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

ANNEXE 6 : OCM FRUITS
ETUDE NATIONALE ESPAGNE et
ETUDE DE CAS VALENCIA

Novembre 2005

Departamento de Proyectos y Planificación Rural (ETSIA). UPM. Avda. Complutense s/n 28040 Madrid
Tlf: 34 91 336 58 35 – Fax : 34 91 336 58 35

TABLE OF CONTENTS

TABLE INDEX

CHART INDEX

GLOSSARY

ACTEL – Associació de cooperatives agràries de les Terres de Lleida (Agricultural Co-operatives Organization of Lleida)

AEM – Agri-Environmental Measures

AILIMPO – Asociación Interprofesional de Limón y Pomelo (Lemon and Grapefruit Interbranch Organization)

AIPEMA – Asociación Interprofesional de Pera y Manzana (Pear and Apple Interbranch Organization)

ANECOOP – Agrupación Nacional de Exportación de Cooperativas Citrícolas (Citrus Fruit Export Organization of Spain)

ASAJA – Asociación de Jóvenes Agricultores (Young Farmers Organization)

BOE – Boletín Oficial del Estado (Official State Gazette)

CAE-CV – Comité de Agricultura Ecológica de la Comunidad Valenciana (Valencian Organic Farming Committee)

CCAA – Communidades Autónomas (Autonomous Regions)

CMO – Common Market Organization

COAG – Coodinadora de las Organizaciones de Agricultores y Ganaderos (Farmers Organizations Coordinator)

EC – European Commission

EU – European Union

FADN – Farm Accountancy Data Network

FEGA – Fondo Español de Garantía Agraria (Spanish Fund of Agrarian Guarantee)

GD – General Direction

INE – Instituto Nacional de Estadística (Spanish Statistic Institute)

INTERCITRUS – Interprofesional Citrícola Española (Spanish Citrus fruit Interbranch Organization)

IP – Integrated Production

MAPA – Ministerio de Agricultura Pesca y Alimentación (Ministry of Agriculture, Fisheries and Food of Spain)

NGS – National Guaranteed Surface

NIP – National Irrigation Plan

OF – Operational Funds

OP – Operational Programs

PO – Producers Organization

UPA – Unión de Pequeños Agricultures (Small Farmers Union)

VMP – Value of Marketed Production

1. CONTEXT OF FRUITS PRODUCTION IN SPAIN

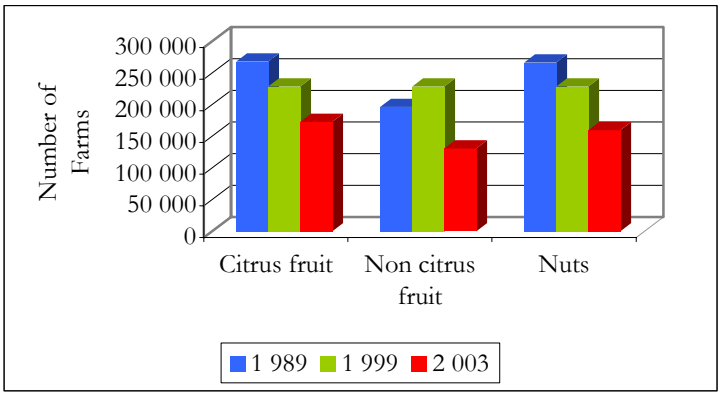
1.1 Main characteristics of the fruits production in Spain

The orchards area of different fruits concerned (apples, pears, peaches, nectarines, citrus fruit and nuts) in 2003 represented, according to INE, more than 932 thousand hectares, 70 and 127 thousand hectares less than in 1999 and 1989 respectively.

Nuts represented, in 2003, around 57% of this area, whereas citrus fruit area represented 29% and non citrus fruit 14%. These percentages stand almost invariable since 1989.

The number of farms has decreased between 1989 and 2003, according to the Agricultural Census, 35.5% in citrus fruit, 33.4% in non citrus fruit and 40.1% in nuts. In 2003, citrus fruit is the most significant crop, in terms of number of farms, with more than 172 thousand farms, followed by nuts with 159 thousand farms and non citrus with 131 thousand farms.

Chart 1: Evolution of the number of farms



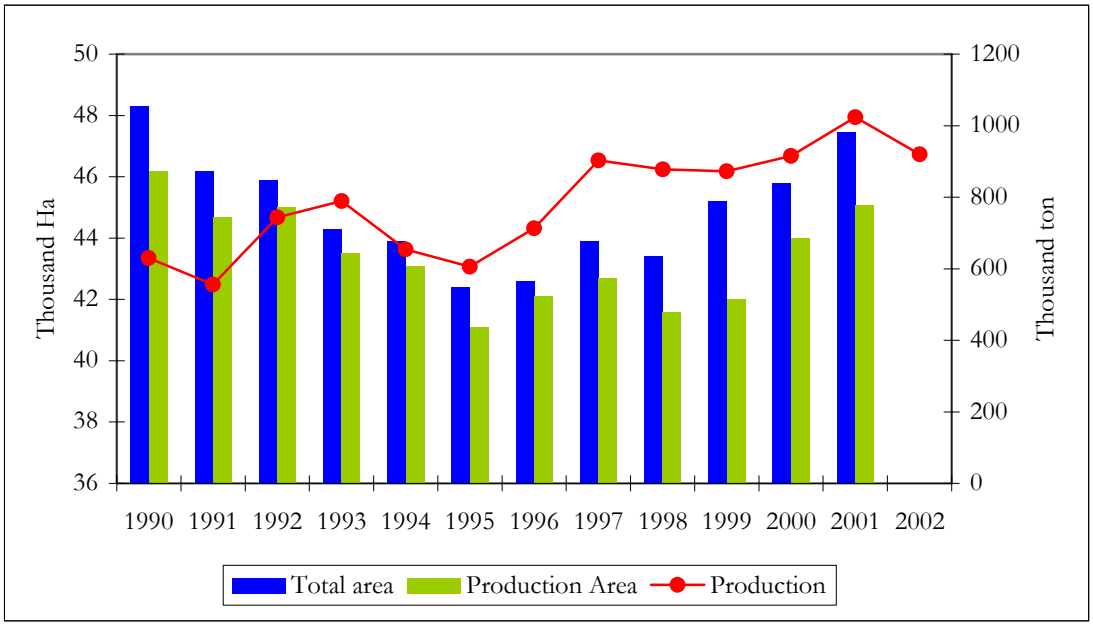
Source: INE, 1989-2003

Lemons – 1990/2002 Evolution and representation

In 2001, according to INE, lemon crop represented 12% of the production of fruit at a national level, reaching an important role in Spanish fruit production, but not so relevant as other citrus fruits like oranges and tangerines.

From the point of view of the evolution, lemon production has followed a positive trend, more significant since 1995, and reaching a maximum in 2001. The evolution of the area of this crop has suffered a gradual decrease from 1990 to 1995, but since 1996 has followed the production tendency. The gap between total area and production area has become more prominent in the last years, reaching its peak in 1999 (3.2 thousand hectares of difference).

Chart 2 : Evolution of the area (thousand ha) and production (thousand tonnes) of lemons



Source: INE, Boletín Estadístico

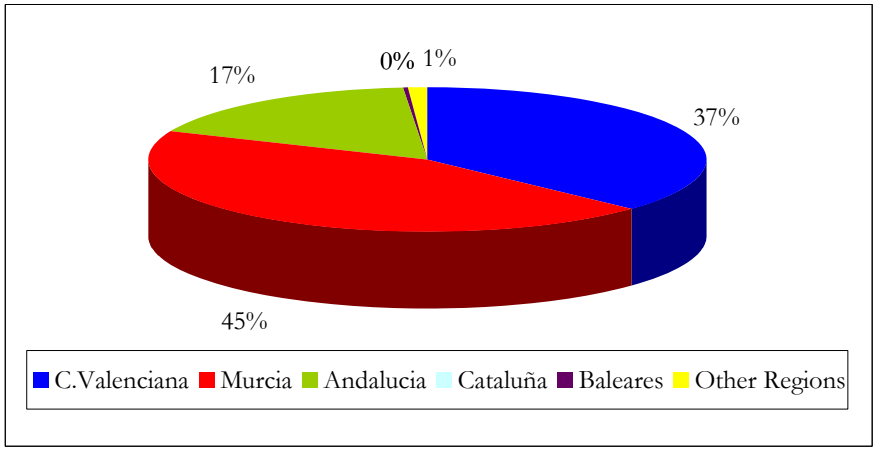
In regional terms, lemons prevail in Murcia (Table 1 and Chart 3), with 45% of the production in 2001-2002, followed by C. Valenciana (37%) and Andalucía (17%), with significant increases of the produced quantity, in the period 1997-2002 in the three regions.

Table 1 : Evolution of regional production (tonnes) of lemons

Region	97-98	98-99	99-00	00-01	01-02
C.Valenciana	220,192	220,314	308,911	342,390	359,957
Murcia	284,910	361,500	395,000	420,000	433,000
Andalucía	97,202	90,738	177,459	161,165	168,923
Cataluña	592	1,000	1,125	855	899
Baleares	3,400	2,000	2,000	2,000	2,000
Other Regions	13,500	13,300	12,700	10,900	10,900

Source: INTERCITRUS

Chart 3: Regional importance of lemon production (2001-2002)



Source: INTERCITRUS

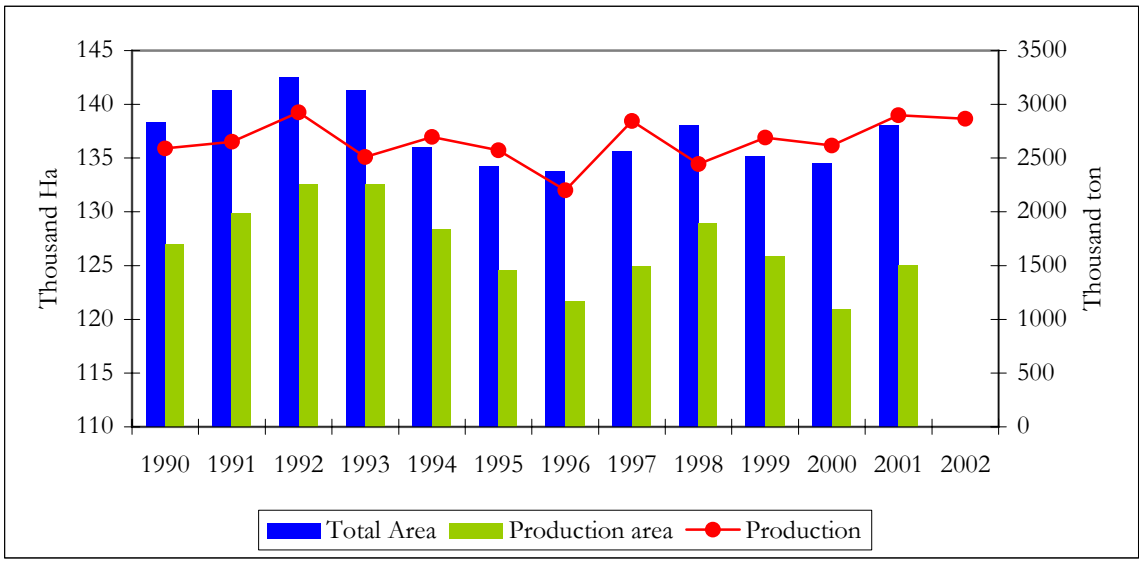
Oranges – 1990/2002 Evolution and representation

Orange production is the main fruit crop in Spain. It represents 33% of the quantity of fruit produced in 2001 and it is the main yield among citrus fruit, according to INE.

The evolution of the area of orange crop from 1990 to 2002 (Chart 4) shows a slight decrease from 1992 to 1996, when it reaches its lowest value related to total area (133.8 thousand hectares). But in terms of production area, this takes place in 2000 (120.9 thousand hectares). It is significant the gap between total area and production area, with an average value of 10.5 thousand hectares during the concerned period.

In terms of orange production, the evolution from 1990 to 2002 remains steady, without significant changes in the period.

Chart 4 : Evolution of the area (thousand ha) and production (thousand tonnes) of oranges



Source: INE, Boletín Estadístico

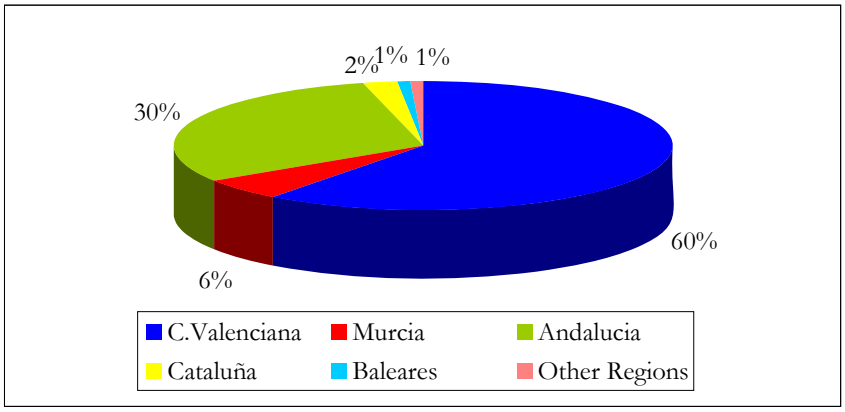
Orange yield prevails in Mediterranean regions, as in any other citrus fruit crop, according to Intercitrus data. C. Valenciana is the most representative region, contributing to orange production with 60% in 2001-2002, followed by Andalucía (30%). The evolution of production in both regions has been stable, but it has increased substantially in Murcia from 1997 to 2002.

Table 2: Evolution of regional production (tonnes) of oranges

Region	97-98	98-99	99-00	00-01	01-02
C.Valenciana	1,887,497	1,668,463	1,663,559	1,683,295	1,666,203
Murcia	75,258	104,280	123,200	144,070	156,350
Andalucía	540,381	533,331	801,973	779,207	835,315
Cataluña	38,686	36,100	44,350	51,920	59,736
Baleares	23,550	24,525	25,015	20,010	19,000
Other Regions	32,700	32,748	32,725	26,525	26,525

Source: INTERCITRUS

Chart 5 : Regional importance of orange production (2001-2002)



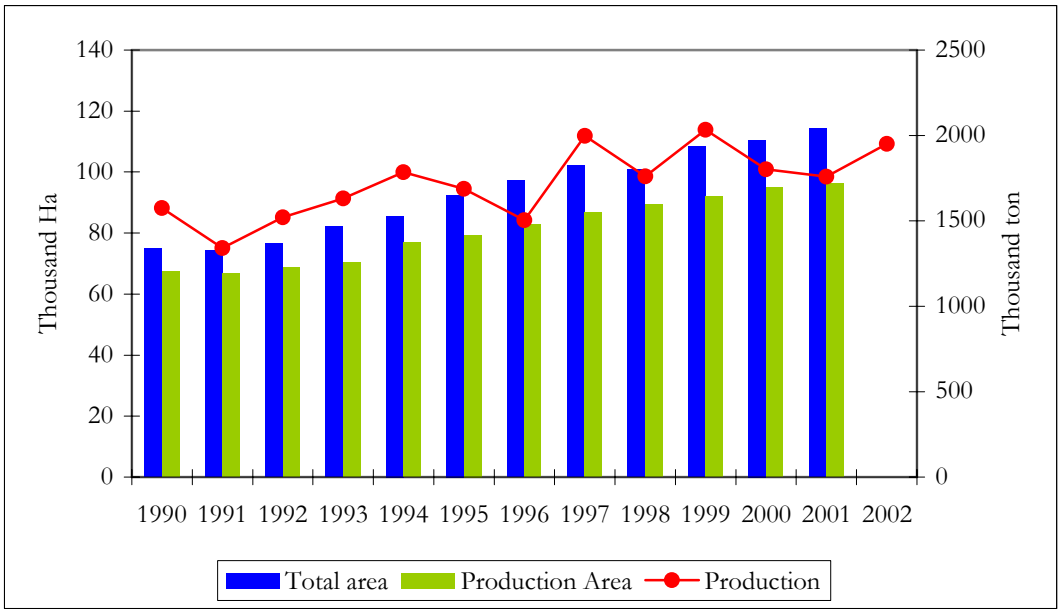
Source: INTERCITRUS

Tangerines – 1990/2002 Evolution and representation

In 2001, according to INE, tangerine crop represented 20% of the production of fruit at a national level, the second crop in order of importance, and more than 30% of citrus fruit Spanish production in that year.

Produced quantities followed a positive trend, but not very prominent, in 1990-2002 period, reaching its maximum value in 1999 with 2033 thousand tonnes (Chart 6). In terms of area, the evolution is gradually upward, in total area and in production area, and the gap between them is not so significant as in orange crop.

Chart 6 : Evolution of the area (thousand ha) and production (thousand tonnes) of tangerines



Source: INE, Boletín Estadístico

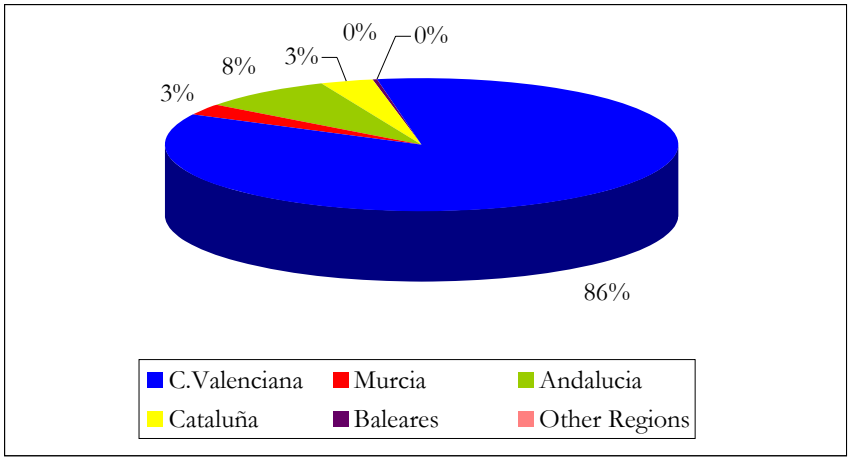
From a regional point of view, tangerine production concentrates in Mediterranean regions, mainly in C. Valenciana, where in 2001-2002 was produced 86% of the national tangerine crop (Chart7). According to Intercitrus data, the regional production of this citrus fruit has decreased in C. Valenciana in the period 2000-2002 in more than 300 thousand tonnes and has increased on the contrary in Andalucía.

Table 3: Evolution of regional production (tonnes) of tangerines

Region	97-98	98-99	99-00	00-01	01-02
C.Valenciana	1,645,870	1,573,498	1,743,833	1,573,116	1,406,065
Murcia	41,743	51,000	61,820	45,740	46,200
Andalucía	54,379	63,680	129,164	120,261	137,775
Cataluña	49,319	38,400	51,750	77,849	55,092
Baleares	2,200	1,100	1,400	2,000	2,100
Other Regions	600	900	925	600	600

Source: INTERCITRUS

Chart 7 : Regional importance of tangerine production (2001-2002)



Source: INTERCITRUS

Apples – 1990/2002 Evolution and representation

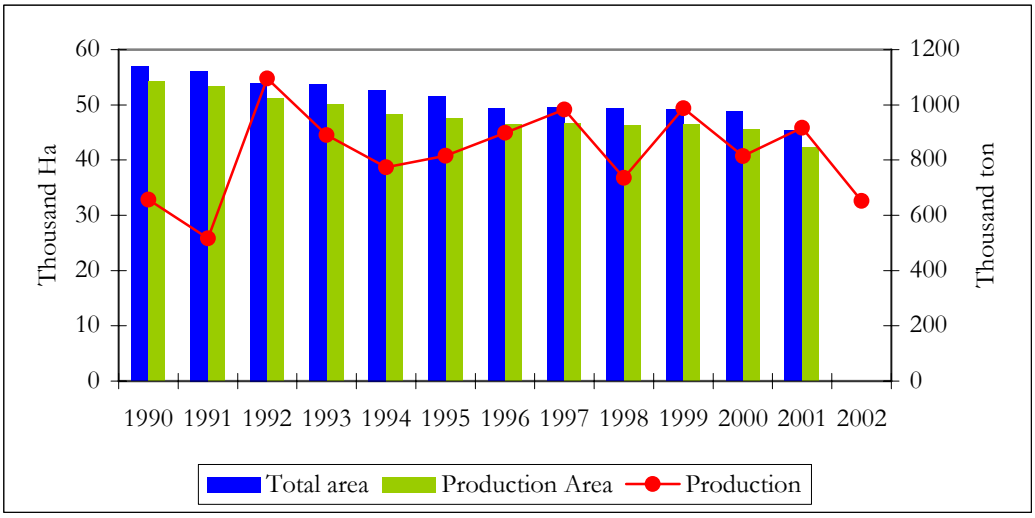
The apples crop represented in 2001, according to INE data, 6% of the Spanish fruit production, with a similar percentage to other non citrus fruits crops, but not so relevant as the production of citrus fruits.

Referring to the evolution, apple production has suffered a continuous decrease from 1990 to 2002 (Chart 8), reaching its maximum value in 1992 with 1095 thousand tonnes, due to a sharp growth of the production from 1991 to 1992 (more than 570 thousand hectares of increase).

The evolution of the area is similar to the production trend. It follows a linear falling tendency in the concerned period and has lost more than 13 thousand hectares of production area, according to INE data. There is no significant gap between production area and total area in apple crop and this short difference remains steady along the last years.

In regional terms, apple production prevails in Cataluña (Table 4 and Chart 9), with 57% of the production in 2003, followed by Aragón (25%). The evolution of production in both regions has varied erratically from 1997 to 2002, decreasing in almost 100,000 tonnes in Cataluña. Generally, production has also decreased in other regions in the same period.

Chart 8 : Evolution of the area (thousand ha) and production (thousand tonnes) of apples



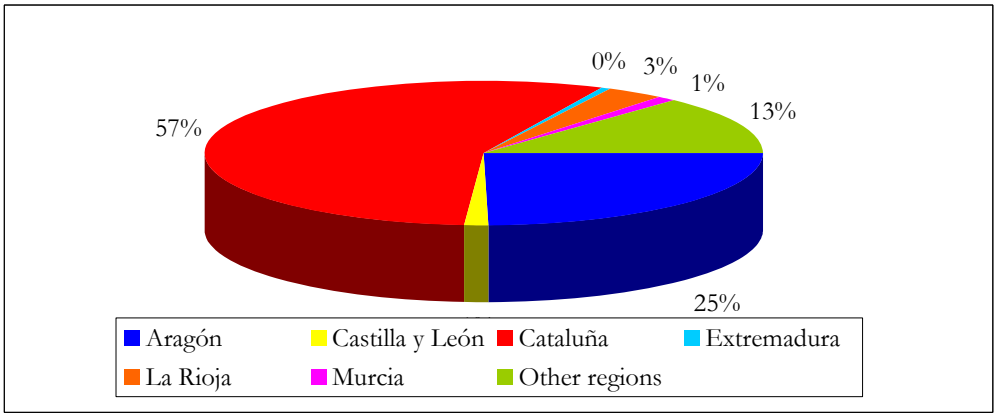
Source: INE, Boletín Estadístico

Table 4: Evolution of regional production (tonnes) of apples

Region	1997	1998	1999	2000	2001	2002	2003
Aragón	180,920	174,100	232,856	124,400	199,500	209,205	173,493
Castilla y León	43,061	34,075	48,577	4,570	21,040	4,850	10,300
Cataluña	484,500	351,794	403,019	393,360	393,120	258,211	392,980
Extremadura	17,900	9,100	6,045	7,000	3,570	3,600	3,105
La Rioja	32,660	24,135	18,604	24,139	31,285	33,350	24,455
Murcia	13,668	12,910	15,456	10,700	9,550	8,434	7,540
Other regions	210,994	129,886	263,866	119,200	147,500	127,969	91,990

Source: INE, Boletín Estadístico and AIPEMA

Chart 9: Regional importance of apple production (2003)

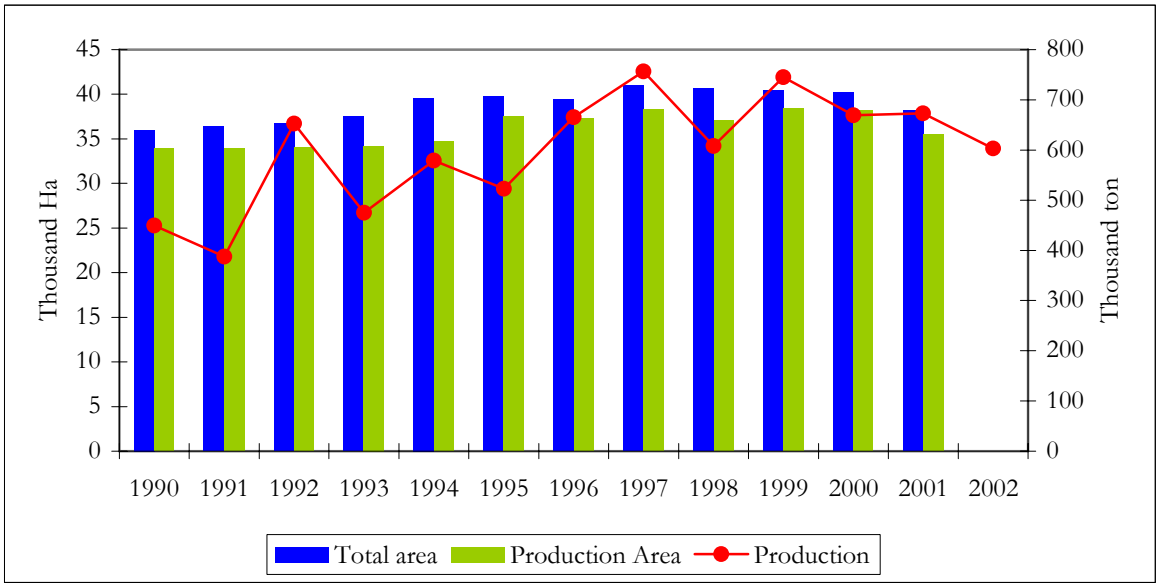


Source: AIPEMA

Pears – 1990/2002 Evolution and representation

The evolution of pears production in Spain during 1990-2002 has been erratic (Chart 10). It followed a positive tendency from 1990 to 1997 (757 thousand tonnes of pears produced this year), with continuous fluctuations during this period, although the trend became negative from 1997 to 2002, decreasing in more than 150 thousand tonnes.

Chart 10 : Evolution of the area (thousand ha) and production (thousand tonnes) of pears



Source: INE, Boletín Estadístico

However, Spanish pear production is not very significant. In 2001, it reached only 5% of the fruit crop, according to INE data. Changes in pear crop area follow a similar trend to production. The total area reached its peak in 1997 and began to fall up to 2001, in a slight tendency, losing 3 thousand hectares in that period of time. There is no important gap between total area and production area, furthermore this difference has decreased during the last years.

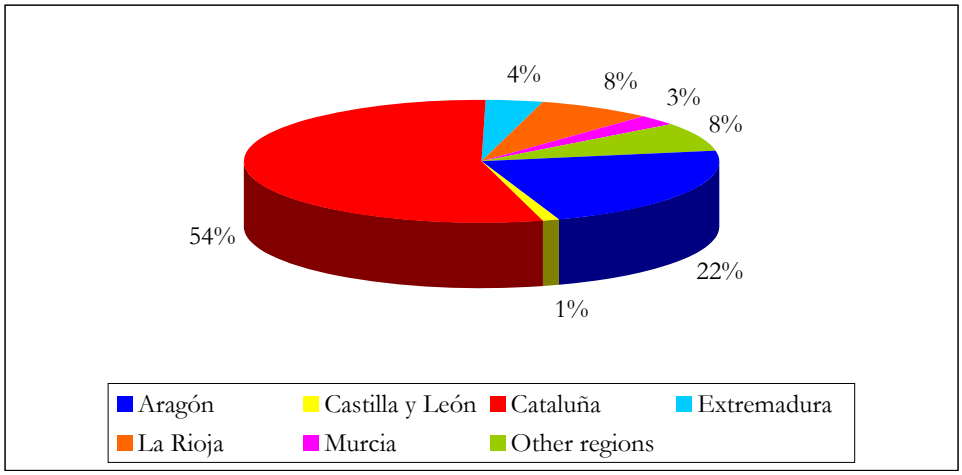
Pear yield prevails in Cataluña and Aragón, according to INE and AIPEMA data (Table 5 and Chart 11). In Cataluña, pear production reached 350,202 tonnes in 2003, 54% of the national production, and in Aragón 144,942 tonnes were produced (22%). There have been no significant changes in regional pear production from 1997 to 2003.

Table 5: Evolution of regional production (tonnes) of pears

Region	1997	1998	1999	2000	2001	2002	2003
Aragón	136,142	120,709	154,429	152,069	152,600	157,165	144,942
Castilla y León	4,042	2,995	5,217	2,487	8,500	8,050	5,816
Cataluña	390,409	335,520	377,646	340,733	332,807	295,623	350,202
Extremadura	88,120	26,995	58,952	41,060	30,120	21,301	23,866
La Rioja	34,231	29,895	35,427	36,875	45,108	45,144	50,450
Murcia	27,868	31,072	38,897	28,210	25,500	24,790	17,560
Other regions	76,040	61,169	74,626	100,070	65,200	50,915	48,393

Source: INE, Boletín Estadístico and AIPEMA

Chart 11: Regional importance of pear production (2003)



Source: AIPEMA

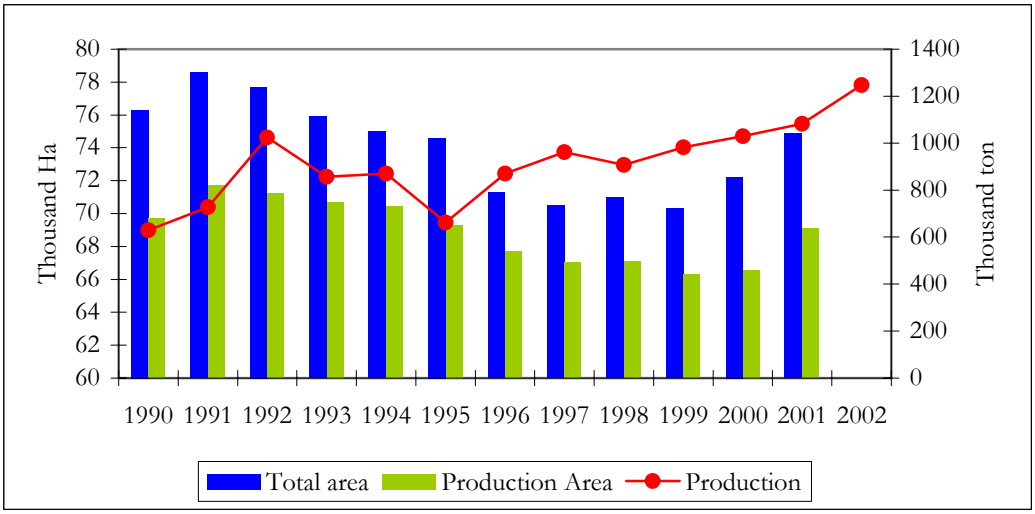
Peaches and nectarines – 1990/2002 Evaluation and representation

Peaches and nectarines represented in 2001, according to INE data, around 8% of the total production of fresh fruit, being the most representative non citrus fruit crop in terms of production.

Produced quantities followed a marked positive trend, specially from 1995 to 2002 period (Chart 12), reaching its maximum level at the end of this period with 1247 thousand tonnes. On the contrary, the evolution of the peaches and nectarines area has not been so stable. From 1991 to 1999 it suffered a noticeable decrease, losing more than 8 thousand hectares, but it recovered during the 1999-2001 period.

The gap between total and production area is prominent in peaches and nectarines crop (around 5 thousand hectares average in 1990-2001 period), although it remains steady along the concerned period.

Chart 12 : Evolution of the area (thousand ha) and production (thousand tonnes) of peaches and nectarines



Source: INE, Boletín Estadístico

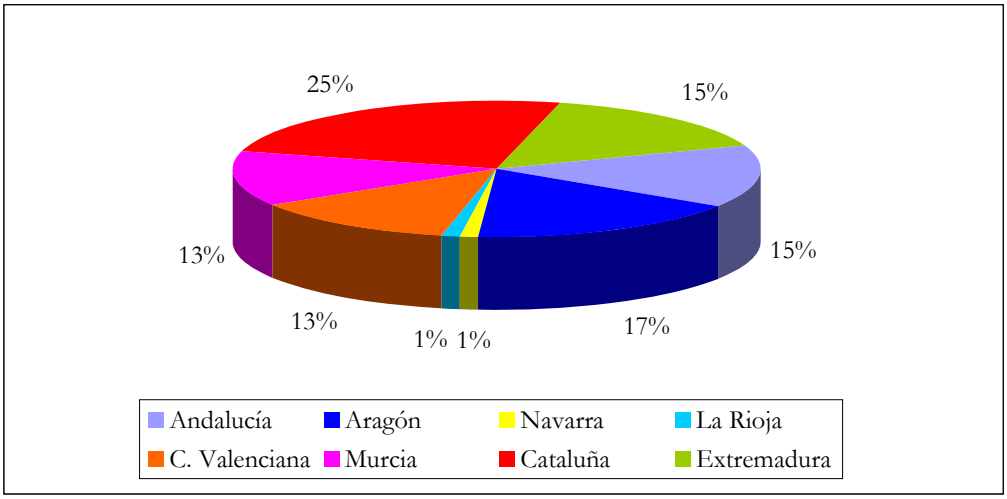
From a regional point of view, peach and nectarine production is broadly expanded (Table 6 and Chart 13). Although Cataluña is the main producing region (25% in 2003, according to CCAE data), Aragón, Extremadura, Andalucía, Murcia and C. Valenciana have important productions. The evolution of regional production from 1996 to 2003 shows significant increases in almost every region.

