946	370703	504169	78.94%

Source: NSSG

Chart 3: Evolution of olive oil and table olives production



Source: NSSG

1.1.5 Evolution of olive trees

The number of olive trees has been continuously increasing during the last decade. Its growth is given in

Table 4 and Chart 4. The growth of the number of olive-trees per hectare is also presented in

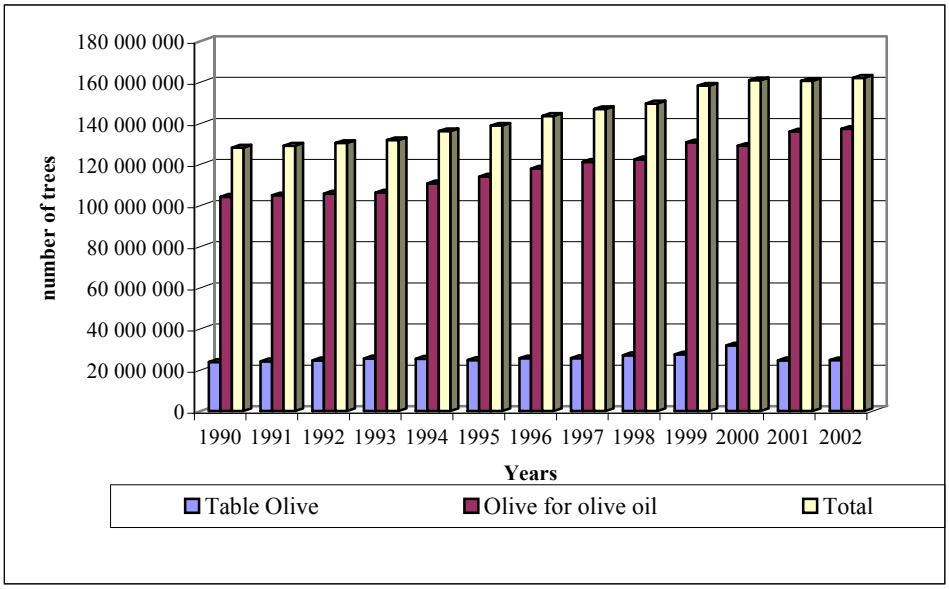
Table 4. The number of trees concerns, both trees for table-olives and olives producing olive-oil. The number of trees has continuously been increasing, with the exception of the year 2000.

Table 4: Evolution of number of olive trees

YEAR	Table Olive	Olive intented to be olive oil	Total	Olive trees per ha
1990	23,889,667	104,291,779	128,181,446	185.55
1991	24,178,338	104,950,000	129,128,338	183.28
1992	24,719,913	105,760,046	130,479,959	183.07
1993	25,614,817	106,248,762	131,863,579	183.52
1994	25,475,659	110,772,737	136,248,396	187.65
1995	24,895,382	114,003,029	138,898,411	190.44
1996	25,695,736	117,905,650	143,601,386	193.67
1997	25,793,628	121,182,101	146,975,729	196.21
1998	27,229,622	122,481,028	149,710,650	197.47
1999	27,592,145	130,769,382	158,361,527	205.00
2000	31,914,379	129,053,238	160,967,617	206.04
*2001	24,715,116	135,951,606	160,666,722	204.02
*2002	24,775,885	137,338,029	162,113,914	207.76

Source: NSSG, * Ministry of Agriculture

Chart 4: Evolution of number of olive trees



The area covered by olive-trees compared to the total area covered by tree crops in Greece, is about 77.51% (for the period under examination) a number indicating the significance of olive farming in Greece.

Olive efficiency is around 3 ton/ha, after 1990 and has been increased compared to the previous years, reaching a maximum of 3.30 in year 2002. Although there was a decrease in the cultivated area in 2002, the production was increased; hence, the higher efficiency results.

Table 5: Evolution of olive efficiency (ton/ha)

	Year														
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**Percentage change 1990-2003**
Olives	1.45	2.88	2.59	2.34	2.8	2.96	2.87	2.79	3.2	3.13	3.2	2.98	3.3	2.62	80,69%

The percentage change over the whole period 1991 – 2002 is increasing.
The average value for the 11 year period of 1991-2002 is equal to 1.68%. However, if the last year (2003) is included the average change becomes almost zero (-0.18%). The year 2003 was an exceptional year .. If on the other hand the first year (1990) is included then an erroneous average change is calculated equal to 7.42%.
The total percentage change for all the period (calculated as the difference between the value of 2003 and 1990) is again erroneous and equal to 80.69%. If, however, the value is calculated for the period 1991-2002, a more reasonable value is obtained equal to 14.58%.

1.1.6 Evolution of the number of mills

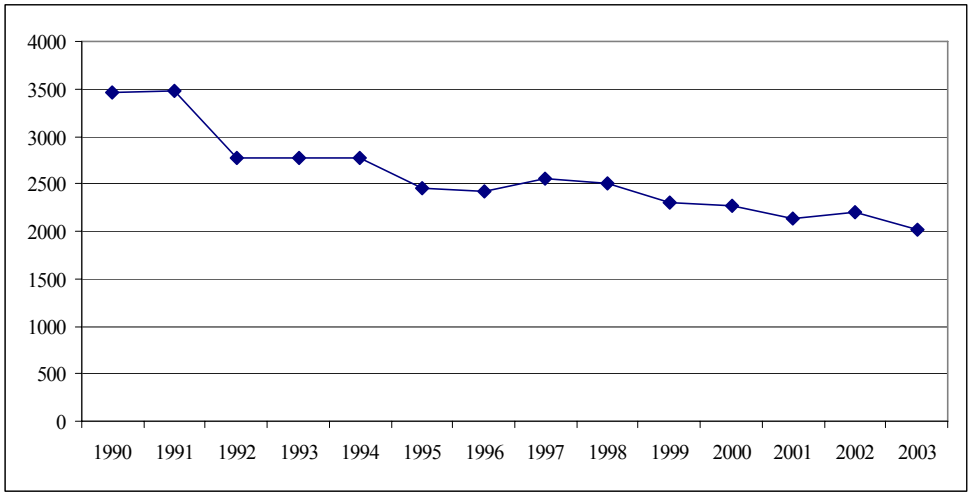
The number of olive-mills throughout Greece, presents a declining trend, about 41.7% during the period 1990 – 2003.
In the next table and chart the number of olive mills is given.

Table 6 : Evolution of olive mills number

Number of mills per region	**YEARS**													
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Sterea Ellada	542	543	439	437	436	345	354	363	367	320	312	282	307	266
Peloponnese	1257	1257	988	990	990	916	920	934	920	859	838	798	810	764
Ionian Islands	331	332	265	262	262	232	204	233	228	190	182	165	174	154
Epirus	112	112	80	82	82	68	61	72	48	63	52	58	51	49
Thessalia	77	77	68	68	68	60	41	76	71	75	60	61	58	42
Macedonia	81	81	66	66	66	61	72	79	79	83	84	85	79	78
Thrace	6	6	3	3	3	3	5	6	6	6	6	6	5	6
Southern Aegean	329	330	259	257	257	191	195	210	215	163	176	125	170	143
Crete	733	733	608	601	601	573	561	576	566	549	554	547	545	519
TOTAL	**3468**	**3471**	**2776**	**2766**	**2765**	**2449**	**2413**	**2549**	**2500**	**2308**	**2264**	**2127**	**2199**	**2021**

Source: OPEKEPE

Chart 5 : Evolution of olive mills number



1.1.7 Evolution of the number of producers organisations (PO)

There were 83 active organisations of producers in the sector of olive-oil and table-olives in 2003, while they were 79 before 1990. (Source: OPEKEPE).

According to legislation the organisations of producers should develop and elaborate operational programmes. In reality no such programmes have ever been realised in the past. The project team came in contact with a number of POs in Peloponnese, during the implementation of the case study. The discussions confirmed that the POs do not have real operational programmes, and the implementation of specific investments was not a priority of the POs. A significant amount of money equal to 1.4 % of the annual subsidy budget, is being allocated to POs, , with the purpose of supporting actions that can improve the quality of the produced oil. However, in reality the Associations of Agricultural Cooperatives, which operate as Producers Organisation, use this money to cover part of their operational costs.

1.2 Mains characteristics of the olive oil production in Peloponnese

1.2.1 Peloponnese as case study region.

Peloponnese is the second olive producing region after Crete. The geographic region of Peloponnese is shared between two Regional Governments; the Region of Peloponnese and the Region of Dytiki Ellada (West Greece Region). The region has 7 prefectures; 5 of them belong to the Region of Peloponnese and 2 to the Region of Dytiki Ellada. For the purposes of the present study the whole (7 prefectures) of Peloponnese is considered.
The prefectures of Messinia and Lakonia (2 of the 7) hold the majority of oliveyards. There are some small differences between these two areas as far as olive farming practices is concerned. The case study was focused mainly to Messinia, an area that produces a high quality olive-oil. In the interviews, olive-oil producers of this area have been used.

1.2.2 Evolution of the olive groves area - 1990 to 2003

The olive-groves area presents an increasing trend from 1990 to 2003 (

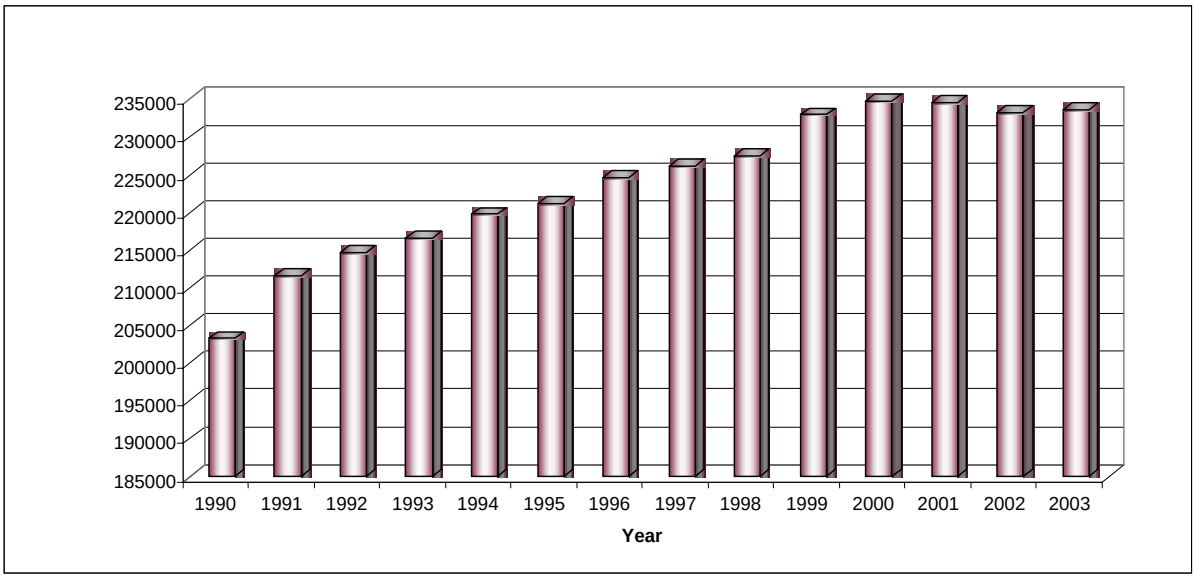
Table 7& Chart 6). The percentage of change in the whole region was 14.91%, and the maximum increase of cultivated area is presented in Argolida Prefecture with Messinia Prefecture coming at second place.

Table 7. Change (%) of olive groves area in Peloponnese and its Prefectures - 1990 to 2003

Areas of olive trees*	Percentage change 1990-2003
Prefecture in the Peloponnese Region	***14.91%***
Argolida	40.62%
Arkadia	0.93%
Achaia	12.67%
Ilia	8.41%
Korinthia	8.47%
Lakonia	7.49%
Messinia	22.21%

Chart 6 that follows presents an increasing trend of the areas that olive trees are cultivated.

Chart 6. Evolution of Olive groves area (ha) in Peloponnese

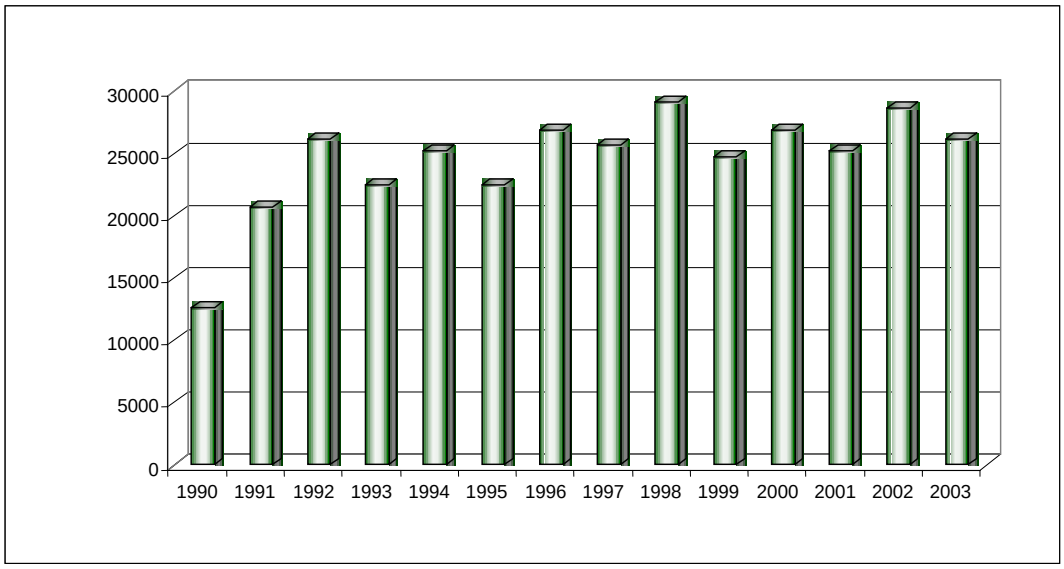


1.2.3 Evolution of oil and table-olives production, 1990 to 2003

Olive (table-olives and olives for oil production) and olive-oil production are presented in this section.

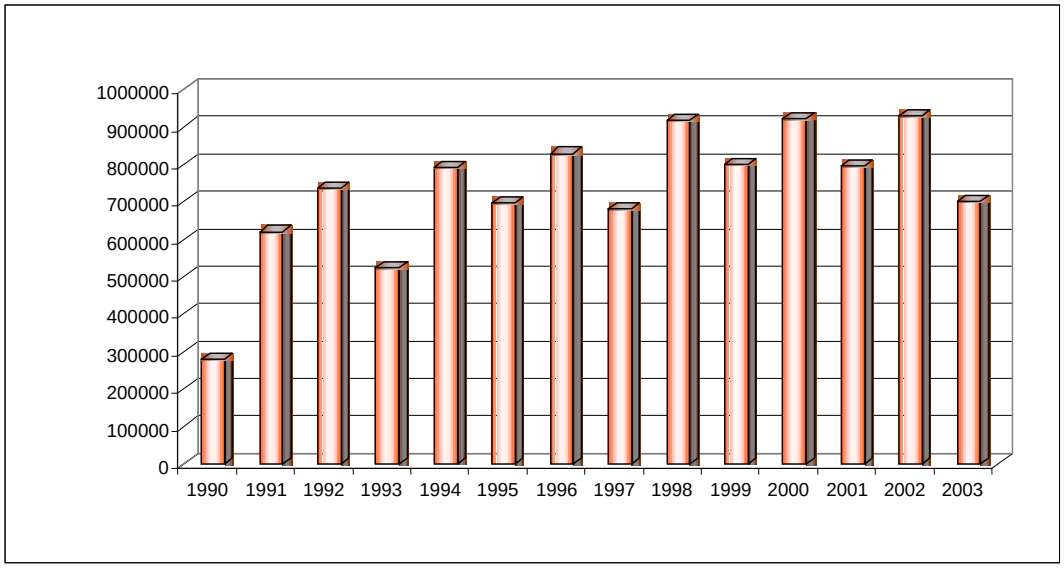
The production of table olives presents fluctuations during the years, but the overall trend was increasing (Chart 7).

Chart 7. Evolution of Table-Olives' Production in Peloponnese (tonnes)



In general, the trend is the same for olives used for olive-oil production (Chart 8).

Chart 8. Evolution of Olives for Olive Oil Production (tonnes)



The evolution of olive-oil production in the Peloponnese region is presented in Chart 9. The year-by-year fluctuation is significant. In Messinia (Chart 10), the last years (2000-2003) the production fell and rose sharply, with a particular fall in 2002 that reached 70.49% and a high raise in the following year, which was in the order of 251.94%.
The total increase olive-oil production in the Peloponnese region from 1990 to 2003 was 108.16%.