Table 6: Evolution of regional production (tonnes) of peaches and nectarines

Region	1996	1997	1998	1999	2000	2001	2002	2003
Andalucía	74,243	87,220	86,090	104,310	90,991	93,688	95,000	97,500
Aragón	63,250	66,100	75,856	71,960	100,000	95,000	122,000	111,000
Navarra	8,550	9,000	3,780	4,500	5,550	5,250	5,500	6,080
La Rioja	7,300	8,050	6,500	7,350	9,000	8,750	9,000	7,425
C. Valenciana	49,000	68,500	55,000	73,260	92,159	60,788	76,180	83,965
Murcia	42,500	65,050	61,896	87,183	64,000	67,000	81,000	87,000
Cataluña	102,300	110,800	117,000	112,200	143,800	128,700	142,550	162,528
Extremadura	55,000	51,300	61,300	62,000	76,000	51,000	55,000	101,697

Source: CCAE

Chart 13: Regional importance of peaches and nectarines production (2003)



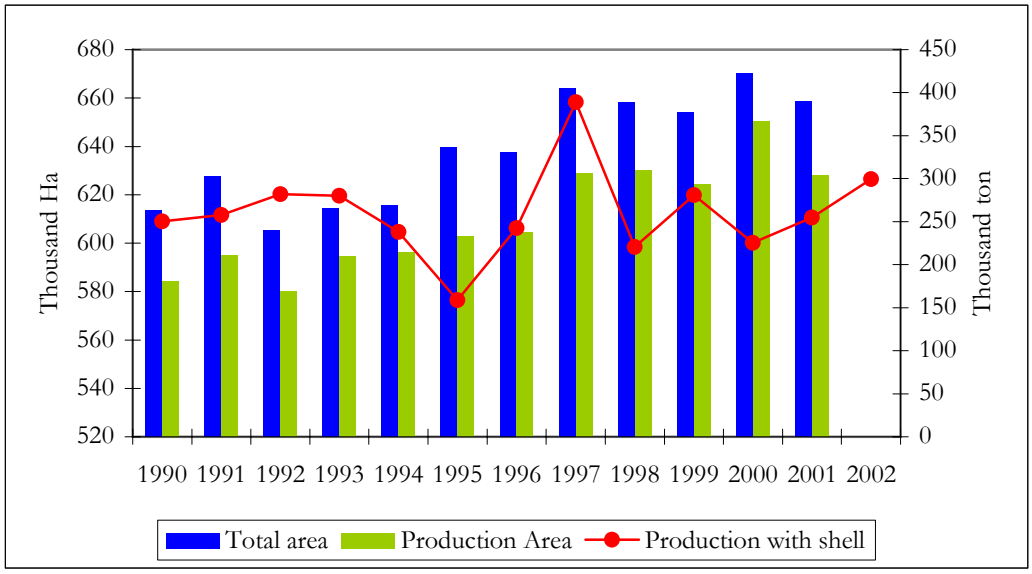
Source: CCAE

Almonds – 1990/2002 Evaluation and representation

Nuts production is not very relevant in Spain. In 2001, according to INE data, it represented around 2% of the production of fruit, including fresh fruit and nuts. However, almonds crop is the most important among nuts. It represented in 2001, around 87% of the nuts production.

The trend of almonds production during the period 1990-2002 has been unstable (Chart 14). Although the results are similar in 1990 and in 2002, during this period production has fluctuated erratically, reaching its lowest value in 1995 (159 thousand tonnes) and its peak in 1997 (389 thousand tonnes), with a striking variation between these years.

Chart 14 : Evolution of the area (thousand ha) and production (thousand tonnes) of almonds



Source: INE, Boletín Estadístico

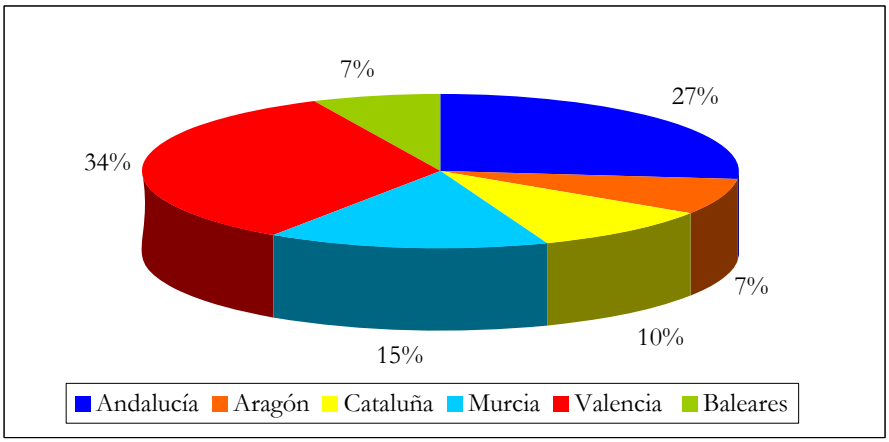
On the contrary, the evolution of the almond crop area has followed in the concerned period a positive trend without substantial differences between total area and production area. Almond yield concentrates in C. Valenciana, with 34% of the production in 2001 (Table 7 and Chart 15), and Andalucía (27%). Regional production of almonds has increased in both regions, but substantially in Andalucía, in almost 25 thousand tonnes from 1995 to 2001.

Table 7: Evolution of regional production (tonnes) of almonds

Region	1995	1997	1998	1999	2000	2001
Andalucía	27,481	82,700	28,560	60,149	24,506	52,030
Aragón	10,044	..	..	..	..	14,125
Cataluña	13,998	36,834	22,742	32,789	31,100	19,712
Murcia	21,406	35,208	19,343	39,624	28,187	29,887
C. Valenciana	58,144	76,207	61,078	56,705	46,125	65,310
Baleares	14,953	13,466	14,618	14,618	16,565	13,287

Source: INE, Boletín Estadístico and VVAA, 1999

Chart 15: Regional importance of almonds production (2001)



Source: INE, Boletín Estadístico

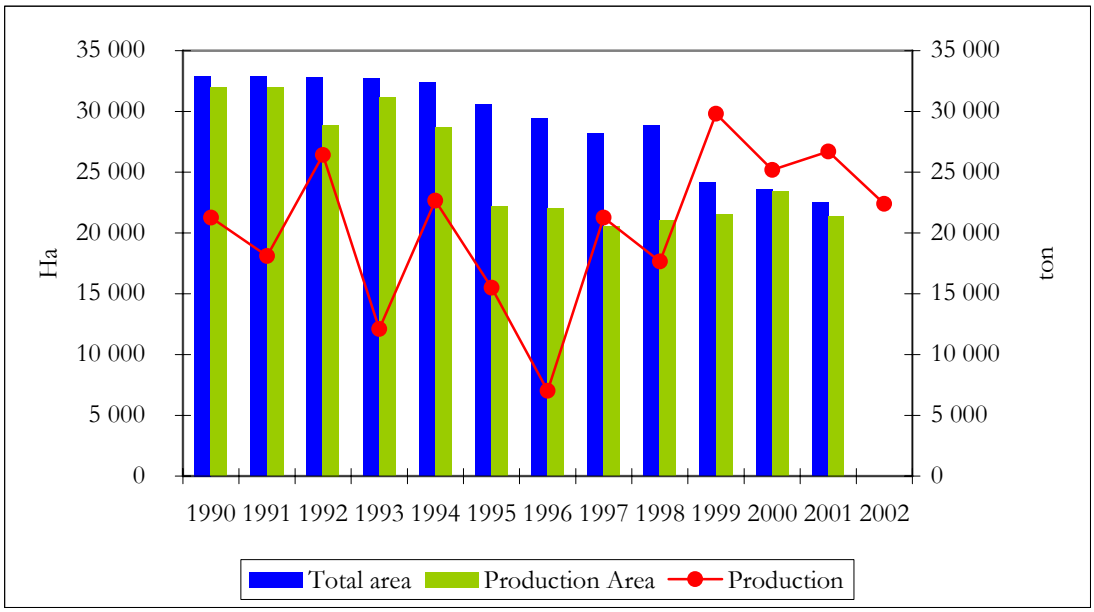
Hazelnuts – 1990/2002 Evaluation and representation

In 2001, the hazelnuts crop represented around 10% of nuts production at a national level, but just 0.2% of the fruits concerned in this study (INE data).

Hazelnuts production has varied irregularly from 1990 to 2002 (Chart 16), with negative trends in two periods: between 1990 and 1996 and between 1999 and 2002. The minimum level of production reached in 1996 (7 thousand tonnes) was followed by an abrupt increase until reaching the production peak in 1999 (nearly 30 thousand tonnes).

The evolution of the area is more linear. It shows a gradual decrease during the concerned period, losing more than 10 thousands hectares between 1990 and 2002. It is necessary to emphasize the evolution of the gap between total and production area of hazelnuts crop. Meanwhile, in 1995 the difference is very important (8 thousand hectares), in 2000 almost all the hazelnuts hectares were producing.

Chart 16 : Evolution of the area (ha) and production (tonnes) of hazelnuts



Source: INE, Boletín Estadístico

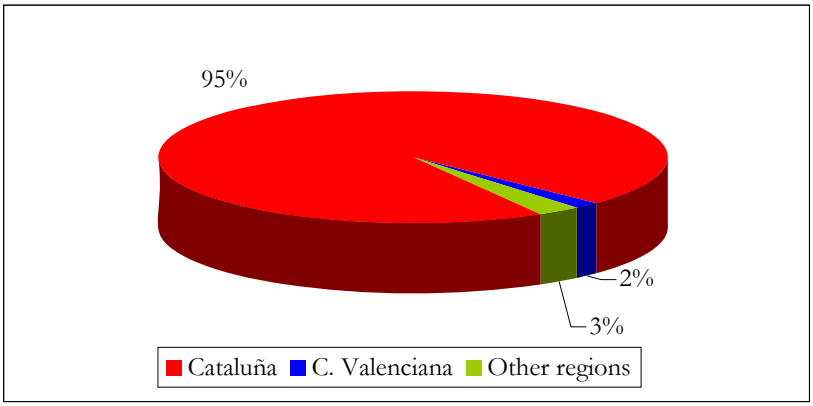
In regional terms, hazelnut production is mainly located in Cataluña, with 95% of national production in 2001, according to INE data. The evolution of production in this region has increased from 1995 to 2001 in 80% (Table 8 and Chart 17).

Table 8: Evolution of regional production (tonnes) of hazelnuts

Region	1995	1997	1998	1999	2000	2001
Cataluña	14,118	18,722	15,489	27,574	17,103	25,427
C. Valenciana	468	604	598	363	355	407
Other regions	906	1,926	1,580	1,874	856	757

Source: INE, Boletín Estadístico and VVAA, 1999

Chart 17: Regional importance of hazelnuts production (2001)

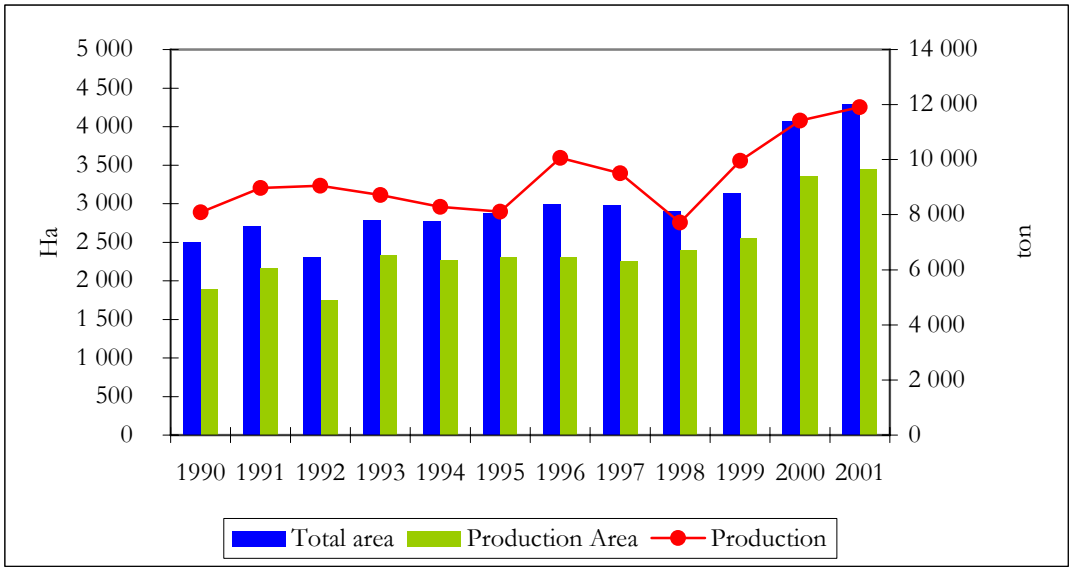


Source: INE, Boletín Estadístico

Walnuts – 1990/2001 Evaluation and representation

Walnuts represented in 2001, according to INE data, around 3% of the Spanish nuts production, but only 0.1% of the production of concerned fruits. The evolution of this production during the 1990-2001 period follows a positive and quite steady trend, mainly from 1998 to 2001, when walnuts production reached its maximum level with almost 11 thousand tonnes.

Chart 18 : Evolution of the area (ha) and production (tonnes) of walnuts



Source: INE, Boletín Estadístico

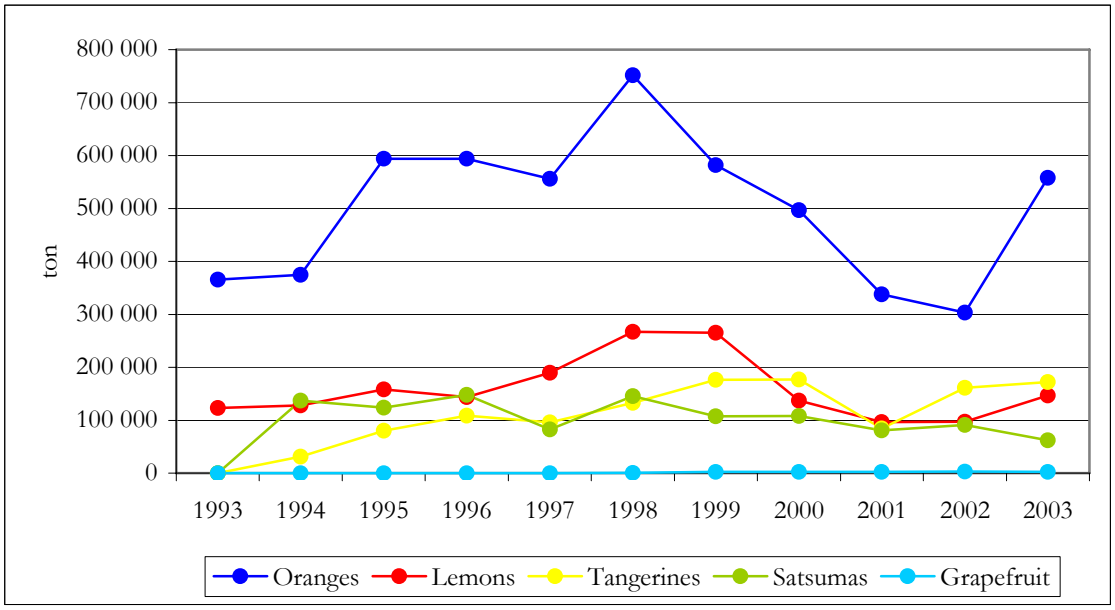
The evolution of the walnuts area shows the same tendency that production (Chart 18), increasing 2.5 thousand hectares of total area and 2.2 thousand hectares from 1990 to 2001.

Processed citrus fruits production

According to FEGA data, orange crop is the most representative among citrus fruits in terms of processed production, with around 59% of the production in 2003, followed by tangerines (18%), lemons (16%) and satsumas (7%).

The evolution of the processed quantities in the period 1993-2003 can be observed in Chart 19 and Table 9. Oranges and lemons follow approximately the same trend: the production increases until 1998, when both orange and lemon processed production reach their peaks (752 and 267 thousand tonnes of processed fruit respectively). From then on, the tendency decreases up to 2002, but in the last campaign of the period returns to increase, especially in the orange production, in which this change is quite sharp.

Chart 19: Evolution of processed citrus fruits production (tonnes) 1993-2003



Source: FEGA, 1990-2003

The trend in tangerines is quite linear upwards, even this production overcomes in terms of importance processed lemon production, in the last two campaigns of the period. On the contrary, processed satsumas production decreases, particularly from 1998, in a gradual and sustained way.

Table 9: Evolution of processed citrus fruits production (tonnes) 1993-2003

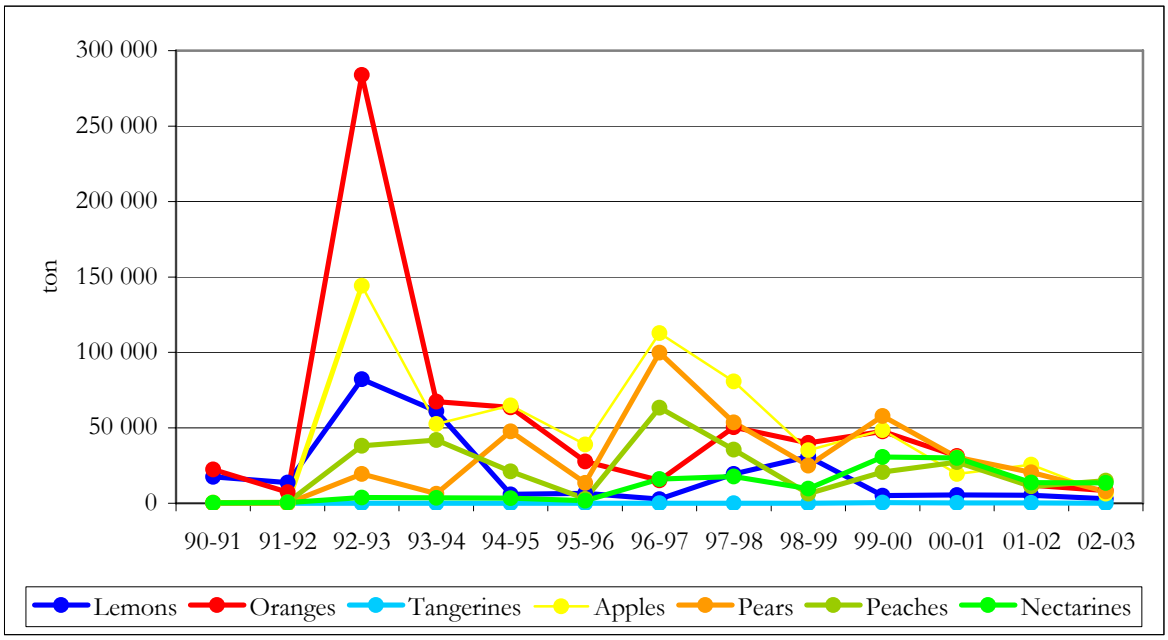
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Oranges	365,363	374,428	594,088	594,095	555,850	751,633	582,078	496,776	338,010	303,549	557,933
Lemons	123,381	128,064	158,225	144,027	189,851	266,794	265,171	137,227	96,536	97,509	146,649
Tangerines	-	31,291	80,496	108,723	96,220	132,672	176,187	177,100	84,710	161,414	172,418
Satsumas	-	136,965	123,856	147,888	82,907	145,520	107,704	108,076	80,939	91,325	62,244
Grapefruit	-	-	-	-	-	620	2,147	2,169	2,408	2,843	2,283
Total	**488,744**	**670,748**	**956,665**	**994,733**	**924,828**	**1,297,239**	**1,133,287**	**921,348**	**602,603**	**656,640**	**941,527**

Source: FEGA, 1990-2003

Withdrawals

The evolution of fruit withdrawals by category can be observed in Chart 20 and Table 10. The importance of this fruit withdrawals declines during the 1996-2003 period. Meanwhile, from 1990 to 1996 there are fluctuations in every fruit category, since 1996 the trend suffers a gradual decrease, descending in more than 250 thousand tonnes.

Chart 20: Evolution of fruit withdrawals 1990-2003 (tonnes)



Source: FEGA, 1990-2003

Table 10: Evolution of fruit withdrawals 1990-2003 (tonnes)

	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03
Lemons	17,636	13,698	82,205	61,007	5,998	6,641	2,845	19,500	31,052	5,043	5,460	5,249	3,052
Oranges	22,539	7,334	283,829	67,519	63,656	27,869	15,178	50,558	40,158	47,664	31,418	11,981	8,422
Tangerines	28	0	0	0	0	0	0	50	0	418	164	196	63
Citrus fruits	**40,203**	**21,032**	**366,034**	**128,526**	**69,654**	**34,510**	**18,023**	**70,108**	**71,210**	**53,125**	**37,042**	**17,426**	**11,537**
Apples	0	0	144,272	52,541	64,981	38,993	112,747	80,853	35,229	48,477	19,404	25,648	6,334
Pears	0	0	19,594	6,436	47,604	13,638	99,948	53,534	24,968	57,799	30,549	20,626	7,905
Peaches	380	638	38,176	41,979	21,253	3,007	63,461	35,699	6,398	20,859	27,373	11,332	14,976
Nectarines	222	353	3,895	3,656	3,347	1,616	16,014	17,905	9,814	30,674	30,194	13,886	13,619
Non Citrus fruits	**602**	**991**	**205,937**	**104,612**	**137,185**	**57,254**	**292,170**	**187,991**	**76,409**	**157,809**	**107,520**	**71,492**	**42,834**
TOTAL	**40,805**	**22,023**	**571,971**	**233,138**	**206,839**	**91,764**	**310,193**	**258,099**	**147,619**	**210,934**	**144,562**	**88,918**	**54,371**

Source: FEGA, 1990-2003

At a national level, non citrus fruits are the most frequently withdrawn types of fruit, more than citrus fruits, especially since 1996. It is significant the high level of withdrawals in 1992, particularly due to the increases in the quantities of withdrawals of orange, apple and lemon.

According to Fondo Español de Garantía Agraria (FEGA) data, main destinations for fruit withdrawals are biodegradation/organic fertilizers, (52% of the fruit withdrawals had this destination in 2002-2003 campaign), free distribution (34%) and livestock feeding (14%).

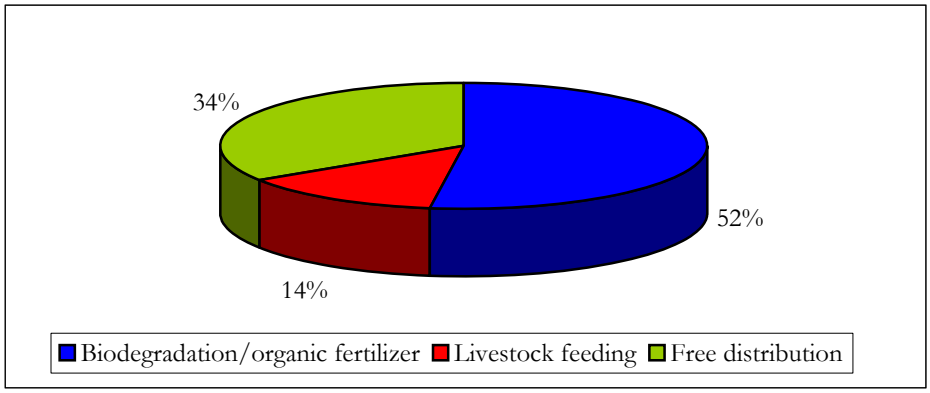
By categories of fruit withdrawals, most of them are destined to biodegradation/organic fertilizer, except orange withdrawals, which are mainly destined to livestock feeding (Table 11).

Table 11: Destination of fruit withdrawals (tonnes) in 2002-2003

	Biodegradation / organic fertilizer	Livestock feeding	Free distribution
Apples	3,414	886	2,223
Pears	4,800	1,133	2,103
Peaches	9,839	4,632	778
Nectarines	9,778	3,630	645
Lemon	1,921	1,021	111
Tangerine	-	20	43
Orange	303	7,531	589
TOTAL	**30,055**	**18,853**	**6,492**

Source: FEGA, 1990-2003

Chart 21: Destination of fruit withdrawals 2002-2003



Source: FEGA, 1990-2003

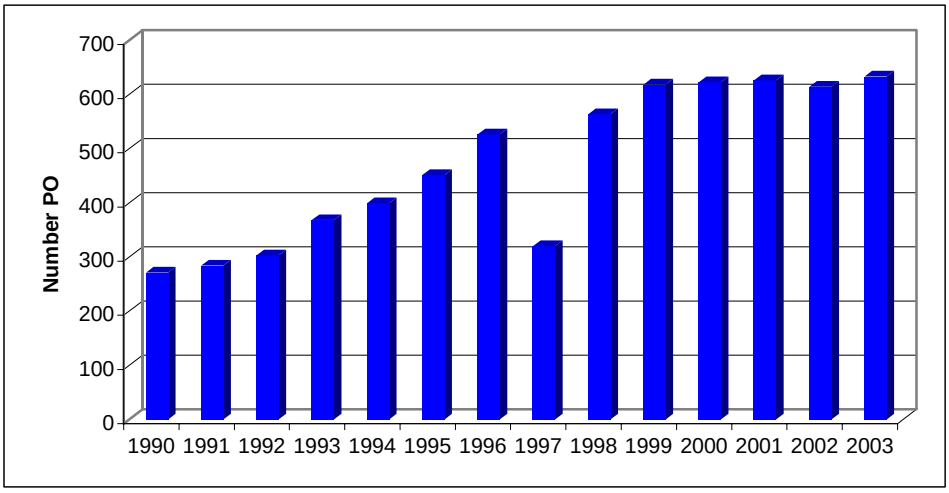
Producers Organizations

Concerning fruit and vegetable Producers Organizations, two different periods can be distinguished, before and after the CMO implementation. In the first period, until 1996, the number of Producers Organizations suffered a noticeable increase (Chart 22), reaching a number of 526 PO at the end of this period. In the second part of the years under analysis, there is a sharp decrease in 1997, reaching its lowest level since 1993, probably due to difficulties in adaptation to the new CMO. In 1998, the number of PO retrieved 1996 level and from 1999 to 2003 the number of PO has stayed steady, fluctuating around 600 PO. In 2003, according to statistical official data of Ministerio de Agricultura, Pesca y Alimentación (MAPA), 633 PO were registered.

In regional terms, PO are mainly situated in C. Valenciana (in 2003 there were 177 PO in this region), followed by Andalucía (142), Murcia (85) and Cataluña (79). Meanwhile, C. Valenciana improved the number of PO in a slightly way until 1999 but has experienced a loss since then, it has remained steady in Cataluña. Andalucía and Murcia PO have suffered a significant increase during de 1990-2003 period (Table 12).

The classification of PO by categories (Chart 23) shows those referred to fruit and vegetables are predominant (46% in 2001), over those dedicated exclusively to citrus fruit (22%), fruits (14%) and nuts (8%). During the period 1999-2001 this classification has not suffered substantial changes.

Chart 22: Evolution of the number of Producer Organizations



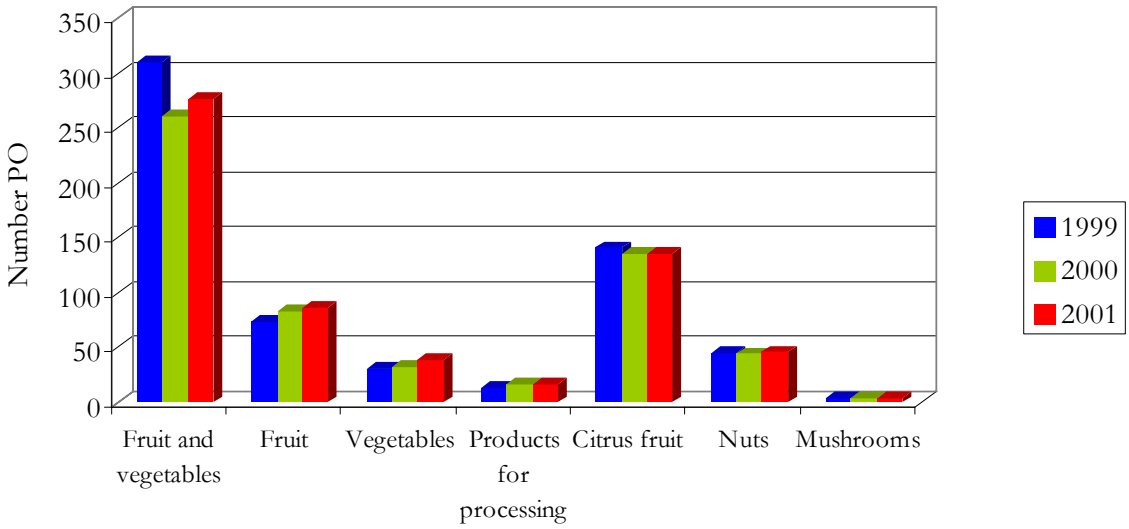
Source: MAPA, 1990-2003

Table 12: Evolution of the number of Producers Organizations by region

Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Andalucía	23	24	25	29	38	54	75	59	107	131	133	131	133	142
Aragón	16	17	17	21	26	28	34	24	37	39	39	39	40	41
Baleares	3	3	6	8	8	9	9	0	5	6	6	6	6	6
Canarias	0	0	0	0	0	4	32	6	32	34	32	30	36	40
Cantabria	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Castilla-La Mancha	8	10	11	14	17	19	19	7	12	13	14	14	14	15
Castilla y León	0	0	0	1	2	3	2	0	1	1	1	1	1	2
Cataluña	60	63	67	66	79	92	97	51	76	82	83	84	77	79
C. Valenciana	126	129	134	167	163	170	176	102	189	191	188	186	180	177
Extremadura	3	4	5	5	6	7	8	7	11	15	16	22	22	22
Murcia	28	29	31	46	48	52	52	53	76	81	83	85	81	85
Navarra	1	1	2	5	5	6	13	3	5	9	11	12	10	9
País Vasco	0	0	0	0	0	0	0	0	0	0	0	0	0	2
La Rioja	2	3	4	5	6	6	8	8	12	16	16	16	14	13
TOTAL	**271**	**284**	**303**	**368**	**399**	**451**	**526**	**320**	**563**	**618**	**622**	**626**	**614**	**633**

Source: MAPA, 1990-2003

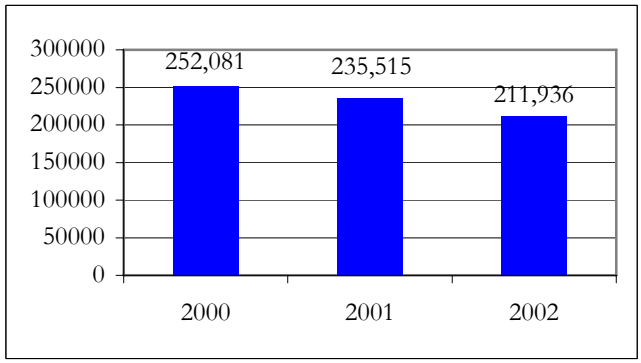
Chart 23: Producer Organizations by category 1999-2001



Source: MAPA, 1990-2003

From the point of view of the number of PO members (Chart 24), there is a significant decrease from 2000 to 2002, according to Commission of the European Communities data. Meanwhile, in 2000 the number of PO members was 252,081 members, in 2002 represented 211,936, 16% less than in 2000.

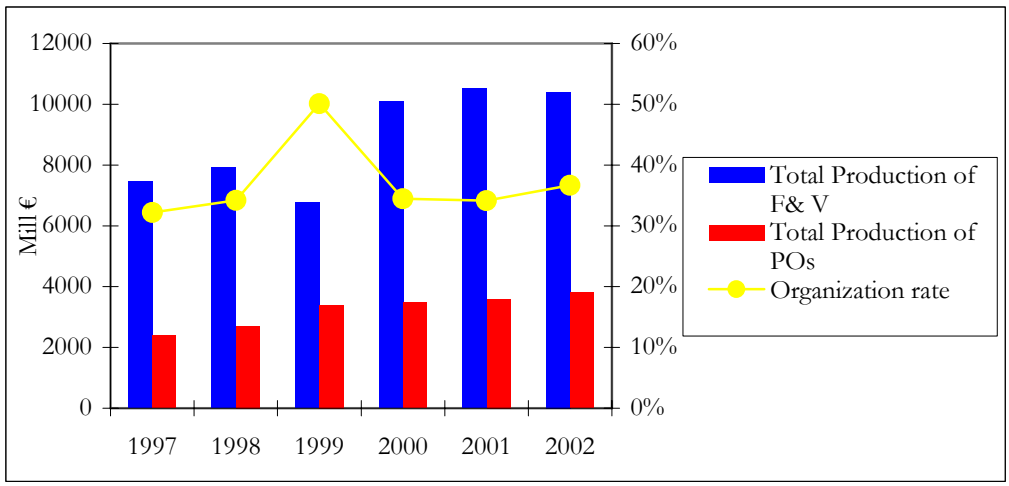
Chart 24: Evolution of number of members of PO



Source: Commission of the European Communities, 2004

The rate of organisation of the Spanish fruit and vegetables sector does not exceed 40% (Chart 25 and Table 13), except for 1999, when the organization rate reached 50.1%. In this year total production of fruits and vegetables decreased in more than €1,100 million and total production of PO increased in almost €700 million. As the trend of PO total production between 1997 and 2002 seems linear and evolution of total production of fruits and vegetables suffers a significant decrease in 1999, the high organization rate of 1999 could be related to the decrease in Spanish total production. Apart from this particular year, the organization rate progresses slightly between 1997 and 2002 to reach 36.7%, which represents €3,814 million in absolute values.

Chart 25: Evolution of the organization rate of the F&V sector from 1997 to 2002



Source: CCAE and Commission of the European Communities, 2004

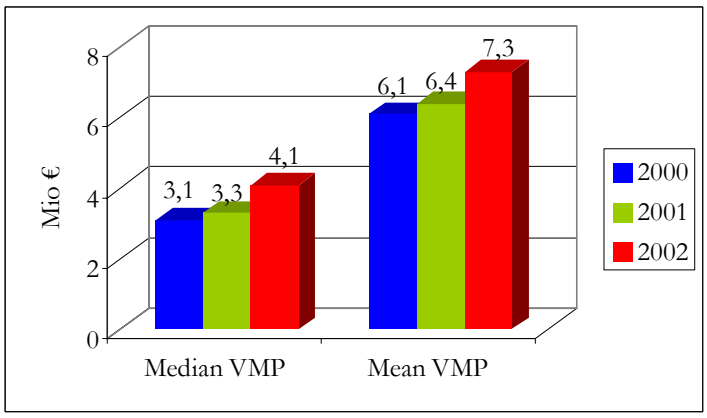
Table 13: Evolution of the organization rate of the F&V sector from 1997 to 2002

	1997	1998	1999	2000	2001	2002
Total Production of F&V (mill €)	7,453	7,916	6,769	10,087	10,521	10,403
Total Production of POs (mill €)	2,399	2,709	3,392	3,476	3,594	3,814
Organization rate	32.2%	34.2%	50.1%	34.5%	34.2%	36.7%

Source: CCAE and Commission of the European Communities, 2004

Between 2000 and 2002, the median VMP of the Spanish POs increased €1 million, approximately from €3,1 to €4,1 million, with a substantial increase in 2002 (Chart 26). The median value has been considered as being more representative than the average one. The average VMP accounts for almost double of the median VMP, showing the existence of some POs in Spain presenting a huge economic dimension.

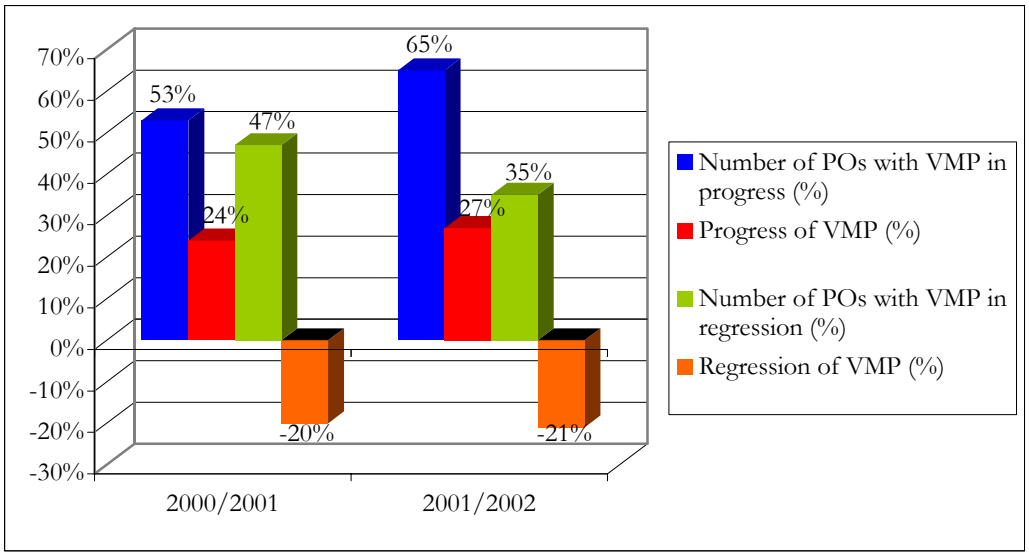
Chart 26: Median and mean of value of marketed production through POs (mill €)



Source: Commission of the European Communities, 2004

According to European Commission data, between 2000 and 2002 the number of the POs with VMP in progress increases from 53% between 2000 and 2001 to 65% between 2001 and 2002 (Chart 27). These POs for which the VMP increases improve their economic result of 24% from 2000 to 2001, and 27% from 2001 to 2002, while Spanish total production of fruits and vegetables progresses only by 4.3% from 2000 to 2001 and decreases 1.1% from 2001 to 2001. Thus, producers organised in POs experienced in the considered period a significant increase of their VMP, while the VMP of producers outside POs suffered from a substantial stagnation.

Chart 27: Percentage of POs with VMP in progress/ regression and percentage of progress/ regression of VMP



Source: Commission of the European Communities, 2004

1.2 Level of implementation of the various measures of the CMO in Spain

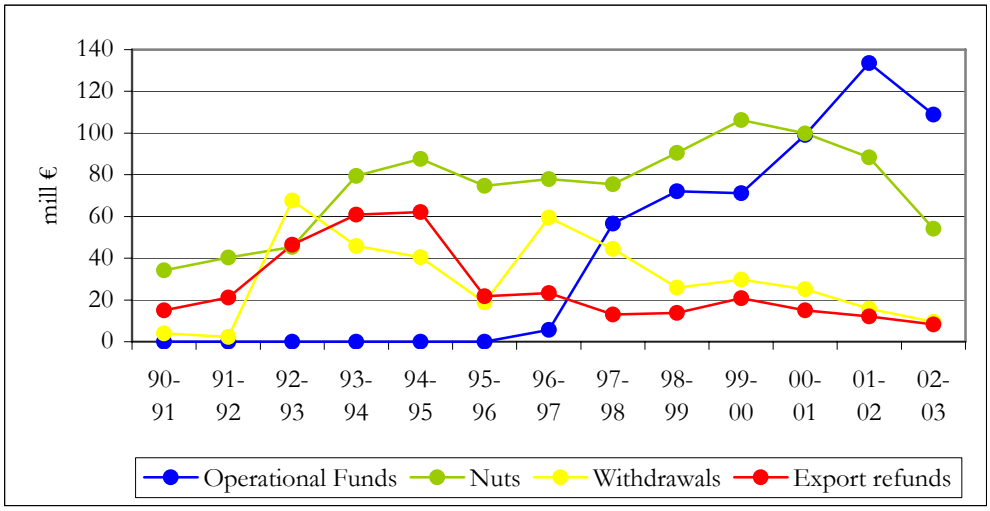
The main measure of CMO has been constituted by the aids to PO and their Operational Funds (OF). During the period from 1996 to 2003, the importance acquired by these OF in the budget of the OCM compared to the other types of aid of the CMO is spectacular (Chart 28). According to FEGA data, since 1996 OF have become the most important type of CMO aid with a striking increase up to 2001-2002 campaign, when it reached its peak (133.62 million euros, 53% of these aids). On the contrary, aids to withdrawals and export refunds have suffered a sustained decrease since 1996, as expected due to the CMO purposes (in 2002-2003 each one of them do not reach 10 million euros). This continuous decline can be confirmed through the analysis of the evolution of the fruit withdrawals in terms of quantity (Chart 20).

The evolution of the aids to nuts has increased up to 2000-2001 campaign, but from that moment this kind of expenses declined, when the specific aids for quality and marketing improvement began to expire[1].

The evolution of PO concerned by CMO's measures is represented in Chart 28. The number of PO managing OF has stayed steady, varying around 600 PO. However, the number of PO managing withdrawals has decreased from 591 PO in 1994-1995 to 250 in 2002-2003. This downward trend took place especially since the CMO establishment, showing again the less importance of the aids to withdrawals, in favour of the OF.

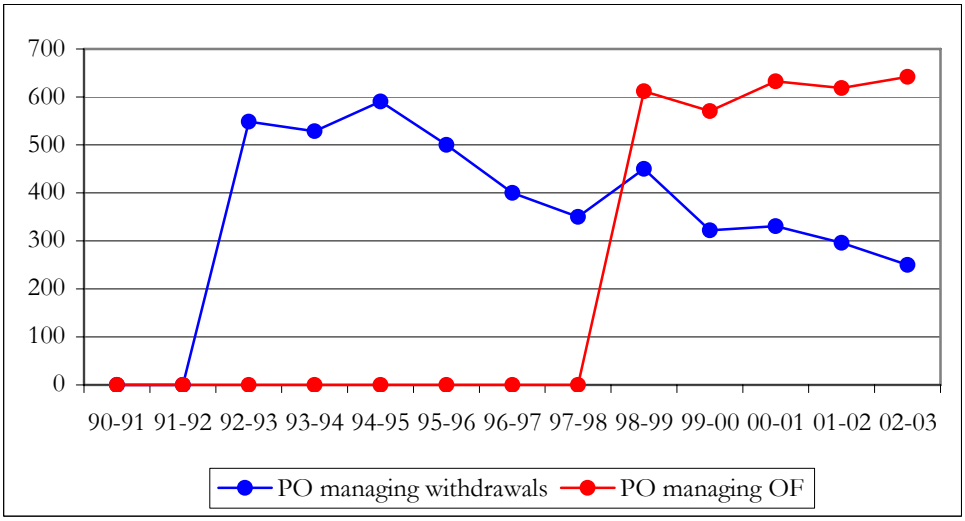
[1] In 1999-2000 finished the specific aids for quality and marketing improvement of nuts, established in 1989 by Reg. (ECC) 790/89 with 10 years of duration and deferred two more years through Reg. (ECC) 558/01 and 545/02.

Chart 28: Evolution of the expenses (mill €): intervention measures and operational funds



Source: FEGA, 1990-2003

Chart 29: Evolution of the number of PO managing withdrwals and OF



Source: FEGA, 1990-2003 and MAPA, 1990-2003

OF are composed of the following measures:

1: Action plan

2-1: Production – Technical measures (phytosanitary measures, irrigation, machinery, greenhouses, facilities, R&D)

2-2: Production - Services, training and research (advice, alert hail, frost and diseases, training courses and R&D)

2-3: Production – Special environmental measures (Biological/Integrated production, R&D)

3: Control – Quality and phytosanitary measures (equipment, expenses with personnel (incl. waste analysis), R&D)

4-1: Marketing – Technical measures (land, real estate, storage, packing, transportation, R&D)

4-2: Marketing - Sales, promotion and outlet (planning of production, market analysis, sales offices, promotion and R&D)

4-3: Marketing - Special environmental measures (waste management, additional transportation expenses, research and R&D)

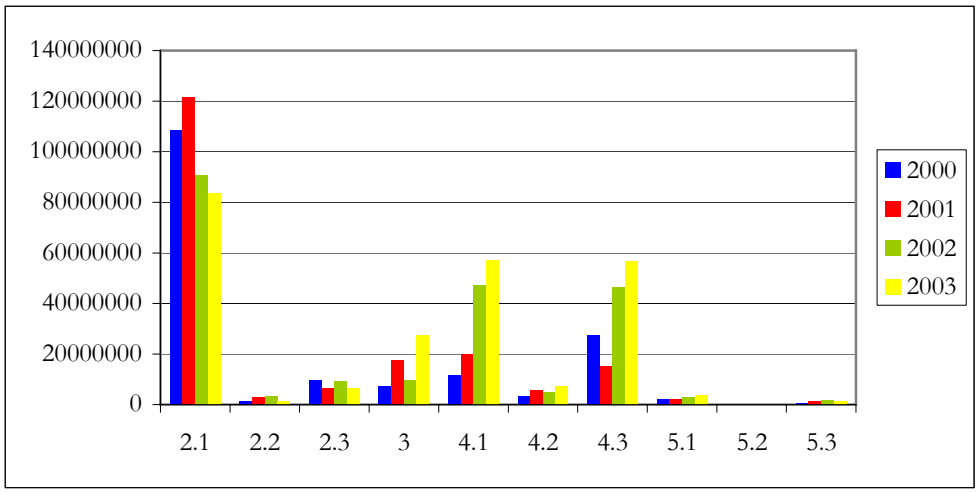
5-1: Other – General expenses (admin. expenses)

5-2: Other – Mergers and acquisitions

5-3: Other - Other (ISO 9000 systems, other)

The evolution of the distribution of OF by measures is shown in Chart 30 and Table 14. According to MAPA data, production measures are the most relevant in expenditure terms, specially those referred to technical measures, which represented 33% of the expenditure in 2003 (Chart 31). This expenditure in technical measures increased from 2000 to 2001 in more than €12 million, but it has decreased to 83,735,245 euros in 2003. On the contrary, marketing measures have increased their relative importance, especially those referred to technical measures and special environmental measures, which have increased 385% and 52% respectively, from 2000 to 2003. It is necessary to point out that no expenditure was assigned to mergers and acquisitions during the period under analysis.

Chart 30: Evolution of the distribution of OF by measures (euros)



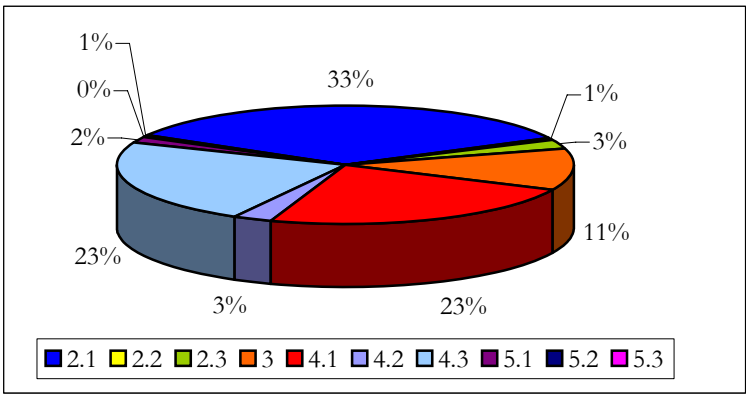
Source: MAPA

Table 14: Evolution of the distribution of OF by measures (euros)

Year	Production (euros)			Control (euros)	Marketing (euros)			Other (euros)			Total (euros)
	2-1	2-2	2-3	3	4-1	4-2	4-3	5-1	5-2	5-3	
2000	108,680,558	1,189,598	9,898,878	7,179,425	11,771,659	3,432,330	27,304,060	2,178,137	0,00	629,103	172,263,749
2001	121,462,727	2,884,214	6,386,493	17,735,039	19,983,100	5,629,346	15,228,748	2,078,187	0,00	1,241,894	192,629,747
2002	90,659,973	3,519,153	9,448,393	9,865,625	47,397,129	4,866,589	46,503,927	2,933,716	0,00	1,783,474	216,977,979
2003	83,735,245	1,281,836	6,309,983	27,354,793	57,064,125	7,147,543	56,608,952	3,755,889	0,00	1,428,870	244,687,237

Source: MAPA

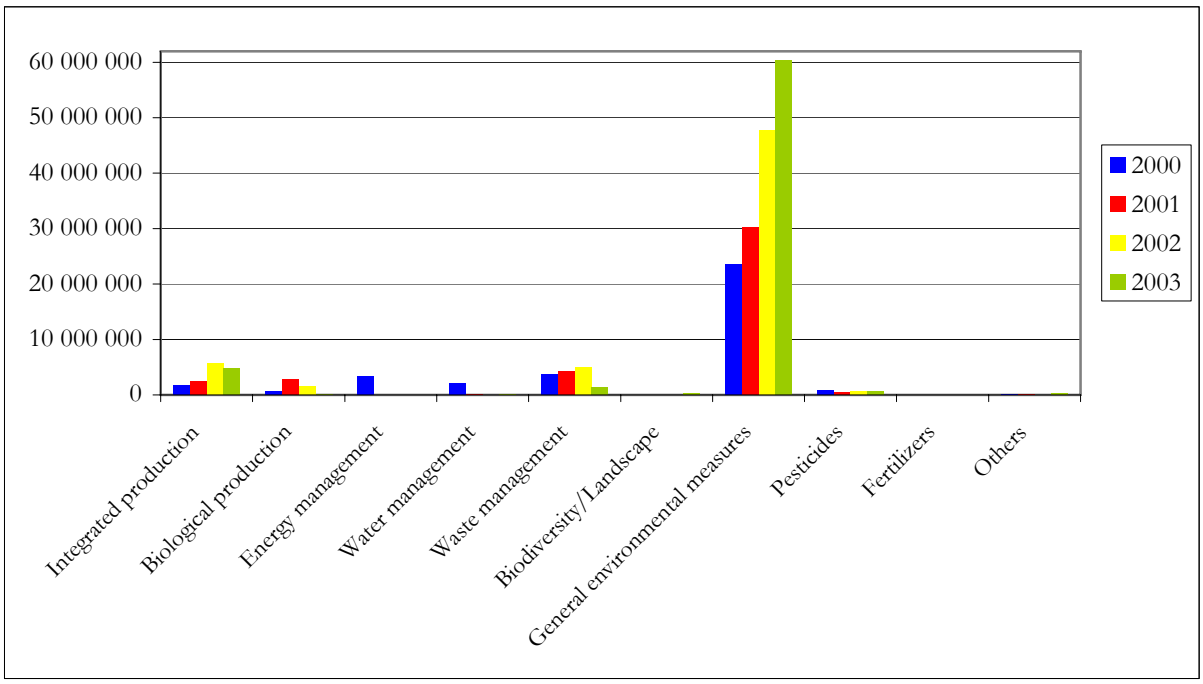
Chart 31: Distribution of OF by measures (euros), in 2003



Source: MAPA

According to MAPA data, the distribution of OF concerning to environmental measures shows that general environmental measures represent 90% of the expenditure in 2003 (Chart 33), followed by integrated production (7%) and waste management (2%). Moreover, expenditure on general environmental measures has increased sharply from 2000 to 2003, according to the evolution of the distribution of OF (Chart 32 and Table 15), while other measures have stayed steady.

Chart 32: Distribution of OF environmental measures (euros)



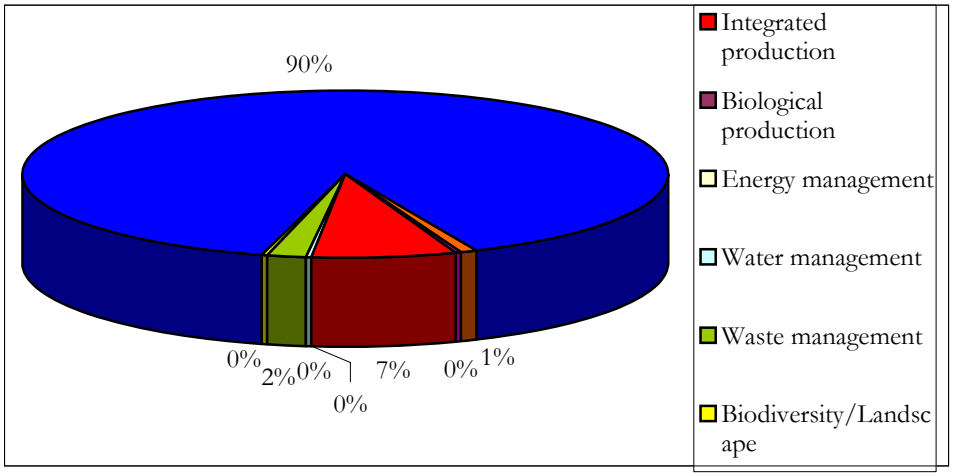
Source: MAPA

Table 15: Distribution of OF environmental measures (euros)

Year	Special environmental measures						Other environmental measures				Total
	Integrated production	Biological production	Energy management	Water management	Waste management	Biodiversity/ Landscape	General environmental measures	Pesticides	Fertilizers	Others	
2000	1,678,323	628,938	3,278,688	2,090,186	3,639,702	0	23,526,598	887,521	0	67,901	35,797,857
2001	2,342,662	2,825,966	5,143	148,630	4,288,547	0	30,260,819	497,697	0	142,295	40,511,760
2002	5,588,598	1,453,533	0	11,406	4,932,184	0	47,776,354	606,832	0	0	60,368,907
2003	4,859,718	81,436	0	94,268	1,354,442	203,069	60,341,703	605,894	0	227,223	67,767,753

Source: MAPA

Chart 33: Distribution of OF environmental measures (euros), in 2003



Source: MAPA

1.3 Institutional framework of the fruits production in Spain

The institutional framework at Spanish fruits sector presents a complex structure due to the decentralization of Spanish public administration, and also to the relevance given to private organizations. So that there are different institutions in charge of the following tasks:

1.3.1 Public administrations

They are the responsible of direct CMO planning, funding, control and monitoring:

Planning

The European Commission (EC) approved CMO measures in 1972 and 1996 and the institution in charge of planning the policy at the European level is the National Administration, by means of the MAPA responsible. The MAPA is in thigh touch to CCAA agricultural responsible in order to planning a CMO policy as close as possible to the different regional needs.

Management monitoring and auditing system:

Fruits and vegetables CMO management system is similar to the rest of CMO in Spain. The competences distribution between National and Regional Public Administrations awards agriculture competences to Regional Governments, but general economic regulation to National Government. Thus the MAPA is responsible of:

- Relation with EC to coordinate the national program.
- The funding coordination by means of FEGA.
- Regional management bureaus coordination by means of several Agriculture Ministry departments at General Direction (GD) level.

Finally CCAA are in charge of direct aids management and divulgation.

MAPA gets funding from EC and distribute it to CCAA by means of FEGA. In addition, the Agriculture General Direction gets in touch with regional management bureaus to control the program application an to inform European Commission. There is a monthly meeting between the national administration responsible and the ones of the 17 CCAA to monitoring the MCO campaign development.

Farmers and industries must address their aid application forms to the CCAA in which their farm (or its main part) is located.

Funding

As CMO is a horizontal policy the funding is calculated at the European level to the whole country, so that, although the CCAA are autonomous to managing many policies CMO a global policy is applied in the same way all over the country. Regional governments are responsible of those competences into the CMO organization transferred by national government. In this case these are the pays to Producers Organizations. But there is a national institution responsible of global pay management, FEGA. This institution transfers direct pays from EU to CCAA, which are responsible of paying to Producers Organizations.

Control and monitoring

The monitoring program is based on specific physical and financial indicators established by the European legislation. According to regulation EC 445/2002 which establishes the monitoring system of the measures of the regulation EC 1257/1999 (in substitution of the 1750/1999), a monitoring report is presented to the European Commission. There are two controls:

- Administrative controls.
- Farm survey.

Administrative controls are the base of the control and monitoring system. Besides of farm survey controls they are the responsible of assuring that each surveyed producer is carrying out the condition to receive aids according to EC regulations. These controls are done at all the applications and are responsibility of regional institutions.

1.3.2 Private organizations

Interbranch organizations

- *Interprofesional Citrícola Española (INTERCITRUS)* is one of the interbranch organizations representative from the citrus sector. Within it the producers organizations (CITRUSAT, AOPCC, CCAE), unions (COAG, ASAJA, UPA), and commercial and industrial organizations (CGC, AEFA, AIZCE) are represented.
- *Asociación Interprofesional de Limón y Pomelo (AILIMPO)* is the interbranch organization representative from lemon and grapefruit sector, 29 producers organizations and 73 commercial and industrial organizations are associated.
- Other interbranch organization specialized at citrus fruit exporting tasks is *Agrupación Nacional de Exportación de Cooperativas Citrícolas (ANECOOP).*
- *Asociación Interprofesional de Pera y Manzana (AIPEMA)* is the interbranch organization representative from apple and pear sector. Within it the producers organizations, as CEF and CCAE, unions (COAG, ASAJA, UPA) and commercial and industrial organizations (ASOZUMOS, FEFRUTH) are represented.

Producers organisations at national level

CCAE *Confederación de Cooperativas Agrarias de España*: Joint the main part the Agricultural Cooperative Societies amongst them there are fruit producers cooperatives.
The most important producers organizations specialized in fruits are:

- *CITRUSAT, Asociación de Organizaciones de Productores de Cítricos, SAT*
- *AOPCC: Asociación de Organizaciones de Productores integradas en el Comité de Gestión de Cítricos*, Joints 35 Producers Organizations.
- CEF, Comité Económico de Productores de Fruta Dulce de Cataluña

Unions

The following unions have a national scope, and are the most representative at Spanish Rural Domain:

- ASAJA: *Asociación de Jóvenes Agricultores.*
- UPA: *Unión de Pequeños Agricultures.*
- COAG: *Coodinadora de las Organizaciones de Agricultores y Ganaderos.*

All of them are organized with a federal mode, with a national structure and particular organizations at each region.

Research and technical institute

The most relevant Spanish research centres are:

- INIA: *Instituto Nacional de Investigación Agraria y Alimentaria*
- CSIC: *Consejo Superior de Investigaciones Científicas*
- IVIA: *Instituto Valenciano de Investigaciones Agrarias*
- IRTA: *Institució per a la Recerca i el Desenvolupament Tecnològic Agroalimentari*
- IMIDRA: *Instituto Madrileño de Investigación y Desarrollo Agrario y Alimentario*
- SDTA: *Servicio de Desarrollo Tecnológico Agrario*
- UPV: *Universidad Politécnica de Valencia*
- IATA: *Instituto de Agroquímica y Tecnología de Alimentos*
- AINIA: *Instituto Tecnológico Agralimentario*
- IBMCP: *Instituto de Biología Molecular y Celular de Plantas*
- IAMZ: *Instituto agronómico Mediterráneo de Zargoza*
- IFAPA: *Instituto Andaluz de Investigación y Formación Agraria, Pesquera, Alimentaria y de la Producción Ecológica*

Specially in citrus fruit, there is a national research network, *Red Temática de Cítricos*, created to link all the national research institutions. This program focuses at:

- Identification of deficit lines of work in collaboration with the citrus fruit sectors implied.
- Development of information and transference of technology mechanisms.
- Collaboration with other networks and work groups at European or international level.

Origin Denominations

Finally we mention the Origin Denomination Regulating Councils, because they can act as market and production regulators. At Spain there are 15 fruits Origin Denominations (MAPA, 2004a):

- Cítricos Valencianos
- Clementinas de las Tierras del Ebro
- Manzana de Girona
- Manzana Reineta del Bierzo
- Melocotón de Calanda
- Pera de Jumilla
- Peras Rincón de Soto
- Cerezas de la Montaña de Alicante
- Cereza del Jerte
- Avellanas de Reus
- Nísperos de Callosa d'En Sarriá
- Uva de mesa Embolsada de Vinalopó
- Chirimoya de la Costa Málaga y Granada
- Kaki Ribera del Xuquer
- Pasas de Málaga

1.4 CMO implementation context in Spain

The application of REG (EC) No 1257/1999 has two measures (3 and 4) which are not specific for fruit production but affect these crops:

- Measure 3: Environmental techniques or rationalizing chemical products use
  - Measure 3.2 Integrated Control

  - Measure 3.3 Integrated Production
  - Measure 3.4 Organic farming

- Measure 4: Fight against erosion at fragile environments
  - Measure 4.1 Woody crops at slopes or terrace

Spanish Good Farming Practices Code was motivated by European requirements included in the Council Directive 91/676/CEE, which is related to water management against nitrogen pollution. It is not a compulsory regulation, but acts as a reference framework to Good Farming Practices Codes of each CCAA.

Concerning Organic farming, although CCAA stipulate their specific rules, Spanish framework is composed by the following regulations:

- Real Decreto 1852/1993, about Organic farming and its certification requirements (BOE nº 283)
- Orden de 6 de diciembre de 1993, including regulations of Real Decreto 1852/93.
- Orden de 28 de diciembre de 1993, including regulations of Real Decreto 1852/93.
- Orden de 14 de marzo de 1995, including regulations of Real Decreto 1852/93 and establishing *Comisión Reguladora de la Agricultura Ecológica* composition and functions.

Spanish regulations in Integrated Production are included in Real Decreto 1201/2002, which contains basic and general requirements about Integrated Production. Specific regulations are implemented by CCAA. Cataluña, Andalucía, Murcia, Extremadura y Navarra stand out because of the high number of regulations implemented for different products.

Apart from European horizontal regulations, fruit and vegetables CMO establishes certain requirements of environmental character to obtain European aids by means of Operational Programs (OP). Thus, Producers Organizations must include in their statutes the promotion of cultivation practices and production and residues management techniques which are environmentally acceptable.

Operational Programs developed by PO in Spain have included significantly this type of environmental measures, so that during 2001 a 25.3% of the budget of OP was dedicated to environmental actions (MAPA, 2004a).

Spanish regulation related to CMO implementation can be summarized as follows:

- Orden de 14 de mayo de 1997 regulating Operational Programs and their Operational Funds (BOE nº 119).
- Orden de 11 de septiembre de 1997, which extends stipulated period to present Operational Programs (BOE nº 220).
- Orden de 16 de septiembre de 1999 which changes Orden de 14 de mayo de 1997 regulating Operational Programs and their Operational Funds (BOE nº 229).
- Orden de 12 de septiembre de 2000, which extends stipulated period to present Operational Programs (BOE nº 221).
- Orden de 11 de octubre de 2000, which extends stipulated period to present Operational Programs (BOE nº 247).
- Orden de 11 de septiembre de 2001 defining some aspects of REG (EC) No 609/2001 related to Operational Programs and their Operational Funds (BOE nº 219).
- Orden APA/2216/2002 defining the compulsory requirements to recognize Producers Organizations Associations (BOE nº 219).

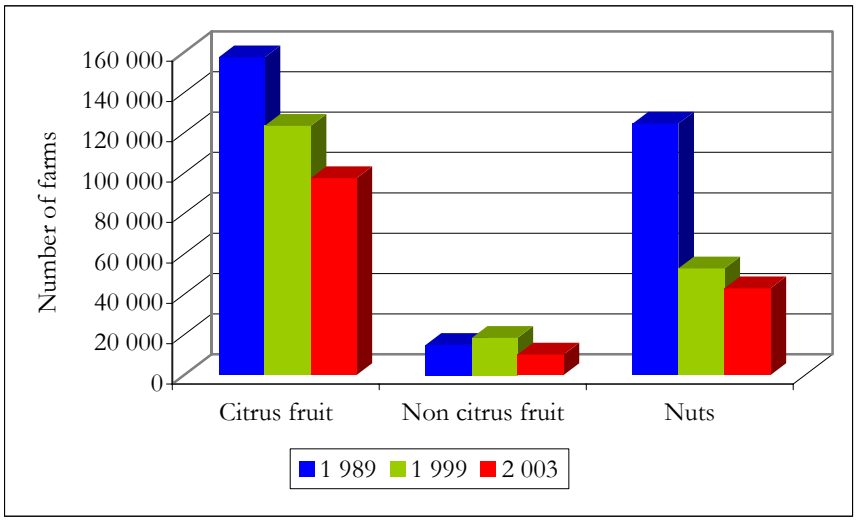
2. CONTEXT OF FRUITS PRODUCTION IN C. VALENCIANA

2.1 Main characteristics of the fruits production in C. Valenciana

According to the Agricultural Census, the number of farms producing fruits in Comunidad Valenciana was 220,386 in 2003. In terms of number of farms, citrus fruit is the most significant crop, followed by nuts and non citrus fruits (Chart 34). The number of farms has suffered a marked decrease from 1989 to 2003, specially nuts farms which have decreased 65.5% in the period under analysis. Citrus fruits farms were reduced 38% and non citrus fruits 32.1%.

The orchards area of different fruits concerned represented 307,793 hectares in 2003: citrus fruits area represents 59.4% (182,830 ha) of total orchards area, nuts 36.9% (113,622 ha), and non citrus fruit 3.7% (11,341 ha).

Chart 34: Evolution of the number of farms in C. Valenciana



Source: INE, 1989-2003

Lemons – 1990/2003 Evolution and representation

According to INTERCITRUS data (Chart 3), Comunidad Valenciana produced 37% of national lemon production in 2001-2002. It is the second producing region behind Murcia (45%) and followed by Andalucía (17%).

The evolution of the area of lemon crop from 1989 to 2003 (Chart 35) shows a steady decrease in the period, when it has lost almost 6 thousand hectares, reaching its lowest value (10,997 hectares). However, in terms of lemon production, the evolution has suffered a substantial increase from 1995 to 2003, which has balanced the negative trend of the first years of the period under analysis. The rise reaches its peak in 2001 with 359,957 tonnes. In 2003, lemon production was 347,471 tonnes, almost 200% more than in 1995.

Chart 35: Evolution of the area (ha) and production (tonnes) of lemons in C. Valenciana

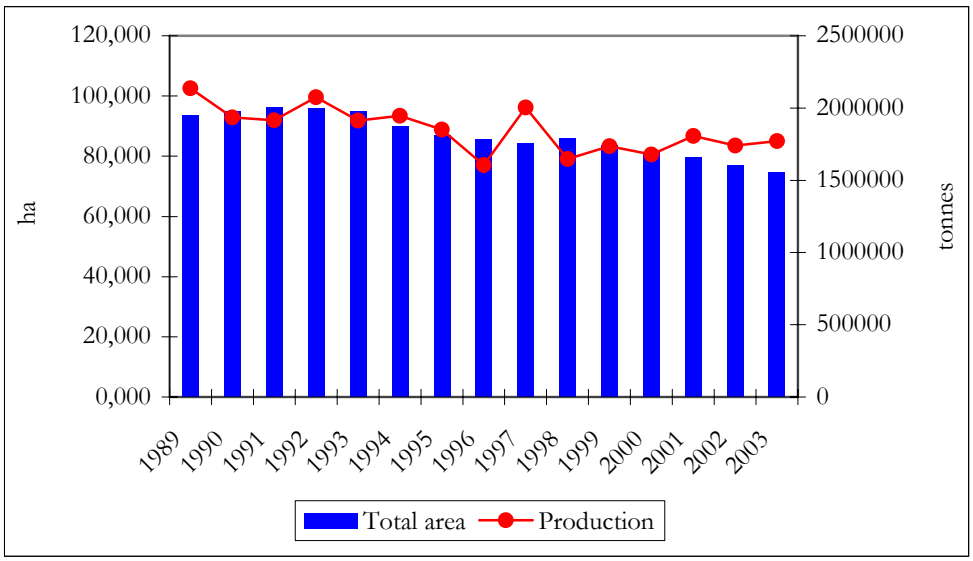
Source: Generalitat Valenciana, 1998-2003

Oranges – 1990/2003 Evolution and representation

In regional terms, C. Valenciana orange yield is the most representative in Spain (60%) in 2001-2002, followed by Andalucía (30%), according to INTERCITRUS data (Chart 5).

From the point of view of the evolution, orange production has followed a slight negative trend, the same tendency as the area of this crop (Chart 36). While orange production has decreased in 364,857 tonnes from 1989 to 2003 (17% of 1989 production), orange crop area has fallen to 74,517 hectares in 2003, its lowest level in the concerned period. It supposes 19 thousand hectares less than in 1989.