Chart 9 : Evolution of olive oil production (tonnes) in Peloponnese

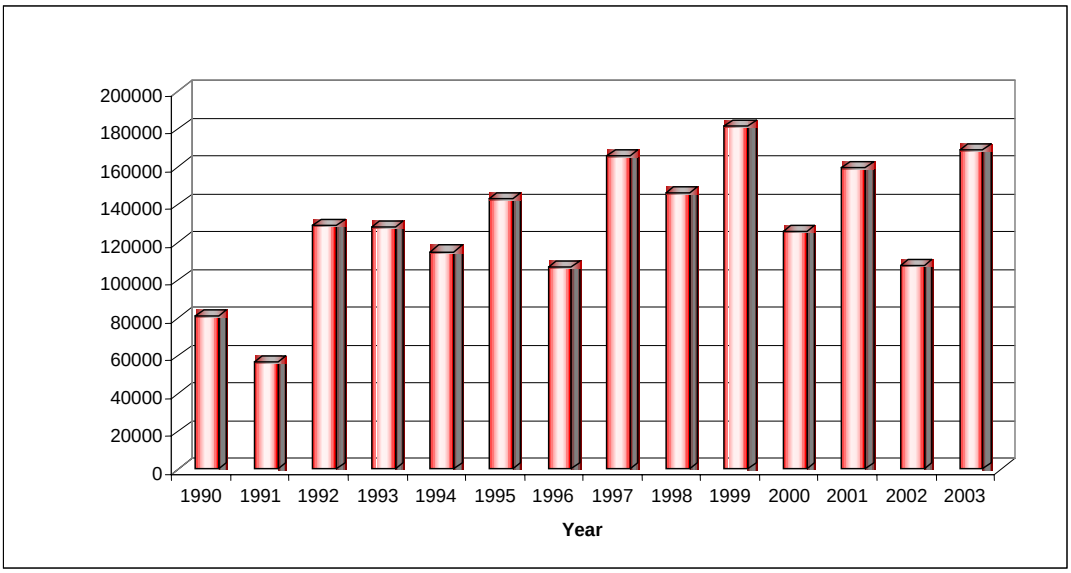
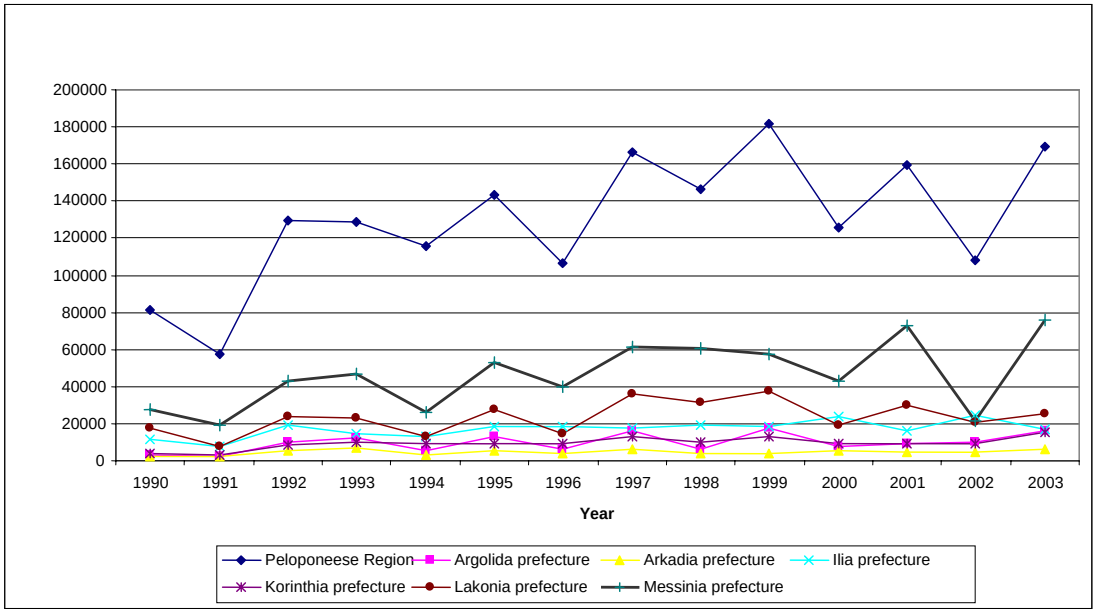
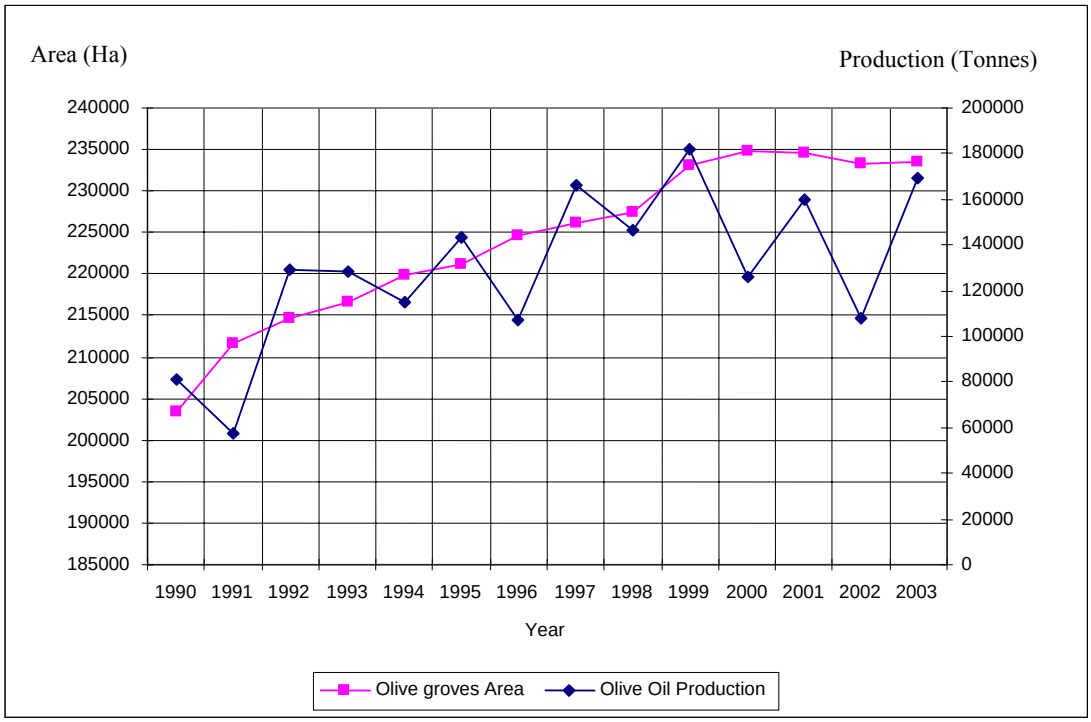


Chart 10. Evolution of Olive Oil Production (tonnes) in Peloponnese Perfectures



The following chart (Chart 11) compares the oliveyards area (in ha) and the annual production (in tonnes) during the examined period.

Chart 11.Evolution of olive oil Area and production, in Peloponnese



Olive efficiency in Peloponnese is about 3.5 ton/ha, after 1990 and has been increased compared to the previous years, reaching in a maximum of 4.11 in year 2002.

Table 8 : Evolution of olive efficiency (ton/ha) in Peloponnese

	Year													
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Olives	1.43	3.03	3.55	2.52	3.72	3.25	3.81	3.12	4.16	3.54	4.05	3.50	4.11	3.11

The percentage change (over the whole period 1990 – 2003) is not a very important indicator, at this point, because many parameters affect olive oil production. The overall change is only indicative of the trend concerning olive oil production per ha.

The efficiency of Olive Oil production is ranged between 0.27 and 0.78, with a mean value of 0.58. A pick efficiency has been realized in 1999 (Table 9).

Table 9. Evolution of Olive Oil Production Efficiency (tonnes/Ha)

Year	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Production/ Area	0.40	0.27	0.60	0.59	0.52	0.65	0.48	0.74	0.64	0.78	0.54	0.68	0.46	0.72

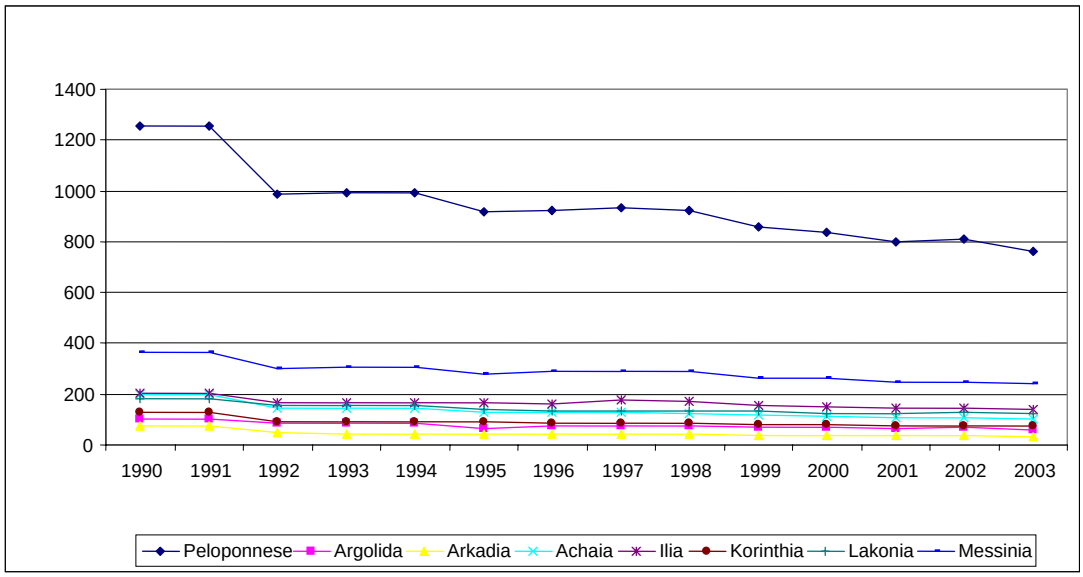
1.2.4 Evolution of olive mills number in Peloponnese- 1990 to 2003

In 1990 the number of oil-mills in Peloponnese was 1257, with Messinia having 367 of them. In 2003 the number of oil-mills has been decreased significantly. A number of 764 mills has been survived (39.22% decrease). The most of them, 269 in number, ceased their operation in 1992, and after that year there was almost a stabilization. Table 10 and Chart 12 present the growth of mills during the period of 1990-2003.

Table 10. Evolution of number of mills in Peloponnese and its perfectures

Perfectures	Years													
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Argolida	102	102	84	87	87	67	75	77	75	72	71	67	69	61
Arkadia	76	76	47	43	43	42	44	43	42	37	36	35	35	30
Achaia	200	200	143	143	143	130	131	128	122	120	113	105	108	102
Ilia	202	202	166	167	167	167	161	177	173	153	150	144	145	137
Korinthia	127	127	90	90	90	91	87	87	86	82	78	74	76	74
Lakonia	183	183	156	156	156	138	135	132	134	132	126	125	128	121
Messinia	367	367	302	304	304	281	287	290	288	263	264	248	249	239
Total	1257	1257	988	990	990	916	920	934	920	859	838	798	810	764

Chart 12. Evolution of Number of Mills in Peloponnese



1.3 Payments under olive CMO in Greece

OPEKEPE the Payment Authority (its description is given in next paragraphs) has the responsibility of payments. Analytical data for each Hellenic region per product are expected from OPEKEPE. At this point a general presentation of payments is given in the following table. Based on data from OPEKEPE we will be able to describe the level of implementation of each measure during the period 1990 – 2003.

Table 11 : Payments under olive CMO

	Payments																
	in mil drs												in thousand Euros				
	1988	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2001**	**2002**	**2003**
Olive	17322	39360	50823	82598	76351	131039	119353	35273	161771	190083	170808	148439	167324	201099	590165	565387	544821

Source: Ministry of Agricultural Development and Food

1.4 Institutional framework of the olive oil production in Greece

In this chapter, the main public and private bodies associated with the production, treatment, payments, control etc of olive in Greece is included. Every body is presented with a brief description of each role.

1.4.1 Institutions in charge of the management and payment of the premiums

OPEKEPE is the responsible authority of paymens under the application of the CAP and CMO.
Aim of OPEKEPE is the management of credits of European Agricultural Guidance and Guarantee Fund –Department of Guarantees. This management is based on a system of control of payment documents of beneficiaries of Community aids and the consecutive recognition and liquidation of expenses, the approval of payment and the relative command, so that the legality of payments is ensured according to the national and Community requirements. Another aim of OPEKEPE is the prevention and the cracking down of any financial irregularity, as well as the recuperation of any pecuniary financial aids, which has been overwhelmed illegally or unduly.
The competences of OPEKEPE, according to the article 24 of Law No 2045/01, are the following:

- the control of payment documents and the recognition and liquidation of expenses. Recording of data and files of payments done.
- the realisation of all kinds of control relative with the legality of payments and the movement of forecasted procedures for the recuperation overwhelmed illegally or unduly, as well as for the imposition of any legal ratification.
- the collection of economic data and the proposal for the formulation of budget of Special Account of Guarantees of Agricultural Products
- the proposal for the publication of decisions and the publication of circulars and directives that determine the details of application of common agricultural policy in the sector of guarantees, the controls and the necessary supporting documents
- the publication and the issuing of imports and exports certificates, as well as certificates of predetermination of contribution in the import and return at the export
- the undertaking of competences of purchase and clearance of products of purchasing intervention, after the decision of Minister of Agriculture as well as the undertaking of competitions, contracting of relative conventions, control of supporting documents, determination of the value of cleared out products, liquidation of financial aids to be recovered or to be returned, follow-up of reserves, ascertainment and certification of deficits or surpluses, deteriorations or alterations
- the maintenance of letters of guarantee and the receipts of guarantees
- the participation in the formulation of lending contracts for the financing of Special Account of Guarantees of Agricultural Products

1.4.2 Institutions in charge of the controls (premiums, surfaces, etc.)

Agrocert
The public, non-profit organization operating under the auspices of the Minister of Rural Development & Food with the title AGROCERT is the standardization, inspection and certification authority in Greek Agriculture. AGROCERT is a Private Law Legal Entity and operates for the public interest. The mission of AGROCERT is the contribution to the improvement of rural population income, the reinforcement of agricultural economy and the sustainable development of the countryside. AGROCERT aims to contribute to the constant collaboration of the different institutions that act as agents of development. Furthermore AGROCERT seeks to become the institutional medium that guarantees the product quality and also implement procedures responsible for the production of qualitative agricultural products.
The scope of AGROCERT is:
the promotion of quality assurance in Agriculture; the protection of terms that refer to a product origin; the support of environmental - friendly systems, such as the system of integrated management in agriculture and forest exploitation. The competences of AGROCERT, according to the current legislation, are:

– The certification of production and surveillance procedures for agricultural products, according to International, European and National Regulations and Standards. The certification is enforced by issuing certificates, compliance labels, quality system certificates and environmental management system certificates.

- The editing and publication of optional standards and guides; the drafting of principles that govern the development and certification of management systems for the quality assurance of agricultural products.
- The evaluation and supervision of the organizations that are responsible for the inspection and certification of organic agricultural and animal products; the control of trade and distribution for the organic agricultural and animal products; the granting of a single label for the acknowledgement of the Greek organic agricultural and animal products.
- The evaluation, approval and supervision of private sectors, responsible for the certification of certain documents application that are composed, published, and recognized by AGROCERT.
- The inspection, supervision and certification of the following agricultural products:
    - protected designation of origin
    - protected geographical indication
    - traditional specialty guaranteed
    - according to valid European regulations.
- Record keeping of the following:
    - Private Organizations that cooperate with AGROCERT and are responsible for certifications;
    - Auditors, technical experts and inspectors responsible for agricultural products;
    - All the certified products;
    - Agricultural exploitations.

The fields of interest of AGROCERT are:

- **Organic Farming Products**
- **Integrated Management in Agricultural Production**
- Quality Assurance of Pork
- Quality Assurance of Mariculture Products
- Quality Assurance of Beef & Veal Meat
- HACCP, ISO
- PDO, PGI, Traditional Specialty Guaranteed Agricultural Products
- Special Poultry Farming

OPEKEPE and Prefectural Authorities are in charge for the control of areas and oil production statements on which the subsidies are based.

1.4.3 Interbranch organisations

An Inter professional Organisation of Olive oil and Olive in national level has been recognised under the Ministerial Decision No 315482/23.12.2002 of Minister of Agriculture, according to the article of National Law 2732/1999. This organisation is operating in a national level, is a legal entity of private rights, it has a not speculative character, and its name is "National Interprofessional Organisation of Olive oil and Olive", with head offices in Athens.

1.4.4 Unions

ELEOURGIKI

Eleourgjki is the Central Co-operative Union of Olive Products of Greece. It includes 60 Unions and represents the 90% of olive growers. It was founded in 1949. Today, its main objectives are the cover of needs of modern consumers with products of high quality and the effort to be evolved to a modern dynamic commercial enterprise.

For the materialisation of these objectives, Eleourgjki allocates units of packing, storage and distribution, modern technological equipment, specialised staff, even organisation and modern perception.

1.4.5 Research and technical institutes

1.4.5.1 Research Institutes

National Agricultural Research Foundation (N.AG.R.E.F.)

The National Agricultural Research Foundation (N.AG.R.E.F.) is the national body responsible for agricultural research and technology in Greece, functioning as a Legal Private Entity sponsored by the Ministry of Agriculture. It was established in 1989 under the Decree 1845/1989 entitled "Development and Exploitation of Agricultural Research and Technology". N.AG.R.E.F. is also in charge of research for technological improvement and development in agricultural, forest, and fish production, it is also concerned with topics of veterinary, management of marine resources, soil science, land reclamation, processing and preservation of agricultural products, as well as agricultural economy and sociology.

The role of N.AG.R.E.F in the improvement and creation of new plant varieties and animal breeds and in the production of healthy propagative material should be emphasised.

N.AG.R.E.F. has taken part in all the EU framework programmes and has also submitted proposals for programmes that are announced directly by the different directorates of the EU and for programmes that are announced through national bodies (mainly the Ministry of Agriculture and Ministry for the Environment, Physical Planning and Public Works). N.AG.R.E.F.'s research activities are carried out through its National Institutes.

The related to fruits, olive oil and wine CMO branches of NAGREF are:

- National Agricultural Research Foundation of arboriculture and vineyards
    - Institute of Olive Tree and Subtropical plants of Chania
    - Institute of vineyards and wine in Attica
    - Institute of olive tree of Kerkyra
    - Self existent Laboratory of genetic improvement and cultivation practices of nuts, in Fthiotida
- National Agricultural Research Foundation of soil science and water resources
    - Institutes of Soil science
    - Institutes of land mapping and classification in Larissa
    - Institute of water resources and environmental management
- Agricultural Economics & Policy Research Institute (AG.E.P.R.I.)
- Self existent laboratory of economy of less favorable areas.
- Centers of Agricultural Research Application in 27 Prefectures of Greece, three of them in Peloponnese (Arkadia, Argolida, Messinia)

1.4.5.2 Universities

- ***Agricultural University of Athens***

A) Department of Rural Economics and Development,

The primary aim of the Department is to promote knowledge and to educate scientists specialized in research and in tackling problems connected with the economic, social, political and environmental dimension of a viable rural development within the framework of European integration.

As far as its research activities concerns, the Department participates and plays a significant role in a great number of the most important European programs. The research interests of the Department are oriented towards almost all modern trends in agricultural economy and concern among other issues: Agricultural policy, Integrated agricultural development, International agricultural integration, evaluation of projects and programs, innovation management sustainable development and protection of the environment

Teaching staff duties include further activities, such as evaluation of EU research programs and participation in working groups -depending on their specialization, professors of the Department are called upon to collaborate in groups which work on policy-determining issues. Teaching staff duties also include the evaluation of papers submitted to Greek and international scientific journals as well as presentations of topics of general interest at public events.

B) Department of Crop Science
The Department's objective is to train agronomists who will contribute to the development of Greek agriculture and will upgrade its competitiveness. Under the Division of Horticulture, Floriculture and Landscape Architecture the Laboratory of Vegetable Crops exists and under the Division of Pomology and Viticulture the Laboratory of Viticulture is are hosted and under the Division of Plant Protection and Environment the Laboratory of Ecology and Environmental Sciences exists.

- ***Aristotle University of Thessaloniki***

The School of Agriculture of the Aristotle University of Thessaloniki is one of the Greek Schools for undergraduate and postgraduate university teaching in agricultural sciences. The mission of the School of Agriculture is to advance and transmit knowledge and understanding of the biological, physical and social sciences as they relate to the production, storage, processing, marketing, and distribution of agricultural products in a manner consistent with sustainability of the agri-food business, conservation of natural resources, maintenance or enhancement of environmental quality and the supply of safe and high quality food. The School carries out its mission through undergraduate and postgraduate education and training. The sectors of specialisation concerning permanent crops are: Agricultural Economics; Field Crops and Ecology; Horticulture and Viticulture; Crop Protection.

- ***University of Thessaly***

The "School of Agricultural Sciences" has two Departments:
a)Department of Agriculture, Crop Production & Rural Environment
b) Department of Agriculture, Animal Production & Aquatic Environment
The Department of Agriculture, Crop Production & Rural Environment consists of four sectors.
i) Sustainable Production of Crop and Horticulture Plants includes amongst others the related topics Crop Cultivation, Viticulture and Vegetable Production, Organic Agriculture, Models of Plant Growth Simulation, Agricultural Sociology and Policy, Agricultural Economics and Marketing of Agricultural Products.
ii) Plant breeding and Biotechnology, which focuses amongst others on the Agricultural Pharmacology and Control of Agrochemicals in the Environment.
iii) Integrated Crop Protection and
iv) Water Resources, Soil Resources and Agricultural Engineering.
The related research topics of this Sector focus on irrigation and Drainage, Hydraulics and Water Quality, Plant Nutrition and Fertilizers, Sustainable Management of Water and Soil Resources, Soil Pollution and Management.

1.4.6 Institutes for statistics

The National Statistical Service of Greece is a General Secretariat of the Ministry of Economy and Finance, with the following structure: a Central Service, with two General Directorates, twelve Central Divisions and seven Decentralised Divisions.

- Sources providing the NSSG with data:

Individuals, households, public and private enterprises of almost all the branches of economic activity (agricultural, industrial and commercial enterprises, enterprises providing services), state services, local government, public utility organizations, educational establishments, hospitals, social insurance organizations etc consist the sources from which the NSSG collects data. These data are then tabulated after the appropriate processing. The response rate of the above sources is considered satisfactory and facilitates the collection of data by the NSSG.

- Data Collected

The statistics compiled by the NSSG – monthly, trimestrial, annual, quinquennial and decennial – cover almost all the activity sectors. Population data (population by different categories, vital statistics – marriages – births – deaths), employment and unemployment data, data concerning health and social insurance, education, justice, the production process, finance, prices, the national income and, finally, the cultural activities consist the main input for the derivation of statistical tables and indices compiled by the NSSG on a short-term and long-term basis.