Chart 36: Evolution of the area (ha) and production (tonnes) of oranges in C. Valenciana



Source: Generalitat Valenciana, 1998-2003

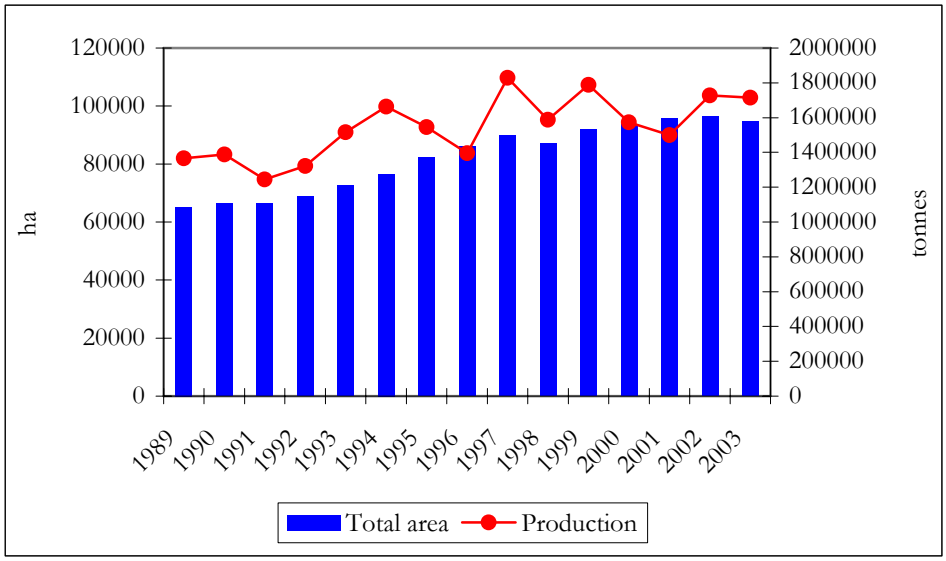
Tangerines – 1990/2003 Evolution and representation

Tangerine production concentrates in Comunidad Valenciana, where in 2001-2002 was produced 86% of the national tangerine crop (Chart 7), followed by Andalucía (8%). Thus, this production is mainly located in the region under analysis.

Produced quantities follow an erratic positive trend (Chart 37): tangerine production in 1989 represented 1,365,200 tonnes and it has increased to 1,714,254 tonnes in 2003, but between these years production has reach its peak (1,829,500 tonnes in 1997) and its minimum level (1,244,700 tonnes in 1991).

On the contrary, the evolution of tangerines area has been continuously upwards, from 65,150 hectares in 1989 to 94,732 hectares in 2003, according to Generalitat Valenciana data.

Chart 37: Evolution of the area (ha) and production (tonnes) of tangerines in C. Valenciana



Source: Generalitat Valenciana, 1998-2003

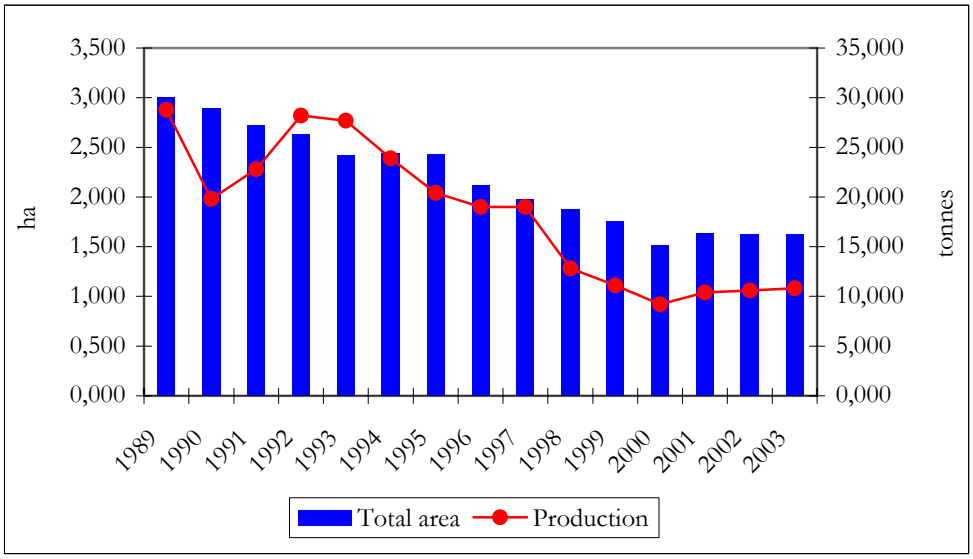
In conclusion, during the period under study, the area destined to citrus fruit crop has increased from 175,150 in 1989 to 180,246 hectares in 2003. In terms of production, around 60% of Spanish citrus fruit is produced in C. Valenciana, showing the importance of this region in citrus fruit yield, in spite of some structural problems, which have a bearing on production costs.

Structural problems are mainly related to property distribution, which is essentially based on smallholdings (Agustí, 2002): the average of the area of citrus orchards reaches 3 hectares of useful agricultural area, compared to almost 12 hectares reached in Spain. In those Valencian areas of greater citrus growing tradition (la Plana, la Ribera, la Safor), the average is lower, around 1 hectare or less (Arnalte and Estruch, 1996).

Apples – 1990/2003 Evolution and representation

According to AIPEMA data, apple production in mainly located in Cataluña (57% of national production in 2003) and Aragón (25%) and it is not very significant in C. Valenciana. This situation has become worse in the concerned period when both area and production have suffered a noticeable decrease.
Apple area has dropped from 1989 to 2003, losing more than 1.3 thousand hectares (46% of the area in 1989). Although production shows a less linear trend, specially between 1989 and 1994, it has also decreased in almost 18 thousand tonnes (Chart 38). This production decline represents a 62.4% reduction from 1989 to 2003.

Chart 38: Evolution of the area (ha) and production (tonnes) of apples in C. Valenciana



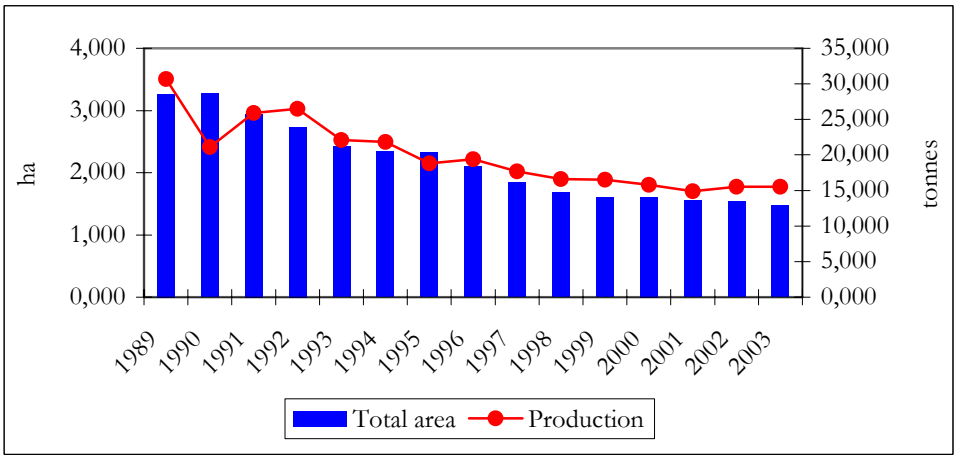
Source: Generalitat Valenciana, 1998-2003

Pears – 1990/2003 Evolution and representation

Pear yield in Comunidad Valenciana has suffered a marked drop, even though it does not represent an important production among fruits concerned (pear production concentrates in Cataluña and Aragón, as shown in Chart 11). The evolution from 1989 to 2003 of pear production shows a substantial decrease, more than 15 thousand hectares (Chart 39). Almost half of the C. Valenciana pear production has been lost in the period under analysis.

The same trend is shown in terms of area. The evolution of the area of pear crop from 1989 to 2003 describes a linear reduction, in almost 1.8 thousand hectares, and it reaches its lowest value in 2003 with 1,469 hectares, according to Generalitat Valenciana data.

Chart 39: Evolution of the area (ha) and production (tonnes) of pears in C. Valenciana



Source: Generalitat Valenciana, 1998-2003

Peaches and nectarines – 1990/2003 Evolution and representation

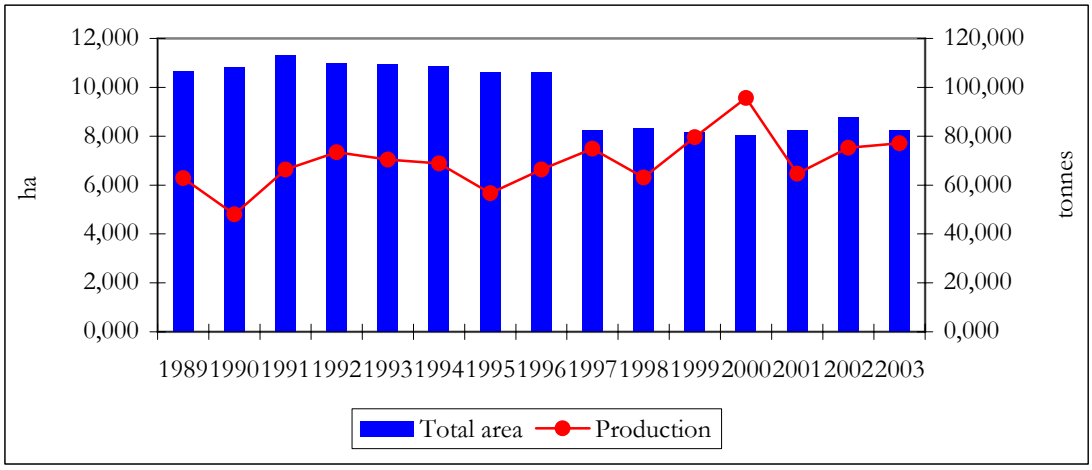
Peach and nectarine production is expanded in several Spanish regions (Chart 13). Although Cataluña was the main producing region in 2003 (25%), Aragón, Extremadura, Andalucía, Murcia and C. Valenciana have important productions.

The evolution of peaches and nectarine area in C. Valenciana during 1989-2003 (Chart 40) shows two different periods: from 1989 to 1996 the area remains stable, varying around 10,800 hectares.

In 1997 there is a marked drop (area decreases in 2,376 ha), and from then on area fluctuates around 8,300 hectares.

Produced quantities followed a slight positive trend, reaching a peak in 2000 with 95.7 thousand tonnes, according to Generalitat Valenciana data. In 2003, peach and nectarine production rose 77,133 tonnes, 14.3 tonnes more than in 1989.

Chart 40: Evolution of the area (ha) and production (tonnes) of peaches and nectarines in C. Valenciana



Source: Generalitat Valenciana, 1998-2003

Nuts – 1990/2003 Evolution and representation

Nuts production and nuts area in Comunidad Valenciana is mainly concentrated in almond crop (Table 16). It represents 98.34% of the area and 98.4% of the production, while both yield and area of walnuts and hazelnuts are not significant.

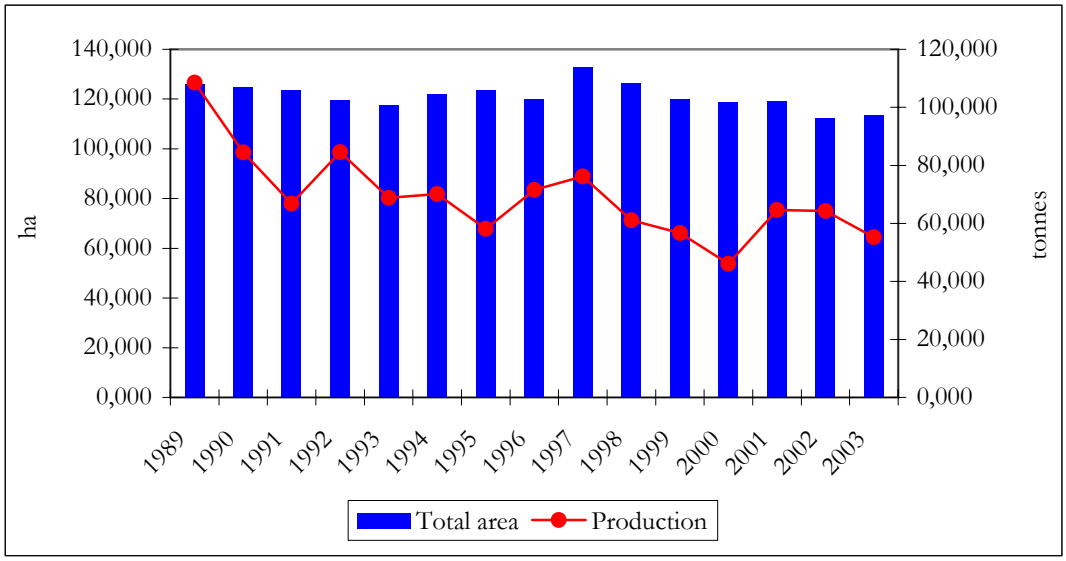
Concerning almond crop (Chart 41), while area remains quite steady with a slight negative trend, almond production seems to suffer an important decrease. The evolution of almond yield shows a steep negative tendency. In 1989 production reached 108,500 tonnes and descended to 55,304 tonnes in 2003. However, almond crop area has varied around 120 thousand hectares, decreasing from 1997 to 2003 in almost 20 thousand hectares.

Table 16: Importance of different types of nuts in C. Valenciana in 2003 (% of total of nuts concerned)

	Walnuts	Hazelnuts	Almonds
Area (%)	0.66%	1.00%	98.34%
Production (%)	0.86%	0.74%	98.40%

Source: Generalitat Valenciana, 1998-2003

Chart 41: Evolution of the area (ha) and production (tonnes) of almonds in C. Valenciana



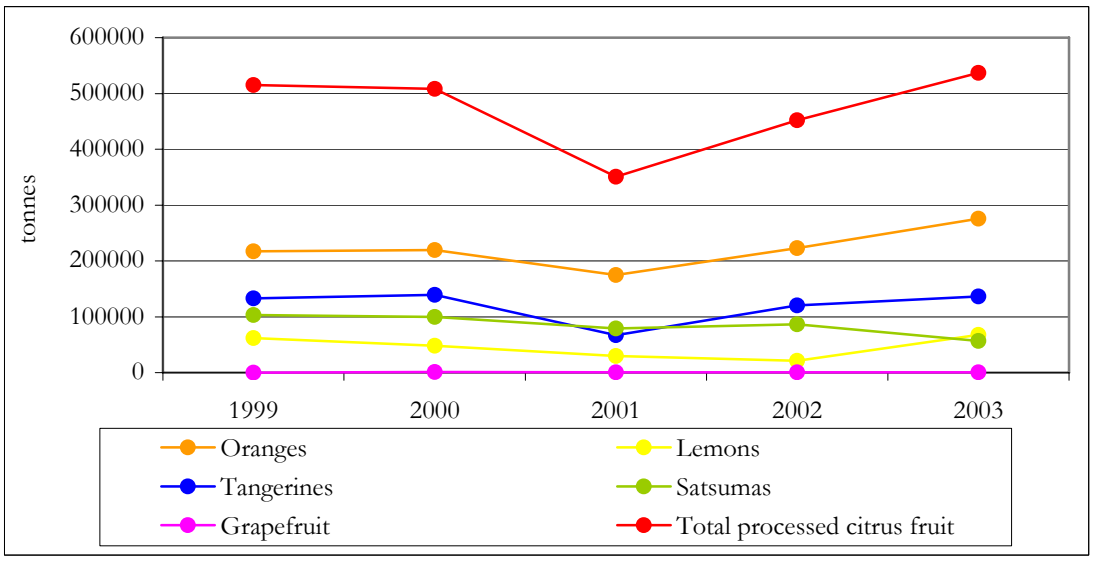
Source: Generalitat Valenciana, 1998-2003

Processed citrus fruits production

In Comunidad Valenciana, according to Generalitat Valenciana data, processed production represented 14.13% of total citrus fruit production in 2003. The evolution of this rate shows a substantial decrease from 1999 to 2001 (a loss of 10.15%) but it recovers its 2000 value in 2003.

Orange crop is the most representative citrus fruit destined for processed production with 51.4% of processed production in 2003 (Chart 42 and Table 17), followed by tangerines (25.5%), lemons (12.6%) and satsumas (10.6%). Grapefruit yield allocated to processed production is negligible. In terms of evolution of processed quantities, both orange and tangerine production suffered a noticeable drop between 1999 and 2001 (66,174 tonnes less of tangerines), but they increased from 2001 to 2003 going above their 1999 levels. The evolution for lemons and satsumas shows a decrease until 2002, when the trend changes in the case of lemons but remains negative for satsumas.

Chart 42: Evolution of processed citrus fruit production (tonnes) in C. Valenciana



Source: Generalitat Valenciana, 1998-2003

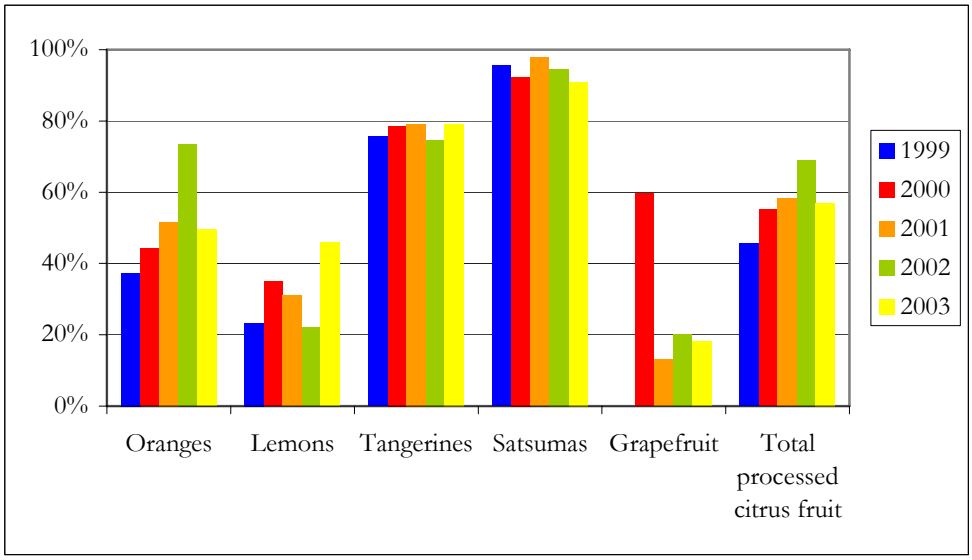
Table 17: Evolution of processed citrus fruit production (tonnes) in C. Valenciana and % of total production

	1999	2000	2001	2002	2003
Oranges	217,205	219,700	174,530	223,094	275,780
Lemons	61,880	47,898	29,868	21,405	67,455
Tangerines	133,217	139,310	67,043	120,500	136,529
Satsumas	103,012	99,846	79,110	86,407	56,608
Grapefruit	0	1,292	314	572	413
Total processed citrus fruit	**515,314**	**508,046**	**350,865**	**451,978**	**536,785**
Total citrus production	3,523,804	3,835,875	3,598,304	3,676,864	3,799,861
% Processed production	19.9%	13.24%	9.75%	12.29%	14.13%

Source: Generalitat Valenciana, 1998-2003

Concerning the importance of C. Valenciana processed citrus fruit production compared to national production (Chart 43), it is very prominent the rate of processed satsumas in C. Valenciana, where almost all the Spanish production is located. Processed tangerines present an important rate, with 80% of national processed production in 2003. The evolution of relative importance of total processed citrus fruit shows a marked increased until 2002, when it reaches 68.8% of national production, but in 2003 it decreases to 57%, an outstanding value.

Chart 43: Evolution of the importance (%) of C. Valenciana processed citrus fruit production compared to national production

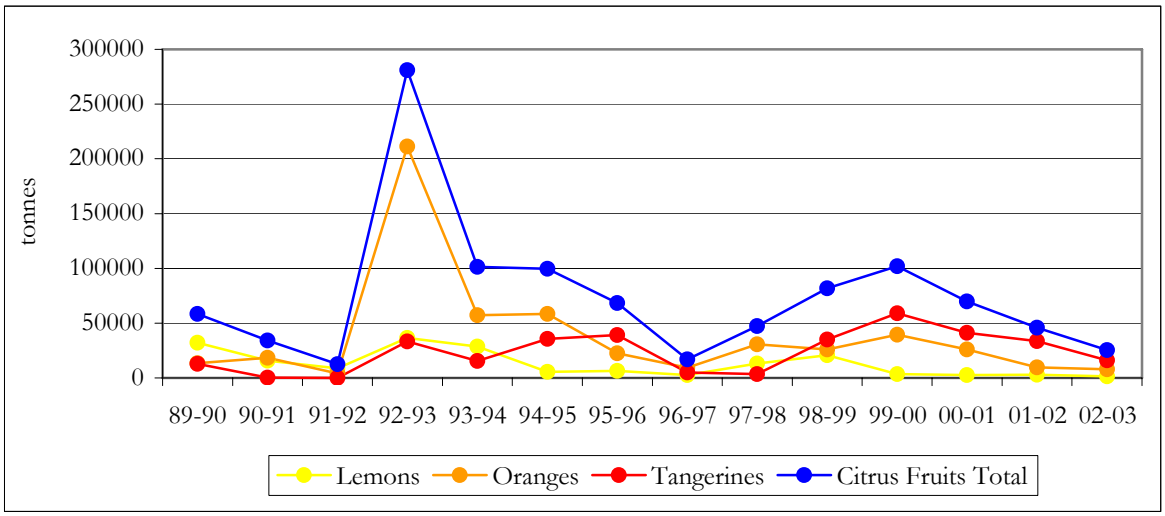


Source: Generalitat Valenciana, 1998-2003 and FEGA, 1990-2003

Withdrawals

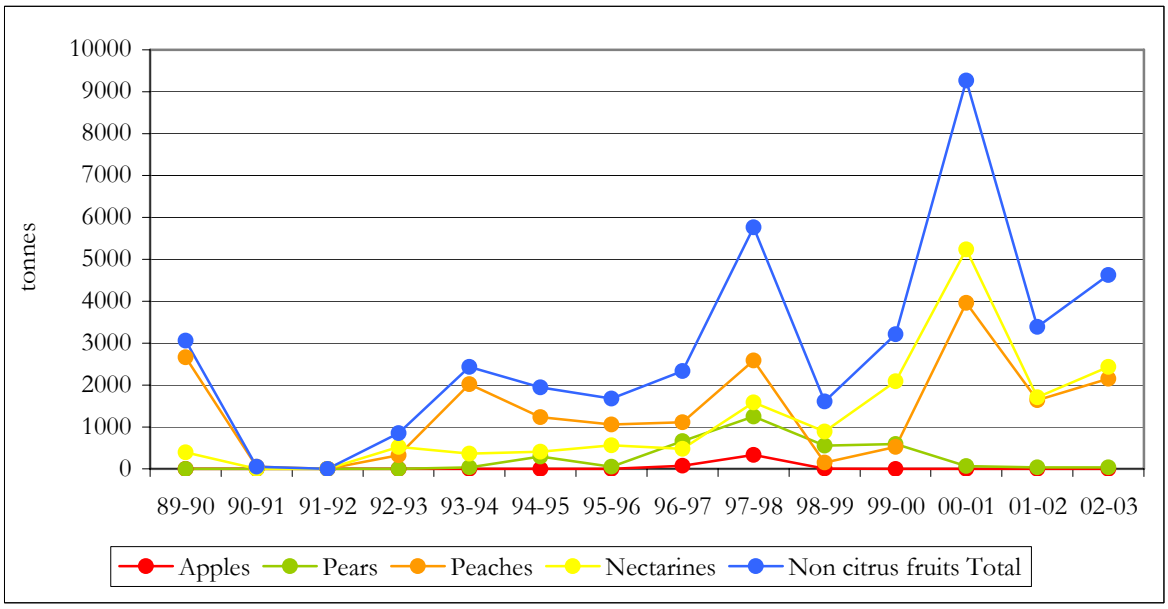
The evolution of fruit withdrawals by category can be observed in Charts 44 and 45 and Table 18. Citrus fruit withdrawals present the same evolution as withdrawals at national level (Chart 20), except in 1996-1997 when citrus fruit withdrawals in C. Valenciana decline to one of its lowest values, while there is a noticeable increase in general terms in Spain. Since the CMO implementation in 1996 citrus fruit withdrawals have experienced two different periods, specially in the cases of oranges and tangerines. From 1996 to 2000, it increases to 101,858 tonnes, but since 2000 the trend suffers a gradual drop, descending in more than 76 thousand tonnes.

Chart 44: Evolution of citrus fruit withdrawals in C. Valenciana 1990-2003 (tonnes)



Source: FEGA, 1990-2003

Chart 45: Evolution of non citrus fruit withdrawals in C. Valenciana 1990-2003 (tonnes)



Source: FEGA, 1990-2003

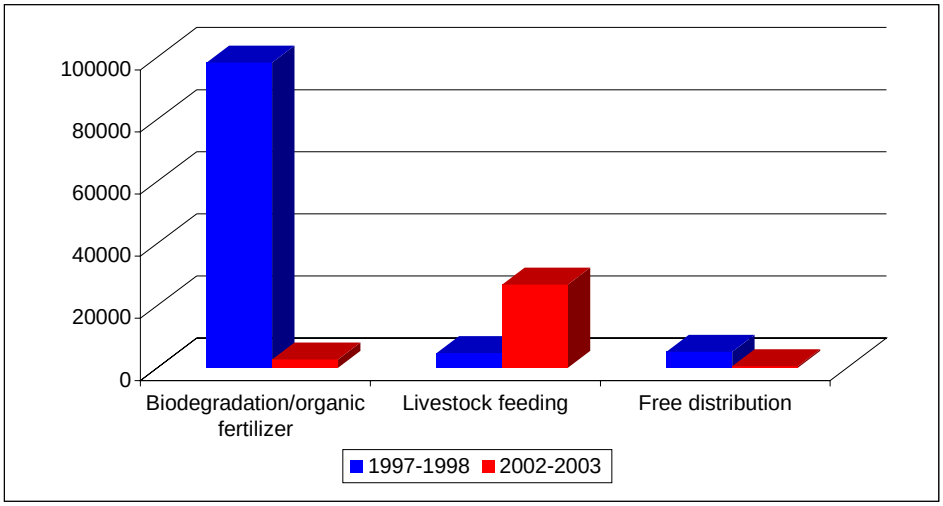
Table 18: Evolution of fruit withdrawals 1990-2003 in C. Valenciana (tonnes)

	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03
Lemons	32,192	15,646	8,654	3,6581	28,554	5,589	6,521	2,752	13,000	20,721	3,556	2,566	2,937	1,454
Oranges	13,382	18,370	3,944	211,185	57,241	58,383	22,637	9,428	30,742	25,944	39,302	26,067	9,516	7,882
Tangerines	12,816	281	0	33,182	15,551	35,757	39,261	4,850	3,509	35,191	59,000	41,043	33,448	16,129
Citrus fruits total	**58,390**	**34,297**	**12,598**	**280,948**	**101,346**	**99,729**	**68,419**	**17,030**	**47,251**	**81,856**	**101,858**	**69,676**	**45,901**	**25,465**
Apples	0	0	0	0	0	0	0	76	337	10	0	0	0	0
Pears	0	0	0	0	39	300	53	665	1,252	555	593	65	37	38
Peaches	2,661	55	0	331	2,024	1,238	1,061	1,116	2,584	152	526	3,965	1,644	2,153
Nectarines	399	0	0	523	370	411	562	479	1,588	891	2,093	5,240	1,707	2,434
Non citrus fruits total	**3,060**	**55**	**0**	**854**	**2,433**	**1,949**	**1,676**	**2,336**	**5,761**	**1,608**	**3,212**	**9,270**	**3,388**	**4,625**
TOTAL	**61,450**	**34,352**	**12,598**	**281,802**	**103,779**	**101,678**	**70,095**	**19,366**	**53,012**	**83,464**	**105,070**	**78,946**	**49,289**	**30,090**

Source: FEGA, 1990-2003

On the contrary, the evolution of non citrus fruit withdrawals does not resemble evolution at a national level. Although this kind of withdrawals is less important than citrus fruit ones in C. Valenciana, since 1996 there is an expansion, specially in peaches and nectarines, while pear withdrawals show a steady decline and apple ones are nonexistent, according to FEGA data.

Chart 46: Evolution of destination of fruit withdrawals in C. Valenciana (tonnes)



Source: FEGA, 1990-2003

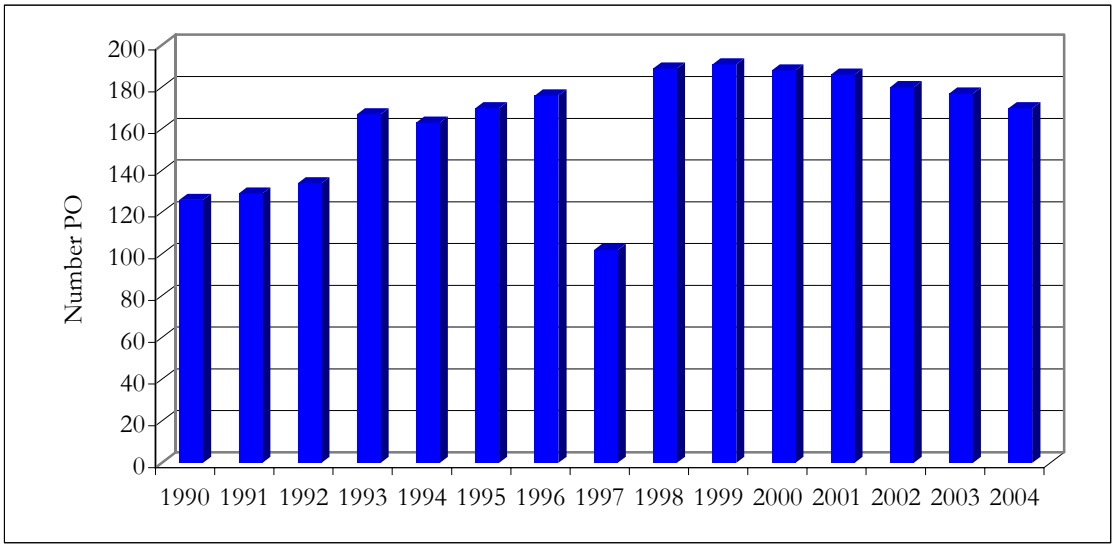
From the point of view of the destination of fruit withdrawals, it is necessary to emphasize a significant change: while in the 1997-1998 campaign most of the fruit withdrawn is destined to biodegradation or organic fertilizer, in 2002-2003 this option declines in favour of the livestock feeding destination. Free distribution does not represent an important channel to withdrawals.

Producers Organizations

Although Producers Organizations are mainly located in C. Valenciana (in 2003 there were 177 PO in this region, compared to 142 in Andalucía, 85 in Murcia and 79 in Cataluña), the number of Valencian PO has suffered a slight decrease since 1999, decreasing in 14 PO between 1999 and 2004.

As explained in the national case, two different periods can be distinguished in the evolution of PO (Chart 47). In the first period, before the CMO implementation in 1996, the number of Producers Organizations increased, reaching a number of 176 PO at the end of this period. In the second period, there is a steep decrease in 1997, reaching its lowest level with 102 PO, probably due to difficulties in adaptation to the new CMO. In 1998, the number of PO retrieved and went over 1996 level and from 1999 to 2004 the number of PO has declined to 170 in 2004, according to MAPA data.

Chart 47: Evolution of the number of Producer Organizations in C. Valenciana

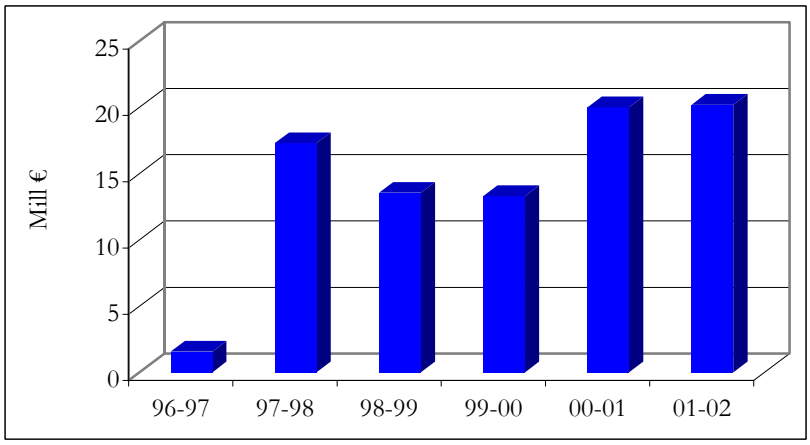


Source: MAPA, 1990-2003

2.2 Level of implementation of the CMO in Comunidad Valenciana

Concerning the aids to PO and their Operational Funds (OF), the evolution of the expenses in C. Valenciana can be observed in Chart 48. The trend is quite erratic, with a substantial increase between 1996-97 and 1997-98 campaigns (more than 15.7 mill €), but descending to 13.2 mill € in 1999-2000. The tendency changed in the last years, ascending to 20.2 mill € in 2001-2002 campaign, according to FEGA data.

Chart 48: Evolution of the expenses (mill €) in operational funds in C. Valenciana



Source: FEGA, 1990-2003

2.3 Institutional framework of fruit production in C. Valenciana

As explained in Chapter 1.3, the Spanish institutional framework presents a complex structure because of the decentralization of Spanish public administration. These are the main institutions operating in fruit sector in Comunidad Valenciana.

2.3.1 Public administrations

General framework has been explained in Chapter 1.3.1. In terms of planning, CCAA agricultural responsible are in charge of communicating different regional needs to MAPA, in order to develop a CMO policy as close as possible to reality.

Concerning management monitoring and auditing system, the competence distribution between National and Regional Public Administrations awards agriculture competences to Regional Governments, but general economic regulation to National Government. Thus CCAA are in charge of aids management and divulgation. Regional governments are responsible of those competences into the CMO organization transferred by national government. In this case these are pays to Producers Organizations which operate in the region. But there is a national institution responsible of global pay management, FEGA. This institution transfers direct pays from EU to CCAA, which are responsible of paying to Producers Organizations.

In the case of Comunidad Valenciana, agricultural responsible department is Conselleria d'Agricultura, Pesca i Alimentació which depends on the regional government, Generalitat Valenciana.

2.3.2 Private organizations

Interbranch organizations

Interbranch organizations operating in Comunidad Valenciana are those set up at a national level: *Interprofesional Citrícola Española (INTERCITRUS), Asociación Interprofesional de Limón y Pomelo* (AILIMPO), *Agrupación Nacional de Exportación de Cooperativas Citrícolas (ANECOOP)* and A*sociación Interprofesional de Pera y Manzana (AIPEMA).*

Producers organisations at regional level

FECOAV *Federación de Cooperativas Agrarias de la Comunidad de Valencia*: Joint the main part the Valencian Agricultural Cooperative Societies, most of them there are fruit producers cooperatives.
The most important producers organizations specialized in fruits are:

- *CITRUSAT, Asociación de Organizaciones de Productores de Cítricos, SAT*
- AOPCC: Asociación de Organizaciones de Productores integradas en el Comité de Gestión de Cítricos, Joints 35 Producers Organizations.