- The use of the NSSG Data

The State is the main user of statistics and indices compiled by the NSSG. On the basis of these data it materializes and follows-up its policies in various domains. Other users are the European Union, which needs the particular data of its Member – States in order to compile the European statistics, international organizations (UN, UNESCO, FAO, ILO, OECD etc), businessmen, scientists, researchers and analysts, as well as citizens.

- Points of particular interest for the NSSG

The National Statistical Service of Greece concentrates on and operates properly in order to:

- coordinate effectively all the statistical works,
- ensure the harmonization of statistics compiled in our country, through uniform methodology, concepts, definitions and classifications to be applied by all services and institutions,
- provide methodological support to services and institutions asking its assistance,
- set up and update databases and meta-databases,
- provide products of high quality.

The data gathered by NSSG are:

- Census Of Population 1991
- Censuses 2000-2001
- Demography
- Labour Market
- Indices
- National Accounts
- Trade & Services
- External Trade
- **Primary Sector**
  - Aquaculture and Fisheries
  - **Survey on the Structure of Agricultural** - Livestock Holdings
  - Distribution of the Country's Area into Basic Categories of La...
  - **Agriculture and Livestock Census**
  - **Agricultural Statistics**
  - Fishery Census
  - Livestock Surveys
  - Annual Agricultural Survey
  - Input - Output Price Indexes in Agricultural and Livestock Pro...
  - **Survey on Agicultural and Livestock Products**
- Secondary Sector (Industry)
- Social Statistics

1.5 CMO implementation context in Greece

1.5.1 Environmental actions of operational programmes

The environmental actions that might be included in an operational programme of a Producers Organization can be one or more of those suggested in the **Ministerial Decision No 396122 (Athens, 9-10-2000) on the subject "**National Regulating Frame for the environment", concerning the obligatory application of environmental friendly actions by the producers organizations.
According this Ministerial Decision, the producers organizations should undertake the following environmental actions:

A) Environmental friendly actions and related investments

1) Investments for integrated production. The investments should be in accordance to the International Organization for biological Control (IOBC/ WPRS) and may be the following:

- Promotion of use of supported methods of fighting of enemies and illnesses, which methods are friendly to the environment, economically viable and socially acceptable

- Encouragement of research and practical application, education and information mainly in biological methods of fighting as well as in all the methods that include use of chemical substances in the frame of system of integrated confrontation of enemies of cultivations
- Formulation of guidelines on integrated production, development and establishment of control methods of the effects of plant-protection products in beneficial species.

2) Investments for integrated combating of diseases, enemies and herbs. These actions may be the following:

- Technical assistance , training and information. Training for trainers – executive officers from the Ministry of Agricultural
- Equipment and tools for the application of integrated combating

3) Rational use and reduction of agrochemicals for the protection of soil, water and landscape quality.

For nitrated polluted areas according Directive No 91/676/EEC concerning "the protection of waters against pollution caused by nitrates from agricultural sources", the Code of Good Farming Practice (Ministerial Decision No 85167/ 820/ 26.3.2000) should be followed. For the rest areas the Code of Good Farming Practice which includes the minimum environmental obligations or the producers.

In cases of sludge use for cultivations fertilization, this will be applied in accordance to Joint Ministerial Decision No 80568/4225/22.3.91 on the methods, terms and restrictions for use of wastewater treatment sludge in agriculture.

4) Actions for the preservation and promotion of biodiversity. The related actions that should be applied by the OP are:

- Measurement of indicators of the present situation. Determination of spots where a significant problem exists or they have significant value for the wild species.
- Actions for the avoidance of destruction of dwellings of wild fauna (eg nests of birds etc) and self sown wooden plants (provided that they do not become weeds)
- Planning for the increase of dwellings and biodiversity (eg careful management of hedgerows and weeds, installation of new hedgerows)
- Maintenance of safety zones at the application of fertilizers and plant-protection products
- Parallel cultivation of many species of trees or horticultural instead of monoculture
- Preservation of part of rural holding without cultivations (at preference in the periphery)
- Taking of special measures for the protection of threatened species of the region

5) Treatment and management of used packaging - materials waste

The following legislation should be followed: Law 1650/86 on the protection of environment" and Joint Ministerial Decisions 19396/1546/18.7.1997, 9728/824/96, 114218/31.10.97, 14312/1302/00, as well as the code of good farming practice.

More specifically for the packaging and processing plants of producers organisations the approval of environmental terms and the authorisation of waste disposal should become accordingly with the national and European legislation.

6) Analyses of soils, and remainings in products and waste

i) Soil analyses for pollutants, such as heavy metals (Cu, Pb, Zn, Cd), nitrates and indicators of soil quality such as "bio-indicators".

ii) Analyses of products for residuals of plant-protection products. Analyses of products for remains of plant-protection products bases in Commission program (Commission recommendation of 17.12.99) and the National program (Circular No 90783/22.3.00 of Ministry of Agriculture).The analyses are held in annual base.

iii) analyses of waste

7) Waste and water analyses

Water intended for irrigation will be analyzed periodically for possible pollutants (salts, nitrates, toxic substances etc) that will pollute the soil and the underground natural water resources.

8) Disinfection of soil

The chemical disinfection of soil should be avoided. It should is taken into consideration the national policy for the application of protocol of Montreal for the progressive withdrawl of methyl bromide. It is recommended the application of alternative methods.

9) Reconstitution of hedgerows
The presence of hedgerows in the limits of rural exploitations is obligatory
10) Recycling of nutritious solutions (sublayers)

i) the utilisation of sublayers of domestic origin such as pumice and perlite Is recommended
ii) With regard to the nutritious solutions the promotion of "closed systems" is recommended
iii) In case of "open systems" becomes cutting of bags of culture with sub layer of perlite or pumice

11) Actions for the abolition of withdrawn products with technologies henceforth advanced from those forecasted in the National Regulating Frame for the withdrawls
12) Improvement of composting method
13) Genetic improvement, trials of genetic resistance in the illnesses, experimental orchard (concerning the environment) after approval of Ministry of Agriculture

B) Internal audits for keeping quality standards, plant-health regulations and maximum allowed content in residues, technical means and human resources suitably educated for the execution of audits (obligatorily).

i) Formulation and distribution of rules that the Organisation of Producers places in application and which can be extended in the producers not members (annex III, of Reg No 2200/96 and the Code of Good Farming Practice)
   - Rules of information providing with regard to the production
   - Rules of production
   - Rules of marketing
   - Rules with regard to the withdrawl

   The withdrawl should be materialised in a way so that the environment is protected
ii) Acquisition of technical means and suitably educated personnel for the realisation of audits
iii) Qualitative control for the observation of plant health regulations and particularly the maimum allowed content in residues

C) Creation of chains of production of organic products
1) Creation of lines (infrastructure) of organic products
In the frame of formulation of National Regulating Frame, it is not allowed for the Producers Organisations of organic products or Producers Organisations that are activated partially in the sector of organic agricultural products to proceed to product withdrawl.
The lines of infrastructure of organic products are based on the initiatives of ORGANISATIONS OF PRODUCERS and their unions, interprofessional organisations, other joint initiatives and individual businessmen, which are included in the registrations of biofarmers - businessmen of Ministry of Agriculture.

1.5.2 Relationship between AEM measures and orchards.

No specific Measures relating to olives have been proposed in the AEM catalogues. But in many Measures the contracts signed concern olives.
According to the existing data of AEM implementation and evaluation the situation concerning AEM is as follows.
The Agroenvironmental measures (AEM) have been implemented in two distinct phases in Greece. During the first phase 4 measures were implemented according to Reg.(EEC) 2078/92 from July 1995 till 1999. According to this Regulation an aid is foreseen for farmers, who undertake the obligation to follow certain codes / rules of production, with positive environmental impacts. With a 5-years contract, farmers were obliged to follow a Farming Plan in compliance to the obligations of Reg.2092/91 and its amendments and be under the inspection of a Certifying Body. In Greece, these programmes were:

- Organic farming
- Long term set aside of agricultural land

- Protection of rare breeds of farm animals
- Reduction of nitrate leaching of agricultural origin at the plain of Thessaly

The most significant programme of organic farming was approved in 1995 (EC Decision E(99)12 of 20-01-1999.) with a budget forecast of 4.2 millions ECU covering 6,000 ha up to 1997. Priority was given to holdings already under the inspection of Certifying Organisations (and most of them were geographically randomly distributed), holdings into NATURA 2000 candidate areas, holdings of lakesides, riversides and seaside areas, holdings of islands (with exception of plains on Crete and Evia islands) and finally mountainous and semi-mountainous areas with altitude more than 200 m. In case of no response and no uptake at the above-mentioned areas, the plains would be eligible from the beginning of year1997.
At the end of 1998 a total of 1305 farmers and 6,501.6 ha were contracted and the program was amended in 1999 having an extension of 14.000 ha. At the end of 1998, classified by crops, olives were representing the vast majority (58%) of the contracted UAA. The rest were wine vineyards (9%), cereals (9%), arboriculture (8%), citrus (6%), horticultures (5%) and raisins (4%).

Table 12: Evolution of the AEM 2078/92 of Organic Farming in Greece (1995-1999)

Year	No of new contracts	New Contracted Area (ha)	Total expenditure (GDR)
1995	332	2,356.2	464,716,000
1996	326	1,318.3	936,647,750
1997	586	2,347.1	62,927,416
1998	61	4,884.0	777,618,811
1999	N/A	N/A	N/A
Total	**1305**	**6501.6**	**2,241,909,977**

At the end of 1999 organic farming covered hardly 0.12%, of the total cultivated area. That low implementation was probably due to the complexity of application of codes of organic farming, since many fungus mainly crops diseases were very difficult to be fight with methods and techniques that were suggested in the frame of the program application.

In the second phase, AEM have been launched in 2001, according to RDP (Single Programming Document of Rural Development). All AEM of SPDRD are included in one sole Axis (Axis 3): Agri-environmental measures. Priority Axis 3 of SPDRD was approved with E(2000) 2733/27.9.2000 decision of European Commission and includes AEM in compliance to Reg.1257/99 and its amendments, with an additional effort for complementarity and harmonization with other EU's legislative documents (e.g. Dir. 91/676/EEC, Dir. 92/43/EEC, Dir. 79/409/EEC).
In order a beneficiary to be financed by any of the AEM Measures of SPD RD he should apply obligatory the Codes of Good Farming Practice, as well as the requirements of the National Regulating Frame for the environment, which has been established in the Hellenic legal framework. Under Joint Ministerial Decision No 125347/568/20.1.2004, the application of codes of good farming practices as they approved by No (2003)3139/22.8.2003 European Commission Decision which amends the SPD RD 2000 – 2006, is obligatory, from the beginning of year 2004. Codes of Good Farming Practices aim to the confrontation of the problems caused by agricultural activities.
These practices aim to:

- sustainable development of farming soils and natural
- protection and maintenance of agricultural landscape and its characteristics
- protection of growers and consumers health

Codes of Good Farming Practices intervene in all the phases of agricultural and cattle breeding activities, as well as in specific cases of areas or zones under special protection regimes.
They are dealing with issues like:

- Inputs management
- Soil treatment
- Crop rotation
- Fertilization

- Water resources protection
- Irrigation systems
- Crop protection
- Self-sown flora management
- Farming waste management
- Waste management

2. ANSWERS TO THE EVALUATION QUESTIONS

2.1 Vertical questions relating to the olive oil CMO

2.1.1 Olive – Theme 1: production based subsidies

Question 1(O1) : Does the production based subsidies of the CMO for olive oil provide an incentive for intensification and irrigated production and if so: what are the environmental impacts in terms of soil erosion, run-off to water bodies, degradation of habitats and landscapes and exploitation of scarce water resources ?

Regulation No 136/66/EEC on the creation of common organisation of market in the olive sector did not foresee subsidies for olive production. The subsidy concept was introduced initially in Regulation No 1562/1978, which modified the Common Organisation of Market in olive sector. Greece received this subsidy after 1981, after its accession in the European Community.
The subsidy in the production of olive oil in the frame of Common Organisation of Market led to intensification of olive groves cultivation, a fact which was expressed mainly by the increase of the cultivated areas and the corresponding production.
The olive cultivated area was increased in the period 1990 – 2001; namely, from 690,801 hectares in 1990 it reached the 787,500 in 2001 (Table 13).

Table 13. Evolution of olive groves

Area, in ha	Year														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	change 1990-2003
olive groves	690801	704538	712751	718514	726073	729344	741458	749090	758138	772480	781257	787500	780291	780552	12.99%

Source: NSSG

At years 2002 and 2003 a light decrease in the cultivated area was observed (780,291 and 780,552 hectares, respectively). This reduction may be attributed to beheating or even uprooting of some olive trees, which were destroyed by natural causes (eg frost, fires, etc) and were not replaced. It should be noted that additional olive trees, which are planted after the 1st of May 1998, cannot be used as a base for producers subsidies in the frame of Common Organisation of Market in olive sector, that is in force since the 1st of November 2001. An area of 3500 hectares of new olive trees plantings was granted to Greece with the Commission Decision of 27/3/2000, as an exception.

The data in Table 13 show an increase of 13% in the olive groves cultivated area, during the period 1990 – 2003.
With regard to olive production, there are big fluctuations from year to year (due to different yearly yields of olive trees). The higher olive oil production, which amounted in 504,169 tons, occurred in 2003 (Table 3: Olive oil and table-olive production), despite the fact that both cultivated area and olive production were smaller in comparison to that of the previous years. According to the growth of the tree per hectare number (from 185 to 206) and the olive yield, olive plantations of Greece are categorised between *"Low input traditional plantations, scattered trees" and "Intensified traditional plantations"* (Beaufoy's report).

At this point, it should be stressed that the olive-oil yield is influenced by many factors. The most important of them are plant nutrition and prevailing climatic conditions. If nutrition conditions is not satisfactory, food indigence is observed concerning both the main chemical elements (nitrogen, phosphorous, potassium) and trace elements (mainly boron). This situation influences not only the olive-oil yield but also the production size and the general condition of the olive tree. Of course

this does not mean that a thoughtless use of fertilizers should be applied; instead the appropriate and advisable fertilization dosages for each type of soil and needs of olive trees, which determined through soil analyses should be applied. Moreover, the predominance of unfavourable meteorological conditions (e.g. extended periods of drought) during the two last phases of olive crop growth (when oil deposits in the olive-crop), decreases considerably the olive-oil yield.

It should be mentioned also, that the efficiency of olive was increased from 1.45 that was in 1990 to 3.30 (ton/ha) in 2002, presenting of course intermediary fluctuations, since it is interrelated with the production, which, as it was reported, has presented high fluctuations from year to year . As it can be seen for the following table Olive efficiency is around 2.8 ton/ha, after 1990 and has been increased compared to the previous years, after 1998, reaching in a maximum of 3.30 in year 2002. Although, we had a decrease of cultivation area in 2002, however the production was increased, hence the higher efficiency results.

Table 14: Evolution of olive efficiency (ton/ha)

	Year														
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**Percentage change 1990-2003**
Olives	1.45	2.88	2.59	2.34	2.80	2.96	2.87	2.79	3.20	3.13	3.20	2.98	3.30	2.,62	80.69%

The percentage change over the whole period 1991 – 2002 is increasing.
The average value for the 11 year period of 1991-2002 is equal to 1.68%. However, if the last year (2003) is included the average change becomes almost zero (-0.18%). The year 2003 was an exceptional year .. If on the other hand the first year (1990) is included then an erroneous average change is calculated equal to 7.42%.

The total percentage change for all the period (calculated as the difference between the value of 2003 and 1990) is again erroneous and equal to 80.69%. If, however, the value is calculated for the period 1991-2002, a more reasonable value is obtained equal to 14.58%.
The most significant output of the above Table is the increase in olive efficiency after 1998 (after the change of CMO subsidies).

The olive-oil yield differentiates significantly between areas, even in the same prefecture. The Ministry of Agricultural Development and Food has enacted a number of Ministerial Decisions, which define the upper limits of yield per area, and according to which oil production could be subsidized.
As far as the age of existing olive trees concerns, most of them are old. More specifically, 131,200,000 olive trees, from the total 152,100,000 that were existed in the period 1998/1999, were full productive; the remainder 20,900,000 trees were young and not productive and they were expected to enter the full production phase after a decade, in the period 2008/2009 (data form NSSG).
Provided that an olive tree has entered in full production, the height of its production does not influenced further by the age of tree, under the condition that the olive tree receives the suitable cares (ground ploughing, crop health protection, etc).
Concerning new plantations, no data are available from the Ministry of Agriculture, except of 3500 ha of new olive plantation, that took place after 2000. With the Commission Decision of 27/3/2000, the Greek National Program of new plantings of 3500 hectares of olive trees was approved according to Article 4 of EC Regulation No 1638/1998. The olive cultivated area in 1998, (758138 hectares), in comparison to the olive cultivated area in 2001 (787500 hectares) shows that the approved area of 3500 hectares of new plantations was overlapped. There are no data concerning the type of farming in these new plantations.

As a conclusion from the data/discussion above, an intensification of olive growing has been taken place in Greece, mainly after 1998.
The intensification of olive farming in Greece, that was expressed mainly by the increase of production, cultivated area and efficiency, had certainly some environmental impacts on the soil, water and landscape.
As far as the relationship between intensification and CMO premium is concerned, it is estimated that CMO premiums enhanced this intensification. This relationship was weaker than other crops, such as maize, or raisin (according to case study interviews)
There are no indications that some olive were more concerned on CMO premiums than others. All the growers (even these small farmers that they have olives for their own consumption) had benefit from CMO premiums.

Case study results
According to the interviews with the olive growers that were realised in the Prefecture of Messinia (Peloponnese), particularly in the Pylia and Meligala Provinces, the subsidies that the olive oil producers have received did not constitute a motive for further increase of olive oil production. This is argued by the fact that the most of them haven't increased their cultivated area. Only one olive grower (out of 23) bought some land in the beginning of the '90s, which was already cultivated with olive trees.

- **Soil**

The intensified traditional olive plantations dominate in Greece, but traditional olive groves also exist. The intensive modern olive plantation has been introduced the last years and in many regions of the country is found in an experimental stage. Unfortunately, no available data exist, that could allow the quantification of these plantation types .
In the intensified traditional olive plantation, surface tillage is applied twice during spring (milling in depth of 5 – 20 cm). All the other time the ground is covered by natural vegetation. Deep tillage is applied only when a parcel is to be planted for first time. This practice does not assure of course, that inadequate methods of ground management are not applied. Many times milling is taken place in wetted ground that has as a result the soil compaction and its structure destruction. If this is applied continuously, it can turn the ground inactive and easy to erosion.

In Greece, intensified olive tree farming and the use of agricultural machinery in farmlands, which compact the ground and causes the formation of a surface crust (thus reducing the infiltration of water in the ground), increased the grounds vulnerability in the olive groves (CEC, 1992,CORINE). The abandonment of olive groves in the past years, followed by an intensive pasture of the goats and sheep is also a soil erosion factor in Greece (Yassoglou, 1971).

The problem of soil erosion is more intense in the inclined grounds, in which milling does not become at contour lines, as would be supposed regularly, but uptight to them resulting in increased soil erosion.
In the case of traditional olive groves that are located mainly in the small islands of Aegean Sea, soil erosion is caused by the abandonment of the cultivations (destruction of terraces due to lack of maintenance). This can also cause settling of the ground and in certain cases desertification of a particular region, when for example the abandonment of the cultivations is followed by repeated fires or exceeding pasturing by sheep and goats.
The general characteristics of the main types of olive groves are presented in the following table, and can easily be seen that are in agreement with the relevant data of the Beaufoy's study.