Unions

The following unions are integrated in their national union, and are the most representative in Comunidad Valenciana:

- ASAJA-Comunidad Valenciana: *Asociación de Jóvenes Agricultores de la Comunidad Valenciana.*
- UPA-Comunidad Valenciana: *Unión de Pequeños Agricultures de la Comunidad Valenciana.*
- COAG-La Unió: Coodinadora de las Organizaciones de Agricultores y Ganaderos en la Comunidad Valenciana.

Research and technical institute

The most relevant Valencian research centres are:

- IVIA: *Instituto Valenciano de Investigaciones Agrarias*
- SDTA: *Servicio de Desarrollo Tecnológico Agrario*
- UPV: *Universidad Politécnica de Valencia*
- AINIA: *Instituto Tecnológico Agroalimentario*
- Estación Experimental de Vila-Real
- Estación Experimental de Carcagente
- Estación Experimental de Elche
- IBMCP: *Instituto de Biología Molecular y Celular de Plantas*

Origin Denominations

Finally we mention the Origin Denomination Regulating Councils, because they can act as market and production regulators. In Comunidad Valenciana are located 5 of the 15 Spanish fruits Origin Denominations (MAPA, 2004a):

- Cítricos Valencianos
- Cerezas de la Montaña de Alicante
- Nísperos de Callosa d'En Sarriá
- Uva de mesa Embolsada de Vinalopó
- Kaki Ribera del Xuquer

2.4 CMO implementation context in C. Valenciana

Concerning the implementation of measures 3 and 4 of REG(EC) No 1257/1999 in C. Valenciana, some specifications can be made:

- Measure 3: Environmental techniques or rationalizing chemical products use
    - Measure 3.2 Integrated Control: this measure is applied to non irrigated fruit crops and stone fruits.
    - Measure 3.3 Integrated Production: implementation of this measure began in 2001 and it is applied to vineyards, grape crop and citrus fruit crop.
    - Measure 3.4 Organic farming: applied to all crops since 2001.

- Measure 4: Fight against erosion at fragile environments
    - Measure 4.1 Woody crops at slopes or terrace: applied in C. Valenciana.

Concerning Good Farming Practices, Comunidad Valenciana implemented Orden de 29 de marzo de 2000, establishing Valencian Good Farming Practices Code. This Code is mainly related to irrigation and fertilization in the case of permanent cultures.

Organic farming in Comunidad Valenciana is regulated by Orden 94/4262, which establishes the regulations for Organic farming production, its certification requirements and the setting up of Comité de Agricultura Ecológica de la Comunidad Valenciana, CAE-CV (Valencian Organic Farming Committee). CAE-CV is an autonomous institution dependent on Conselleria d'Agricultura, Pesca i Alimentació and it is responsible of controlling, certificating and promoting Organic farming in C. Valenciana.

In terms of Integrated Production, Valencian regulations are included in Spanish framework (Real Decreto 1201/2002), complemented with two regulations:

- Decreto 121/1995, about regulation of products grown by techniques of integrated agriculture.
- Orden de 23 de mayo de 1997, about the regulations of products grown by techniques of integrated agriculture and authorization requirements.

In addition, three specific rules have been established for olive crop, vineyards and citrus fruit crop. In the case of citrus fruit, it is regulated by several rules:

- Resolución de 31 de julio de 1997, establishing regulations for Valencian citrus fruit Integrated Production.
- Resolución de 23 de noviembre de 2000, establishing fertilizing regulations for Valencian citrus fruit Integrated Production.
- Resolución de 23 de noviembre de 2000, establishing regulations for Valencian citrus fruit Integrated Production.

Apart from European and national horizontal regulations, fruit and vegetables CMO establishes certain requirements of environmental character to obtain European aids by means of Operational Programs (OP). Thus, Producers Organizations must include in their statutes the promotion of cultivation practices and production and residues management techniques which are environmentally acceptable.

3. ANSWER TO EVALUATION QUESTIONS

3.1 Vertical questions relating to the fruits CMO

3.1.1 Fruits – Theme 1: market measures

Question 1+4(F1): What has been the environmental effect of the market measures (notably support for organizations of producers and their operational funds, intervention, destruction/biodegradation) for the following categories: a, citrus b, apples and pears c, peaches and nectarines? [a specific attention will be paid to the impact of the CMO promoting the grouping of supply]

Measure description

A central aspect of the market measures, within the CMO framework, is to promote the grouping of supply, in favour of producers to acquire a sufficient size and capacity which allows them to negotiate, particularly with great distribution. In order to reach this objective, Regulation 2200/96 establishes OF managed by PO, with specific measures for production, quality and marketing, and reducing the resource of withdrawals.

Level of implementation

As explained in the characterization of the fruit production sector in Spain, the main measure of CMO has been constituted by the aids to PO and their Operational Funds (OF). During the period from 1996 to 2003, the importance acquired by these OF in the budget of the OCM compared to the other types of aid of the CMO is spectacular (Chart 28). On the contrary, aids to withdrawals have suffered a sustained decrease since 1996, as expected due to the CMO purposes. In addition, although the number of PO managing OF has stayed steady, varying around 600 PO, the number of PO managing withdrawals has decreased from 591 PO in 1994-1995 to 250 in 2002-2003. This downward trend took place specially since the CMO establishment, showing again the less importance of the aids to withdrawals, in favour of the OF.

Therefore, the purpose is to evaluate the importance and the evolution of the main types of intervention related to the concerned fruits, through OF, as well as their effects on environment; to analyse if CMO measures have caused an intensification of production and eventually to evaluate the evolution of withdrawals, and the implementation of measures to guarantee the respect of environment in this operations.

Effects on the agricultural practices

Considering this situation, some CMO measures effects on the agricultural practices could be relevant and must be evaluated:

- **Importance and evolution of the principal PO interventions**: it is necessary to determine if CMO measures have reached its purpose of grouping the supply, and to know the importance of actions of the PO.

- **Intensification of production**: it is necessary to determine if CMO measures have promoted an intensification of production.

Effects on the environment

Regarding to environmental effects, it is necessary to analyse the causal channels of both the intensification of production and the grouping of supply to positive and negative environmental impacts.

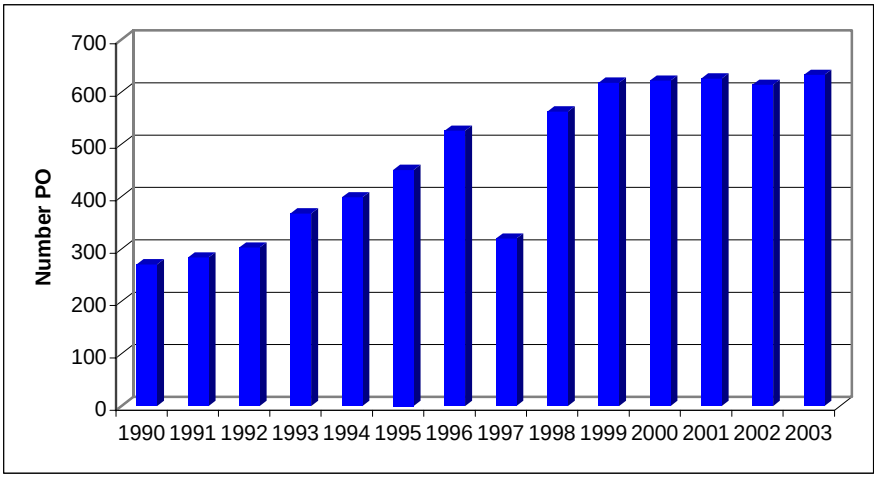
- **Environmental effects**: these environmental effects can be related to water management, fertilizer and pesticide pollution, biodiversity reduction and concentration in high productive areas.
- **Evolution and environmental effects of withdrawals**: it is necessary to determine the potential environmental effects of withdrawals.

Analysis

Importance and evolution of the principal PO interventions

As explained in the characterisation of the fruit production sector in Spain, concerning fruit and vegetable Producers Organizations, two different periods can be distinguished, before and after the CMO implementation. In the first period, until 1996, the number of Producers Organizations suffered a noticeable increase (Chart Q1F1-1), reaching a number of 526 PO at the end of this period. In the second part of the years under analysis, there is a sharp decrease in 1997, reaching its lowest level since 1993, probably due to difficulties in adaptation to the new CMO. In 1998, the number of PO retrieved 1996 level and from 1999 to 2003 the number of PO has stayed steady, fluctuating around 600 PO. In 2003, according to statistical official data of Ministerio de Agricultura, Pesca y Alimentación (MAPA), 633 PO were registered. Thus, there would seem to be a significant stagnation in the grouping of supply process.

Chart 49 : Evolution of the number of Producer Organizations

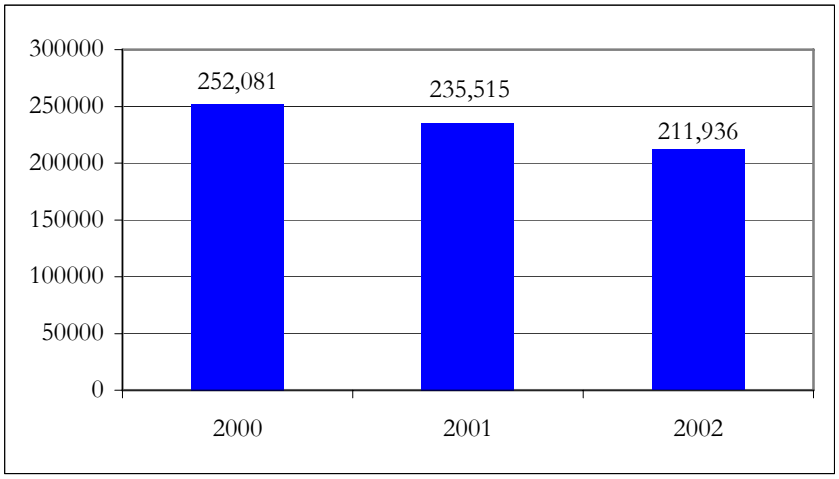


Source: MAPA, 1990-2003

From the point of view of the number of PO members (Chart Q1F1-2), there is a significant decrease from 2000 to 2002, according to Commission of the European Communities data. Meanwhile, in 2000 the number of PO members was 252,081 members, in 2002 represented 211,936, 16% less than in 2000.

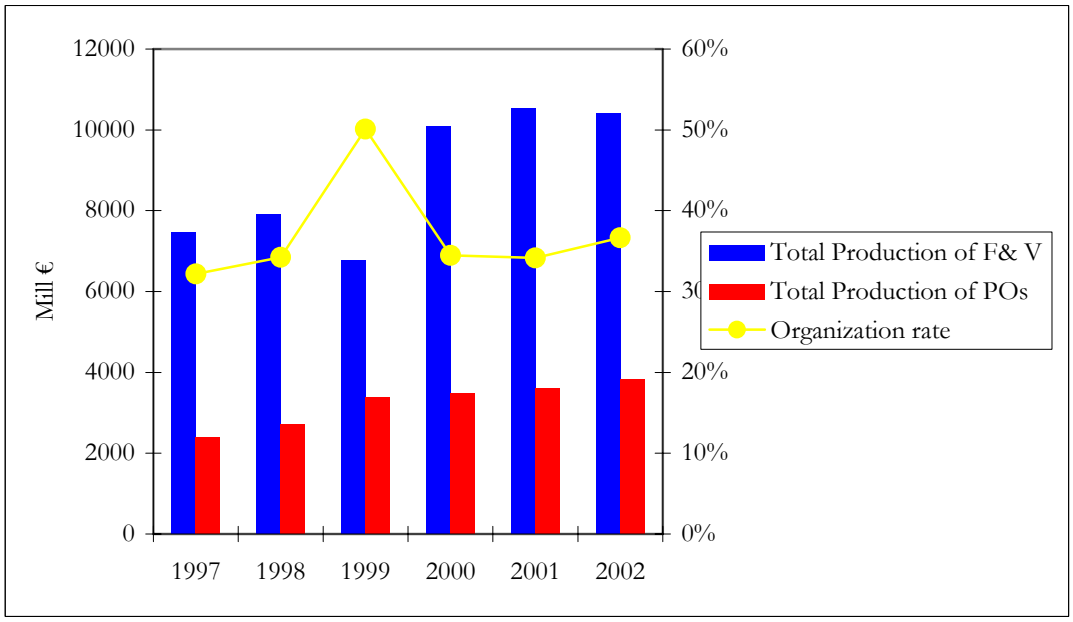
In spite of the increasing evolution of the number of PO, the rate of organisation of the Spanish fruit and vegetables sector does not exceed 40% (Chart Q1F1-3 and Table Q1F1-1), except for 1999, when the organization rate reached 50.1%. As the trend of PO total production between 1997 and 2002 seems linear and evolution of total production of fruits and vegetables suffers a significant decrease in 1999, the high organization rate of 1999 could be related to the decrease in Spanish total production. Apart from this particular year, the organization rate progresses slightly between 1997 and 2002 to reach 36.7%, which represents €3,814 million in absolute values.

Chart 50 : Evolution of number of members of PO



Source: Commission of the European Communities, 2004

Chart 51 : Evolution of the organization rate of the F&V sector from 1997 to 2002



Source: CCAE and Commission of the European Communities, 2004

Table 19: Evolution of the organization rate of the F&V sector from 1997 to 2002

	1997	1998	1999	2000	2001	2002
Total Production of F&V (mill €)	7,453	7,916	6,769	10,087	10,521	10,403
Total Production of PO (mill €)	2,399	2,709	3,392	3,476	3,594	3,814
Organization rate	32.2%	34.2%	50.1%	34.5%	34.2%	36.7%

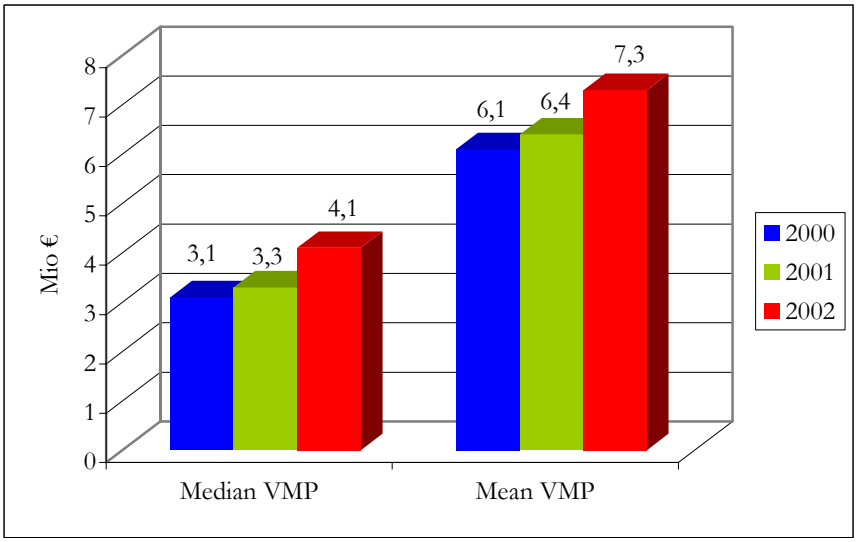
Source: CCAE and Commission of the European Communities, 2004

All the people met consider grouping of supply an essential aim of Spanish fruit producers. In their opinion, it is necessary in order to acquire enough size and capacity to negotiate, particularly with distribution sector, which has experienced an important grouping in the last years, and to reach competitive economies of scale. However, PO organization rate shows an inadequate level to achieve these goals, in spite of its slight increase from 1997 to 2002, according to data and to most of the interviewee people. Some of the main causes of this lack of grouping of supply are (CCAE, 2000):

- Absence of incentives to producer to the incorporation to PO: producers are not willing to assume some compulsory requirements to enter PO due to a lack of aids which balance their efforts.
- PO constitution is negatively influenced by the possibility of the independent producers of being benefited from the CMO measures.
- Scarce level of PO concentration: not only it is important that production is managed by PO, but also that the number of PO is the least possible.

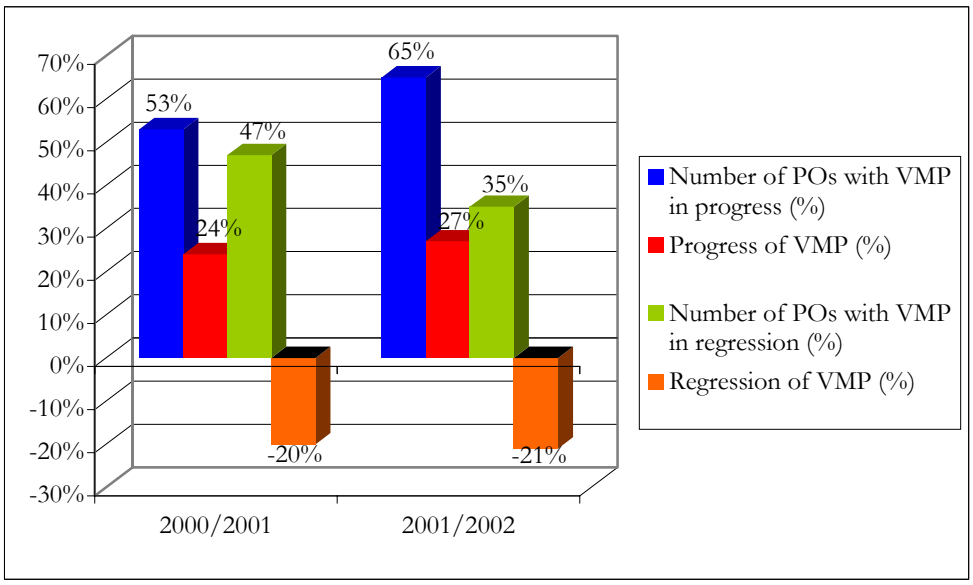
Between 2000 and 2002, the median VMP of the Spanish POs increased €1 million, approximately from €3,1 to €4,1 million, with a substantial increase in 2002 (Chart Q1F1-4). The median value has been considered as being more representative than the average one. The average VMP accounts for almost double of the median VMP, showing the existence of some POs in Spain presenting a huge economic dimension.

Chart 52 : Median and mean of value of marketed production through POs (mill €)



Source: Commission of the European Communities, 2004

Chart 53 : Percentage of POs with VMP in progress/ regression and percentage of progress/ regression of VMP

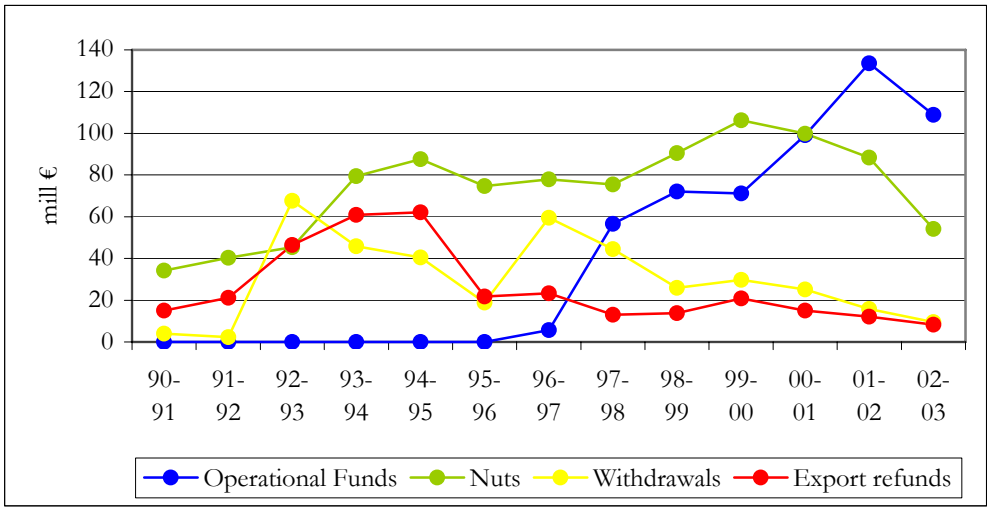


Source: Commission of the European Communities, 2004

According to European Commission data, the number of the POs with VMP in progress increases from 53% between 2000 and 2001 to 65% between 2001 and 2002 (Chart Q1F1-5). These POs for which the VMP increases improve their economic result of 24% from 2000 to 2001, and 27% from 2001 to 2002, while Spanish total production of fruits and vegetables progresses only by 4.3% from 2000 to 2001 and decreases 1.1% from 2001 to 2001. Thus, producers organised in POs experienced in the considered period a significant increase of their VMP, while the VMP of producers outside POs suffered from a substantial stagnation.

According to FEGA data, Operational Funds (OF) have increased spectacularly during the period from 1996 to 2003 (Chart Q1F1-6). Since 1996 OF have become the most important type of CMO aid with a striking increase up to 2001-2002 campaign, when it reached its peak.

Chart 54: Evolution of the expenses (mill €): intervention measures and operational funds



Source: FEGA, 1990-2003

The increase of OF was mainly caused by increases of the marketing measures (Chart Q1F1-7 and Table Q1F1-2), specially technical and special environmental measures, which have balanced the decreased of the expenses in production (technical measures). It is necessary to point out that no expenditure was assigned to mergers and acquisitions during the period under analysis.

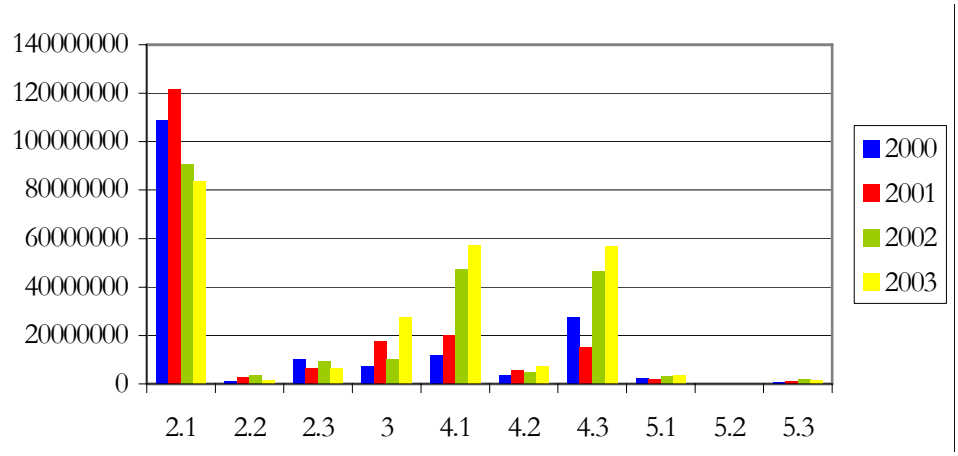
Table 20: Evolution of the distribution of OF by measures (euros)

Year	Production (euros)			Control (euros)	Marketing (euros)			Other (euros)			Total (euros)
	2-1	2-2	2-3	3	4-1	4-2	4-3	5-1	5-2	5-3	
2000	108,680,558	1,189,598	9,898,878	7,179,425	11,771,659	3,432,330	27,304,060	2,178,137	0,00	629,103	172,263,749
2001	121,462,727	2,884,214	6,386,493	17,735,039	19,983,100	5,629,346	15,228,748	2,078,187	0,00	1,241,894	192,629,747
2002	90,659,973	3,519,153	9,448,393	9,865,625	47,397,129	4,866,589	46,503,927	2,933,716	0,00	1,783,474	216,977,979
2003	83,735,245	1,281,836	6,309,983	27,354,793	57,064,125	7,147,543	56,608,952	3,755,889	0,00	1,428,870	244,687,237

Source: MAPA

It is not possible to measure the environmental impact of the OP and of the application of OF in the three types of fruit (apples and pears, peaches and nectarines, and citrus fruit) as required, because there is no detailed information by type of produced fruit related to OF and to OP. According to the not very high organization rate and to the opinion of most of the people met, the evolution of the impact of the fruit sector on the environment is not mainly related to the evolution of PO and with the composition of their OF.

Chart 55: Evolution of the distribution of OF by measures (euros)



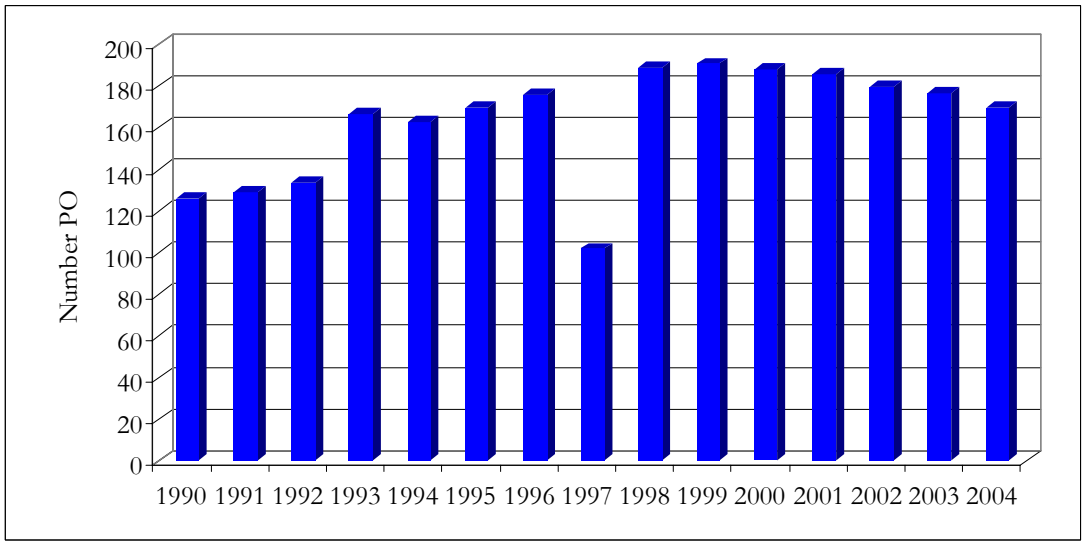
2-1: Production - Technical measures (phytossanitary measures, irrigation, machinery, greenhouses, plants, R&D)
2-2: Production - Services, training, research (advice, warning, training courses, R&D)
2-3: Production - Special environmental measures (organic / integrated production, R&D))
3: Control - Quality and phytossanitary measures (equipment, personnel costs, residue analysis, R&D)
4-1: Marketing - Technical measures (land, real estate, storage, packaging, transport, R&D)
4-2: Marketing - Sales, promotion, outlets (production planning, market research, sales offices, R&D)
4-3: Marketing - Special environmental measures (waste management, additional transport costs, research, R&D)
5-1: Other - Overheads (admin costs)
5-2: Other - Merges and acquisitions
5-3: Other - Other (ISO 9000 systems, other)

Source: MAPA

In regional terms, although Producers Organizations are mainly located in C. Valenciana (in 2003 there were 177 PO in this region, compared to 142 in Andalucía, 85 in Murcia and 79 in Cataluña), the number of Valencian PO has suffered a slight decrease since 1999, decreasing in 14 PO between 1999 and 2004.

As explained in the national case, two different periods can be distinguished in the evolution of PO (Chart Q1F1-8). In the first period, before the CMO implementation in 1996, the number of Producers Organizations increased, reaching a number of 176 PO at the end of this period. In the second period, there is a steep decrease in 1997, reaching its lowest level with 102 PO, probably due to difficulties in adaptation to the new CMO. In 1998, the number of PO retrieved and went over 1996 level and from 1999 to 2004 the number of PO has declined to 170 in 2004, according to MAPA data.

Chart 56: Evolution of the number of Producer Organizations in C. Valenciana



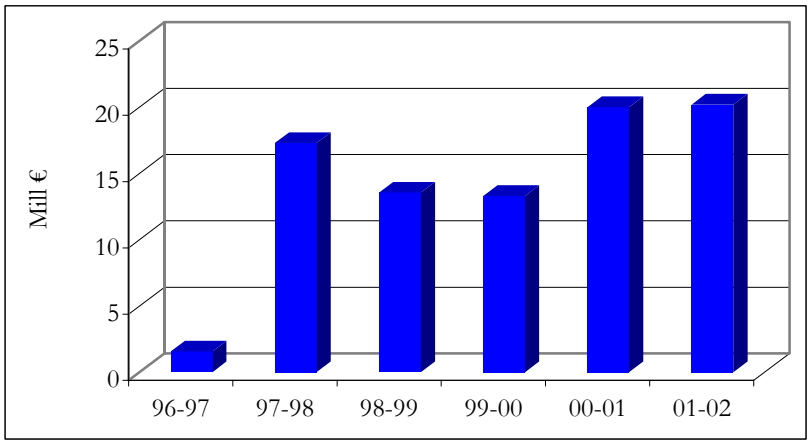
Source: MAPA, 1990-2003

According to producers surveys, there is enough awareness of the importance of grouping of supply (all the producers met considered grouping of supply to be important), in order to reach higher negotiation capacity and to protect producers interests. However, producers do not consider that supply is grouped enough (78% of producers met) and it could be due to the following reasons:

- Farmers are not willing to join PO because joining involves a lot of expenses, but few benefits.
- Farmers do not received directs payments and it could suppose some lack of confidence in CMO measures.
- Structural problems of Valencian farming, like smallholdings and part time farmers, which affect the capacity of producers grouping.

Concerning the aids to PO and their Operational Funds (OF), the evolution of the expenses in C. Valenciana can be observed in Chart Q1F1-9. The trend is quite erratic, with a substantial increase between 1996-97 and 1997-98 campaigns (more than 15.7 mill €), but descending to 13.2 mill € in 1999-2000. The tendency changed in the last years, ascending to 20.2 mill € in 2001-2002 campaign, according to FEGA data.

Chart 57: Evolution of the expenses (mill €) in operational funds in C. Valenciana



Source: FEGA, 1990-2003

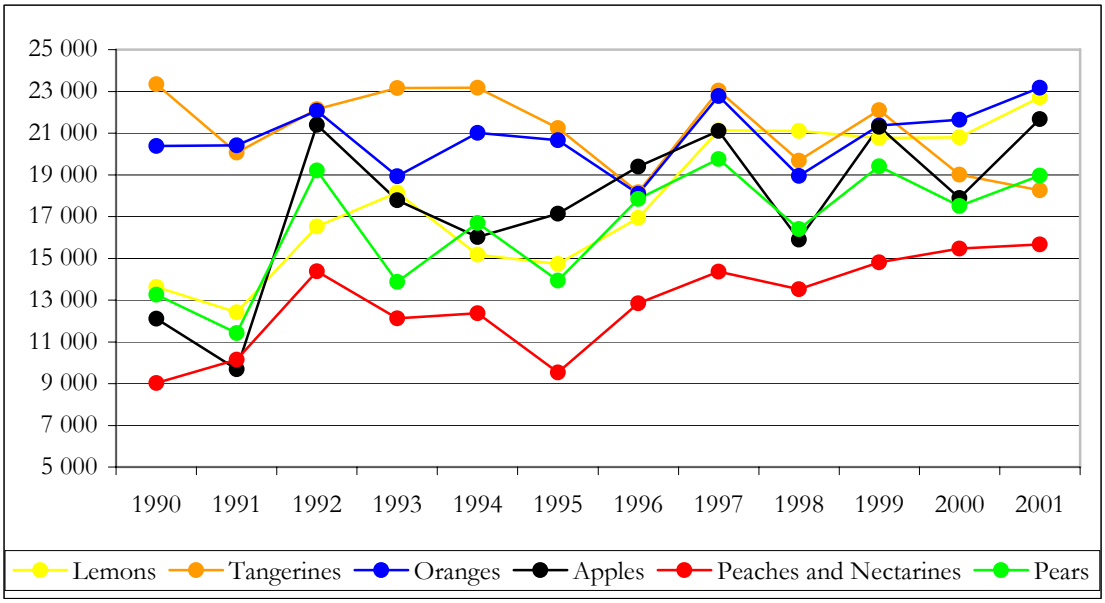
According to producers' surveys, grouping of supply has clearly caused the concentration of storage and packaging centres and the securing of a wide range of marketable varieties which cover a wider period of commercialisation, to satisfy different consumers demands. However, farmers do not consider CMO measures to be responsible of possible changes in the production areas, transferring from marginal lands to high productive areas. Finally, half of the produces met considers grouping of supply to have intensificated fruit crop production.

Intensification of production

In order to determine if CMO measures have caused an intensification of production two aspects can be analysed: the evolution of the yield in the different categories of fruit, which shows whether the quantity of fruit produced by hectare increases, and the evolution of dry lands and irrigated lands of fruit crops.

According to Chart Q1F1-10, the evolution of the different fruits concerned shows a higher yield in most of the crops, specially since 1995. The cases of lemons, peaches and nectarines are significant. They show a gradual positive trend of yield, more prominent than any other crop. Furthermore, yields tend to stabilize in the last years in higher values more than in the 1990-1995 period, particularly in lemons, pears, peaches and nectarines.

Chart 58: Evolution of the yield (Kg/ha) by categories of fruit, 1990-2001



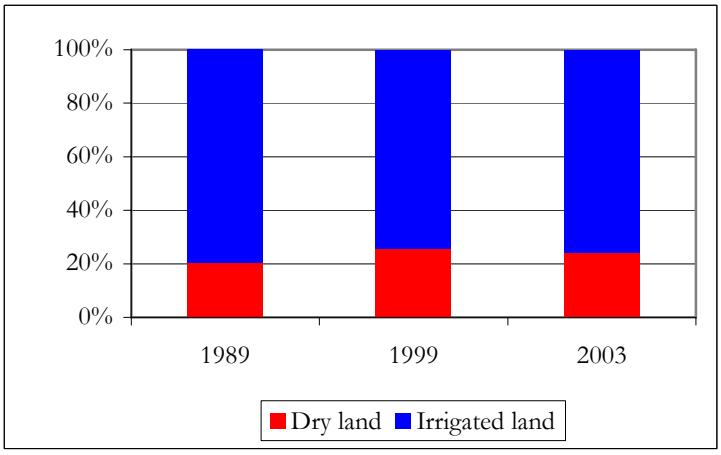
Source: INE, Boletín Estadístico

Concerning crop areas, as shown in Chapter 1.1, citrus fruits crop area has suffered a considerable increase, mainly due to the expand of lemon and tangerine crop area (Charts 2 and 6), while apple crop area decreased (Chart 8), pear crop area remained quite stable (Chart 10), and peach and nectarine crop area seemed to rise in the last years (Chart 12).

In terms of dry and irrigated surfaces, it must be pointed out citrus fruit are essentially grown in irrigated lands in Spain (MAPA, 2004a), so that this analysis determines the evolution in non citrus fruits.