Table 15 : General characteristics of main types of olive groves

	traditional olive groves	**intensified traditional olive plantation**	**purely intensive practices**
Typical location	small islands of Aegean Sea	Crete, Peloponnese, Sterea Ellada, Ionian islands, Lesbos	Crete, in some limited areas of Peloponnese
Terraces with supporting walls	abandonment of these cultivations- terraces destruction due to lack of maintainance	The existence of terraces is very common. Soil erosion is more intense in the inclining grounds, in which milling does not become at contour lines, as would be supposed regularly, but uptight to them resulting in increased soil erosion.	No terraces. Cultivation in flat lands.
Management of understorey	Surface tillages and very often manual herbs cutting	two surface tillages (milling in depth of 5 – 20 cm) during spring period. At the remainder year duration the ground is covered by natural vegetation. Deep tillage is applied only in case that a parcel is to be planted for first time.	Not met in the case study, but usually, tillages and herbicides use.

It should be noted, that the official authorities as well as the interviewers insisted that there does not really exist intensive olive groves in Greece. However, some ecologists believe that intensive practices are often.
According to Beaufoy's report, the widespread olive production in the semi – mountainous areas of Greece, in combination with the natural lack of water and with the excessive grazing pressure, has resulted in acute desertification problems in some semi arid areas; examples of these problems are quite common in south Peloponnese, Crete and Central and East Aegean islands.
In parallel, estimates based on the PESERA model indicate that the areas with the highest risk of soil erosion by water are located in southern Greece (5 – 10 tonnes/ha/year). Areas with low organic carbon content (0 – 1%) appear mostly in Southern Europe and correspond to areas with high soil erosion risk. No information for trends is currently available. The PESERA results do not always match with data and models employed at national level that can use more detailed information but the model provides a good comparative overview at EU-15 level. Furthermore, currently PESERA focuses only on water erosion and not on wind erosion.
The existing literature for olive cultivation in Greece is focused mainly in Crete, where the highest soil erosion problem related to olive cultivation is recorded by the existing references. (Beaufoy 's report, WWF report).

Case study results
According to the interviewed growers, (in Peloponnese) the problem of soil erosion is limited in specific inclined areas and it has been caused mainly by milling practices. In most inclined fields there are terraces that are maintained and consequently they are protected from the soil erosion. In the inclined fields, where erosion is observed, the cultivators try not to till, and they try to destroy weeds via weed eradication or cutting. In cases that terraces exist, the growers prefer to use tilling instead of herbicides or other more environmental friendly practices, because both cost more; as a result they don't directly relate tilling to CMO subsidies. During the farming period they apply tilling 1-2 times according to the climatic conditions and the weeds density. Tilling is realised during the end of spring and the beginning of summer. This has the result that the ground is not bare during the wintry months, as it is covered by the weeds that are developed because of the autumnal rainfalls. These can protect the ground from erosion in the sensitive winter period.

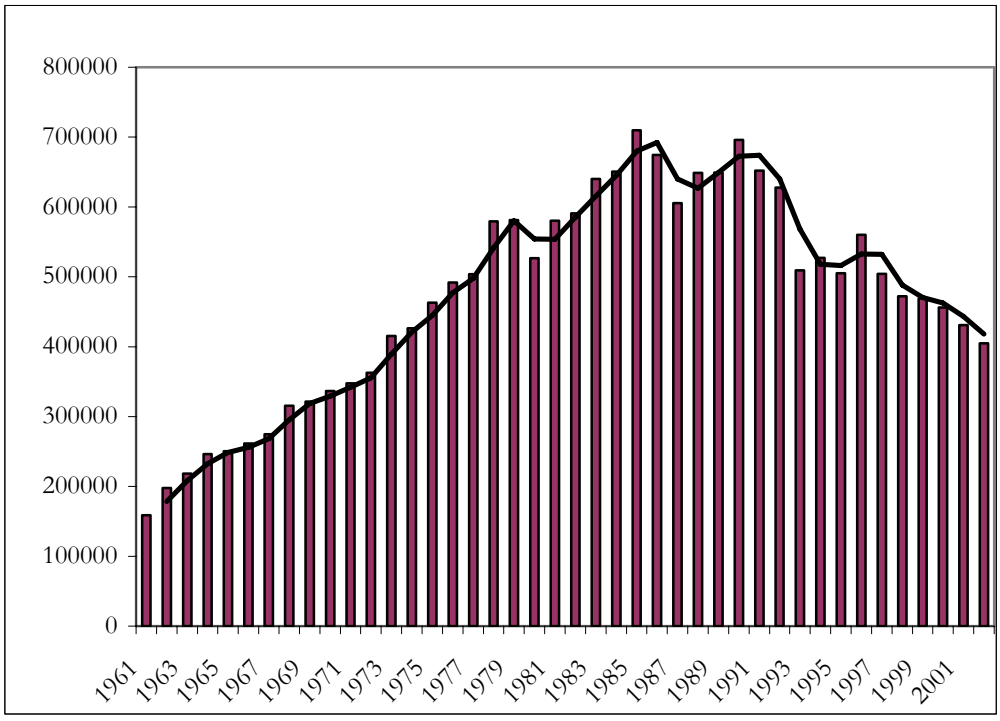
Summarising, there exists soil erosion problems as a result of olive tree farming, which could be reduced by the application of suitable treatment and management soil techniques.

- **Use of fertilizers, pesticides – water run off.**

The quantification of environmental impacts regarding the pollution of water bodies through surface run-off is not possible, because there are no available data concerning the types and quantities of fertilizers and pesticides that are used.
There is no pollution of water bodies when appropriate fertilization, based on the real nutritious needs of both olive tree and soil type (through soil analyses), is applied. However, in Greece, excessive use of fertilizers is quite often with water pollution impacts and pointless or useless increase of production cost.

According to IRENA project the consumption of the Total nitrogen (N) mineral fertiliser had the largest decrease (more than 30%) in Denmark and Greece; at the same time, the consumption of the Total phosphate (P_2O_5) mineral fertiliser in EU-15 decreased by 35% from 1990 to 2001 (3-year averages). According to source, it is difficult to link these trends directly to environmental impacts, as the final environmental impact depends also on other factors.
The total fertiliser consumption in Greece increased from 1961 to 1990 and then decreased from 1990 until 2001 (Chart 13. Evolution of total fertilisers use in Greece (1961 – 2001).
A comparison of the FADN Data for different crops shows that olive farming has the lowest fertilisers cost consumption compared to fruits and vineyards. Thist means that fertlisation is not so much used in olive farming as in other crops. FADN data shows also an increase in fertilisers consumption cost (for all the examined crops), which could led to incorrect conclusions. The fertilizers and soil improvers cost of specialist olives increase is ought to the cost increase of fertilisers, and not in the consumption increase (Chart 14. Evolution of fertilizers and soil improvers cost of specialist olives.

Chart 13. Evolution of total fertilisers use in Greece (1961 – 2001)

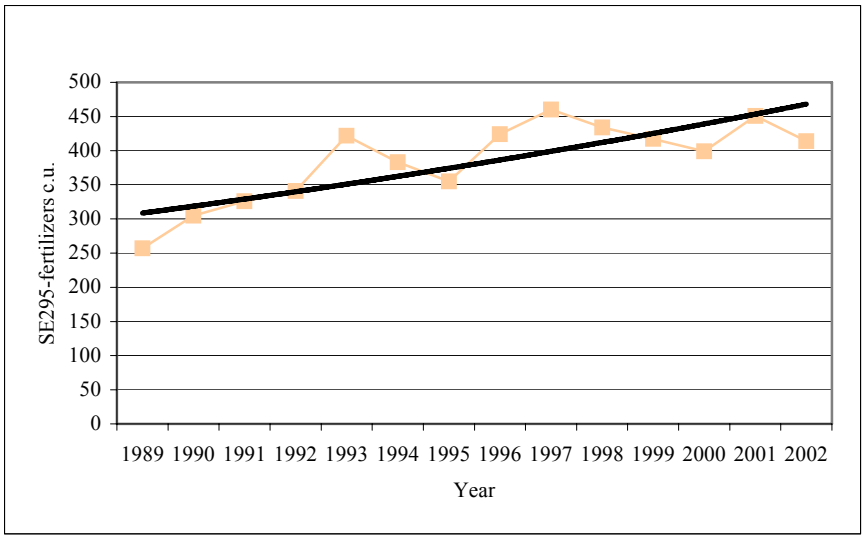


Source : IRENA indicator report

In addition,, the use of pesticides and more specifically of herbicides decreases soil erosion (milling avoidance). However, in case where the suitable crop protection product is not used, both soil and water bodies are polluted. Up to the year 2003, certain pesticides (e.g. Simazine) were used in a small scale, which had big persistent action on the soil and caused water pollution due to surface run-off. Such drastic products are forbidden for other plantations with the exception of olives and the crop protection industries have stopped promoting them. Most of the pesticides that are used today (e.g. Glyphosate) are inter systematic and softer to the ground.

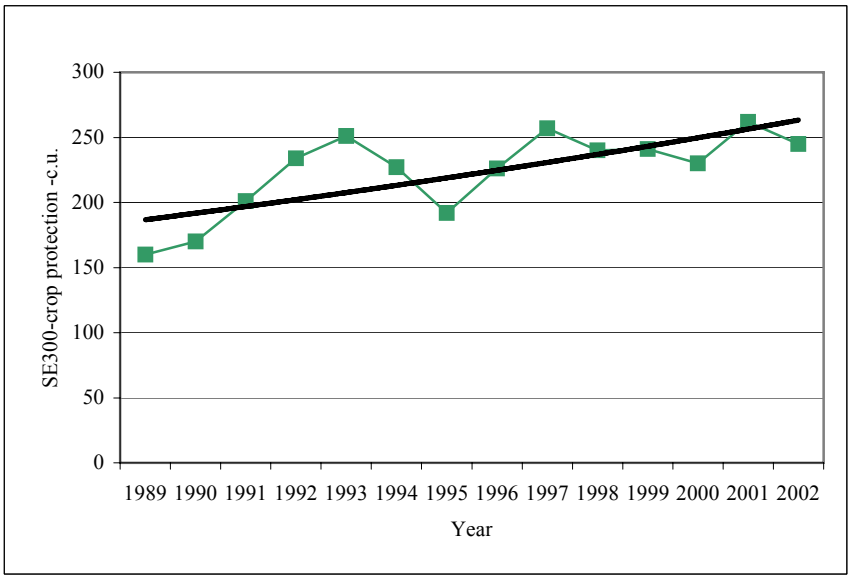
IRENA indicators report estimates that in Greece the pesticide application rates (kg a.i./ha) are higher than the EU average. Currently, existing data does not allow an assessment of the potential increase in environmental risk associated with higher pesticide sales or use volumes. This is partly due to the lack of knowledge on the spatial, seasonal and crop application patterns of pesticides by farmers, and partly due to the changing nature of plant protection products in terms of active ingredients (toxicity), application behaviour and decomposition patterns (persistence).
No specific data are available for pesticides use in olive farming, in Greece. According to FADN data we may notice an increase of crop protection products cost, which is much lower compared to the similar costs of fruits and vineyards.

Chart 14. Evolution of fertilizers and soil improvers cost of specialist olives



Source : FADN

Chart 15. Evolution of crop protection cost of specialist olives.



Source: FADN

It should be emphasized once more the lack of specific data concerning both fertilisers and pesticides consumption in Greece.

Case study results
According to the interviewed olive growers, the use of fertilisers has been decreased (mainly due to their higher costs). More precisely, with relation to the quantities of pesticides and fertilizers used,

it is estimated that in the case study area of Peloponnese, there is a tendency of reduced use and the farmers use both fertilizers and pesticides according to the needs of the trees and whenever this is necessary.
Some of the producers –which are members of a group of producers, who apply integrated production management- record the quantities and types of pesticides and fertilizers they use, as an obligation of the management system that they apply. Since the reduction of pesticides' quantity constitutes one of their environmental objectives, they decrease the quantity of drastic substance per hectare in order to achieve this goal. The reduction of quantity of fertilizers is also included in their environmental objectives. They follow strictly the fertilization protocols that exist for each prefecture in combination with the olive trees nutrition needs (that result from the soil analyses).
Two other olive growers record the quantities of pesticides and fertilizers that they use in the direction of the integrated production management, without officially applying this production management system.
Olive growers that use conventional cultivation practices have decreased the quantities of fertilizers and pesticides during the last years, because of a better information and knowledge and because of increased costs. In parallel with the usage of crop-protection products (mainly sprayings) many producers apply foliage fertilization.

Nevertheless, reliable data on water and soil pollution do not exist. The water in the region, according to farmers, is of good quality regarding pollution and salinity. The interviewed farmers mentioned that there are not any significant problems relating to the runoffs into watercourses, for example drained fields, uprooted woody plants alongside watercourses or ditches; deposits of sediment in watercourses on a farm etc., and in general such phenomena do not occur in Peloponnese.

The above data are in agreement with IRENA' s report statement: An *increase of pesticide residues in the soil could also affect water quality through leaching into groundwater bodies or soil erosion processes. However, the information currently available is not sufficient to provide definite conclusions on trends in average annual pesticide content in soils, and even less so on water pollution risks. This highlights that further research and data collection are urgently needed in this area.*

It is clear that if a right use of pesticides and management of water resources can greatly mitigate the environmental impacts of olive trees cultivation. During the examined period the impacts of intensification to water run-off have been decreased, compared to these of periods before 1990.

- **Landscape**

In Greece, during the last years some land areas have been reclaimed for the planting of new (varieties) olive cultivations. This was a usual practice until 2001, when there was not possible to include the new olive trees in the regime of production subsidy. Moreover, some olive tree clearances happened sometimes.
The planting of new varieties, or olive groves clearances however, could not downgrade the landscape, as they concerned a small piece of land and if a friendly to the environment cultivation practice is applied in the position of the pre-existing olive cultivation. (eg organic farming and integrated agricultural production).
On the other hand, according to Beaufoy's report and Kabourakis reports many olive producing areas were densely forested till the post war period . No recent data exist that could support the statement that, during the last years, olive CMO led to the degradation of landscape,.

Case study results
According to the case study results, terraces exist in the most inclined areas. These terraces are maintained by the farmers and contribute to the preservation of a good rural landscape. The growers have not destroyed hedgerows or terraces, in the contrary they maintain them, limiting the degradation of the ground and the landscape,.

- **Biodiversity**

According IRENA Indicator report rare and more vulnerable farmland species are in decline in Europe, as shown by the number and conservation status of butterfly species in the Prime Butterfly Areas. Their conservation status is generally negative in the EU-15, with Spain and Greece as positive exceptions. Greece has included provisions in the Codes of Good Farming Practices for both biodiversity and landscape.

According to experts – scientists responsible for the mapping of biodiversity in Greece, nothing significant has been done in Greece concerning the evaluation or the connection of the effects of olive groves in biodiversity.

Case study results
According to the farmers interviewed in the frame of the case study, no change has been realised either to the olive groves size or the cultivation techniques that could lead to habitats degradation as old olive trees have not been replaced with other new, neither the planting density has been increased. Two of the 23 producers observed that birds have decreased in number (collared doves) in the olive groves, without, however, being able to relate this observation to certain causes.
The growers have not destroyed hedgerows or terraces, in the contrary they maintain them, in that way limiting the degradation of the ground and the landscape.

- **Exploitation of scarce water resources.**

Case study results
According to the findings of the case study, with regard to water resources, abundant reserves of water exist in the whole region of Messinia in Peloponnese, which are not exploited. Moreover, water consumption for irrigation has not been increased at all in the area; on the contrary in certain cases (e.g. the producers that are members of Groups of producers that follow integrated production management) sprinklers were replaced with drip irrigation, which had lead to water saving.

Concluding, in Greece there was an intensification in olive cultivation, especially after 1998. This intensification can be linked to the CMO and especially to the CMO premium per oil kilogram. The intensification of olive grove cultivation in Greece has happened mainly in areas of Crete and Peloponnese, and had some effects on soil erosion, water run off, landscape and biodiversity.
As far as the relationship between intensification and CMO premium concerns, it is estimated that CMO premiums enhanced this intensification. This relationship was weaker than other crops, such as maize, or raisin (according to case study interviews)
There are no indications that some olive were more concerned on CMO premiums than others. All the growers (even these small farmers that they have olives for their own consumption) had benefit from CMO premiums.
There exists a soil erosion problem, as a result of olive trees farming, which could be reduced by the application of suitable treatment and management soil techniques.
During the examined period the impacts of intensification to water run off have decreased, compared to these of periods before 1990, due to agrochemical use reduction.
In the examined period the olive yards rural landscape has been maintained in a good situation. In case of terraces in sloping olive yards, the farmers try to preserve these terraces.
It is estimated that a reduction of biodiversity has occurred, as a result of olive tree framing practices, without any precise data available, except of estimations of some interviewers.

Question 2 (O1). Do the production based subsidies of the CMO lead to extra inputs of agro-chemicals as an insurance premium for the related income support and if so: what are the impacts of this on flora and fauna (biodiversity) and pollution, especially of soil and water?

All over European Union olive cultivation is categorized in three broad types:

- *Low inputs traditional olive groves (plantations).* They consist usually of old aged trees planted on terraces. Their management includes few or no chemical inputs but it requires big labor work. As a result of their particular plantation characteristics and farming practices, these plantations have potentially the highest natural value (biodiversity and landscape value) and the most positive effects, such as soil erosion prevention in mountainous areas. These plantations are also the least viable, in clearly economic terms and hence the most vulnerable to abandonment.
  This type of olive plantations is met mainly in mountainous regions and in certain small islands of Aegean Sea.
- *Intensified traditional plantations*. The traditional farming patterns are applied in these plantations but with more intensive management, characterized by systematic use of chemical fertilizers and pesticides, application of more intensive weed control and soil management. There is a tendency for further intensification by increase of irrigation, increased tree density and mechanic harvesting. This particular type of olive groves is met mainly in Sterea Hellada, Evia Island, Peloponnese, the islands of Aegean and Ionian Seas, and in certain regions of Crete.
- *Intensive modern plantations*. In them, smaller varieties of trees are used and their management is based in intensive and highly mechanized systems. These plantations are usually irrigated.

The intensified – traditional and intensive modern systems are of least natural value and they cause the greatest negative environmental impacts, particularly in the form of soil erosion, pollutants run-off to water bodies, degradation of habitats and landscape and overexploitation of scarce water resources.

The intensified traditional olive plantation dominates in Greece, while traditional olive groves exist too (mainly on sloping and mountainous areas, as well as on the small Aegean islands). The intensive modern olive cultivation has been applied in some regions of the country, during the last years , where is found still in an experimental stage. Unfortunately, no available data exist, that could allow the quantification of these plantation types .

Olive production subsidy, in the frame of Common Organisation of Market led, (as it was explained above), to the intensification of olive trees cultivation, which was expressed mainly by an increase of cultivated areas and corresponding production.

This intensification which has occurred even before the application of CMO led to an increase of agrochemical use in past decades (fertilizers, crop-protection products), related to the increased cultivated area and production. The quantity of agrochemicals per hectare was not increased, but the total consumed quantity of these was increased as a result of increased cultivated area. During the last period of 1990 – 2003 a reduction of fertilizers has been observed, as described above in the previous question, and according to the interviews of the case study the use of pesticides has not been increased.

The use of agrochemicals has certainly some negative impacts to the environment and mainly to the fauna and flora (biodiversity) and to the soil and water. Unfortunately, no data are available concerning the consumption of agrochemicals in olive farming, therefore these negative impacts cannot be quantified (for the examined period).

As far as the types of agrochemicals that are used in olive growing concerns, the permissible products by the Ministry of Agriculture and those which are used in practice by the growers are presented in the next paragraph. Directorate of Crop Harvest Protection of Ministry of Agricultural Development and Food enacted the following Ministerial Decisions, concerning the permissible use of agrochemicals in olive cultivation:

- Decision No 105348/15 - 06 – 2004 – for the use of *Simazine* as herbicide, only in olive groves until June 2007
- Decision No 106967/ 24-9-2002 / FEK 1561B/13-12-2002 – concerning the use of *Methomyl* for the protection from Prays oleae (insecticide)

- Decision No 114726/4-11-2003 / FEK 1739B/26-11-2003 - concerning the use of Mancozeb, for the protection of olive trees from *Spilocaea oleagina*, *Gloeosporium olivarum*, *Capnodium oleaophilum* (fungicide)
- Decision No 90382 /22-1-2004/ FEK 200B/04-02-2004 – concerning the use of Dimethoate, for the protection from *Dacus oleae* (insecticide)
- Decision No: 111891/2.10.2003/ FEK 1506B/13-10-2003- concerning the use of Cypermethrin for the protection from *Aonidiella aurantii, Saisetia oleae, Lepidosaphes gloventii* (insecticide)
- Decision No 111097/22.09.2003/ FEK 1479B/10-10-2003 – concerning the use of Chlorpyrifos methyl for the protection from *Saissetia oleae, Prays oleae*
- Decision No:111895 /2.10.2003/ FEK 1506B/13-10-2003 - concerning the use of Alpha-Cypermethrin for the protection from *Bactrocera oleae*
- Decision No 1866/29-2-2002- concerning the use of azinphos methyl for the protection from Saisetia oleae and other.

Case study results
In practice, according to case study findings, olive growers do not use Simazine, as the pesticides industries ceased its promotion, since Simazine is allowed only for olive growing until June of 2006. They use Glyphosate as herbicide, instead. They usually use Methydathion (Decision No 1185/26-02-1980, revision of 31-12-2000) as a general insecticide instead of Methomyl.
They also use azinphos methyl.

The rest permissible pesticides are not used, in general, for the protection of olive groves.

- **Biodiversity**

A. Fauna
The thoughtless and untimely use of crop-protection products (mainly pesticides) and secondary the use of fertilizers can lead to the reduction of beneficial insects population, disturbing this way the biological balance.
The use of crop-protection products and mainly insecticides (eg Dimethoate, pyrethrines etc) that are used in olive cultivation, , has as a result on one hand the sufficient protection of olive trees cultivation and on the other hand the minimisation of negative impacts in the beneficial insects, in case that they are used according to their specifications of use
Crop-protection products should, in general, be used only when a disease or an insect may cause economic damage in the cultivation of olive trees. More specifically, the use of pesticides known as "broom" (eg methydathion, azinphos methyl) should be avoided and they should be used restricted only in cases where no other alternative solution exist. This kind of pesticides is very detrimental for all the insects including the beneficials and it should be used only if that use is judged as absolutely necessary.

No specific literature concerning biodiversity and olive farming in reece has been found. Kabourakis reports that the diversity of the cultures was significantly reduced by intensification and the monoculture of olive-trees. However, no more details are given on the time horizon of this intensification.
According to one of the scientists interviewed -who was one of the group which developed biodiversity mapping in Greece- there is not something known concerning olive farming related to biodiversity reduction.
The Hellenic Ornithologic Society published very recently (June 2005, available only in Greek) a study concerning agriculture and birds. According to this study, the intensification of both cotton and olive farming has resulted to the destruction of significant semi-natural ecosystems and of a big part of basic elements of rural landscape. The mixed farming – animals breeding areas of islands and mountainous regions are of the most significant structures in the Mediterranean and whole Europe. At these areas, the agricultural activities are connected (in their majority) with the creation and continuous maintenance and preservation of terraces. The terraces have constituted the major tool for soil erosion mitigation and for the development of new cultivated land, since poor and inclined ground of Greece was a restrictive factor for the agricultural production. The role of dry

stone walls (1 – 1.5 m of height) and hedgerows is also significant in the islands, as they constitute important elements of the island rural landscape for the wild animals, since a lot of animal species (wizards, mammals and insects) find there a shelter. These animal species are important food for birds.
In permanent crops, which related directly to terraces, vines and olive groves are predominant as well as fruit bearing trees. Many birds spend the winter in these orchards, since the birds can find there, their food in crops and insects. These birds include redbreast, linnet, Sylvia atricapilla, S. melanocephala, thrush, T.pilaris etc.
Olive groves that cover significant areas of Greek countryside and contribute to a respectable rural income, are very important biotopes for millions of birds. These birds, spend the winter in Mediterranean areas, mainly in places where old trees and luxuriant vegetation exist. Olive trees play the role of birds' shelter, as they constitute forests of evergreen trees (Handrinos and Akriotis, 1997). Birds that are met in oliveyards are sparrow-hawks, owls, various insectivorous birds and many others
Donald et al. (2002) determine a number of threats for birds deriving from the agriculture, based at numerous studies of last years. These threats include amongst others some related to olive groves

- increased use of pesticides and fertilizers that lead to destruction of birds' food (insects - fauna, seeds) but also to direct poisoning of birds. (NOT anymore the situation in Greece, concerning olives)
- destruction of hedgerows, big trees, small lakes and other "structural elements of rural landscape" that are considered not-productive spaces. (Partially occurred in Greece, no significant connection with olive groves)
- increase of intensive and reduction of extensive cultivations of cereals and other annual cultures.
- abandonment of traditional uses of ground in rural areas that have high biodiversity and forestation of these areas (eg mountainous and islander regions of Mediterranean)

Based on the above discussion, it can be concluded that the use of agrochemicals in olive farming in the past might have a negative impact to the fauna, which unfortunately cannot be more precise. This situation seems to have been changed during last years.

B. Flora

The negative impacts to flora from the agrochemicals use originate from the thoughtless use both of fertilizers and mainly herbicides.
The use of herbicides may cause destruction of plants – hosts of certain beneficial insects and appearance of some durable weeds, mainly after excessive use of herbicides
No Greek literature has been found connecting the impacts of olive growing and the use of agrochemicals to flora, but it is estimated according to the findings of the case study that they do not have any significant direct negative impact in flora.

- **Soil**

The impacts caused from both fertilizers and herbicides to water and soil pollution have been analyzed in the previous question 1(O1).
Besides, it should be mentioned that no nitrates pollution problem of underground aquifer has been reported in the case study area of olive farming. A problem of nitrates pollution would not be connected to olive cultivation, since no excessive nitrogenous fertilization of olive trees takes place neither on the surface and by irrigation systems at the irrigated olive groves.

Moreover, the application of various fungicides and insecticides has minor impact in soil and water, provided that the guidance of use of each product is carefully followed.

Finally, it should be noticed, that the keeping of Codes of Good Farming Practice is obligatory for all the producers, from 2004, but more specifically for the producers that have had contracts financed under Measures and Programmes in the frame of Regulation No1257/1999.

- **Use of water**

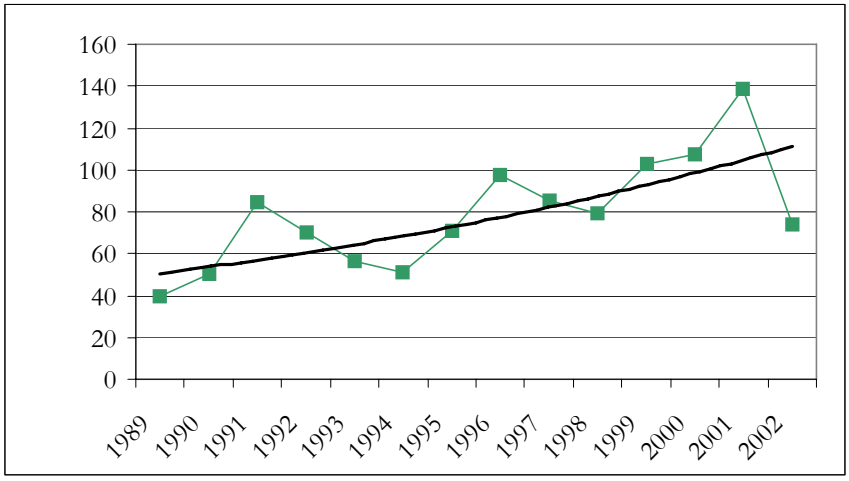
Greece is characterized by a combination of mountains and plains, with a relatively high proportion of poor soils. High levels of precipitation shortages result in prolonged periods of drought in many parts of the country. Geomorphology, geological structures, uneven distribution of rainfall in space and time and diminishing precipitation have all resulted in a scarcity of water during the peak period for irrigation. (IEEP Report).
No specific connection between geographic region, irrigation technology and type of crop can be drawn. In most regions of Greece and for most crops, all types of irrigation systems can be found. Both groundwater and surface water sources are used and, in some cases, a small proportion of water is drawn from springs. For all crop types and geographical regions, the dominant irrigation system is support irrigation, lasting from late spring to early autumn

As far as olive irrigation concerns, olive tree is considered generally as a tree durable in the drought. It is developed in soil with low annual water supplies compared to other fruit-producing tree. In order the olive tree to increase its production, it should develop rich vegetation. A significant factor for the growth of vegetation is the water feed.

Olive tree has increased water needs in certain periods of its biological circle and concretely during the vegetation growth, transformation of blossoms to crops, shaping of fructifying eyes layers, and the four phases of crop creation. During the year, these periods are placed in the beginning and in the end of summertime, as well as at first autumnal months (September, October). The lack of water at the end of summertime is considered as particularly important, which can cause belated blossoming of the trees in the next spring and decrease the percentage of perfect flowers, which are going to be transformed to crops. This situation is owed likely in partial decreased leaf population of trees, since the ability of olive tree to create crop - creating eyes in a year is determined by the size of olive production in combination with the leafs surface of tree during previous summertime.
Rainfall at winter in Greece, covers the first water needs of plant, while some years when rains occur during spring and autumn the water needs of olive tree are almost entirely covered. In the opposite situation, three or maximum four applications of irrigation water are required. The prevailing irrigation system is drip irrigation.
In Greece, at the older times most olive groves were not irrigated. The last years however, the number of irrigated olive areas has been increased. This practice of irrigation has been mainly applied in Crete, where the most significant problems of water scarcity are connected to olive cultivation. The majority of the available literature is concentrated at the region of Crete. Specifically, both Beaufoy's and WWF studies are based on literature concerning water management (for irrigation purposes) in Crete.
The main vegetable crops grown in Crete are fresh tomatoes, cucumbers, potatoes, eggplants, onions, watermelons, melons, cabbages and peppers, while among fruit crops olive covers more than 89% followed by citrus 3.4%, almonds and avocados.
The demand for irrigation water is high, while at the same time only 31.0% of the available agricultural land is irrigated in Crete, a percentage lower than that of Greece (36.3%) (K.S. Chartzoulakis, N.V. Paranychianakis, A.N. Angelakis)
In Crete, there was an increase of irrigation water by more than 55% in the last 15 years, while the average increase at the same time in the country was 25%. For vegetable crops, more than 91% of the cultivated area is irrigated, while the irrigated percentage in row crops was 34.0%, in fruit trees 36.3% and in vineyards 45.1%. Even with these data, we can not claim that 32% (89% of 36.3%) of irrigation water needs are addressed to olive cultivations irrigation.
It is estimated that, on average, only 55% of water diverted or extracted for irrigation is effectively used by the crop In some cases, the losses are estimated to be as much as 50% of the delivered water (Dialynas, Diamadopoulos, & Angelakis, 1995). From the above discussion it might be concluded, that no reliable data exist for the irrigated areas of olive groves, except of a general estimation according to the literature that an increase in irrigated olive yards has occurred.
Furthermore, it should be noticed that the IRENA report estimates regional water abstraction rates for agriculture calculated by weighting national reported water abstraction rates by regional irrigable area . This regionalisation provides a good indication of regions that have a higher water demand. In Greece the regions estimated to require more than 1000 million m^3/year are: Anatoliki

Makedonia (Thraki), Kentriki Makedonia and Thessalia (representing 58% of Greek agricultural water abstraction). None of these regions are characterized by olive farming and therefore an increase of irrigation water cannot be connected to olive intensification.
Furthermore, according to FADN Data the water consumption cost for olives irrigation increased more than 100% the period from 1989 to 2002.

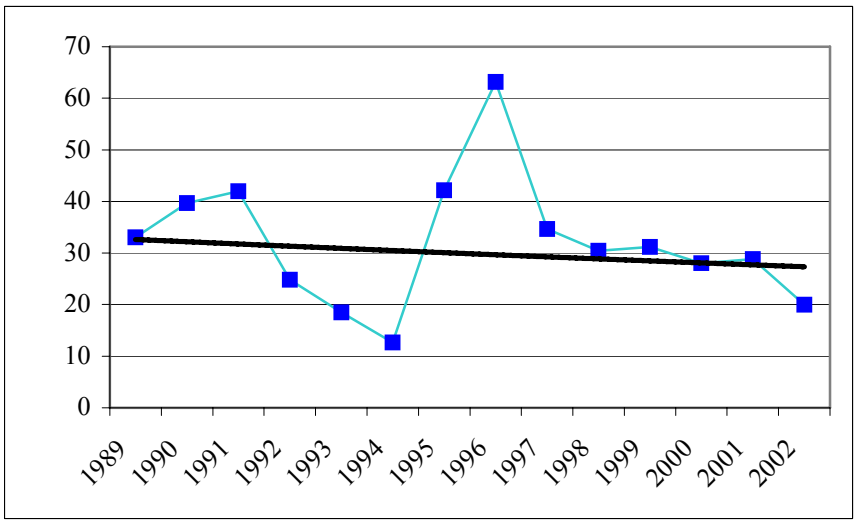
Chart 16. Evolution of water consumption cost for specialist olives (F81-AVG) in Greece



Source : FADN

The same data for Peloponnese present a slight decrease in water consumption cost for specialist olives, which could strengthen the comment that irrigation for olives has been used mainly in other areas (such as Crete and Eastern Aegran Islands) and not in Peloponnese. The interviews with the growers in Peloponnese support this comment. None of them has changed his irrigation practices during the period under examination or as a demand of CMO premiums..

Chart 17. Evolution of water consumption cost for specialist olives (F81-AVG) in Peloponnese – Ipiros – Ionian Islands



Source : FADN

Case study results
After the presentation of data concerning the effects of agrochemicals in environment, as well as the evolution of irrigation, the farming practices of the olive farmers are presented at this point, as they have been recorder during the interviews.

Traditional olive tree cultivation practices

- Fertilization according to the tree needs (usually soil analyses take place). It is usually applied during winter months and sometimes, depends on the prevailing meteorological conditions, until March – April.
- The weeds destruction comes about even with tilling or weeds uprooting in combination with weed cutting. During tilling, special care is taken so that an a strip of land is left without milling among the rows of the olive trees. Usually two tillings are applied each year, during April – May and May – June. The first tilling takes place with the lid of till raised so that the ground is not compressed so much. In slope grounds tilling is not applied, but instead of that weed uprooting is applied.
- The crop protection products are used, most times, only if a serious problem of insect or mycetes or bacteria or virus infestation is observed. There is an effort by the local agronomists for the avoidance of inopportune sprayings.
- In case of irrigation, the frequency and the irrigation water quantity depend on the prevailing meteorological conditions.

Integrated Olive Production Management Techniques

The practices that producers apply, who are members of Groups of Producers of Integrated Olive Production Management, are the same with the aforementioned with the difference that all these practices come under certain rules, which the farmers are obligated to follow. Concretely, each producer has the obligation to:

- manage the remainings appropriately
- store the pesticides appropriately manage farm's waste (batteries, lubricants etc)
- follow health and safety principles
- use a storage building.

Moreover, in order to achieve their environmental objectives, the olive growers apply the following:

- Reduction of tillage in sloping grounds, aiming at the reduction of soil compaction and the maintenance of the soil's organic content in acceptable levels.
- Reduction of the drastic substances' quantity of the crop protection products per hectare.
- Reduction of the quantity of fertilizers used, following the strict fertilization protocols per prefecture.
- Irrigation according to the plants' water needs, since they keep an irrigation timetable and at the same time they conduct water analyses in regular time intervals.

Organic farming practices of Olive Trees

The practices that the olive-organic-farmers apply are the same with those of traditional olive cultivation with some differentiations. Concretely:

- The destruction of weeds takes place only with mechanical means (tilling, grass cutters, etc.), since herbicides use is prohibited.
- The plant-protection products that are used partially differ from the similar of traditional cultivation and their use is allowed according to Regulation No 2092/91.
- The fertilization takes place with the utilization of different types of fertilizers, which are usually allowed according to Regulation No 2092/91. Moreover, organic-farmers apply also green manure (i.e. seeding and usually inversion of some legumes,) so that the nitrogen levels of olive trees are improved.
- Irrigation is applied in the same way as in the traditional cultivations.

Animals preservation in the Olive groves

No producer maintains animals in his olive groves. The olive groves are not fenced and there is a risk of animals' theft as well as of destruction of olive trees from the animals, because of uncontrolled grazing.

Concluding, olive production subsidy, in the frame of CMO led to the intensification of olive trees cultivation. This intensification was expressed mainly by an increase of cultivated areas and production.

The intensification, even before 1990, led to an increase of agrochemicals use in past decades (fertilizers, crop-protection products). Concretely, the quantity of agrochemicals per hectare was not increased, but the total consumed quantity of these as a result of cultivated area increase. During the last period of 1990 – 2003 a reduction of fertilizers has been observed, and according to the interviews of the case study the use of pesticides has not been increased.
Limited literature exists concerning the effects of agriculture, especially on birds. According to this, a decrease of biodiversity occurred in past decades (before 1990), when the use of both fertilizers and pesticides presented an increasing trend. The use of agrochemicals, had some impacts on water quality, without having data to support this statement.

2.1.2 Olive – Theme 2: farming practices

Question 1 (O2): Does the CMO support sustainable farming practices that are beneficial to the environment such as organic and integrated production systems?

The CMO for olive was established initially in 1966 with Council Regulation No 136/66/EOK "*on the establishment of a common organisation of the market in oils and fats*'. This regulation did not contain any actions of environmental protection and promotion of alternative cultivation methods, as organic farming and integrated production management.
By the time, a number of modifications in Regulation 136/66/EOK took place, from which the most important were the followings:

- Council Regulation (EC) No 1638/98 of 20 July 1998 amending Regulation No 136/66/EEC on the establishment of a common organisation of the market in oils and fats
- Council Regulation (EC) No 1513/2001 of 23 July 2001 amending Regulations No 136/66/EEC and (EC) No 1638/98 as regards the extension of the period of validity of the aid scheme and the quality strategy for olive oil

According to Council Regulation No1638/1998 a part of financial aids that are granted to the producers of olive oil and table olive should be disposed for the financing of actions aiming at the improvement of production and environmental protection. The percentage of aid concerning actions of the producers' organizations was fixed in 1.4% and it should be retained by the recognized producers organisations and unions of these organisations, for financing of specific actions of quality improvement.
The content of the operational programs of approved producers organisations or their unions has been determined in Council Regulation No 513/2001. These programs may concern one or more from the following sectors:

- administrative management and follow-up of market of olive oil and table olive sector
- improvement of environmental impacts of olive cultivation,
- improvement of quality of olive oil and table olive production.
- system of detection, certification and protection of quality of olive oil and table olive, under the auspice of national authorities.

The active producers organisations in the sector of olive oil and table olive in Greece were 83 in year 2003, while they were 79 before 1990.
Until recently, the POs have never implemented a real operational programme containing specific clear environmental actions.