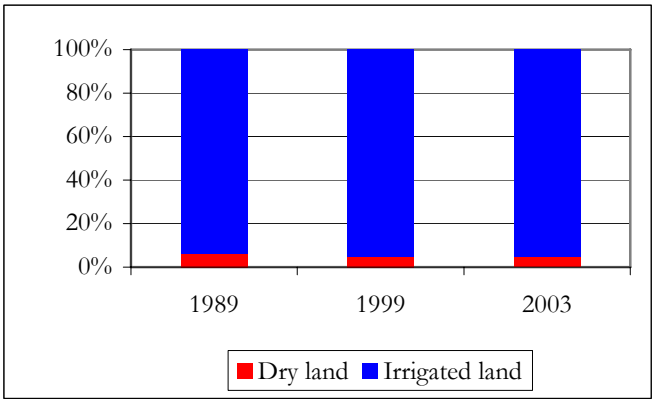
A slight decrease of the percentage of dry land can be observed in pears and peaches, but not in apple crops (Charts Q1F1-11, Q1F1-12 and Q1F1-13). The reduction of dry land surfaces is specially noticeable in peaches. This crop has lost 6,8 thousand hectares of dry land from 1989 to 2003, and irrigated land represented 96% of the crop area in 2003. This situation is less obvious in pear crop, but its percentage of irrigated land area has also increased, in spite of the reduction in absolute values.

Chart 59: Evolution of the dry and irrigated surfaces (%) of apples



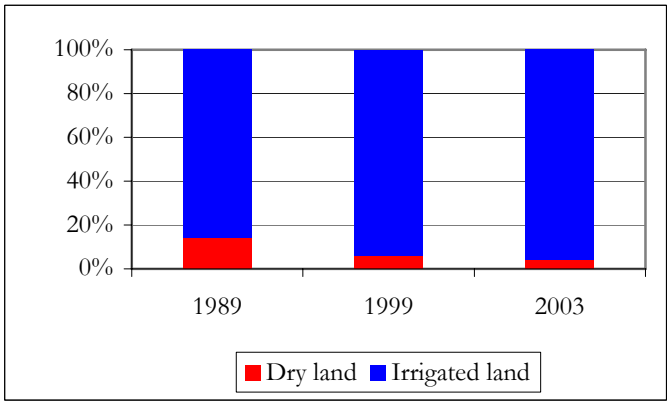
Source: INE, Censo Agrario

Chart 60: Evolution of the dry and irrigated surfaces (%) of pears



Source: INE, Censo Agrario

Chart 61: Evolution of the dry and irrigated surfaces (%) of peaches



Source: INE, Censo Agrario

In conclusion, an intensification of production can be observed in fruit crops through the indicators showed. Moreover, some scientific publications have concluded that fruit sector has seen significant intensification of production systems in recent years, particularly in Spain, to supply buoyant consumer demand in the north of Europe (Baldock D., Dwyer J., Sumpsi J.M., 2002).

This conclusion is confirmed by the experts we have queried, who affirm that an intensification of the crops concerned has taken place, but according to their opinion, CMO measures have not caused this fact in a prominent way, but market factors. In general, market measures try to rationalize production and to improve competitiveness, through the improvement of the quality. Some experts confirm this statement, asserting *CMO has been relatively liberal, intervention being limited and emphasis being placed on market forces* (Ledermann, 1998). So, most of the trends and changes cited have been strongly favoured as a result of non-CMO influences. In addition, some CMO measures like the promotion of integrated and organic production, which plays an important role in OP, attempt to increase the quality, not to intensificate production.

Regarding to non citrus fruit crops, practices have changed as intensification has produced, according to experts met. Those surfaces where irrigation has been implemented have varied their practices and fertilizer and pesticide pollution has been reduced, due to fertirrigation. Moreover, new irrigation surfaces have implemented environmental friendly types of irrigation, as drip and spray irrigation methods. According to producers' surveys, intensification has not affected water consumption. So it can be concluded that some practices tend to standardize, particularly practices which PO may carry out for their members, but the influence of CMO measures is not very high.

In the case of citrus fruit crops, intensification has no sense due to requirements of these crops. Citrus fruit crops need some specific culture practices, in terms of irrigation, treatments and

fertilizers which are necessary to achieve quality productions. Thus, these yields are essentially intensive. Many researches are aimed at the possibility of reducing productive factors, as water consumption. In this area, many researches have been carried out, specially concerning deficit irrigation practices, for instance Montaña, C. et al., 2005 and González-Altozano, P.; Castel, J.R. (1999).

Concerning the case study, most of the farmers met confirm previous statements: 68.4% of the producers intensified their productions during the period under analysis, but just 10% considered CMO market measures to be responsible of intensification. In fact, 87.5% of producers met do not think that CMO market measures lead to intensificate.

Experts met do not agree with the influence of CMO in the evolution of the cultural practices diversity. On the one hand, some of them state that agricultural practices trend to uniformity, but on the other hand it is confirmed that there are no changes in these practices related to CMO market measures. According to producers' surveys, 41% of farmers polled consider that agricultural practices are more uniform due to CMO measures, especially those measures related to grouping of supply, but 23% of the producers state that no influence is related to these measures.

Environmental effects

As explained, the potential environmental effects of both the intensification of production and the grouping of supply can be related to water management, fertilizer and pesticide pollution, biodiversity reduction and concentration in high productive areas. In order to analyse them, some particular indicators for each of them can be established. Therefore, the evaluation is made individually for each of the referred possible effects:

- Water management

According to the experts we have interviewed, there has been a great improvement in the technology of environmental friendly types of irrigation, as drip and spray irrigation methods. This evolution, joined to the increase in the use of these methods, has caused a better water management, in the last years. No data are available in Spain related to irrigation types in orchard farms, but all the people met assert the use of efficient irrigation methods is increasing, with its consequent reduction in the waste of water and researching in this area aim to determine specific water requirements in order to avoid excesses in water consumption.

Concerning the case study, in C. Valenciana the implementation of drip irrigation method is increasing and at present reach 40% of the orchards, according to some experts met. Reduction in water consumption due to drip irrigation method reaches 1600 m^3/ha (from 8000 m^3/ha to 6400 m^3/ha), compared to surface irrigation, according to Caballero et al., 1992. But no regional data are available of irrigation types implementation in orchard farms.

According to producers' surveys, intensification has not affected water consumption. Only 10% of farmers met states water consumption has increased because of the intensification of production, while 40% consider it has decreased, mainly due to the implementation of drip irrigation method.

- Fertilizer and pesticide pollution

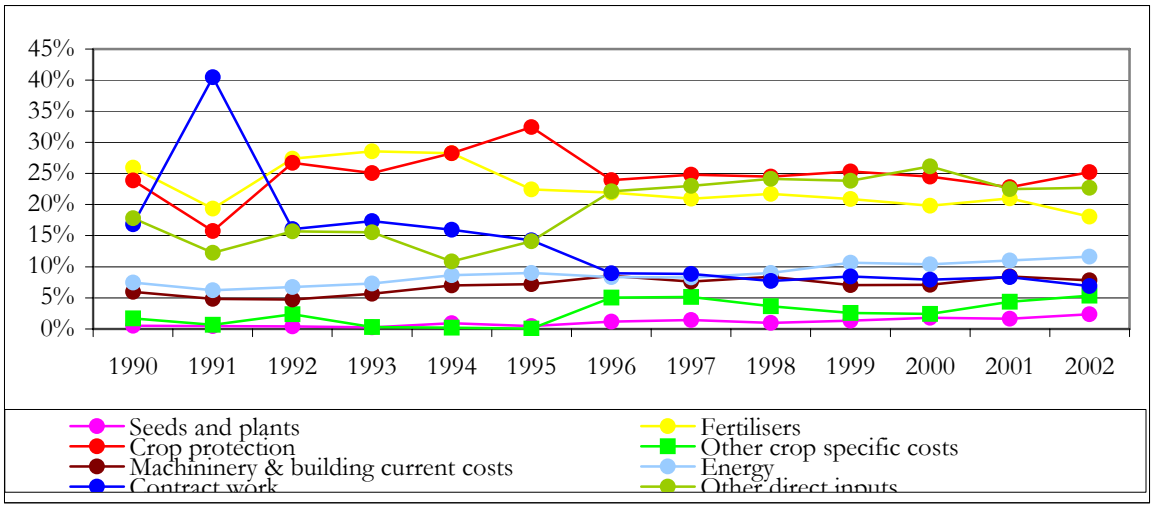
Thanks to the information available in the Farm Accountancy Data Network (FADN) database, it is possible to determine the evolution of intermediate consumption for farms specialised in citrus and non citrus fruit, at a national level and by region in 1992-2002 period.

Regarding to the importance of fertilizers consumption at a national level (Chart Q1F1-14), the evolution tends to decrease continuously, reaching its lowest value in 2002 with 18% of the intermediate consumption costs. However, this element is still on the third place in order of importance among these expenses.On the contrary, the expenses on crop protection measures are

the most important element of intermediate consumption. In 2002, it represented 25% of intermediate consumption expenses, but it reached its peak in 1995 (32%). The evolution of this charge is quite steady and does not change in a significant way during the period under analysis.

In regional terms, focusing in Mediterranean regions, where most of the fruits crops are mainly located, Andalucía is where fertilizers consumption represented the most important charge in 2002 (28% of the intermediate consumption expenses). This cost has lost importance in the total charges from 1990 to 2002 in all the Mediterranean regions. For instance, in C. Valenciana its weight among the total cost of intermediate consumption has reduced 4%.

Chart 62: Evolution of Intermediate Consumption in Spain, 1990-2002



Source: FADN

Table 21: Intermediate Consumption by regions, 1990

Region	Seeds and plants	Fertilizers	Crop protection	Other crop specific costs	Machininery & building current costs	Energy	Contract work	Other direct inputs
Aragón	1%	32%	18%	5%	13%	24%	1%	5%
Cataluña	2%	25%	11%	2%	17%	17%	11%	15%
Baleares	3%	32%	17%	0%	14%	28%	3%	2%
Castilla-La Mancha	-	-	-	-	-	-	-	-
C.Valenciana	0%	24%	28%	1%	3%	3%	20%	20%
Murcia	-	-	-	-	-	-	-	-
Andalucía	-	-	-	-	-	-	-	-
Canarias	-	-	-	-	-	-	-	-
España	**1%**	**26%**	**24%**	**2%**	**6%**	**7%**	**17%**	**18%**

Source: FADN

Table 22: Intermediate Consumption by regions, 1995

Region	Seeds and plants	Fertilizers	Crop protection	Other crop specific costs	Machininery & building current costs	Energy	Contract work	Other direct inputs
Aragón	-	-	-	-	-	-	-	-
Cataluña	-	-	-	-	-	-	-	-
Baleares	11%	32%	10%	0%	15%	24%	4%	3%
Castilla-La Mancha	-	-	-	-	-	-	-	-
C.Valenciana	0%	21%	35%	0%	4%	7%	17%	15%
Murcia	1%	31%	19%	0%	21%	20%	2%	7%
Andalucía	-	-	-	-	-	-	-	-
Canarias	-	-	-	-	-	-	-	-
España	**0%**	**22%**	**32%**	**0%**	**7%**	**9%**	**14%**	**14%**

Source: FADN

Table 23: Intermediate Consumption by regions, 2002

Region	Seeds and plants	Fertilizers	Crop protection	Other crop specific costs	Machininery & building current costs	Energy	Contract work	Other direct inputs
Aragón	1%	17%	30%	1%	14%	14%	1%	20%
Cataluña	4%	13%	23%	3%	16%	10%	10%	20%
Baleares	-	-	-	-	-	-	-	-
Castilla-La Mancha	0%	22%	17%	2%	11%	11%	2%	34%
C.Valenciana	1%	20%	24%	4%	6%	9%	11%	23%
Murcia	1%	16%	41%	14%	1%	10%	2%	15%
Andalucía	2%	28%	17%	0%	4%	11%	12%	26%
Canarias	7%	10%	7%	1%	17%	22%	0%	36%
España	**2%**	**18%**	**25%**	**5%**	**8%**	**12%**	**7%**	**23%**

Source: FADN

Analysing crop protection expenses in Mediterranean regions, a significant increase in Murcia is observed, where this cost represented 41% of the intermediate consumption expenses in 2002. In other regions, as C. Valenciana the evolution shows a decrease of the importance of the crop protection charges. On the contrary, in Cataluña it is an element which has obtained more importance during the 1990-2002 period.

However, the information provided by FADN database is not useful to determine if these evolutions occurred due to the quantities of consumed inputs or due to the variations of their prices.

Table 24: Quantity of fertilizer (kg/ha) by fruit category, 1997

	N	P2O5	K2O	Compounds	Soil Improvements
Oranges	562	46	49	618	730
Tangerines	657	37	34	790	402
Lemons	568	170	70	556	1301
Citrus fruit average	**596**	**84**	**51**	**655**	**811**
Apples	186	5	15	511	817
Pears	197	7	17	555	629
Peaches	168	51	19	658	524
Non citrus fruit average	**184**	**21**	**17**	**575**	**657**

Source: INE, Boletín Mensual Estadística 1997

The dosage of fertilizer used by category of fruit crop (Table Q1F1-6) shows those types of fertilizer which could represent a negative environmental effect. It is significant the dosage of

nitrogen fertilizer applied on citrus fruit crops. Moreover, according to the experts interviewed, nitrogen fertilizers could involve problems of water pollution. Another important effect on environment pointed out by experts is the higher levels of pesticide and fertilizer intakes that new varieties need, due to their difficulties of adaptation.

In what concerns regional study, it can be pointed out that pesticide and fertilizer consumption is being reduced, according to most of the experts met. Thanks to fertirrigation, the use of these inputs has decreased and subsequent leaching is being reduced. In addition, if water dosage is reduced, leaching decreases too (Lidón, A., 1993). Thus, the implementation of drip irrigation methods benefits environment.

Another reason proving the reduction of fertilizer and pesticide pollution is related to the control of the farming practices by cooperatives. In quite a lot of cases, they carry out several field operations instead of farmers, improving put them into practice. Moreover, farmers receive much technical training to improve irrigation and fertilizing practices, and to enhance crop protection avoiding pollution.

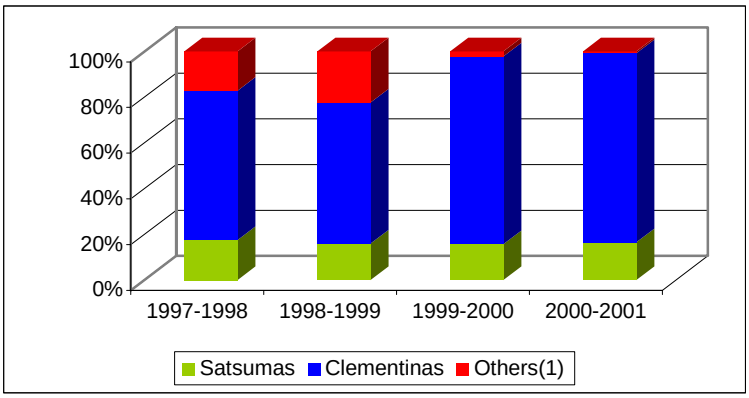
Concerning residues of plant protection products and according to regional experts, in C. Valenciana maximum residue limits are less exceeded each year.

- Biodiversity reduction

The evolution of the production of varieties of tangerines and oranges from 1997 to 2001 is showed in Chart Q1F1-15 and Q1F1-16. There is a prominent difference between both crops: the production of tangerines crop has tended to concentrate in Clementinas, reducing the importance of other varieties during the period 1997-2001.

Meanwhile, in the same period, production of the different varieties of orange crop has remained steady, without any significant decrease in the importance of the quantities of the different varieties produced. Furthermore, the number of varieties is lesser in tangerine crop than in oranges, so that it could represent a higher risk situation of biodiversity reduction in this case.

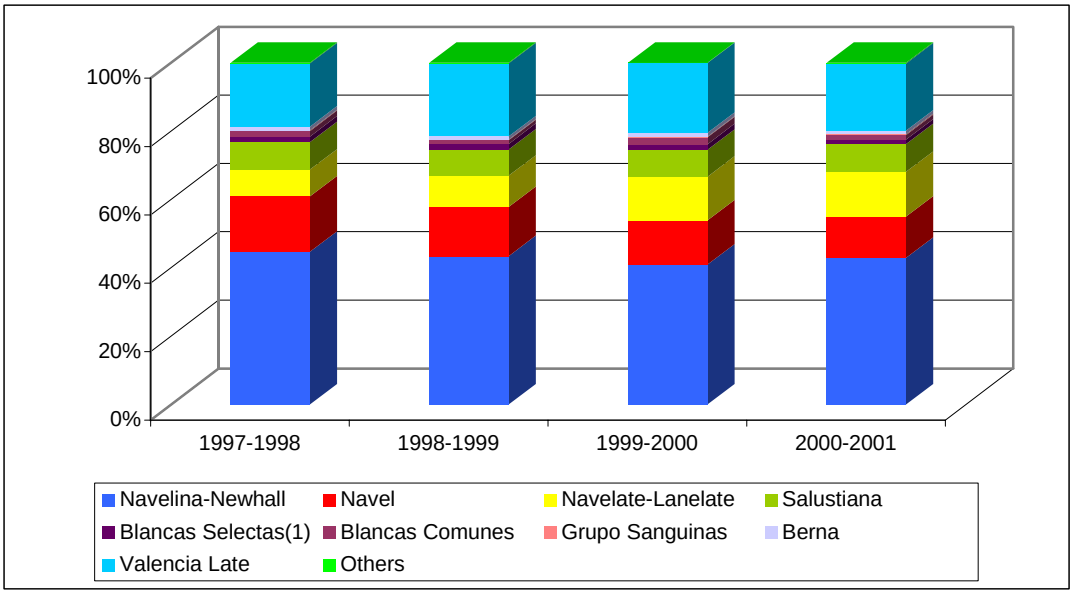
Chart 63: Evolution of the production of varieties of tangerines (%), 1997-2001



(1) Clementina, Fortuna, Wilking, Monreal, Kara, Mineola, Ortanique and Comun

Source: INTERCITRUS

Chart 64: Evolution of the production of varieties of oranges (%), 1997-2001



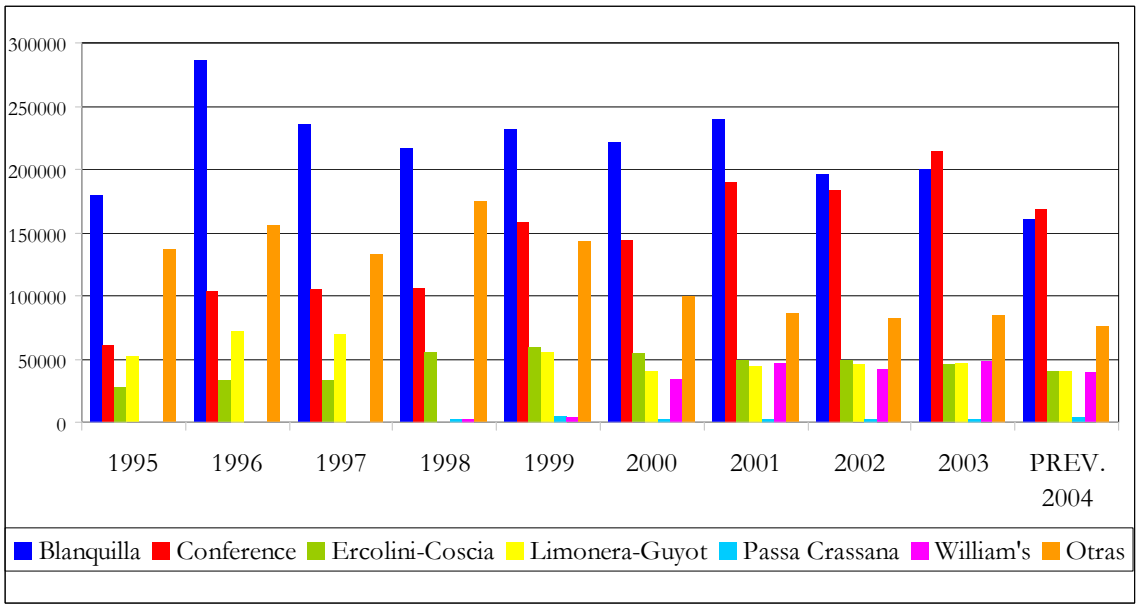
(1) Cadenera, Imperial, Macetera and Castellana

Source: INTERCITRUS

In terms of pear varieties, the evolution of production (Chart Q1F1-17) shows a trend contrary to monoculture. Blanquilla was the most produced variety from 1995 to 2002, but it has been losing importance during this period. Conference production has increased, reaching its peak in 2003 with 213,702 tonnes, and other varieties, like Passa Crassana and William's, have increased their relative importance, according to AIPEMA data.

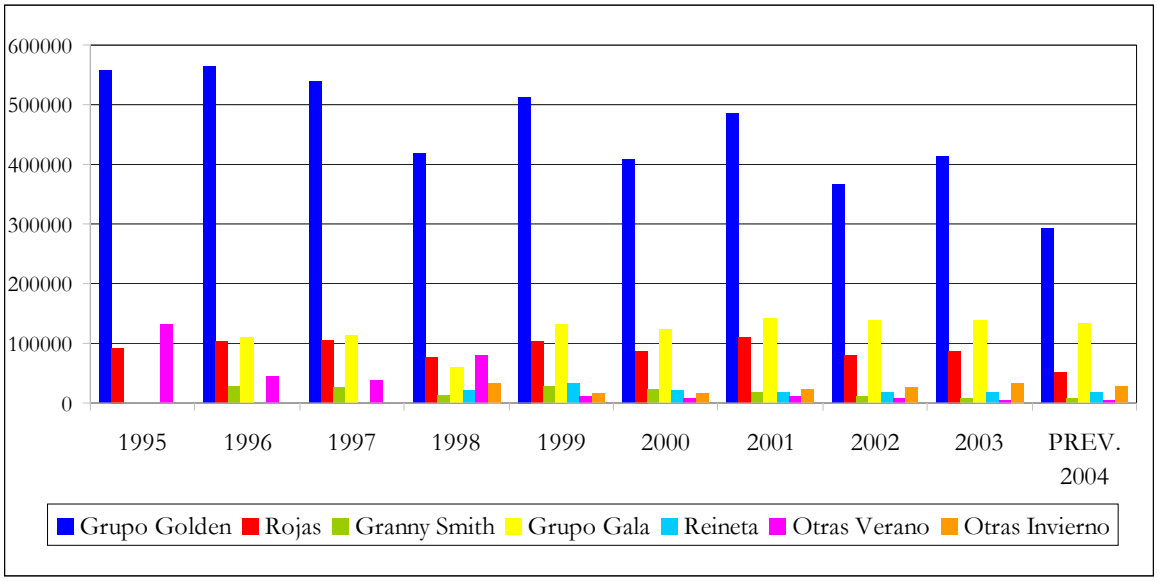
The tendency is similar in apple varieties production, as shown in Chart Q1F1-18. While Golden varieties decrease in terms of relative importance, Gala and other winter varieties increase their presence. This situation appears in different studies. For instance, Iglesias and Carbó (2002) assert that *the varietal situation of apple crop presented a considerable evolution in the last years. At present time, there is an wide range of varieties in the market, which allows to cover the different times of harvesting* (Table Q1F1-8)*, and contribute to provide a great diversity of colorations and adapted tastes for consumers demands.*

Chart 65: Evolution of pear varieties production in Spain (tonnes)



Source: AIPEMA

Chart 66: Evolution of apple varieties production in Spain (tonnes)



Source: AIPEMA

On the contrary, it is necessary to point out that some local varieties are losing in spite of their good adaptation to local conditions, and they are being replaced by other varieties more marketable (Iglesias and Carbó, 2002).

Concerning peach varieties, present variety control trend is aimed to reach more diversification in both fruit features and availability supply period, trying to achieve a production calendar of four or five months (Moreno, M.A., 2005), as shown in Tables Q1F1-9, Q1F1-10 and Q1F1-11.

Table 25: Marketing calendar of pear varieties

Varieties	Jun		Jul		Aug		Sep		Oct		Nov		Dic		Jan		Feb		Mar		Apr		May	
Canylla	■	■																						
Castell	■	■																						
Delbard Premier	■	■	■																					
Magallon	■	■	■																					
Ercolini			■	■	■	■	■	■	■	■	■	■												
Conference	■	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Limonera			■	■	■	■	■	■	■	■	■	■												
Morettini			■	■	■	■	■	■	■	■	■	■												
Red Barlett					■	■	■	■	■	■	■	■												
William's					■	■	■	■	■	■	■	■												
Alejandrina					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Blanquilla					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Devoe					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Decana							■	■	■	■	■	■	■	■										
Buena Luisa							■	■	■	■	■	■	■	■	■	■								
General Leclerc							■	■	■	■	■	■	■	■	■	■								
Grand Champion							■	■	■	■	■	■	■	■	■	■								
Flor d'Hivern									■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Passa Crassane										■	■	■	■	■	■	■	■	■	■	■	■			

Source: ACTEL

Table 26: Marketing calendar of apple varieties

Varieties	Jul		Aug		Sep		Oct		Nov		Dic		Jan		Feb		Mar		Apr		May		Jun	
Golden Delicious																								
Golden Smothee																								
Golden Suprema																								
Ozark Gold																								
Early Red One																								
Early Gold																								
Gala																								
Red Chief																								
Oregon Spur																								
Top Red																								
Granny Smith																								
Belleza de Roma																								
Starking																								

Source: ACTEL

Table 27: Marketing calendar of white peach varieties

Varieties	June				July				August				September				October			
Fidelia																				
Paraguayo																				
Michelini																				
Gladis																				
Opale																				

Source: ACTEL

Table 28: Marketing calendar of yellow peach varieties

Varieties	June				July				August				September				October			
Caterin																				
Carson																				
Baby Gold 6																				
Andros																				
Junquerman																				
Agosto																				
Baby Gold 7																				
Sudanell																				
Baby Gold 9																				
Campiel																				
Miraflores																				
Septiembre																				
Xucla																				
Octubre																				
Embolsado																				
Calanda																				

Source: ACTEL

Table 29: Marketing calendar of red peach varieties

Varieties	June				July			August				September				October			
Rich Lady																			
Royal Gem																			
Royal Glory																			
Rubi Rich																			
Elegant Lady																			
Summer Rich																			
Merril Ohenry																			
Manolito																			
Rojo Escola																			
Ryan Sun																			
Roig Setembre																			
Roig Rito																			
Comodin																			
Lucie																			
Roig Albesa																			
Terribelle																			
Rojo Abel																			
Rojo Octubre																			

Source: ACTEL

Table 30: Marketing calendar of white nectarine varieties

Varieties	June				July			August				September				October			
Snow Queen																			
Early Giant																			
Caldesi 2000																			
Jade																			
Queen Giant																			
Zafir																			
Flavour Giant																			
Festina																			
Caldesi 2020																			
Silver Late																			

Source: ACTEL

Table 31: Marketing calendar of yellow nectarine varieties

Varieties	June				July				August				September				October			
May Diamond																				
Independence																				
Big Top																				
Red Diamond																				
Early Sungrand																				
Star Red Gold																				
Fantasia																				
Venus																				
Fairlane																				
Flamekiss																				
Red Gin																				
Autum Free																				
Tastee Free																				
Albared																				

Source: ACTEL

In conclusion, some problems of biodiversity decrease could appear in some local varieties of fruit crops, like tangerines and apples, and this statement agrees with the opinion of some experts interviewed, who assert that many local varieties of all fruit crops are disappearing. Some of their arguments are based on the scarce number of firms which are dedicated to distribute seeds and on the small number of varieties these firms sell, those which are more productive and commercial. On the contrary, there is a wide range of marketable varieties and the evolution shows a trend to diversificate these varieties in order to cover a wider period of commercilization, to satisfy different consumers' demands.

According to producers' surveys, the same conclusions in terms of local varieties can be drawn: 79% of the producers met consider that local varieties are being lost. At regional scope, experts state that the number of marketable varieties has increased. Nowadays, there are more than 20 marketable varieties and other 20 which are able to become commercialized, while there were only 6 varieties (Clementina, Clementina fina, Satsuma, Washington Navel, Blanca and Valencia) ten years ago.

- Concentration in high productive areas

A high concentration in productive areas could cause both a desertification of those areas which are less productive and marginal areas, and a tendency to monoculture with a loss of biodiversity on those areas which are more productive.

Table 32: Evolution of regional area (ha and %) of apples

	1989		1999		2003	
Andalucía	1251	2,77%	697	1,77%	492	1,61%
Aragón	9365	20,77%	8500	21,62%	6863	22,46%
Asturias	2513	5,57%	4314	10,97%	3371	11,03%
Baleares	522	1,16%	211	0,54%	111	0,36%
Canarias	536	1,19%	349	0,89%	236	0,77%
Cantabria	93	0,21%	93	0,24%	140	0,46%
Castilla y León	2675	5,93%	2044	5,20%	1402	4,59%
Castilla-La Mancha	1257	2,79%	514	1,31%	606	1,98%
Cataluña	17774	39,42%	14718	37,43%	11824	38,70%
C.Valenciana	2857	6,34%	1370	3,48%	960	3,14%
Extremadura	830	1,84%	347	0,88%	121	0,40%
Galicia	1323	2,93%	2140	5,44%	1393	4,56%
Madrid	138	0,31%	39	0,10%	6	0,02%
Murcia	1069	2,37%	456	1,16%	97	0,32%
Navarra	824	1,83%	801	2,04%	645	2,11%
País Vasco	1194	2,65%	1675	4,26%	1711	5,60%
La Rioja	866	1,92%	1054	2,68%	574	1,88%

Source: INE, Censo Agrario

Table 33: Evolution of regional area (ha and %) of pears

	1989		1999		2003	
Andalucía	1363	4,02%	1025	2,96%	956	3,46%
Aragón	7883	23,24%	7853	22,65%	5572	20,16%
Asturias	91	0,27%	62	0,18%	97	0,35%
Baleares	309	0,91%	106	0,31%	86	0,31%
Canarias	320	0,94%	168	0,48%	227	0,82%
Cantabria	20	0,06%	16	0,05%	11	0,04%
Castilla y León	441	1,30%	633	1,83%	595	2,15%
Castilla-La Mancha	416	1,23%	331	0,95%	116	0,42%
Cataluña	14392	42,42%	15674	45,21%	12868	46,57%
C.Valenciana	2541	7,49%	1106	3,19%	732	2,65%
Extremadura	2575	7,59%	2543	7,33%	1402	5,07%
Galicia	279	0,82%	466	1,34%	334	1,21%
Madrid	29	0,09%	26	0,07%	7	0,03%
Murcia	1176	3,47%	1681	4,85%	1768	6,40%
Navarra	674	1,99%	914	2,64%	920	3,33%
País Vasco	161	0,47%	250	0,72%	226	0,82%
La Rioja	1256	3,70%	1817	5,24%	1717	6,21%

Source: INE, Censo Agrario

Table 34: Evolution of regional area (ha and %) of peaches

	1989		1999		2003	
Andalucía	9993	14,58%	9120	14,42%	9227	13,06%
Aragón	13807	20,15%	12878	20,37%	15684	22,21%
Asturias	12	0,02%	6	0,01%	34	0,05%
Baleares	185	0,27%	208	0,33%	339	0,48%
Canarias	229	0,33%	78	0,12%	69	0,10%
Cantabria	1	0,00%	5	0,01%	1	0,00%
Castilla y León	357	0,52%	213	0,34%	117	0,17%
Castilla-La Mancha	1130	1,65%	824	1,30%	425	0,60%
Cataluña	16119	23,52%	13496	21,35%	18131	25,67%
C.Valenciana	9514	13,88%	6550	10,36%	6520	9,23%
Extremadura	1986	2,90%	4948	7,83%	6172	8,74%
Galicia	38	0,06%	189	0,30%	86	0,12%
Madrid	7	0,01%	4	0,01%	1	0,00%
Murcia	11463	16,73%	12494	19,76%	12111	17,15%
Navarra	1402	2,05%	1002	1,58%	739	1,05%
País Vasco	14	0,02%	37	0,06%	5	0,01%
La Rioja	2264	3,30%	1173	1,86%	965	1,37%

Source: INE, Censo Agrario

Table 35: Evolution of regional area (ha and %) of lemons

	1989		1999		2003	
Andalucía	8491	19,98%	6315	17,25%	5735	15,70%
Aragón	5	0,01%	0	0,00%	-	-
Asturias	8	0,02%	3	0,01%	28	0,08%
Baleares	382	0,90%	199	0,54%	167	0,46%
Canarias	366	0,86%	139	0,38%	96	0,26%
Cantabria	8	0,02%	6	0,02%	9	0,02%
Castilla y León	1	0,00%	3	0,01%	4	0,01%
Castilla-La Mancha	-	-	63	0,17%	-	-
Cataluña	46	0,11%	29	0,08%	23	0,06%
C.Valencian a	13168	30,99%	11041	30,15%	10997	30,10%
Extremadur a	3	0,01%	7	0,02%	5	0,01%
Galicia	35	0,08%	70	0,19%	27	0,07%
Madrid	-	-	-	-	0	0,00%
Murcia	19979	47,02%	18737	51,17%	19439	53,21%
Navarra	-	-	-	-	-	-
País Vasco	1	0,00%	5	0,01%	3	0,01%
La Rioja	1	0,00%	0	0,00%	-	-

Source: INE, Censo Agrario

Table 36: Evolution of regional area (ha and %) of tangerines

	1989		1999		2003	
Andalucía	1172	2,46%	4188	5,09%	5910	6,91%
Aragón	1	0,00%	24	0,03%	-	-
Asturias	-	-	0	0,00%	0	0,00%
Baleares	71	0,15%	55	0,07%	81	0,09%
Canarias	31	0,07%	25	0,03%	27	0,03%
Cantabria	-	-	0	0,00%	0	0,00%
Castilla y León	-	-	2	0,00%	0	0,00%
Castilla-La Mancha	6	0,01%	32	0,04%	7	0,01%
Cataluña	1604	3,37%	3748	4,55%	4138	4,84%
C.Valenciana	43721	91,90%	71558	86,93%	71586	83,66%
Extremadura	1	0,00%	2	0,00%	14	0,02%
Galicia	-	-	10	0,01%	1	0,00%
Madrid	-	-	-	-	0	0,00%
Murcia	966	2,03%	2671	3,24%	3802	4,44%
Navarra	-	-	-	-	-	-
País Vasco	-	-	0	0,00%	-	-
La Rioja	1	0,00%	0	0,00%	-	-

Source: INE, Censo Agrario

Table 37: Evolution of regional area (ha and %) of oranges

	1989		1999		2003	
Andalucía	33619	21,89%	38634	24,88%	43971	29,20%
Aragón	2	0,00%	51	0,03%	-	-
Asturias	6	0,00%	4	0,00%	16	0,01%
Baleares	2419	1,58%	2209	1,42%	1862	1,24%
Canarias	1677	1,09%	938	0,60%	762	0,51%
Cantabria	2	0,00%	0	0,00%	0	0,00%
Castilla y León	6	0,00%	12	0,01%	17	0,01%
Castilla-La Mancha	24	0,02%	20	0,01%	-	-
Cataluña	3886	2,53%	4444	2,86%	3437	2,28%
C.Valenciana	100619	65,52%	96322	62,03%	89901	59,71%
Extremadura	260	0,17%	143	0,09%	139	0,09%
Galicia	19	0,01%	58	0,04%	15	0,01%
Madrid	-	-	2	0,00%	0	0,00%
Murcia	11035	7,19%	12445	8,01%	10441	6,93%
Navarra	-	-	-	-	-	-
País Vasco	1	0,00%	2	0,00%	0	0,00%
La Rioja	-	-	0	0,00%	0	0,00%

Source: INE, Censo Agrario

The evolution of the regional area of the different fruit crops can be used to determine whether the production of fruit in Spain is suffering a process of concentration in high productive areas (Tables Q1F1 14-19).