Case study results
In addition, according to the case study farmers' answers, all the producers are members of Producers Organisations that are recognized but they have not submitted any operational programs. The producers organisations in Greece, are usually the first and secondary degree cooperatives of each region.
As far as olive organic farming concerns, it continuously expands in Greece. Specifically, the area of olive trees cultivations that were introduced in the program of organic farming was 17,340.85 hectares in 2003, while the corresponding area in 1999 was 10,265.68 hectares (Olive organic

farming constitutes the most important, between the different plants organic farming, in Greece). In year 2003, the area of olive organic farming covered a percentage of 71% of total area of organic farming (Table 17). Olive tree does not characterized by many myketological diseases and enemies, therefore the methods and techniques that are proposed in the frame of organic farming application, can face any disease effectively.

Table 16. Evolution of organic farming in olive sector

Area of organic cultivations (ha)			
	Year 1999	**Year 2002**	**Year 2003**
Olive (area in ha)	10266	14595	17341

Table 17. Evolution of organic farming in Greece

Year	**2002**	**2003**
Permanent Crops		
Fruit trees	**897.34**	**1010.53**
Nuts	**796.33**	**855.55**
Citrus	**1856.4**	**2072.87**
Olive	**14594.66**	**17340.85**
Vines	**2598.56**	**3168.24**
Total	**20743.29**	**24448.04**

Source: Ministry of Agricultural Development and Food

The implementation of organic farming program was financed from European Union in the frame of Regulation No 2078/92 and its financing continues in the frame of Regulation No 1257/1999 by means of the AEM measures. The program of organic farming is implemented under Priority Axis 3 of Single Programming Document of Rural Development (SPD RD), which was approved with EC Decision No E(2000) 2733/27.9.2000. Organic farming is one of the 13 measures (of SPD RD Up to the end of 2003, only 5 measures have begun to be implemented and Organic farming is one of them.

According to the "Annual Report of SPD implementation in year 2003" the program of organic farming had been implemented as following:

- It has been applied in 54 out of the 57 Prefectures of Greece.
- The signed contracts in the program were 5224 (for both programs: of 2078/92 and 1257/99, 1199 of them at 2003). The contracts correspond to an area of 18,953 hectares, from which 3,554 hectares concern the contracts of 2003.

In the following Tables (

Table 18 and Table 19) the level of AEM payments is given.
The paymenst of AEM 2057/92 concern the four AE programmes that have been activated in the frame of No 2057/92 Regulation and they related to contacts assigned under these four programmes. Payments of SPD RDR concern payments of the 13 Measures of Axis 3 which are financed in the frame of Regulation No 1257/99. The sum of the payments concerns the total payments for all the AEM for the years 2001, 2002 and 2003.

Table 18 . AEM 2057/92 (Payments) *(million €)*

	YEARS					
	2001		2002		2003	
	Total payments	EC contribution	Total payments	EC contribution	Total payments	EC contribution
Indicator budget	17.4	13.0	11.8	8.9	14.5	10.9
Payments	15.88	11.91	9.05	6.79	4.852	3.639
% of implementation	91.26%	91.62%	76.69%	76.29%	33.47%	33.38%

Source: Managing Authority SPD RDR

Table 19 . SPD RD, Regulation 1257/99 *(million €)*

	YEARS					
	2001		2002		2003	
	Total payments	EC contribution	Total payments	EC contribution	Total payments	EC contribution
Indicator budget	12.9	9.7	33.1	24.7	47.4	35.5
Payments	0	0	1.06	0.8	4.49	3.37
% of implementation	0	0	3.2%	3.24%	9.48%	9.49%

Source: Managing Authority SPD RDR

Apart from the above agro-environmental measures, a System of Integrated Agricultural Production Management is applied in Greece from year 2000. This is a system of an of a rural holding that includes inter alia, good farming practices, principles of health and safety of workers, products safety, traceability and environmentally friendly actions. This system aims at the development of an environment suitable for effective and profitable agricultural production in an economically viable and environmentally responsible rural holding, incorporating useful natural processes in the modern farming practices,.
The continuously increasing demands of markets for certified products according to the System of Integrated Management induced the development of the following standards:

AGRO 2-1: Specification
This standard includes general requirements for agriculture practices. It includes the whole principles for the certification of the Integrated Management System that is applicable in every agricultural holding independent from its specific cultivations.

AGRO 2-2: Requirements for use
This standard describes the technical and legal requirements of the Integrated Production Management System for crop production and accompanies the standard AGRO 2-1. It includes the general codes of Good Farming Practice and the accompanying measures of environmentally friendly agriculture (crop production), in a way that safe and qualitative products are produced and best environmental management is achieved.

The benefits deriving from the system application are:

- Assuring of cultivations output (quantity and quality) and income of farmers
- Reduction of environmental impacts of agricultural activities
- Satisfaction of social and market requirements for both environmental protection and agricultural products free (as much as possible) from chemical substances.

The total certified areas, according to the Integrated Production Management System (IPMS) were 15,632.2 hectares in year 2005. Table olive trees are cultivated at 102.7 hectares or at only 1.13% of the total cultivated land according to the IPMS.

The opportunity for the application of this system was provided by the development of Good Agricultural Practice rules for olive groves, in the context of Regulation No 1334/2002. This Regulation provide support to olive growers organizations to create codes of Good Olive Husbandary Practice specific for olive growing and the local environment of each organization. The project is implemented by Elaiourgiki and it is called K.OR.E.P which is the Greek acronym equivalent of Codes of Good Olive Culture Practice. The environmental management standard ISO 14001 is the baseline for the system.
The continuously increasing demands of markets for certified products according to the System of Integrated Management are the only supporting aids for integrated management production promotion.

Concluding, CMO supports in general, mitigation of environmental impacts of olive cultivation, by certain actions that may be included in the operational programmes (OPs) of POs. No significant environmental actions have been incorporated in the OPs until recently. Sustainable farming practices that are beneficial to the environment such as Organic Farming and Integrated Production Systems are not supported by CMO. Organic farming is strongly supported and financed by the AE measures of SPD RDR. Integrated production systems, are not financed by any measure, but they expand as a result of the continuously increasing demands of markets for certified products according to the System of Integrated Management.

2.1.3 Olive – Theme 3: Specific measures

Question 1 (O3): What is the environmental impact of restriction on imports from outside the EU?

Greece, although is a self-sufficient country in olive demand, however it participates in the trade of olive oil. At the period of year 1995, Greece imported (mainly in bulk) 212.72 tons of olive oil, from third countries and exported 4,962.77 tons (Table 20 and Table 21).
Greece imports small quantities of olive oil from various countries. These quantities then are exported. The imported olive oil is coming mainly from Egypt and Albania.
The imports from these countries had a vertical fall after year 1995 and they reached at 4,364 kgs (Table 20) in year 2003. Imports of olive oil presented annual fluctuations in the yeas between 1995/1996 and 2003.

Table 20. Olive imports in Greece

COUNTRIES	YEARS (QUANTITIES IN KG)									
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
EGYPT	989			4122		15389				
TURKEY		92990								
ALBANIA		101130	54810	2400						
LEETONIA		18686								
JAPAN				10673		1987				
RUSSIA				452						
TAIWAN					2567					
AUSTRALIA						5540				
UNITED ARABIC EMIRATES						110				
CANADA							7030			
SWITZERLAND							411	435		
CYPRUS							20			
USA								19925	12696	
POLAND								11772		
CZECH REPUBLIC										4364
NOT DETERMINED					12757	30260				
TOTAL	**989**	**212806**	**54810**	**17647**	**15324**	**53286**	**7461**	**32132**	**12696**	**4364**

Table 21 : Olive exports from Greece

VARIOUS THIRD COUNTRIES	QUANTITY IN KG									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	8795864	4962772	4354986	5685378	7256348	6245988	9043460	8799490	7646366	8806748

The reduction of imports from third countries has as result the better disposal and promotion of Greek olive oil both in European and in world market. This reduction is not connected to a further increase of produced quantity of olive and consequently does not raise additional impacts to the environment, more than what has been reported and analyzed in the previous questions.

Concluding, no environmental impact is connected to the restriction on imports from outside the EU.

Question 2 (O3): What are the environmental impacts of increased maximum guaranteed quantities per member state?

Council Regulation No 136/66/EOK "*on the establishment of a common organisation of the market in oils and fats*" was considerably modified in 1998 by Council Regulation No 1638/1998, as it was reported and above. The increase of Maximum Guaranteed Quantity (MGQ) of olive oil in European Union that is eligible for production subsidy was one of the modifications in the new Regulation. MGQ was increased from 1.35 millions tons to 1.78 millions tons, presenting an increase of about 31.6%. This MGQ was distributed between the olive productive Member States and a National Guaranteed Quantity has been determined for each one country. Simultaneously, production subsidy was decreased from 142.2 Euros/ton to 132.5 Euros/ton of produced olive oil.

Production subsidy in each Member State is referred to the National Guaranteed Quantity. A portion of 42.8% of maximum guaranteed quantity has been allocated to Spain, 30.6% to Italy and 23.6% to Greece. In case that a Member State exceeds the national guaranteed quantity, the granted subsidy to its producers is decreased proportionally. At this case, a percentage of 20% of this excess can be used for the compensation of excess of the national guaranteed quantity of another Member State, while the 80% can be moved to the national guaranteed quantity of the next campaign, taken into consideration the big annual fluctuations concerning olive production (biennial phenomena).

The allocation of MGQ between Member States (National Guaranteed Quantities) is given in the following Table 22.The National Guaranteed Quantities for Greece are 419,529 tons.

Table 22 : National guaranteed quantities, seed-oil included (in tons)

Spain	Italy	Greece	Portugal	France	Total
760027	543164	419529	51244	3297	1777261

In

Table 23, olive oil production quantities grants per country and per year are given.

Table 23. Production (tonnes)of olive oil for which aid was granted (*)

Year	Italy	Spain	Greece	Portugal	France	Total
1987/1988	742.500	770.000	321.718	38.000	4.088	1.876.306
1988/1989	390.000	408.000	319.231	24.570	1.200	1.143.001
1989/1990	585.000	573.000	316.372	35.100	2.825	1.512.297
1990/1991	148.000	700.000	170.869	20.000	2.310	1.014.179
1991/1992	650.000	610.000	430.147	34.992	3.400	1.728.539
1992/1993	410.000	636.000	314.432	17.075	1.840	1.379.347
1993/1994	550.000	588.000	323.161	27.486	2.407	1.491.054
1994/1995	458.664	583.000	389.904	29.220	2.440	1.463.228
1995/1996	625.000	375.000	445.000	34.000	2.450	1.481.450
1996/1997	410.000	986.700	494.218	37.000	2.360	1.930.278
1997/1998	712.847	1.147.000	492.364	39.600	2.480	2.394.291
1998/1999	452.286	899.991	562.493	33.936	2.364	1.951.070
1999/2000	791.595	747.000	463.090	47.380	2.681	2.051.746
2000/2001	540.864	1.074.970	479.066	25.444	2.247	2.122.591
2001/2002	711.076	1.562.531	404.619	33.613	2.591	2.714.430

(*)included seed oil. The table olives as equivalent olive oil are included from the period 1998/1999.

In parallel, is should be reminded that olive cultivation areas presented an increasing trend during period 1990 – 2001, Specifically, olive cultivation land from 690,801 hectares that was in year 1990, reached the 787,500 hectares in year 2001 (

Table 1).

According to article 4 of EC Regulation No 1638/1998: *additional olive trees and corresponding areas that are planted afterwards 1st May 1998 are not eligible for support, in the frame of common organisation of market in the sector of oils and fats, that has been in force from 1st November 2001*. However, additional olive trees in the frame of transformation of an old olive grove or new plantings in areas that are agreed in a program approved by the European Commission can be taken into consideration inside certain limits. These programs concerned areas in Greece, France and Portugal.
With the Commission Decision in 27/3/2000, the Greek National Program of new plantings of 3500 hectares of olive trees was approved according to Article 4 of EC Regulation No 1638/1998.
The olive cultivated area in 1998, (758,138 hectares), in comparison to the olive cultivated area in 2001 (787500 hectares) shows that the approved area of 3500 hectares of new plantations was overlapped. Olive production presents big fluctuations from year to year, because the biennial phenomenon. The higher production of olive oil was marked in year 2003 (504,169 tons - Table 3), despite the fact that the corresponding production of olives that was intended for oil production was enough lower compared to olives production of the previous years.
The output of olives in olive oil is influenced by a lot of factors, which were also analyzed above.
It is observed that the efficiency of olive was increased from 1.45 ton/ha that was in year 1990, to 3.30 ton/ha in year 2002. It presents of course intermediary fluctuations since it is related to oil production, which, as it was reported, presents great fluctuations from year to year (Table 4). The average value for the 11 year period of 1991-2002 is equal to 1.68%. However, if the last year (2003) is included the average change becomes almost zero (-0.18%). The year 2003 was an exceptional year. If on the other hand the first year (1990) is included then an erroneous average change is calculated equal to 7.42%.

The total percentage change for all the period (calculated as the difference between the value of 2003 and 1990) is again erroneous and equal to 80.69%. If, however, the value is calculated for the period 1991-2002, a more reasonable value is obtained equal to 14.58%.
The overall change is only indicative of the trend concerning olive oil production per ha. The most significant output of the evolution of efficiency is the increase in olive efficiency after 1998 (after the change of CMO subsidies).

Concluding, it can be sail that the increase of Maximum Guaranteed Quantity led to intensification of olive cultivation, which was expressed mainly by an increase of cultivated areas and corresponding production.
Of course it should be taken into consideration that despite the increase of Maximum Guaranteed Quantity, the profit for the producers was not equivalent, since the unitary olive production subsidy was decreased at 6.8%. This reduction influences mainly small producers.
Moreover, each time when overshooting of National Guaranteed Quantity occurs, the unitary amount of aid is decreased, which is calculated multiplying a factor lower than 1 by this unitary amount of aid. This factor results as follows:

↘ $\text{Factor} = \frac{\text{Corrected Maximum National Guaranteed Quantity}}{\text{Production}}$

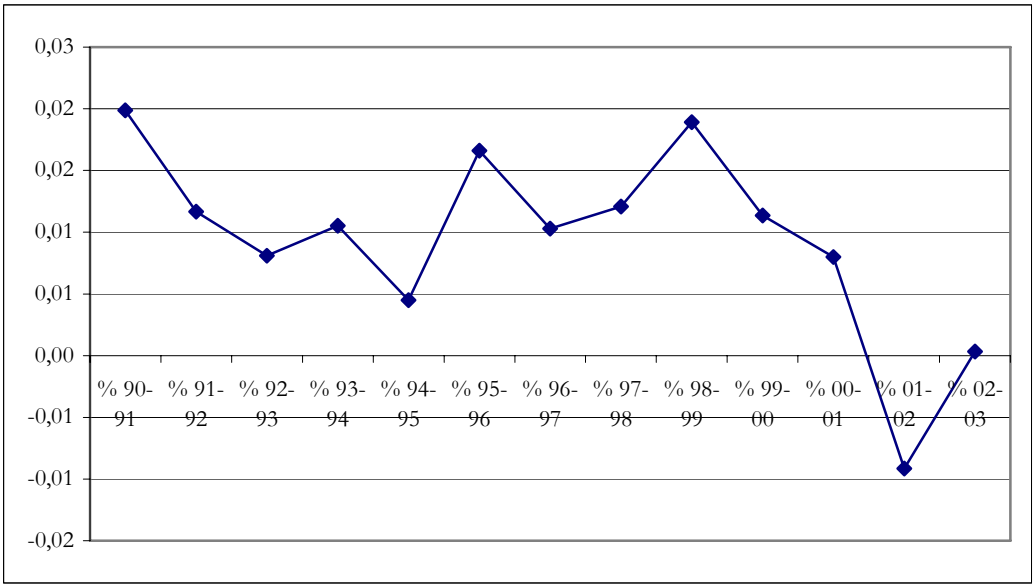
It should be mentioned, that at periods of 1998/1999, 1999/2000 and 2000/2001 the limits of National Guaranteed Quantity have been overshooted in Greece with all the impacts that this involves. It should also be noticed, that with EC Decision of 9/8/2001, Greece has been permitted to grant production aid to table olives for olive campaigns of periods 2001/2002 until 2003/2004. For the calculation of quantity of aid unit for table olives and the management of National Guaranteed Quantity of olive, 100 Kgr of processed table olives are considered as equivalent to 13 Kgr of olive oil that they are eligible for production subsidy. The weight of processed table olives that should be taken into consideration is the net drained weight of entire olives, after processing, potentially smashed olives but without removal of their core.
Consequently, the table olives are also included in National Guaranteed Quantity as equivalent olive oil.

In the following chart the trends before and after the CMO reform are shown. As it can be extracted from this Chart, the annual growth of olive groves areas remained almost constant in the level of 1.2 – 1.9% until 2000 – 2001 period, not significantly higher of these of the previous years.

The continuation of olive plantations cultivation, despite of the reduction in subsidies may be explained by the following reasons:

- The olive production is a traditional cultivation in Greece, with no big holdings and the producers continued to take care of their oliveyeards, independently from the suppression of the subsidies. The growers are very often small producers who produce olive oil for their family, friends and relatives needs. In addition they based in the market price of olive oil, which constitutes the main part of their agricultural income.
- It is possible, that olive produced in non authorised plantations, was processed in the mills, together with "justified" olives and thus subsidised. The controls of mills were not very strict at the past and maybe such phenomena had occurred
- A significant number of olive growers did not realize this reduction of subsidy.

Chart 18 : Evolution of olive efficiency trend



Case study results

According to the results of the case study, only four producers (from the total of 23 interviewers) were aware of the fact that in 1998 the quantity of oil eligible for CAP aid was increased by about 30% for Greece and they were informed by the national and local press and by informal discussions at local level (their village etc.). None of them changed his farming practices in order to increase his production.

At this point it should be reported that in certain cases, some olive growers, (except of the interviewed ones), present that their production is higher that the "real one", using non-legal means. This fact creates profit in them, but problems in the majority of the rest sincere olive growers, which are in danger of receiving decreased subsidy in case of exceeding the national limit of 419,000 tones of National Guaranteed Quantity of olive oil. For the protection of the olive farmers, the Ministry of Rural Development and Foods has published a number of Ministerial Decisions with which the maximum olive oil output per tree and per acre is fixed, for all the olive-production regions of the country.

Additionally, very few of the producers had observed the drop of subsidy by about 6.8% per kilogram of olive oil, notwithstanding that all of them were aware that deductions are made for exceeding NGQ.

Finally, it should be mentioned that all of the interviewed farmers made a comment concerning year's 2003 subsidies, when there were a lot of rains that increased the flesh of olives, so that there

was big olive oil output, which led to reduction of the subsidies in the order of 40%. All the growers agree that the reductions were very important and involved an important reduction in their agricultural income. Nevertheless, this fact did not have any effect to the management of their farms.
From the above, it can be concluded, that since the growers didn't presume CMO reform as a major change for their income, they didn't modify their farming techniques, (as it was stated also by all interviewers).

Concluding, according decisively to all interviewers, olive cultivation practices had not changed after CMO reform and therefore no environmental impacts are connected to CMO reform and especially to the increased maximum guaranteed quantities for Greece.

Question 3 (O3) : What is the environmental effect of the removal of the production aid in terms of payment per tree meant for smaller producers?

Council Regulation No 136/66/EOC "*on the establishment of a common organisation of the market in oils and fats*" and its amendments had established special regime for aid of small producers. Initially, those producers that produced quantity of olive oil lower than 100 Kgr per year had been fixed as small producers. By the time, this quantity was increased and was determined in Regulation No 3499/1990 as 500 Kgr of olive oil annual production.
For the calculation of olive oil quantity produced by small producers, which could grant aid, the real production was not taken into consideration, but the production that resulted as the output of the multiplication of the number of trees by the estimated yield in olive oil of tree, which depends on the area of production in which the producer's farm belongs to.
Regulation No 1638/1998 suppressed this special regime for small producers and it was determined that the production subsidy will be granted to all the producers according to the quantity of olive oil that they produce and not according to the number of trees and a determined production per tree.
Even if available data do not exist, concerning the percentage of small producers and the techniques that they applied after the change of regime, it is explicit that their income shrank. The real reduction of income of this olive grove portion was still bigger, since from 1998 the unitary amount of olive production aid was decreased also at 6.8%, as it is reported and above.
Some of the small producers, it is likely, to have been led to abandonment of olive cultivation and they were directed in other cultivations.

Case study results
According to the findings of the case study, only two of the interviewed producers were small ones until 1998. The two producers' views, regarding to what form of subsidy was better for their income, were discordant. More specifically, one of them supported that the old regime, which was in force before 1998 was better for small producers, since the region in which his properties are found, suffer for the local climatic conditions, (ice is very common during winter) and the soil quality is poor, resulting very often to a decreased output of olive trees to olives and consequently to olive oil produced. As a consequence, there was a great income shrinkage for him after the application of the new regime.
On the contrary, the other small producer supported that the new regime of subsidy is better than previous, since the output of his olive trees in olives and olive oil is higher, than the determined.
In any case, it should be noted that both producers agree that the new regime of coming CAP is likely to lead them either to increase their olive groves area or to turn to other cultivation, so that they will ensure additional income.

Concluding, the change in subsidization of small producers did not involve any change in the farming practices of their olive groves (as they described in a previous question) and since there was no change in the farming practices, there were no environmental effects deriving form the abolishment of the production aid in terms of payment per tree meant for smaller producers.

2.1.4 Olive – Theme 4 : structural and accompanying measures

Question 1 (O4) : What are the environmental impacts of the grants for grubbing up old groves, replanting and irrigation [Rural development regulation 1257/1999]?

In the frame of application of Regulation No 1257/1999 in Greece through the means of Operational Program "Rural Development - Reconstruction of Countryside" (E.P.A.A. – A.Y.), that is materialised by the Ministry of Rural Development and Foods, no subsidy is included for grubbing up and replanting of olive trees or for grubbing up of olive trees and planting with different types except of aid for restoring agricultural production potential damaged by natural disasters.
In parallel, no any subsidy for irrigation exclusively to olive cultivation is included with only exception the cases of application of organic farming and system of integrated management in the plant production. Funds are given for improvement of irrigation conditions in the frame of the Operational Programme of "*Rural Development - Reconstruction of Countryside*".
These funds are given under the following measures.

- Priority Axis 6: Growth and protection of Natural Resources and Environment
  - Measure 6.2 - *Saving and exploitation of surface flows – Artificial enrichments of underground aquifers – Modernisation and improvement of conditions of irrigation*
    Priority is given in regions where water balance has been disturbed seriously, or where for social and environmental reasons, the maintenance of anthropogenic activities is essential (i.e. islands, isolated mountainous regions, areas of intensive agriculture/with environmental problems).
- Priority Axis 7: "Programs of rural land development"
  - Measure 7.7 -*Management of agriculture water resources*

Both measures finance public or local authorities for projects of water resources management improvement.
Under Measure 6.5 - *Confrontation of damage that is caused in the agriculture from calamities, fires and other extraordinary incidents and preventive relative measures*, producers can be financed for replacement of irrigation piping and other equipment.

From the above presentations, it can be concluded that the environmental effects of financing of irrigation works are positive, since a better irrigation water management is applied.

Question 2 (O4) : What are the environmental impacts of the LFA aid for olive farmers??
According to Chapter V of Regulation No 1257/1999 the farmers of less favorable areas are eligible of equating compensation aid. This regime is applied by means of the Priority Axis 2 of Single Programming Document of Rural Development (SPD RD), which was approved by the EC Decision No E(2000) 2733/27.9.2000.
The agricultural exploitations of mountainous and less favourable areas provide low income to the growers due to their permanent natural predicaments, as high altitudes, abrupt inclinations, short vegetation period, poor – downgraded soils etc. This fact, in combination with the absence of alternative sources of employment, creates significant problems for the living conditions of natives in these areas and for the continuation of agricultural activities.
Aim of Measures of Axis 2 is to mitigate this situation, compensating a part of income loss by granting an annual equating compensation to the farmer-breeders, permanent residents of these areas and to moved cattle-breeders.
The equating compensation is granted per hectare of agricultural areas. The total annual budget of equating compensation that can be granted at a region and to a beneficiary depends on:

- the number of acres that the farmer possesses and develops in mountainous, less favorable and with special problems areas,
- the type of exploitation,
- whether the farmers come under the regime of new farmers or whether they are successors of early retirement,
- whether their exploitations are viable,

- whether the new farmers have professional education and training,
- whether they are the beneficiary residents of islands of Aegean Sea or residents of mountainous areas.

The annual equating compensation may reach up to 5500 € per beneficiary in mountainous areas and up to 5000 € in less favourable areas. Olive farming is eligible for granting under the regime of equating compensation.

The implementation level of equating compensation program in Greece is given in

Table 24. Unfortunately, data concerning aid budget given to different cultivations do not exist, therefore it cannot be estimated the percentage of aid given to olive cultivations.

Table 24 : Implementation of Application of Program of Equating Compensation - Data up to 15/10/2003

	Period 16/10/99 – 15/10/02	Period 16/10/02 – 15/10/03	Total
Public Payments in € (budget) 2000 - 2006	779,860,000		
Applications/year (average mean)	143,574		
Beneficiaries/year (average mean)	126,174		
Payments in €	270,680,358	134,554,979.35	405,235,337.35
Absorption %	34.71	17.25	51.96

The beneficiary farmers undertake, between other obligations, the engagement that at all the period of program duration, they will apply farming practices in conformance with the Codes of Good Farming Practice.

Moreover, under Council Regulation No 2019/1993 specific measures for certain agricultural products to profit of small islands of Aegean Sea were established. Aegean islands with permanent population less than 100.000 residents are comprehended as `'small islands ".
Olive production is eligible for granting in the above schemes. A granting of flat-rate aid per hectare has been determined, for the maintenance of olive groves cultivated by traditional cultivation practices. This aid is given under the prerequisite that olive groves are maintained in a way that good conditions of production are ensured.

This aid according to Commission Regulation No 2837/1993 is granted:

- to farmers who cultivate in areas with minimal density of 50 trees per hectare,
- to farmers who cultivate in areas where olive groves maintenance works have been materialized at the adequate way. These maintenance works have been judged according to use and local tradition as essential for assuring the good conditions of olive groves.
- in case of olive groves that are intended for olive oil production, and for these olive groves areas that have been declared and for which aid had been asked.

The subsidy amount was determined to 145 €/hectare by the Joint Ministerial Decision No 271092/15.10.2003 on the subject: "Details of application of Council Regulation 2019/1993 on the issuing of flat-rate aid to olive growers of the small Aegean islands, for the maintenance of traditional cultivation of olive groves". By this decision the minimal density of olive trees was increased in 80 trees per hectare.
Because of their special characteristics and farming methods, these cultivations have potentially the highest natural value (biodiversity and landscape) and the most positive environmental benefit, which is the mitigation of soil erosion in mountainous regions, as it was reported and above.
The above subsidy is granted besides the production subsidy of olive in the frame of Council Regulation No 136/66/EOK.
Concluding, both the olive growers of the small islands of Aegean Sea and these of mountainous and less favourable areas have additional incentives for the application of environmentally sound farming techniques. The environmental impacts of aid to farmers of LFA are positive.
In order all the above aids to be given to the potential beneficiaries – farmers, the farmers should obligatory apply the Codes of Good Farming Practices as described in the answer of Horizontal Question 1(H3).. Relative codes for good olive farming practices are still under development (pls see answer to the Horizontal Question 1(H3)).
The application of the Codes of Good Farming Practices by the farmers is a guarantee that the farmers will not apply intensive cultivation at their land.

Case study results
The general conclusions derived from the interviews are the following:

- Only one olive farmer has implemented uprooting of old olive trees, because theose trees were destroyed by ice. The rest uprooted and replaced individual olive trees in the farms of other olive growers concern trees that were destroyed by various causes (eg illnesses, extreme meteorological phenomena, fires, e.t.c.). None of the farmers took any subsidy for the uprooting of the olive trees during the examined period.
- One of the interviewers had an area of 1.5 hectares uprooted. The type of plants uprooted was Corinthian raisin, which were replaced by olive trees. The new plantations haven' t been intensified and no irrigation system has been installed.
- Among the interviewed olive growers there were two that their olive groves holdings are in disadvantaged areas. For this reason they received equating compensation, which is granted per hectare of agricultural area and amounts approximately 53,8 € per hectare of olive trees. This aid did not lead to intensification of the olive groves, as the farmers applied Codes of Good Farming Practices, since the beneficiaries of this subsidy undertake the engagement that during the whole program period, they should apply farming practices in conformity with the Codes of Good Farming Practice.

The Codes of Good Agricultural Practice that concern the cultivation of olive are the same either for the disadvantaged and the mountainous areas or for the rest areas.
Regarding the Operational Programs, the Producers Organisations have not submitted any program.

2.2 Horizontal questions

2.2.1 Horizontal – Theme 1 : land use over time

Question 1(H1): Does the CMO lead to substantial changes in land use over time (abandonment, expansion and set-aside) and if so: what are the positive and negative environmental impacts? [This question should preferably consider typical patterns of alternative status/use after or before use of the land for the permanent crop to which the CMO relates.]

In Greece, the national olive-growing registration has begun to be materialised recently. The management system of the Olive-growing Registration and GIS aims to the recording and management of olive productive resources that exist and operate in Greece, as well as to the calculation of financial support to the producers of olive oil.
The following data are recorded in the system:

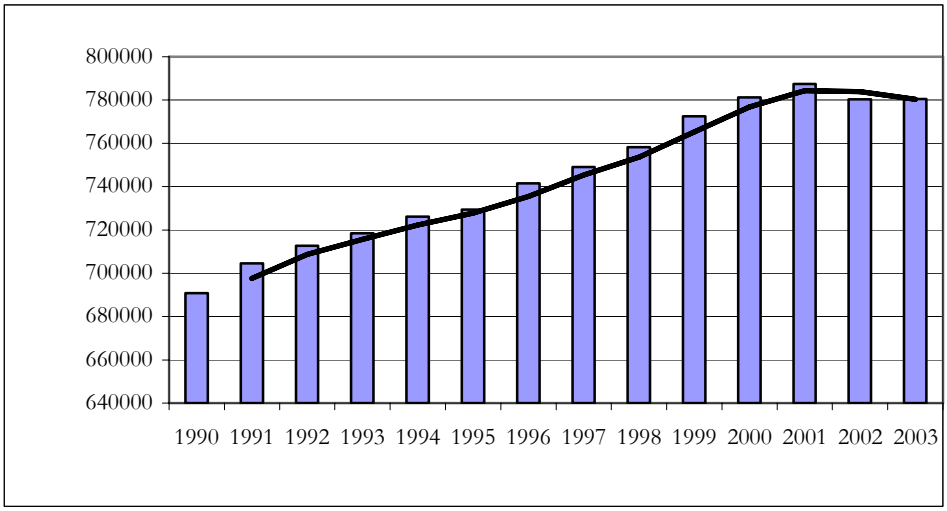
- Olive growers, specifically every individual or legal entity that possesses and cultivates areas with olive trees.
- Olive farms, cultivated areas with olive trees, mapped and coded from the responsible authority per olive grower (as extracted from the corresponding cultivation statements)
- Olive mills, in which the distribution of olive-crops per olive grower and month of oil production are recorded, as well as the corresponding quantity of produced olive oil. The subsidies are calculated on the basis of this data.
- Cooperatives of Olive growers and Prefectural Organisations in order the olive growers at every Cooperative to be watched for statistical reasons.

Due to the delay in the creation of reliable territorial data, do not exist significant data of changes of land uses related to the cultivation of olive trees and consequently the answer in the present question can only be based on a general examination of data related to the evolution of olive groves cultivated areas.
The CMO support was attractive to land uses changes, since the increased production led to increased financial support. The olive groves growth, which is given in the next chart, is characterised by a continuous increase during the period of years 1990 – 2003, except the two last years when a light decrease is observed. After the 1998 restriction of new trees plantation, CMO support to the oil production stays more or less at the same levels. The increase of olive groves areas during last years, which corresponds to an average of 1% of the olive groves land per year as well as the halting of olive groves increase after year 1999 indicates that this increase was

connected to CMO support. From the other hand, it cannot be safely connected to the abandonment of some other kind cultivation or to any other change of land uses. Furthermore, if we could use the threshold value of 10% of change of land use over a period of ten years (1990 -1999) as a significant judgment criterion, we can say that the olive grove land increase is lightly above the limit of this threshold value. These changes in olive groves land may be supposed as limited substantial one.

In any case no safe conclusions can be deduced concerning the type and the kind of environmental impacts, since no data on the cultivations that have been changed to olive groves exist.
It should be mentioned here that land use changes were not available neither from national sources, neither from IRENA report (Land use changes data for UK, Sweden, Austria, Finland and Greece at the time of writing of IRENA report were not available).
CORINE Land Cover has been implemented for years 1990 – 2000. Changes in land use between the two years have been recorded. However, statistical data (including changes of land uses) are not yet available to the public. It is more that sure, that these data will be soon available. From interviews with Ministry of Environment – National Network of Environmental Information, it can be deduced that the most areas that have been changed to oliveyards areas, were vineyards before, but this is not actually a useful piece of information.

Chart 19: Evolution of olive grove areas (ha) between 1990 and 2003



Case study results
As far as the case study concerns, the majority of producers was not compelled to abandon or to plant new olive groves, apart from two producers, who replaced other cultivations by olives trees.
One of the producers replaced Corinthian raisin by olives, since the cultivation of olive trees is much simpler in comparison to the Corinthian raisin and the final product, the olive oil, has better price.
The other producer replaced partly a vine, removing a line of nogs and adding in its place a line of olive trees. In fact, this is a co-cultivation of vine and olive trees.
Apart from those two producers, no one else abandoned or planted any cultivation.
Since no one farmer abandoned olive groves land, there were no environmental consequences such as landscape deterioration, fires, erosion, etc.

2.2.2 Horizontal – Theme 2 : adequate spending level and method

Question 1 (H2) : Are there indications that a change in total spending on the CMO <u>in its present form</u> would have a substantial positive or negative environmental impact? [This question should preferably address the claim of the literature that CMOs for permanent crops differ with respect to their overall environmental impact.]

No data are available concerning the subsidies for different environmental measures of the operational programmes of the producers organisations. Therefore, a reliable answer can not be formulated.
It can only be mentioned a Circular of Ministry of Agriculture with the subject: "Details of Application of No 2200/96 Council Regulation, with regard to the Operational Programs and Funds, as well as the financing aid in the frames of Regulation No 609/2001 afterwards the suppression of Regulation No 411/97"
In this Circular, the various plans for financing are presented. Amongst them, special support aid is foreseen for:

- organic, integrated or experimental farming,
- organic crop protection products (pheromone and predatory), independently on whether the production is organic, integrated or conventional.
- Environmental measures in which the utilisation of recyclable packing is included.

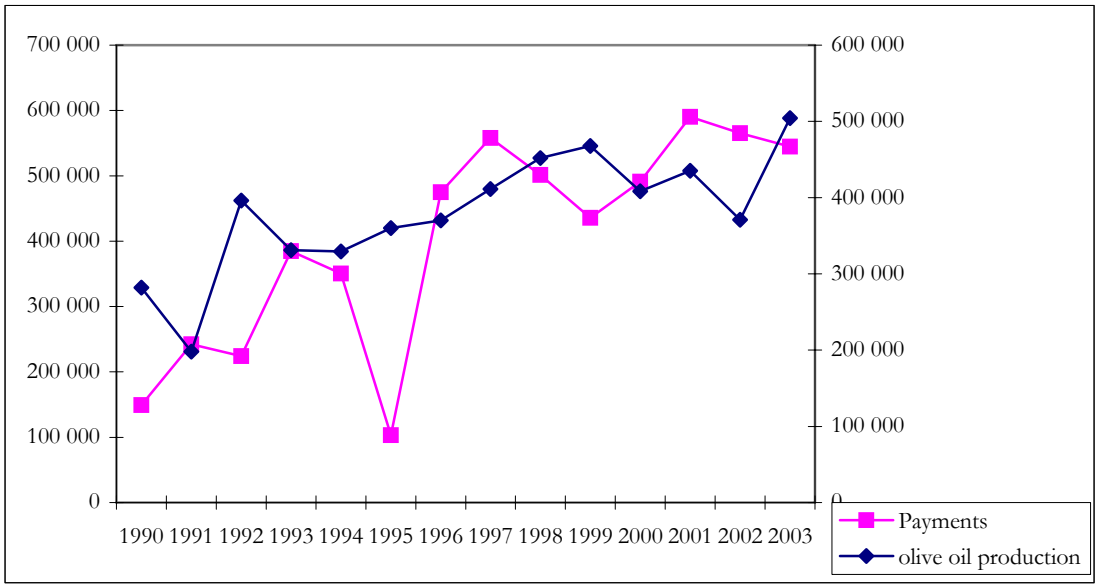
Case study results
According to the interviewed producers during the case study, the way of granting subsidies should change. The majority of producers support that there should be decoupling of the subsidy from the production.
The subsidy should be connected with the quality and not with the quantity of the produced olive oil. Only by this way, the farmers will be compelled to apply environmental friendly cultivation practices (integrated production management, organic farming, etc). This alterate subsidy will result to the reduction of olive farming environmental effects.
The measure that should be abolished is the connection of subsidy to the olive oil production. The decoupling of the subsidy from the production should take place progressively, so that the transition from the one regime to the other will be smooth.

Question 2 (H2). Are there indications that decoupling of spending <u>at its present level</u> would have a substantial positive or negative environmental impact?

The subsidy to the production of olive oil in the frame of Common Organisation of Market led to intensificationbof cultivation of olive trees, which was expressed mainly by an increase of cultivated area and corresponding production, as it is also described by the relative answer in question O1.
The cultivated area of olive presented increasing tendency at the period of years 1990 – 2001. It was 787,500 hectares in year 2001, instead of 690,801 that were at year 990. At years 2002 and 2003 a light cultivated area decrease was observed, which it is likely to be caused by the beheading or even uprooting of certain olive trees, which were destroyed by natural reasons (eg frost, fires, etc) and were not replaced. Concerning the prohibition of subsidy to olive trees that were planted after the 1st May 1998 it should be mentioned the exception of 3500 hectares area of new plantings of olive trees that was granted to Greece by the Decision of Commission in 27/3/2000.
Olive production presents high fluctuations from year to year, due to every year different yield of olive trees. The biggest olive oil production, which amounted in 504,169 tons, occurred in year 2003, despite that both the cultivated area and the production of olives that were intended for oil production were quite lower compared to that of previous years.
According to the olive growers who have been interviewed during the implementation of the case study, year 2003 was one exceptional year as far as production concerns (that it had as result and

the important overshooting of MGQ, and consequently the proportional reduction of subsidies to the growers).
It should be mentioned also, that the efficiency of olive was increased from 1.45 that was in 1990 to 3.30 (ton/ha) in 2002, presenting of course intermediary fluctuations, since it is interrelated with the production, which has presented high fluctuations from year to year.
As far as the age of existing olive trees concerns, most of them (about 86%) are old.
Consequently, the intensification of olive trees cultivation in Greece, that was expressed mainly by the increase both of the cultivated areas and production had certainly some environmental effects in soil, in water and in landscape.
The growth of payments related to olive oil production is given in the next Chart.

Chart 20: Evolution of payments and olive oil production



The increase tendency of olive oil production from the period 1998 (in consequence to the increase at 30% of MGQ) and the related increase of subsidy payments are appeared in Chart 20: Evolution of payments and olive oil production. For years 1999 and 2003 when important overshooting of the MGQ was observed there was an exception in payments.