According to INE data, there are noticeable differences between citrus and non citrus fruits, regarding to the evolution of regional distribution of different crops area. Citrus fruits area is mainly located in a few Mediterranean regions. Lemon crop area is essentially situated in Murcia (53,2% of the hectares in 2003) and there is a slight trend to increase the number of hectares dedicated to lemon crop in this region. On the contrary, tangerine crop area, which is concentrated in C. Valenciana (84% of the area in 2003), is diversifying its locations. Regarding to orange crop area, its evolution presents stability and there are no significant changes in the regional distribution of the surfaces during 1989-2003, in spite of most of the area dedicated to produce this crop is located in a few regions (mainly C. Valenciana, with 60% of the hectares in 2003).

The evolution of non citrus fruit regional area shows that there is no risk of concentration of production in high productive areas. Apple, pear and peaches crop areas are not so concentrated as citrus fruit crops and their evolution does not show a trend to locate the production in those areas which are more productive.

With the available information, it is not possible to evaluate if there is a process of local concentration within the regions but, at a regional scope, there is no actual risk of concentration in high productive areas. This conclusion could be drawn of the case study. According to farmers surveys, intensification is not causing concentration of production in high productive areas (only 15.8% of the producers consider that intensification has caused the concentration of production in high productive areas).

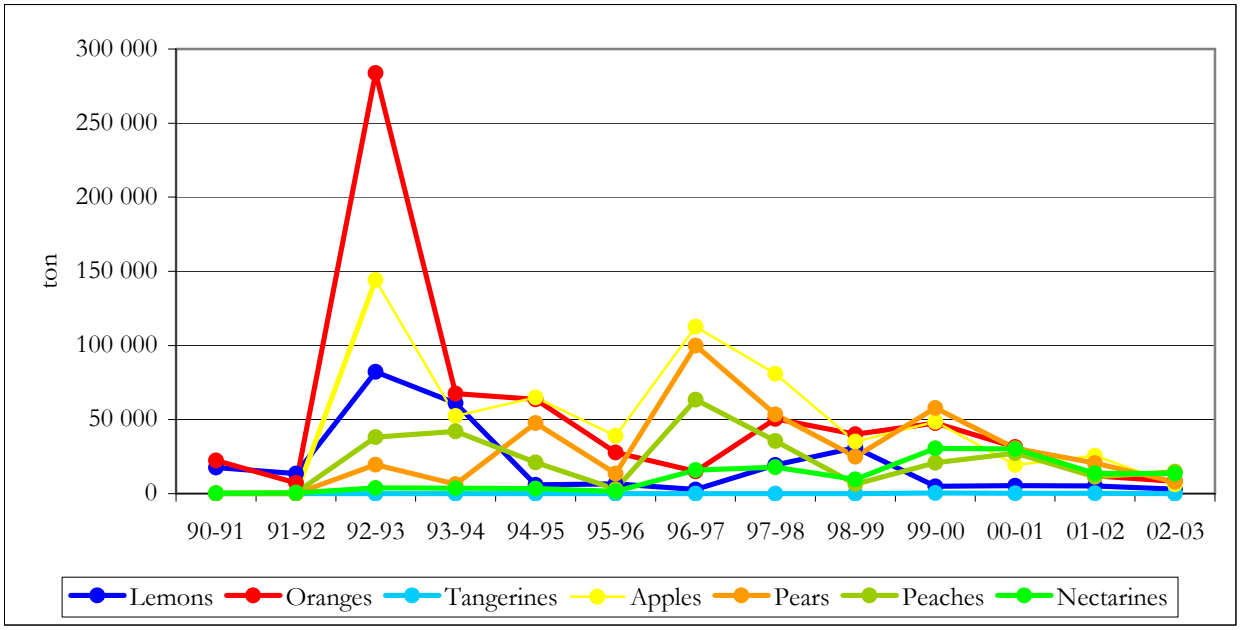
Evolution and environmental effects of withdrawals

Destinations to fruit withdrawals with potential environmental implications are regulated by FEGA through an internal procedure manual. FEGA is working in an official document to regulate withdrawals: “Directrices nacionales para la elaboración de pliegos de condiciones referentes a

métodos de retirada respetuosos con el medio ambiente". However, CCAA are in charge of withdrawals management. Fruit withdrawals destined to biodegradation and livestock feeding must be approved by the local or regional public Environmental Administration, always under FEGA regulation.

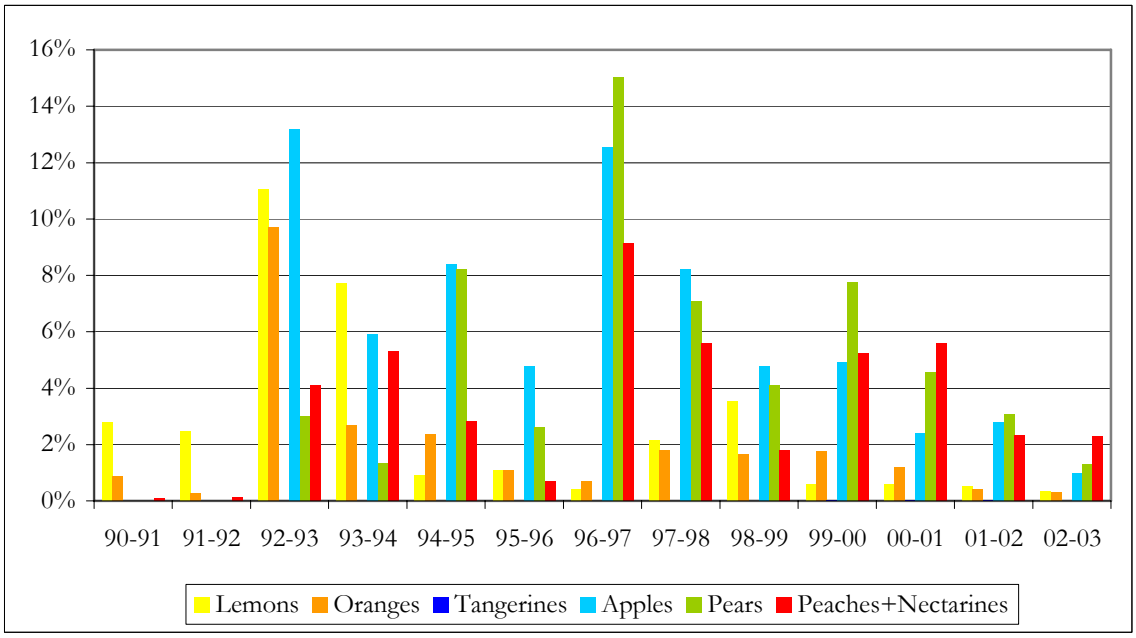
The evolution of fruit withdrawals in terms of absolute values can be observed in Chart Q1F1-19. The importance of this fruit withdrawals declines during the 1996-2003 period. Meanwhile, from 1990 to 1996 there are fluctuations in every fruit category, since 1996 the trend suffers a gradual decrease, descending in more than 250 thousand tonnes.

Chart 67: Evolution of fruit withdrawals 1990-2003 (tonnes)



Source: FEGA, 1990-2003

Chart 68: Evolution of the importance of fruit withdrawals related to their own production (% of total production)

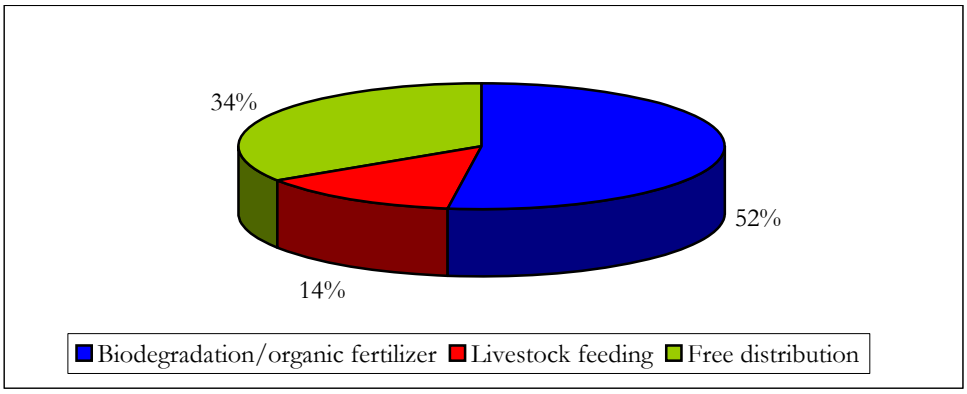


Source: Own work from FEGA, 1990-2003

This decrease is confirmed when the importance of fruit withdrawals related to their own production is analysed. There is a substantial drop of their weight since 1996 and the different categories of fruit concerned, except peaches and nectarines (2.3%), do not exceed 1.5% of their own production in 2002-2003 campaign.

According to Fondo Español de Garantía Agraria (FEGA) data, main destinations for fruit withdrawals are biodegradation/organic fertilizers, (52% of the fruit withdrawals had this destination in 2002-2003 campaign), free distribution (34%) and livestock feeding (14%). All the quantity of fruit withdrawn is channelled to one of these ways, according to FEGA.

Chart 69: Destination of fruit withdrawals 2002-2003



Source: FEGA, 1990-2003

Before the 1996 reform, there were some reports stating that disposal of withdrawn quantities on landfill sites led to locally significant levels of water pollution (Baldock D., Dwyer J., Sumpsi J.M., 2002). Since CMO implementation withdrawals have very little importance in quantity and related to the production so that its potential effect on environment is being reduced. Moreover, they always have acceptable environmental destinations: possible destinations to fruit withdrawals (Reg(EC) 659/97, Reg (EC) 1492/97 and Reg (EC) 103/2004) with potential environmental implications are biodegradation and livestock feeding. Both of them area regulated by FEGA through the procedure manual. As explained, CCAA are in charge of withdrawals management. Fruit withdrawals destined to biodegradation and livestock feeding must be approved by the local or regional public Environmental Administration, always under FEGA regulation.

Concerning biodegradation, the opinion of almost all the people met is that there is no environmental risk, just in few cases there are no suitable place to withdraw. Regarding livestock feeding, problems are related to fruit rot and to the quantity of fruit which can be included in an animal intake. Regulations must establish the possible dose of fruit to animal feeding and the limit of time that fruit can be stored, according to some experts' opinion.

According to all experts met and to producers' surveys, POs have quality environmental requirements for their withdrawing methods. They are also put into practice. Generally, withdrawing procedures of PO are well notified to public administration, but controls are established in order to detect possible deficiencies.

Some experts met point out free distribution as the most socially acceptable destination and in terms of environmental effect. But this kind of destination presents much logistic problems and inflexible requirements (labelling requirements, for instance). Another possibility suggested by some experts is to withdraw in the orchards, reducing costs but increasing the controls.

Conclusions

- There would seem to be a significant **stagnation** in the **grouping of supply** process at national and regional level.

- The **rate of organisation** of the Spanish fruit and vegetables sector **does not exceed 40%**, but it progressed slightly between 1997 and 2002 to reach 36.7%.
- It is considered **grouping of supply an essential aim** of Spanish fruit producers, to acquire enough size and **capacity to negotiate**, particularly with distribution sector, which has experienced an important grouping in the last years. But some **problems** have been found related to promoting the grouping of supply: absence of incentives to producer to the incorporation to PO, PO constitution is negatively influenced by the possibility of the independent producers of being benefited from the CMO measures, scarce level of PO concentration, and farmers are not willing to join PO because joining involves a lot of expenses, but few benefits.
- **Producers organised in PO** experienced in the considered period a significant **increase of their VMP**, while the VMP of producers outside PO suffered from a substantial stagnation.
- **OF have increased** spectacularly during the period from 1996 to 2003, due mainly to **increases of the marketing measures**, specially technical and special **environmental measures**, which have balanced the decreased of the expenses in production (technical measures).
- According to the not very high organization rate and to the opinion of most of the people met, the evolution of the **impact of the fruit sector on the environment is not mainly related to the evolution of PO and with the composition of their OF**.
- **Intensification of production can be observed** in fruit crops through the indicators and scientific publications showed. But according to experts' opinion, **CMO measures have not caused** this fact in a prominent way, but **market factors**.
- The **use of efficient irrigation methods is increasing**, with its consequent reduction in the waste of water.
- **Pesticide and fertilizer consumption is being reduced**, thanks to **fertirrigation**, to the control of the farming practices by **cooperatives** and to **technical training** farmers receive.
- Some problems of **biodiversity decrease** could appear in some **local varieties** of fruit crops, like tangerines and apples. On the contrary, there is a **wide range of marketable varieties** and the evolution shows a trend to diversificate these varieties in order to cover a wider period of commercilization, to satisfy different consumers' demands.
- There is **no actual risk of concentration in high productive areas**.
- The importance of **fruit withdrawals declines** during the 1996-2003 period. There is no environmental risk related to **biodegradation**, just in few cases there are no suitable place to withdraw. Regarding **livestock feeding**, problems are related to fruit rot and to the quantity of fruit which can be included in an animal intake. Regulations must establish the possible dose of fruit to animal feeding and the limit of time that fruit can be stored.
- **Free distribution** is the most socially acceptable destination and in terms of environmental effect. But this kind of destination presents much logistic problems and inflexible requirements, which should be relaxed. Another possibility is to withdraw in the orchards, reducing costs but increasing the controls.
- POs have **quality environmental requirements** for their withdrawing methods and they are also put into practice. Generally, withdrawing procedures of PO are well notified to public administration, but controls are established in order to detect possible deficiencies.

Question 2 (F1): What is the environmental effect of transferring price support from fruit processors to producer groups? [Please note that in the CMO for fruit and vegetables the main measure is the support for organisations of producers and their operational funds]

Measure description

CMO for fruits and vegetables modified price support system. It transferred this support from fruit processors to producers' organizations. Regulation (EC) 2202/96 transferred particularly citrus fruit subject to processing to producers organizations. This transference was conceived with the purpose of allowing the PO to reach competitive prices and to avoid some frauds. In addition, it was planned to guarantee, on the one hand, the provision of raw material to the industry and, on the other hand, the payment of incomes which allow farmers activity.

Therefore, the changes of the support system had the objective of avoiding processing to become a systematic outlet path of the production originally directed towards the fresh products market (a question with little importance in Spain where most of the citrus fruit production goes to fresh fruit market); and to allow for the redirection of industry towards the processing of new products.

Level of implementation

After CMO implementation in 1996, prices received in 1999/2000 in Spain by the producers were similar or superior to the minimum price, established before 1997. It could be owing to the fact that fruit processor industry was ready to adapt to new circumstances and raw material price increased consequently. Thus, the elimination of minimum price did not distort fruit processor sector and caused an improvement in this industry assessment of fruit crops as raw material.

Spanish PO did not make use of aids for multiannual contracts due to most of the citrus fruit produced goes to fresh products market and processed fruit is considered a rescue outlout.

Effects on the agricultural practices

Considering this situation, one aspect could be affected by CMO changes and must be analysed and evaluated:

- **Evolution of the processed quantities**: it is necessary to determine the changes in processed fruit production and the influence of CMO changes on it.

Effects on the environment

Regarding to environmental effects, it is necessary to analyse the causal channels of transferring price support from fruit processors to PO:

- **Environmental effects:** although from a qualitative point of view, processing sector does not present great environmental effects, the main problem corresponds to the residues generated in the preparation of raw materials for its later processed and in the residues of packages and packing. Some of these residues contain high levels of nitrates and/or organic matter, in fruit juice case (MAPA, 2004a). Attention must be paid in water consumption as well as its managing. Managing of all these residues could be affected by the transference of support from fruit processors to producers' organizations, because of the less level of aids fruit processors could receive.

Analysis

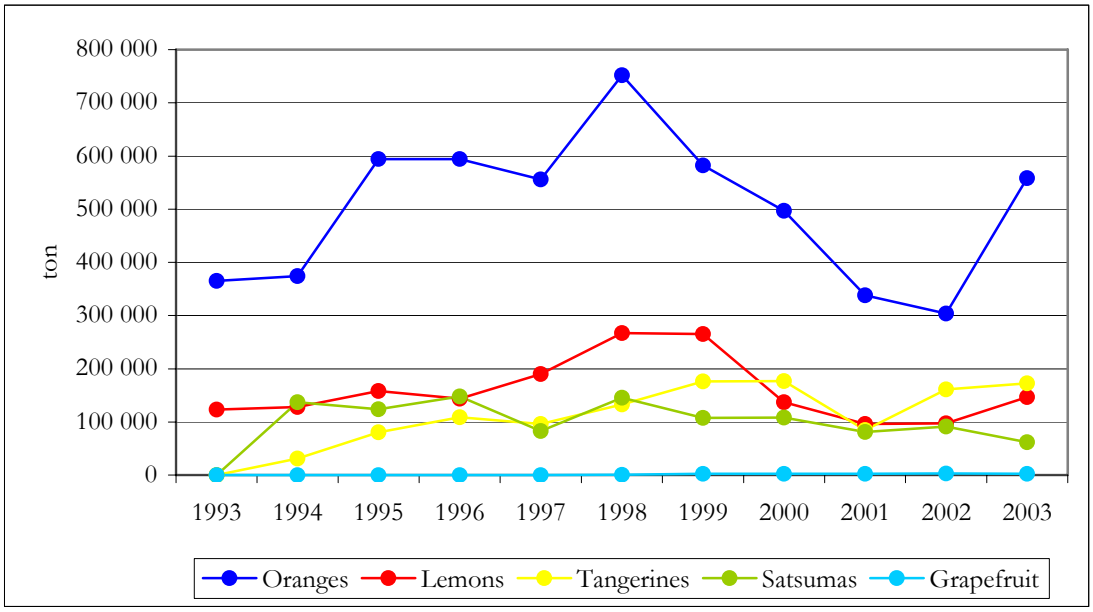
Evolution of the processed quantities

The evolution of processed quantities in the period 1993-2003 can be observed in Chart Q2F1-1 and Table Q2F1-1. Oranges and lemons follow approximately the same trend: the production increases until 1998, when both orange and lemon processed productions reach their peaks (752 and 267 thousand tonnes of processed fruit respectively). From then on, the tendency decreases up to 2002, but in the last campaign of the period returns to increase, specially in the orange production, in which this change is quite sharp.

According to FEGA data, orange crop is the most representative among citrus fruits in terms of processed production, with around 59% of the production in 2003, followed by tangerines (18%), lemons (16%) and satsumas (7%).

The trend in tangerines is quite linear upwards, even this production overcomes in terms of importance processed lemon production, in the last two campaigns of the period. On the contrary, processed satsumas production decreases, particularly from 1998, in a gradual and sustained way.

Chart 70: Evolution of processed citrus fruits production (tonnes) 1993-2003



Source: FEGA, 1990-2003

Table 38: Evolution of processed citrus fruits production (tonnes) 1993-2003

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Oranges	365,363	374,428	594,088	594,095	555,850	751,633	582,078	496,776	338,010	303,549	557,933
Lemons	123,381	128,064	158,225	144,027	189,851	266,794	265,171	137,227	96,536	97,509	146,649
Tangerines	-	31,291	80,496	108,723	96,220	132,672	176,187	177,100	84,710	161,414	172,418
Satsumas	-	136,965	123,856	147,888	82,907	145,520	107,704	108,076	80,939	91,325	62,244
Grapefruit	-	-	-	-	-	620	2,147	2,169	2,408	2,843	2,283
Total	**488,744**	**670,748**	**956,665**	**994,733**	**924,828**	**1,297,239**	**1,133,287**	**921,348**	**602,603**	**656,640**	**941,527**

Source: FEGA, 1990-2003

In conclusion, processed citrus fruit production has tended to decrease in most of the fruits concerned since 1998. But in 2003, processed production recovered, increasing in almost 300 thousand tonnes. However, opinion among farmers polled is divided, 47% of producers think quantities have changed.

According to experts of regional case, Spanish citrus fruit production goes to fresh market generally. Those varieties which present difficulties to be marketed go to processed production. There are not exclusive varieties to processing. Therefore, it can not be said that processing industry has had an influence on the quantities produced.

Environmental effects

The processed fruits sector requires in many occasions to have implanted and certified a system of environmental management to accede to certain markets, due to the exporting activity of many of the firms (preserved fruit and vegetables sector exported around 32% of the total production, according to MAPA, 2004a). It is also necessary to fulfil environmental legislation to be able to ask for public aids.

According to the data available (MAPA, 2004a), in 2002, the number of establishments of this sector which have implanted and certified an environmental management system, fulfilling ISO 14001 requirements, reaches 25 firms, most of them located in Andalucía and Murcia. These data have experienced a very favourable evolution from the year 1997, in which the first company of the sector was certified. So the measures implemented by industrials before CMO reform were not

certified by an environmental management system, although fruit processors had to observe Spanish regulations of solid and urban waste (Real Decreto Legislativo 1163/1986, repealed by Ley 10/1998). However, considering the total number of processing firms in 2002 (549), the percentage of certified establishments is 4,55% only.

Water consumption in these establishments is very variable, depending on the productive activity, technology, size of the establishment and geographic zone. Approximately, the volume of residual waters originated by the sector varies between the 0,4 m^3/t, 14 m^3/t, 9 m^3/t and 1 m^3/t in the subsectors of fresh, frozen, preserved fruits and vegetables, or juice elaboration, respectively (MAPA, 2004a). Sometimes, these residual waters have high nitrate concentrations and, in the case of fruit juices, high concentrations of organic matter.

From the point of view of environment, those fruits which are not suitable for fresh market could be left in the orchard, causing some environmental problems. But this is not a problem in Spain, according to most people met at national and regional scope. Farmers do not leave residues or fruit in their orchards (*cultura del campo limpio*), in order to avoid pests.

According to farmers surveys, 87% of those polled consider agricultural practices have not changed due to the transference of support from fruit processors to producers organizations and no producer states this transference to have environmental negative effects (68.8% of the producers consider it does not have environmental effects and 31.2% of the farmers declare its environmental effects as positive and related to technical assistance to treatments and irrigation).

In conclusion, as explained before, citrus fruit production in Spain goes to fresh market. Thus, processing industry does not have significant influence on quantities produced, agricultural practices or environmental effects.

Conclusions

- **Processed citrus fruit production has tended to decrease** in most of the fruits concerned since 1998, **recovering** in 2003 in almost 300 thousand tonnes. However, opinion among farmers polled is divided, less than a half (47%) of producers think quantities have changed.
- The number of **processing industries** which have implanted and certified an **environmental management system**, fulfilling ISO 14001 requirements, have experienced a very **favourable evolution** from 1997 to 2002. However, it represents 4,55% of processing firms only.
- Farmers polled consider **agricultural practices have not changed** due to the transference of support from fruit processors to producers' organizations and there are **no environmental negative effects** of this transference.
- Generally, Spanish citrus fruit production goes to fresh market and there are not exclusive varieties to processing. So **processing industry has not had an influence on the quantities produced, agricultural practices nor environmental effects**.

Question 3 (F1): What is the environmental impact of the requirements laid down in the market standards?

Measure description

The main quality instrument of the CMO of fresh fruits and vegetables is constituted by the market standards, which are applicable to a total of 40 products. These standards fix mainly the minimum criteria relative to calibre, colour, ripeness and labelling fruits and vegetables must fulfil to be marketed in the European Union. In addition, some intrinsic criteria have been added, such as the organoleptic specifications.

The application of these standards must cause the elimination of those products whose quality is not satisfactory, it must also lead production to satisfy consumers demands and to facilitate commercial relations, thus contributing to improve production return.

According to most of the authorities met, traceability requirements and private regulations imposed by distribution are stricter than CMO market standards. Moreover, growing concern of consumers lead to increase the market standards level, through traceability and food safety requirements (Fernández-Zamudio, Mª A.; Pavia, I. and Caballero, P., 2004).

Level of implementation

Market standards are detailed in 5 Regulations of the Commission for the fruits concerned. These Regulations lay down marketing standard for:

- Reg (EC) No 1799/2001 for citrus fruit
- Reg (EC) No 2335/1999 for peaches and nectarines
- Reg (EC) No 1619/2001 for apples and pears
- Reg (EC) No 175/2001 for walnuts
- Reg (EC) No 1284/2002 for hazelnuts

These regulations are completely implemented in Spain, according to all experts met. Spanish fruit marketable production adheres to guidelines of regulations and not satisfactory production goes generally to processing industry or local or secondary markets. No data are available of not satisfactory production quantities.

Effects on the agricultural practices

The effects on the agricultural practices of market standards are related to:

- **Intensification of production**: it is necessary to determine if marketing rules have promoted an intensification of production.

Effects on the environment

The application of common marketing rules can have the following effects:

- **Environmental effects**: it is necessary to analyse the potential environmental effects of market standards. These environmental effects can be related to intensification of production, and could affect to treatments increase and biodiversity reduction.

- **Environmental effects of products whose quality is not satisfactory**: it is necessary to determine the potential environmental effects of these products.

Analysis

Intensification of production

Intensification of fruit crops production can be observed through the indicators and scientific publications showed in Question 1+4(F1). As explained, an intensification of production has taken place in the last years, although, CMO measures have not caused this fact in a prominent way, but market factors, according to experts opinion. Market standards could be one of these market factors.

At a national scope, people met state that market standards have caused changes in production and agricultural practices, but they have not been related to intensification of production. Private

regulations and traceability have more influence than CMO measures and, therefore, market standards.

Regional experts confirm these statements declaring that no intensification in fruit production is related to market standards. However, 56.3% of producers declare that market standards have high or medium importance in terms of intensification of fruit crops, according to surveys carried out.

Environmental effects

- Biodiversity reduction

Some problems of biodiversity decrease could appear in some local varieties of fruit crops, like tangerines and apples, because of their lack of adaptation to market conditions, as explained in Question 1+4(F1). Some reports confirm this fact. For instance, Batlle, I. et al., 1998 states that *market has trended to reduce variety number. Although this tendency is less prominent in nuts crops, there is clear evidence that native varieties are being replaced by bred varieties with the subsequent risk of genetic erosion.*

On the contrary, there is a wide range of marketable varieties, which are genetically related in most cases, and the evolution shows a trend to diversificate these varieties in order to cover a wider period of commercilization, to satisfy different consumers' demands.

These conclusions have been confirmed by experts at national and regional level, and by farmers polled. It is generally declared that there has been a change in varieties grown, but no trend to monoculture is happening.

- Treatments increase

Concerning treatments there is no agreement. Some national experts met state that the number of treatments has increased in order to avoid fruit crop damages, which are not allowed by market standards. It is also declared that market standards have caused changes in agricultural practices, but private regulations and traceability have more influence than CMO measures.

On the contrary, authorities met at regional level assert that treatments have decreased, especially due to control of crop protection residues. Moreover, farmers' surveys show that 70% of producers state no increase in the number of treatments has happened.

Environmental effects of products whose quality is not satisfactory

Market standards have influenced the quantity of products whose quality is not satisfactory. Regional experts and surveys confirm this statement. 75% of producers polled assert that not marketable production due to market standards has increased in a medium or important level.

Requirements are extremely demanding, but not satisfactory production goes generally to processing industry or local or secondary markets and it does not cause environmental effects, according to national authorities met.

Conclusions

- **Intensification of production has increased** in the last years and not only **market factors** are responsible of this fact, but also **private regulations and traceability requirements**.

- A change in varieties grown has happened, but **no trend to monoculture** is happening. There are some problems of **biodiversity decrease in local varieties** of fruit crops, due to their lack of adaptation to market conditions. On the contrary, there is a **wide range of marketable varieties**, which are usually genetically related.

- **Market standards have increased** the quantity of **products whose quality is not satisfactory**. But **no environmental negative effect** has been caused since not satisfactory production goes generally to **processing industry or local or secondary markets**.

3.1.2 Fruits - Theme 2: environmental measures

Question 1 (F2): What are the overall environmental impacts of the environmental cross-compliance provisions – on cultivation practices and waste management, for which the framework was specified by the Member States - in the CMO (Council Regulation 2200/96)?

Measure description

CMO lays down environmental conditionality for some measures. A framework must be developed by each Member State, in order to regulate:

- Every OP must include environmental friendly measures in cultivation practices and waste management (articles 15 and 16).
- Withdrawals destinations (articles 23, 24 and 25).

So fruit and vegetables CMO establishes certain requirements of environmental character to obtain European aids by means of Operational Programs (OP). Thus, Producers Organizations must include in their statutes the promotion of cultivation practices and production and residues management techniques which are environmentally acceptable.

These measures do not have specific funds. They are previous conditions to PO before being able of benefiting from European aids.

Level of implementation

Spanish regulations related to implementation of the framework for PO environmental measures are the following:

- Orden de 14 de mayo de 1997 regulating Operational Programs and their Operational Funds (BOE nº 119).
- Orden de 11 de septiembre de 2001 defining some aspects of REG (EC) No 609/2001 related to Operational Programs and their Operational Funds (BOE nº 219).
- At present a new framework is being prepared, according to MAPA sources.

These regulations offer a flexible framework to PO in order to prepare their Operational Programs. Elegible measures are not specfic and it may lead PO to uncertainty, due to a lack of financiation guarantee of their OP. However it provides the possibility to adapt to very different and particular situations.

Operational Programs developed by PO in Spain have included significantly this type of environmental measures, so that during 2001 a 25.3% of the budget of OP was dedicated to environmental actions (MAPA, 2004a). According to MAPA data, the distribution of OF concerning to environmental measures shows that general environmental measures represent 90% of the expenditure in 2003 (Chart 33 of national context), followed by integrated production (7%) and waste management (2%). Moreover, expenditure on general environmental measures has increased sharply from 2000 to 2003, according to the evolution of the distribution of OF (Chart 32 and Table 15 of national context), while other measures have stayed steady.

Withdrawals are regulated by FEGA through a procedure manual. However, CCAA are in charge of withdrawals management. Fruit withdrawals destined to biodegradation and livestock feeding

must be approved by the local or regional public Environmental Administration, always under FEGA regulation.

Effects on the agricultural practices

The aim of this question is to determine if environmental measures of Operational Programs have conditioned or modified agricultural practices.

Effects on the environment

It is necessary to analyse the potential effects of environmental measures of Operational Programs, specially those related to **waste management** and it is necessary to determine if the **methods of withdrawing and their destinations** are environmentally friendly.

Analysis

Effects on the agricultural practices

Spanish implementation of the framework for PO environmental measures is considered to be satisfactory by almost every people met. Most authorities declare that it covers many important issues and it is quite flexible. In addition POs use it to develop their Operational Programs, as 100% of farmers polled declare. However, it is also pointed out by some experts that this framework presents some legal insecurity. POs do not have enough security of the which of their proposed measures are going to be passed. This could affect PO's planning. Moreover, it is necessary to promote the continuity of measures in order to help the protection of the environment.

According to the evolution of the distribution of OF by measures, shown in Charts 30 and 31 and Table 14 of national context, production measures are the most relevant in expenditure terms, specially those referred to technical measures, which represented 33% of the expenditure in 2003. Marketing measures have increased their relative importance, especially those referred to technical measures and special environmental measures, 23% of the expenditure in 2003. If special environmental measures included in production measures are considered, the rate of expenditure directly linked to environment rises to 26%.

In this expenditure framework, it can be concluded that environmental measures of PO have influenced agricultural practices at least in a slight way. This fact is confirmed by producers surveys and by national and regional authorities: 100% of farmers polled state that the Operative Program of their PO includes measures aimed at developing environmental protecting farm works. Moreover, according to MAPA sources, these measures are highly implemented in the OP of the Producers Organizations.

Effects on waste management

In 2003, expenditure in waste management represented 2% of the total expenditure of OF concerning to environmental measures. However, it meant much more expenditure from 2000 to 2002. In this period, waste management expenditure increased from 3.6 to 4.9 thousand euros. But in 2003, a sharp drop happened, decreasing to 1.3 thousand euros. Therefore, waste management seemed to have importance in the past, but it decrease in the last year analyzed.

According to national and regional experts, POs are including waste management measures in their OP and they are quite satisfactory, from an environmental point of view. Farmers' surveys confirm this statement.

Moreover, a program of free waste collection is being implemented. SIGFITO is a private non-profit institution, whose aim is to collect plant protection product waste. SIGFITO's financing

comes from packing firms added. According to SIGFITO data, 414 cooperatives and 146 farms were added to the program.

Effects on methods of withdrawing and their destinations

According to the analysis shown in Q1F1, the importance of fruit withdrawals declines during the 1996-2003 period (Charts Q1F1-19 and 20). There seems to be no environmental risk related to withdrawals destinations. This fact is related to the quality environmental requirements of PO for their withdrawing methods. Both national experts and regional ones confirm this statement, and assert they are also put into practice.