Case study results
After the decoupling of subsidies from the olive oil production, two are the expected tendencies as they were recorded by the discussions with the olive growers during the implementation of the Case Study:
In case of growers that they are not only farmers (they have not olive cultivation as main profession), it is likely that they will decrease their activities connected to the intensification, but it is equally likely that they will also be lead to the partial abandonment of olive trees cultivation. Positive environmental repercussion will exist in case of abandonment, when the olive grove will be abandoned as such, without to be replaced by other cultivations. In case of initial abandonment and afterwards cultivation with other type of crops, negative impacts are expected, provided that olive cultivation has lower environmental impacts compared to other cultivation that are suitable for the land that is today dominated by cultivations of olive trees. Always, there is the risk (but only in a small scale) that olive cultivations abandonment will lead to negative environmental impacts (soil erosion, biodiversity decrease).
In the case of growers of exclusive employment (as farmers) two tendencies emerge.
One tendency is the reduction of activities related to the intensification (herbicides use reduction, milling, irrigation avoidance) with parallel opportunity for certain producers that have been turned to organic farming or even to integrated systems of production management, to increase their rural income from the surplus value of the high quality product which they will produce. At this case,

positive environmental impacts are expected, mainly in terms of soil erosion and water use and pollution (from the reduction of herbicides use and irrigation water).
One the other hand, it is likely that the decoupling, which will lead to income shrinkage (suppression of fictitious subsidies), will force the producers to higher intensification of their cultivation aiming to the increase of their total rural income. This phenomenon may occur mainly to regions characterised by olive monoculture (south Peloponnese, Crete, Lesvos island).

Regarding the question, whether this change would affect their farms, the farmers opinions were discordant. The majority supported that only those farmers that are really exclusively farmers will continue to cultivate olives and the rest (that they own and cultivate oliveyards as a second profession), it is most likely that will either rent their holdings or abandon them. The ones that will continue the cultivation will be obliged to partly change the farming practices, since they will be compelled, henceforth, to apply the Codes of Good Farming Practice.

2.2.3 Horizontal – Theme 3 : subsidiarity of agri-environmental schemes and horizontal measures

Question 1(H3) : Have the agri-environmental schemes and any environmental requirement ["cross-compliance" ex CE 1259/1999] related to these CMOs been sufficiently targeted by Member States and regions at hotspots of environmental degradation or possibilities for environmentally friendly production?

None of the AE measures that are applied under SPD RD (or earlier in the frame of financing of No 2078/92 Regulation) is addressed specifically to olive cultivation or to areas conquer to environmental deterioration due to olive cultivation. Concretely, as it is also reported in the bibliography the environmental impacts of olive cultivation in terms of soil erosion and irrigation water consumption are focused mainly in the region of Crete, but none regional measure has been applied focused on olive cultivation in Crete.
In the AE measure of organic farming, some beneficiaries are growers of olive.
Specifically, olive organic farming continuously expands in Greece (independently if the holdings are subsidized under the organic farming measure of SPD RD or not). The areas of olive trees cultivations that were introduced in the program of organic farming amounted in 17,340.85 hectares in year 2003, while the corresponding area in year 1999 was 10,265.68 hectares, that means an increase of about 68%. Olive organic farming constitutes the most important, between the different plants organic farming, in Greece. In year 2003, the area of olive organic farming covered a percentage of 77.74 % of total areas of organic farming.
In order a beneficiary to be financed by any of the AEMeasures of SPD RD, he should apply obligatory the Codes of Good Farming Practice, as well as the requirements of the National Regulating Frame for the environment, which has been established in the Hellenic legal framework. Under Joint Ministerial Decision No 125347/568/20.1.2004, the application of codes of good farming practices as they approved by No (2003)3139/22.8.2003 European Commission Decision which amends the SPD RD 2000 – 2006, is obligatory, from the beginning of year 2004. Codes of Good Farming Practices aim to the confrontation of the problems caused by agricultural activities.
These practices aim to:

- sustainable development of farming soils and natural resources
- protection and maintenance of agricultural landscape and its characteristics
- protection of growers and consumers health

Codes of Good Farming Practices intervene in all the phases of agricultural and cattle breeding activities, as well as in specific cases of areas or zones under special protection regimes.
They are dealing with issues like:

- Inputs management
- Soil treatment
- Crop rotation
- Fertilization

- Water resources protection
- Irrigation systems
- Crop protection
- Self-sown flora management
- Farming waste management
- Waste management

Apart from the above agro-environmental measures, a System of Integrated Agricultural Production Management is applied in Greece from year 2000. This is a system of the organisation of a farm that includes inter alia, good farming practices, principles of health and safety of workers, products safety, traceability and environmentally friendly actions. The system aims at the development of an environment suitable for effective and profitable agricultural production in an economically viable and environmentally responsible agricultural business, incorporating useful natural processes, in the modern farming practices.

The opportunity for the application of this system was provided by the development of Good Agricultural Practice rules for olive groves, in the context of Regulation No 1334/2002[1]. This Regulation foresees support to olive growers organizations to create codes of Good Olive Husbandary Practice specific for olive growing and the local environment of each organization. The project is implemented by Elaiourgiki and it is called K.OR.E.P which is the Greek acronym equivalent of Codes of Good Olive Culture Practice. The environmental management standard ISO 14001 is the baseline for the system.

The continuously increasing demands of markets for certified products according to the System of Integrated Management induced the development of the following standards:

AGRO 2-1: Specification

This standard includes general requirements for agriculture practices. It includes the whole principles for the certification of the Integrated Management System that is applicable in every agricultural holding independently from its specific cultivations.

AGRO 2-2: Requirements for use

This standard describes the technical and legal requirements of the Integrated Production Management System for crop production and accompanies the standard AGRO 2-1. It includes the general codes of Good Farming Practice and the accompanying measures of environmentally friendly agriculture (crop production), in a way that safe and qualitative products are produced and best environmental management is achieved.

The benefits deriving from the system application are:

- Assurance of cultivations output (quantity and quality) and income of farmers
- Reduction of environmental impacts of agricultural activities
- Satisfaction of social and market requirements for both environmental protection and agricultural products free (as much as possible) from chemical substances

The total certified areas by AGROCERT, according to AGRO 2-1 and AGRO 2-2 standards, are 15,632.2 hectares in year 2005. Table olive trees are cultivated in 102.7 hectares or in only 1.13% of the total cultivated land according to the IPMS. There are other farms, which have been certified under ISO 14001 standard (Producers Organisation "Nileas", at Messinia – Peloponnese).

During the implementation of the case study, the work team met a producers organization, which is certified according to ISO 14001 requirements, following both the requirements of AGRO 2-1 and AGRO 2-2 and ISO 14001, in the frame of an integrated production management system. The reasons that induced them to apply the integrated production management system, were both their personal environmental awareness and the necessity to attribute to their product a competitive advantage aiming at the export of the produced olive oil to USA.

Furthermore, according to No 2019/1993 Council Regulation, special measures have been enacted for some specific agricultural products to benefit the producers of small Aegean islands. Olive oil is one of these products. Specifically, a lump sum subsidy per ha has been determined, for the

[1] (Commission Regulation (EC) No 1334/2002 laying down detailed rules for the application of Council Regulation (EC) N0 1638/98 as regards the work programmes of operators organisations in the olive sector for the marketing years 2002/03 and 2003/04 Official Journal L195.

maintenance of olive groves under the traditional olive farming practices, given that olive groves are conserved in such a way that good production conditions are ensured..
Concluding, the only environmental friendly measure related to olive cultivation that is financed anyhow, is the measure of organic farming. According to organic farming requirements the adoption and application of Codes of Good Practice is obligatory. Besides, there does not exist currently any certain providence for measures of confrontation of the environmental deterioration, which is a consequence of olive cultivation, beyond the financing for the maintenance of traditional olive groves in the small islands of Aegean. Special measures will be applied, when the Codes of Good Olive Culture Practice will be in force.
The measure of organic farming is applied all over Greece, while many of other AEM targeted at significant hotspots.

Case study results
Concerning the findings of the case study, the grants that the farmers receive for the production of olive oil is not conditional upon certain environmental considerations, yet. Currently, the Codes of Good Farming Practices are obligatory only for the producers that are included in agro-environmental measures or in some other programs of Ministry of Agricultural Developemnt and Foods.
Regarding the question whether these requirements address the major environmental problems of the zone in which the interviewed farmers' farm is located, in general, the Codes of Good Agricultural Practice are connected to the main environmental issues of the region, in which the case study was conducted. More specifically, the main problem in the area of the interviewed farmers is soil erosion. Moreover, in the wider region of Messinia and Lakonia, where most of olive oil is produced, there is a water shortage problem. In a small-determined area, the area of Trifylia, some problems of water salinity exist. No specific literature was found on the subject.

Question for farmers practising logical/integrated agriculture
Integrated farming is applied the last three years in the case study area. The most recognisable effects of the integrated farming concern the ratification of inputs use. The farmers practicising integrated farming said that they didn't reduce significantly the used fertilizers and pesticides, since they had already reduced the dosage due to the high cost of the agrochemical products. They have a tidier olive orchard with no effect to the production levels.

The farmers– members of producers organisations who apply the integrated production management system, seeking the following profits:
- Guarantee of selling and assurance that the demand of their products will increase
- Connection of their products with their place of origin.
- Reduction of cultivation cost, as all the interventions are applied according to the real needs of olive trees.
- Avoidance of loss of income, since the production is not decreased as in the case of organic farming of olive trees. Consequently, any increase in price of the product constitutes net profit for the producers.
- Application of the rules of multiple compliance. This has as result the decrease of risk of loss of subsidy in the future, when the application of the new CAP will begin.
- Information to the members –producers for anything related with their profession, such as the changes in the legislation, the Community regulations, the subsidies, the investments, the programs, etc..

According to the interviewers the main environmental effects of olive trees intensive cultivation are results mainly of the following farming practices:
- increased and out of time use of fertilizers and pesticides, which lead to the pollution of water resources and soil, but also affect the plant and its health, as it appears from certain soil analyses that were conducted
- excessive irrigation, and especially irrigation with sprinklers which causes water wasting and contributes to soil erosion

- tilling in inclining grounds, which creates erosion problems and soil compaction, while at the same time reduces the organic content of the soil.

The producers – members of producers organizations of integrated production management apply the following, so that they achieve their environmental objectives,:

- They mainly decrease the use of tilling in inclining grounds, aiming at the reduction of soil compaction and the maintenance of the organic content of the soil in satisfactory levels.
- They limit the quantity of drastic substance of crop-protection products per hectare.
- They limit the quantity of fertilizers, following the protocols of fertilization per prefecture.
- They irrigate accordingly to the water needs of the plants, while they try to keep irrigation timetable and conduct water analyses at regular time intervals.

Moreover, any producer - member of producers organization of integrated production management who wants to materialize one from the above procedures, he should previously inform the team's supervising agronomist. The agronomist will provide him with the relative guideline - document that the farmer should follow and complete during the implementation of the required procedure (tilling, irrigation, etc). After the end of the procedure, he should return the document completed to the agronomist(responsible for the system).

The practices that the producers - members of producers organization of integrated production management apply are the same with the respective ones of the traditional olive cultivation with the difference that all these practices are conditioned by certain rules, which they are obliged to follow. Concretely, each producer has the obligation to:

- Suitably manage the remainings.
- Suitably store the pesticides
- Manage his farm's waste (batteries, lubricants etc)
- Follow health and safety principles
- Have a storage building.

Question for organic farmers

Organic farming, in general, aims at the re-establishment of balance between the agricultural and natural environment and at the production of competitive quality products. The olive producers that are included in the program of organic farming anticipate the ensuring of selling their products in a dedicated market and the increase of their products demand. Their fundamental objective is the production of competitive quality products minimizing the risks for his health, consumers' health and environment.

During the application of organic farming, the productivity of olive trees is decreased, mainly because of the limited nitrogen quantities used. This reduction can amount up to 25% of the traditional production and it is usually compensated by higher prices of the organic products.

The organic farmers consider that the main environmental effects of intensive cultivation of olive trees are deriving from the following main farming practices:

- increased and out of time use of fertilizers and pesticides, which lead to pollution of water resources and soil, but also affect the plant and its health, as it appears from certain soil analyses that were conducted
- excessive irrigation, and especially irrigation with sprinklers which causes water wasting and contributes to soil erosion.
- tilling in inclining grounds, which creates erosion problems and soil compaction, while at the same time reduces the organic content of the soil

Organic farming of olive is differentiated from the traditional in the following points:

- The destruction of weeds and herbs takes place only with mechanical means (tilling, grass cutters, etc.), since herbicides use is prohibited.
- The plant-protection products used differ partially from those of traditional farming and their use is allowed according to Regulation No 2092/91.
- The fertilization takes place by the utilization of different types of fertilizers, which are usually allowed according to Regulation No 2092/91. Moreover, organic-farmers apply also green manure (i.e. seeding and inversion of some legumes, usually) so that the nitrogen levels of olive trees are improved.

It should be marked that irrigation is applied by the same way as in the traditional cultivation without any differentiation.

The farming practices that olive organic farmers apply are conditioned by the principles of Regulation No 2092/91. These principles, in general, are very strict and they should be strictly followed.
In any case, the farming techniques of organic farming are the same with the corresponding traditional ones, as it is also reported above, but they are conducted with different way and with different crop-protection means and nutrition products for the olive trees.

As it can been concluded from the above analysis the agri-environmental schemes and all the environmental requirements ["cross-compliance" ex CE 1259/1999 or Codes of Good Farming Practices] related to olive CMOs have not been targeted at hotspots of environmental degradation, since they are addressed to all olive farmers – potential beneficiaries that cultivate land all over the country. The possibilities for environmentally friendly production are the same for all the potential beneficiaries – olive groves farmers, independently of hotspots of environmental degradation.

APPENDICES

Annex 1 : List of people met or contacted

Annex 2 : Main bibliography identified (used or not) in relation with the study

Annex 1: List of people met or contacted

1. Mrs T. Papavasileiou, General Manager OPEKEPE (Payments Authority)
2. Mr Gavalekas, Directorate of land use and Environment, Ministry of Agricultural Development and Food.
3. Mrs Pyriovoli, Directorate of land use and Environment, Ministry of Agricultural Development and Food.
4. Mrs Marianthi Loupassaki, NAGREF, Institute of Olive Tree and Subtropical plants of Chania
5. Mr Alexandros Efthimiou, General Directorate of Crop Protection, Directorate of Production and Exploitation of Arboricultural Products
6. Mr A. Kountouris, General Directorate of Crop Protection, Directorate of Production and Exploitation of Arboricultural Products
7. Mr K. Stournaras, General Directorate of Crop Protection, Directorate of Production and Exploitation of Arboricultural Products
8. Mrs E. Mpousiou, General Directorate of Crop Protection, Directorate of Production and Exploitation of Arboricultural Products
9. Mr Bourdaras, Ministry of Agricultural Development and Food.
10. Mr Apostolos Zontanos, Agronomist, Owner a business of crop protection sales
11. Mr T.Dimalexis, Researcher, Hellenic Ornithological Society
12. Mrs Antonia Galanaki, Biologist, Consultant to the Hellenic Ornithological Society
13. Mrs M. Aravantinou, Ministry of Environment, National Network of Environmental Information
14. Mrs Alexia Chomata, Ministry of Environment, National Network of Environmental Information
15. Mr Kyriakos Georgiou, Assistant Professor in the National University of Athens, Department of Biology
16. Mr Dionyssis Assimacopoulos, Professor in Chemical Engineering Department of NTUA,
17. Mr Michael Zontanos, President of OP of Koukounara (Pylia region)

List of farmers, who have been interviewed (in alphabetical order)

1. Fotis Aggelopoulos, 49
2. Alexopoulos Thanassis, age of 47
3. Anastasopoulos Christophoros, age of 34
4. Apostolopoulos Panayiotis, age of 46
5. Athansopoulos Panayiotis, age of 58
6. Bouzas Yiannis, age of 55
7. Darsaklis Apostolos, age of 38
8. Darsaklis Theodoros, age of 80
9. Gouros Nikos, age of 40
10. Kokkinos Giorgos, age of 39
11. Koronios Christos, age of 40
12. Kouvatsos Giorgos, age of 89
13. Lykisiotis Giorgos, age of 50
14. Matsakas Kyriakos, age of 35
15. Pyliotis Kostas, age of 36
16. Paganis Andreas, age of 55
17. Vergos Andreas, age of 71
18. Victor Koraj, age of 35
19. Tsakalis Panagiotis, age of 32
20. Tsopelas Andreas, age of 46
21. Zontanos Christos, age of 31
22. Zontanos Konstantinos, age of 73
23. Zontanos Yiannis, age of 32

Annex 2 : Main bibliography identified (used or not) in relation with the study

Anadranistakis M., Liakatas A., Kerkidesb P., Rizos S., Gavanosis J., Poulovassilis A., 2000. *Crop water requirements model tested for crops grown in Greece*, Agricultural Water Management 45, pp.297-316, Elsevier.

Angelakis A.N., Marecos do Monte M.H.F., Bontoux L., Asano T., 1999. *Review paper : The status of wastewater reuse practice in the Mediterranean Basin: Need for Guidelines*, Water Research Vol. 33, No. 10, pp.2201-2217, Elsevier.

Assimacopoulos D., 2002. *The Water Management in Greece*. "Festival de l'Oh!". Paris, France.

Balabanis P., *Water in Europe. Research achievements and future perspectives within the framework of european research activities in the field of environment*, European Commission. Directorate General for Science, Research and Technological Development. Brussels, Belgium.

Bourbos B.A., Barbopoulou E.A., *The ecologic and integrated agriculture towards the sustainable development of Chania Prefecture, Crete*.

Caraveli H., 2000. *A comparative analysis on intensification and extensification in mediterranean agriculture: dilemmas for LFAs policy*, Journal of Rural Studies 16, p.231-242, Elsevier.

Chartzoulakis K.S., Paranychianakis N.V., Angelakis A.N., 2001. *Water resources management in the Island of Crete, Greece, with emphasis on the agricultural use*, Water Policy 3, pp.193–205, Elsevier.

Chartzoulakis K.S., Loupassaki M., Bertaki M., Androulakis I., 2002. *Effects of NaCl salinity on growth, ion content and CO2 assimilation rate of six olive cultivars*, Scientia Horticulturae 96, pp.235–247, Elsevier.

Draft Report of Sustainability Indices – Greece 2003

EU Cross Compliance Newsletter, Issue 3 – April 2004.

Hellenic Ornithological Society, 2005. *Agriculture and Birds* (in Greek), Report available in website.

Institute for European Environmental Policy, Polytechnical University of Madrid, University of Athens, 2000. *The Environmental Impacts of irrigation in the European Union*, A report to Environment Directorate of EC.

Loupassaki M., *Effects of fertilizers in soil fertility*, GEO. C. G, 1990. Agrochemicals and Environment. Proc. GEO.C.G Workshop, Chania, Crete. 7-8 Dec. 1989. Chania, Greece. (In Greek.)

PESERA Project, *Soil erosion risk assessment in Europe*.

Poiret M. (Eurostat), *Crop trends and environmental impacts*.

Stobbelaar D.J., Kuiper J., van Mansvelt J.D., Kabourakis E., 2000. *Landscape quality on organic farms in the Messara valley, Organic farms as components in the landscape*, Agriculture, Ecosystems and Environment 77, pp.79–93, Elsevier.

Tsagarakis K.P., Dialynas G.E., Angelakis A.N., 2004. *Water resources management in Crete (Greece) including water recycling and reuse and proposed quality criteria*, Agricultural Water Management 66, pp.35–47, Elsevier.

European Crop Protection Association, Hellenic Crop Protection Association, *Crop protection and water quality*.

Tzouramani I., Mattas K., *Employing real options methodology in environmentally friendly production systems*.