Farmers polled declare withdrawing methods are friendly from the point of view of environment. 100% of the surveys state withdrawals respect the environment.

Conclusions

- **Spanish implementation of the framework** for PO environmental measures is considered to be **satisfactory** by almost every people met. However, it presents some **legal insecurity** and it is necessary to promote the **continuity of PO measures** in order to help the protection of the environment.
- **Environmental measures of PO have influenced agricultural practices** at least in a slight way. Operative Programs of POs include measures aimed at developing environmental protecting farm works.
- **Waste management expenditure has decreased** in 2003 and it seems to have **more importance in the past**.
- POs include **waste management measures** in their OP and they are **quite satisfactory**, from an environmental point of view.
- POs include **quality environmental requirements in their OP** and it could be said that it is guaranteed **no environmental risks are related to withdrawals destinations**.

Question 2 (F2) : Which kind of environmental measures [integrated production, organic production, plant production, fertilisers, energy management, water management, soil management, biodiversity/landscape and environmental management] paid by the operational fund for the producers organisations has turned out to be effective in terms of positive environmental impacts?

Measure description

Operational Programs can include several environmental measures. Regarding to this measures, Reg (EC) No 2200/96 establishes:

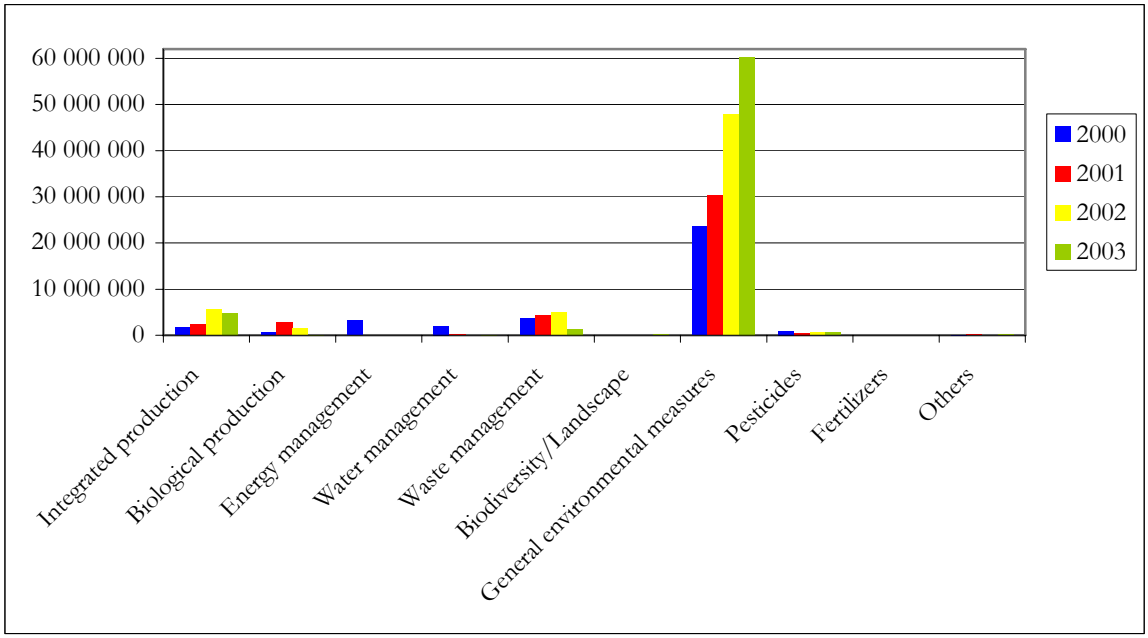
- Operational programmes shall include the creation of organic product lines, the promotion of integrated production or other methods of production respecting the environment (Article 15a).
- Operational programmes shall make financial provision for the technical and human resources required to ensure the monitoring of compliance with the standards referred to in Article 2, with plant-health rules and with maximum permitted levels of residues (Article 15c).

Thus, the aim of this question is to analyse each of these measures, considering their environmental effects.

Level of implementation

According to MAPA data, the distribution of OF concerning to environmental measures shows that general environmental measures represent 90% of the expenditure in 2003 (Chart Q2F2-2), followed by integrated production (7%) and waste management (2%). Biological production, water management and biodiversity/landscape measure have less than 1% of expenditure, while energy management and fertilizer measures have no expenditure in 2003. Moreover, expenditure on general environmental measures has increased sharply from 2000 to 2003, according to the evolution of the distribution of OF (Chart Q2F2-1 and Table Q2F2-1), while other measures have stayed steady.

Chart 71: Distribution of OF environmental measures (euros)



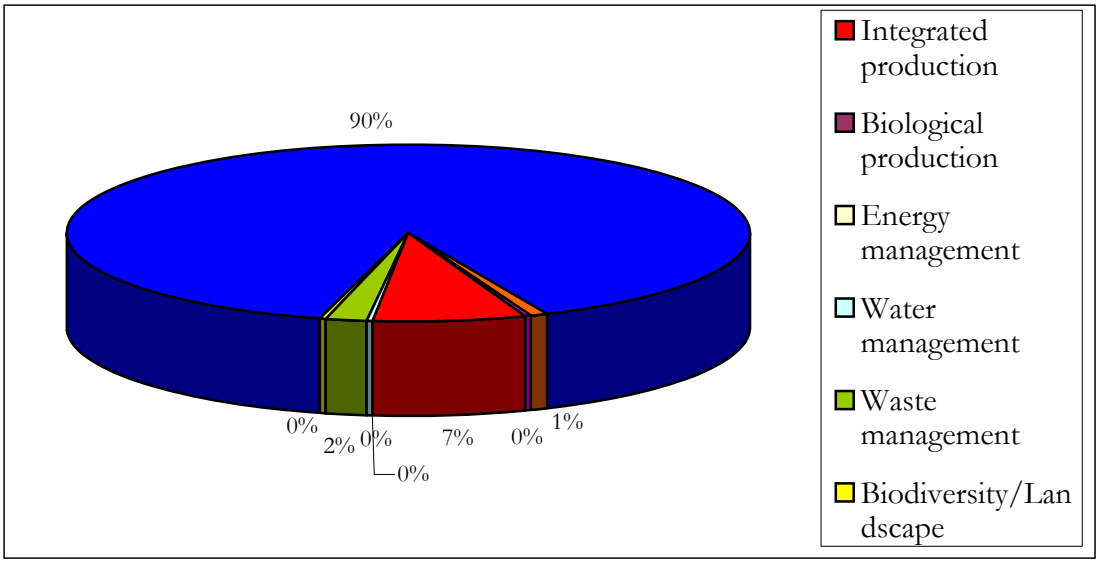
Source: MAPA

Table 39: Distribution of OF environmental measures (euros)

Year	Special environmental measures						Other environmental measures				Total
	Integrated production	Biological production	Energy management	Water management	Waste management	Biodiversity/ Landscape	General environmental measures	Pesticides	Fertilizers	Others	
2000	1,678,323	628,938	3,278,688	2,090,186	3,639,702	0	23,526,598	887,521	0	67,901	35,797,857
2001	2,342,662	2,825,966	5,143	148,630	4,288,547	0	30,260,819	497,697	0	142,295	40,511,760
2002	5,588,598	1,453,533	0	11,406	4,932,184	0	47,776,354	606,832	0	0	60,368,907
2003	4,859,718	81,436	0	94,268	1,354,442	203,069	60,341,703	605,894	0	227,223	67,767,753

Source: MAPA

Chart 72: Distribution of OF environmental measures (euros), in 2003



Source: MAPA

Effects on the environment

The aim of this question is to determine if environmental measures of Operational Programs have had a positive effect on integrated production, biological production, plant production, fertilisers, energy management, water management, soil management, biodiversity/landscape and environmental management.

Analysis

According to the levels of expenditure shown, general environmental management measures seems to be the most implemented ones, followed by integrated production and waste management. Biological production, water management and biodiversity/landscape measures have less level of implementation and energy management and fertilizer measures are not implemented.

But regarding to the environmental effect of these measures, a detailed analysis can be done:

- Integrated production: according to national and regional authorities, this measure has an important positive effect on environment, especially due to its implementation in citrus fruit crops. Some technical publications confirm this fact: Coscollá, R.; Malagón, J. and Fabado, F. (2000) assert that *this kind of production involves more environmental respect, higher quality crops, and better adaptation to consumer requirements*. 46.7% of producers polled state that integrated production measure is important concerning its positive environmental effect.

- Biological production: concerning this measure, opinions are divided. Some experts agree that its implementation is important. Some scientific publications conclude that biological production has more environmental benefits than conventional agriculture, without significant levels of crop reduction (Roccuzzo, G.; Pomares, F. et al., 1998). However other experts, especially regional authorities, state biological production development through Operational Funds is scarce and its environmental consequences are not relevant (biological production receives more funds through agri-environmental measures). In addition, almost half of the polled farmers declare that this measure has no positive environmental effect.

- Fertilizers: farmers as well as national authorities consider that fertiliser measure has a medium positive effect on environment, but regional experts met declare it is important.

Some experts consider fertilizers consumption is being reduced, due to fertirrigation for instance (Ginés, I., 2004).

- Energy management: although it is not implemented at present, this measure is well considered among people interviewee. For instance, some energetic audits are taking place. According to surveys, 64.3% of farmers polled state that this measure does not have importance or have very little importance in terms of environmental effects.

- Water management: this measure is important from the point of view of environment because of the reduction of water consumption which may cause. Farm irrigation structure could be funded through Operational Funds, but investments to take water to orchards must be done by other channels. Only 31.2% of the producers met consider this measure to be environmentally important, but national and regional experts state that it is really important.

- Soil management: most of the people met state that this measure is not outstanding from an environmental point of view, which is confirmed by farmers. 78.6% of those polled consider that it has scarce importance or that it is not important.

- Biodiversity/landscape: both national and regional experts declare that no very significant positive effect is related to biodiversity or landscape measure. According to farmers surveys, this conclusion is confirmed. 63.6% of farmers polled consider this measure as non significant or little significant from an environmental point of view.

- Environmental management: farmers surveys as well as national and regional experts declare that environmental management measures are important or very important concerning their positive environmental effects. These measures have funded technical and human resources to promote environment friendly practices among producers and to implement quality and traceability systems, for instance.

Conclusions

- **Integrated production and environmental management** measures of OF are considered the **most important** ones from an environmental point of view.
- **Fertilisers and water management** measures are considered of **medium environmental importance**.
- Concerning **biological production and energy management** measures, some people met consider them important and others declare they are not environmentally significant.
- **Biodiversity/landscape and soil management** measures of OF are considered the **least important** ones from an environmental point of view.

3.1.3 Fruits - Theme 3: structural measures

Question 1 (F3): What is the environmental impact of structural measures e.g. support for investment in irrigation?

Measure description

The aim of this question is to evaluate the environmental impact of structural measures, especially those concerning fruit crops. Aids can be regulated by:

- Operational Funds.

- Some measures of Reg (EC) No 1257/99 on support for rural development, through support for investment in agricultural holdings (Chapter I, Article 4) and measures of promoting the adaptation and development of rural areas (Chapter IX).

These measures can include aids to agricultural water resources management, and to investments in farm irrigation structures. Thus, analysis is focused on CMO and Reg (EC) No 1257/99.

Level of implementation

Investments in farm irrigation structures of Reg (EC) No 1257/99 are included in the National Irrigation Plan (NIP). The expenditure and area concerned by NIP are shown in Table Q1F3-1. Public investment will reach 50% of this budget.

Farm irrigation structure could be funded through Operational Funds, but investments to take water to orchards must be done by other channels.

Table 40: Area (ha) and budget (000€) of National Irrigation Plan

Region	Area (ha)	Budget (000€)
Andalucía	288,733	504,273
Aragón	142,332	333,538
Asturias	207	697
Baleares	4,531	23,415
Canarias	11,273	43,609
Cantabria	1,276	841
Castilla-La Mancha	91,925	196,459
Castilla y León	192,502	658,102
Cataluña	77,880	251,824
Extremadura	63,925	128,617
Galicia	6,455	16,780
Madrid	13,550	22,358
Murcia	69,872	263,820
Navarra	32,504	119,529
País Vasco	4,370	16,816
La Rioja	18,037	108,230
C. Valenciana	115,519	367,771
Total	**1,134,891**	**3,056,679**

Source: MAPA

Effects on the environment

As explained in Question 1 (F1), in terms of dry and irrigated surfaces, it must be pointed out that citrus fruit crops are essentially grown in irrigated lands in Spain (MAPA, 2004a), so analysis of irrigated orchards surface evolution must be related to non citrus fruits.

A slight decrease of the percentage of dry land can be observed in pears and peaches, but not in apple crops (Charts Q1F1-11, Q1F1-12 and Q1F1-13). The reduction of dry land surfaces is especially noticeable in peaches. This crop has lost 6,8 thousand hectares of dry land from 1989 to 2003, and irrigated land represented 96% of the crop area in 2003. This situation is less obvious in pear crop, but its percentage of irrigated land area has also increased, in spite of the reduction in absolute values.

Thus, this increase of irrigated orchards surface causes an increase in the use of efficient irrigation methods, with its consequent reduction in the waste of water, according to most of the experts met, but official data are not available. Authorities assert that investments in irrigation systems are

mainly aimed at introducing drip irrigation systems or the improvement of the existing ones. It is confirmed by Caballero et al., 1992: reduction in water consumption due to drip irrigation method reaches 1600 m^3/ha (from 8000 m^3/ha to 6400 m^3/ha), compared to surface irrigation. 100% of farmers polled agree with these statements.

In addition, 87.5% of producers declare that cultural practices have change after the installation of irrigation in terms of fertirrigation, reduction in water consumption and reduction in the use of crop protection products, improving environmental effects of farming practices. These statements are confirmed by some scientific publications. Ginés, I. (2004) describes the advantages of fertirrigation concerning environmental effects and shows the increase of these kinds of agricultural practice in new irrigated surfaces.

However, some authorities state that structural measures have helped to the installation of more efficient irrigation systems, but they have not been essential. According to these experts, this process began twenty years ago, when structural measures were not implemented.

Concerning to comparison between structural measures and CMO measures, experts declare that there are not differences among them, especially in environmental terms, except for the level of expenditure. If the investment is less than aproximately 200,000 € (this value depends on the CCAA criterium), it is financed through OF, but if the level of expenditure is more than 200,000 €, it is financed through structural measures. This value is also used to avoid double financiation.

On the contrary, 80% of the farmers' surveys assert that OF measures are more specific and more environmentally demanding. Moreover, they state that OF measures have to be observed by all PO members while structural measures concern a few number of farmers.

Finally, national authorities point out some other structural measures which could cause positive environmental effects and which are implemented in Spain:

- Cogenerating systems from pruning or crop waste which mean a energetic reduction.
- Investments in containers of plant protection products.
- Investments in system of greenhouses plastic recycling.

Conclusions

- While **citrus fruit crops** are essentially grown in **irrigated lands**, non citrus crops are experiencing an increase in terms of irrigation: a **slight decrease of the percentage of dry land** can be observed in **pears and peaches**, but not in apple crops. The reduction of dry land surfaces is especially noticeable in peaches.
- Producers declare that **cultural practices have change after the installation of irrigation** in terms of fertirrigation, reduction in water consumption and reduction in the use of crop protection products, **improving environmental effects** of farming practices.
- **Structural measures have helped** to the installation of more efficient irrigation systems, but they have **not** been **essential**.
- There are **not environmental differences between structural measures and CMO measures**, except for the level of expenditure, according to authorities. On the contrary, farmers assert that **OF measures are more specific and more environmentally demanding**.

Question 2 (F3): What are the environmental impacts, in particular in terms of soil, water and biodiversity of the grubbing-up grants for apple, pears, peach and nectarine trees?

Measure description

In the same way as in Question 1 (F3), the purpose is to determine the environmental impacts of structural measures, especially those referred to grubbing-up. Aids can be regulated by:

- Operational Funds.
- Some measures of Reg (EC) No 1257/99 on support for rural development, through support for investment in agricultural holdings (Chapter I, Article 4) and measures of promoting the adaptation and development of rural areas (Chapter IX).

These measures can include aids to grubbing-up and replanting. Thus, analysis is focused on CMO and Reg (EC) No 1257/99.

Level of implementation

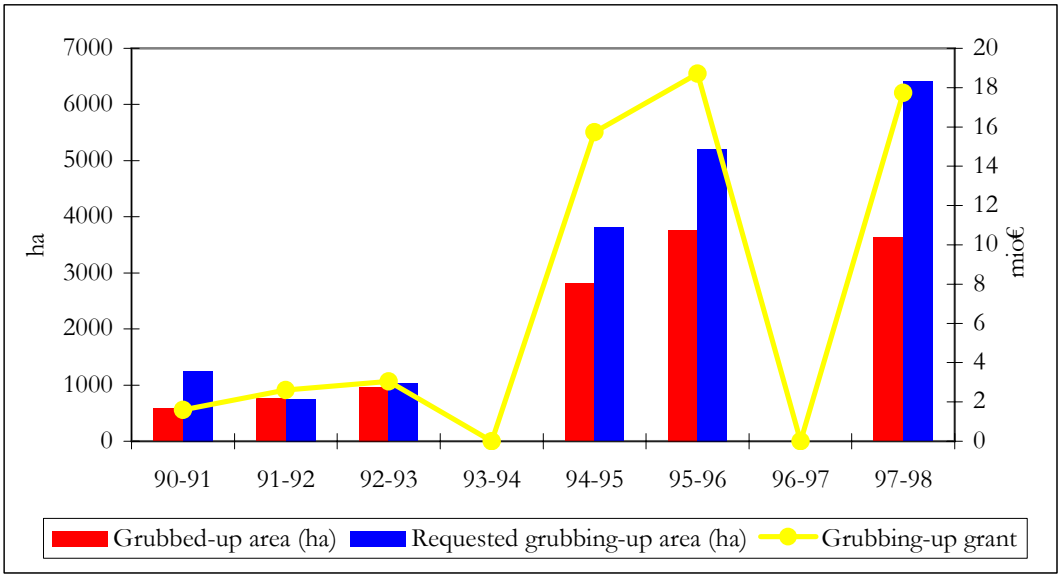
The evolution of the grubbing-up area (ha) and the grubbing-up grants (mio€) can be observed in Table Q2F3-1 and Chart Q2F3-1. No data of the share of the grants that come from the OF are available. They show an increase in the area and in the aids to grub-up between 1990 and 1998. From 1990 to 1995, apple tree is the most grubbed-up crop but from then on grubbing-up concentrates in peaches and nectarines.

Table 41: Evolution of the grubbing-up area (ha) and grants (mill €) from 1990 to 2003

	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98
Grubbing-up grant (Mill €)	1.60	2.60	3.05	0	15.73	18.71	0	17.74
Grubbed-up area (ha)	585.5	762.5	961	0	2817	3769.06	0	3631.4
Requested grubbing-up area (ha)	1247.1	749.7	1028	0	3808	5210.26	0	6406.3

Source: FEGA, 1990-2003

Chart 73: Evolution of the grubbing-up area (ha) and grants (mill €) from 1990 to 2003



Source: FEGA, 1990-2003

Effects on the environment

As can be observed, grubbing-up area has very little importance, in spite of its increase, compared to national fruit crop area. Thus, it can be said that there has not been a significant level of grubbing-up and its environmental effect is not relevant. Therefore, cultural practices evolution after grubbing-up does not represent important effects on environment.

These statements are confirmed by national and regional authorities met and by polled farmers. None of them assert that grubbing-up has had any important environmental negative effect. Moreover, they consider that the importance of grubbing-up area is not significant.

Conclusions

- There has **not** been a **significant level of grubbing-up** and its **environmental effect is not relevant**. National and regional authorities met and polled farmers confirm these statements.

3.1.4 Fruits - Theme 4: nuts

Question 1 (F4): What are the environmental impacts of the income support measures to improve nut quality?

Measure description

Reg (EC) 1035/72 IIbis established specific measures in favour of nuts and carobs for 10 years. In 1989, Reg (EC) 798/89 established new particular measures to improve quality, production and marketing of nuts. These improvement plans were extended two more years through Reg (EC) 558/2001 and Reg (EC) 545/2002.

While the permanent European aids were established, Spanish Government implemented Orden 3184/2003 establishing transitory national aids for 2003. These aids could reach improvement plans, if the regional Government co-funded an equal amount to the one of the national aid. Finally, Reg(EC) No 1782/03 established common regulations for direct payments of the CAP aids, and Reg(EC) No 2337/03 established permanent aids to nuts and carob producers: 120.75 €/ha with a National Guaranteed Surface (NGS) of 568,200 ha. This aid could be complemented by each Member State with 120.75 €/ha.

Apart from these regulations, CMO is also implemented for nuts and carob crops, through Operational Programs of Producers Organizations.

From the point of view of the environmental effects, nuts present positive elements to avoid the impairment of the environment. Nevertheless, it is necessary to point out the possible existence of other methods which could be better in terms of specific environmental purposes.

Level of implementation

Improvement plans have had an excellent implementation in Spain and have played an essential role in structuring nuts sector. They have improved organization through the increase of the number of Producers Organizations. In 1999 more than 84 % of the productive nuts and carobs surface had an improvement plan (V.V.A.A., 1999).

Improvement plans could include several measures:

- Grubbing-up and new plantation
- Changes to other varieties
- Cultural practices and farm management improvement
- Genetic breeding
- Pesticide practices
- Technical assistance
- Marketing assistance
- Acquisition of marketing and processing equipment

The high level of implementation of these measures (Spanish nuts sector has been the most supported one in the UE) have caused several positive efects (V.V.A.A., 1999):

- Grouping of supply: from 23 PO in 1990 (62,569 members), according to MAPA data, to 71 PO in 1997 (121,408 members and 566,352 ha).
- Avoiding abandonment and to maintain production of nuts orchards.

- Production structure improvement: a surface of 22,115 ha until 1997 was grubbed-up and replanted and 36,548 ha were changed to other varieties, which were more suitable to weather conditions.

Concerning CMO implementation Producers Organizations producing nuts were 7.6% of total PO in 2001, according to MAPA data. As shown in Chart 23 of national context, the number of PO producing nuts has remained steady from 1999 to 2001, around 45 PO (in 2001 there were 46 PO).

Effects on the agricultural practices

The aim of this question is to determine nuts surfaces evolution and the implications of the decennial plans and CMO in these possible changes.

Effects on the environment

It is necessary to analyse the potential effects on environment of both decennial plans and their measures to improve quality, production and marketing of nuts; and CMO measures. Effects could be related to production (water pollution, erosion, water overexploitation) and to abandonment (erosion, lose of the productivity, landscape).

Analysis

Effects on the agricultural practices

Nuts production is not very relevant in Spain. In 2001, according to INE data, it represented around 2% of the production of fruit, including fresh fruit and nuts. However, almonds crop is the most important among nuts. It represented in 2001, around 87% of the nuts production. Hazelnuts crop represented less than 10% of nuts production at a national level, but just 0.2% of the fruits concerned in this study (INE data). Walnuts represented in 2001 around 3% of the Spanish nuts production, but only 0.1% of the production of concerned fruits.

As shown in national context, the evolution of the almond crop area has followed in the concerned period a positive trend without substantial differences between total area and production area. Almond yield concentrates in C. Valenciana, with 34% of the production in 2001 and Andalucía (27%).

The evolution of hazelnuts area is quite linear. It shows a gradual decrease during the concerned period, losing more than 10 thousands hectares between 1990 and 2002. In regional terms, hazelnut production is mainly located in Cataluña, with 95% of national production in 2001, according to INE data.

The evolution of the walnuts area shows the same tendency that production, increasing 2.5 thousand hectares of total area and 2.2 thousand hectares from 1990 to 2001.

In regional terms, nuts production and nuts area in Comunidad Valenciana is mainly concentrated in almond crop, as shown in regional context. It represents 98.3% of the area and 98.4% of the production, while both yield and area of walnuts and hazelnuts are not significant.

Almond crop surface remains quite steady with a slight negative trend, according to Generalitat Valenciana data. The evolution of almond crop area has varied around 120 thousand hectares, decreasing from 1997 to 2003 in almost 20 thousand hectares.

Therefore, nuts area is important in terms of absolute values and its variation is positive from a national point of view, but it has decreased 3.5% in C. Valenciana. According to most of the authorities met decennial plans and CMO measures have contributed to avoid abandonment and to maintain production of nuts orchards.

Effects on the environment

Concerning to nuts production, experts at national and regional level state that CMO measures and improvement quality, production and marketing plans have contribute to avoid negative environmental negative effects, but they do not establish differences between the implications of both types of measures.

- Water pollution: nuts crop are not highly intensificated in Spain. In spite of this, in those cases in which water pollution problems could appear due to the use of herbicides or crop protection products, concerned measures have promoted environmentally good farming practices and water treatment systems in some cases.

- Erosion: concerning to erosion, there is an important effect of concerned measures according to experts met. Although nuts crop are not generally located in areas of high risk of erosion, nuts production has not had negative effects on environment in terms of erosion thanks to CMO and decennial plans measures in a significant level.

- Risk of water overexploitation by irrigation: nuts crops are non irrigated lands in Spain. In those areas where intensification could be implemented, introducing irrigation, peach crop is generally more profitable. Thus, no problems of overexploitation by irrigation can be related to these crops.

According to authorities met and considering data shown, there has not been significant abandonment of nuts orchards. Therefore, CMO and decennial plans measures have avoided negative effects on environment involved by abandonment. According to some technical publications (V.V.A.A., 1999, for instance) *socioeconomic and ecologial consequences of abandonment were extremely serious*.

No risks of erosion lose of the productivity and landscape degradation have appeared. Moreover, aids to nuts crops have social implications. They help to guarantee farmers incomes and to avoid depopulation of certain areas.

Conclusions

- **Nuts area is important** in terms of absolute values and its **variation is positive** from a national point of view, but it has **decreased 3.5% in C. Valenciana**. According to most of the authorities met **decennial plans and CMO measures** have contributed to **avoid abandonment** and to maintain production of nuts orchards
- CMO and decennial plans measures have contribute to **avoid negative environmental negative effects**, but authorities met cannot **establish differences** between the implications of both types of measures
- Concerning to **nuts production**, it has **not caused environmental negative effects**: water pollution, erosion and risk of water overexploitation by irrigation have been reduced by measures concerned.
- T here has **not been significant abandonment of nuts orchards**. Therefore, CMO and decennial plans measures have avoided negative effects on environment involved by abandonment. No risks of erosion lose of the productivity and landscape degradation have appeared.
- **Aids to nuts crops have social implications**. They help to **guarantee farmers incomes** and to **avoid depopulation** of certain areas.

3.1.5 Fruits - Theme 5: co-ordination with agri-environmental measures

Question 1 (F5): As the co-ordination between environmental measures in the CMO and the agri-environmental measures been adequate to produce optimal environmental impacts?

Measure description

Regulation (EC) No 1257/1999 on support for rural development establishes agri-environmental measures which may be overlapped by environmental measures allowed to form part of an operational programme. The aim of this question is to determine the consistency between the various measures and the minimum level required in operational programmes. Member States should make sure that any contradiction is avoided between operational programmes and measures carried out under agri-environmental policies. According to this, it is necessary to determine if steps have been taken to avoid funding the same measures twice.

Level of implementation

The application of REG (EC) No 1257/1999 has two measures which are not specific for fruit production but affect these crops:

- Measure 3: Environmental techniques or rationalizing chemical products use
  - Measure 3.2 Integrated Control
  - Measure 3.3 Integrated Production
  - Measure 3.4 Organic farming

- Measure 4: Fight against erosion at fragile environments
  - Measure 4.1 Woody crops at slopes or terrace

The implementation of these two measures is shown in Tables Q1F5 2-5 and their evolution can be observed in Charts Q1F5 1-2. According to these data, all measures concerned are implemented at national level. Integrated control (3.2) and woody crops at slopes or terrace (4.1) measures were not implemented in 2001 in C. Valenciana, but they started off in 2002. It is necessary to point out which of these measures have been implemented for fruits concerned. It can be observed in Table Q1F5-1 (in the case of measure 4.1 crops are not distinguished).

Table 42: Regional implementation of AEM for fruits concerned in 2003

		Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castilla La Mancha	Castilla y León
Integrated Control	Dry land fruits	-	-	-	10/10/2002	10/04/2003	-	-	-
	Pipe fruits	-	-	-	10/10/2002	10/04/2003	-	-	-
	Stone fruits	-	-	-	10/10/2002	10/04/2003	-	-	-
	Citrus fruits	-	-	-	10/10/2002	10/04/2003	-	-	-
Integrated Production	Dry land fruits	-	-	-	-	-	-	-	-
	Pipe fruits	-	28/01/2002	-	-	-	-	-	-
	Stone fruits	-	28/01/2002	-	-	-	-	-	-
	Citrus fruits	-	-	-	-	-	-	-	-
Organic farming	Dry land fruits	19/06/2001	-	18/05/2001	16/06/2001	12/09/2001	18/01/2001	06/05/2002	29/10/2001
	Pipe fruits	19/06/2001	17/01/2001	18/05/2001	16/06/2001	12/09/2001	18/01/2001	06/05/2002	29/10/2001
	Stone fruits	19/06/2001	17/01/2001	18/05/2001	16/06/2001	12/09/2001	18/01/2001	06/05/2002	29/10/2001
	Citrus fruits	19/06/2001	-	18/05/2001	16/06/2001	12/09/2001	-	-	-
Woody crops at slopes or terrace		19/06/2001	26/02/2001	18/05/2001	05/11/2002	10/04/2003	-	-	-

		Cataluña	Extremadura	Galicia	La Rioja	Madrid	Murcia	Navarra	País Vasco	Valencia
Integrated Control	Dry land fruits	-	-	06/09/2002	16/02/2002	-	03/05/2001	-	-	27/12/2002
	Pipe fruits	-	-	06/09/2002	16/02/2002	-	03/05/2001	-	-	-
	Stone fruits	-	-	-	16/02/2002	-	03/05/2001	-	-	27/12/2002
	Citrus fruits	-	-	-	-	-	03/05/2001	-	-	-
Integrated Production	Dry land fruits	12/03/2001	-	06/09/2002	16/02/2002	-	03/05/2001	-	-	-
	Pipe fruits	12/03/2001	18/06/2002	06/09/2002	16/02/2002	-	03/05/2001	-	-	-
	Stone fruits	12/03/2001	06/10/2001	06/09/2002	16/02/2002	-	03/05/2001	-	-	-
	Citrus fruits	12/03/2001	-	06/09/2002	-	-	03/05/2001	-	-	13/03/2001
Organic farming	Dry land fruits	12/03/2001	-	21/09/2001	16/02/2002	-	03/05/2001	-	-	12/03/2001
	Pipe fruits	12/03/2001	-	21/09/2001	16/02/2002	-	03/05/2001	-	-	12/03/2001
	Stone fruits	12/03/2001	-	21/09/2001	16/02/2002	-	03/05/2001	-	-	12/03/2001
	Citrus fruits	12/03/2001	-	21/09/2001	-	-	03/05/2001	-	-	12/03/2001
Woody crops at slopes or terrace		12/03/2001	-	-	16/02/2002	21/12/2001	10/102001	-	-	27/12/2002

Source: MAPA, 2003

Concerning to evolution of implementation and considering the implementation framework shown, measure 3 increased from 2001 to 2002 and all actions included increased at national level too. The same evolution is observed in Valencian region in terms of area, but not related to the number of agreement holders, which has decreased. On the contrary, measure 4.1 (woody crops at slopes or terrace) declined in the same period.

In terms of relative importance respect to total AEM expenditure, measure 4.1 was the most important among measures concerned in 2001, but its significance decreased in 2002 and measure 3.3 became the most important in 2002, in terms of number of agreement holders, but relating to area organic farming is the most significant in 2002.

Table 43: Number of agreement holders of AE measures 3 and 4 in 2001

	Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castilla La Mancha	Castilla y León	Cataluña	Extremadura	Galicia	La Rioja	Madrid	Murcia	Navarra	País Vasco	Valencia	TOTAL nº agreement holders	% AEM	% of total AEM
3.1		261																261	2%	1%
3.2														1,587				1,587	14%	4%
3.3									4,468	263				142			676	5,549	49%	14%
3.4	2,702	245	6		227	1			156					397			198	3,932	35%	10%
3	2,702	506	6		227	1			4,624	263				2,126			874	11,329		28%
4.1	4,753	73	52						2,703					1,606				9,187	100%	22%
4.2																				
4.3																				
4	4,753	73	52						2,703					1,606				9,187		22%

Opened 2002
No data
AEM start off

Source: MAPA, 2003

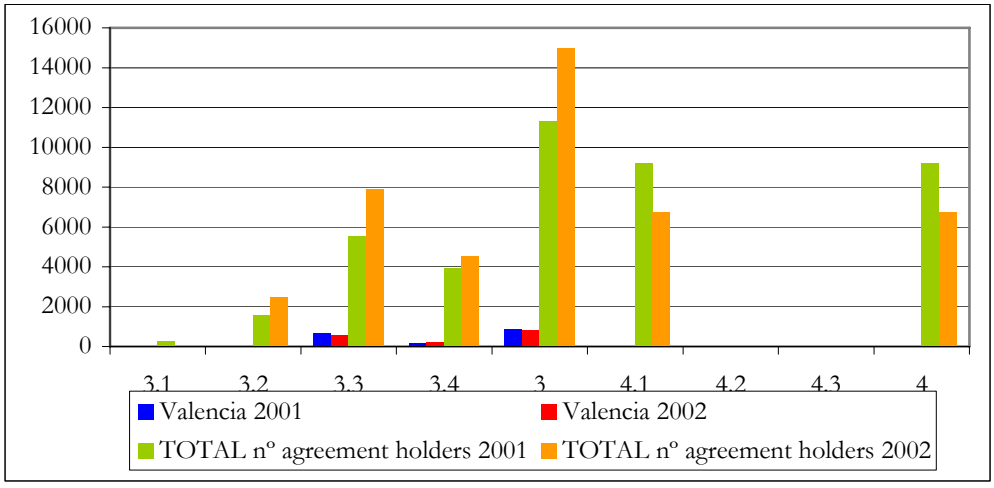
Table 44: Number of agreement holders of AE measures 3 and 4 in 2002

	Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castilla La Mancha	Castilla y León	Cataluña	Extremadura	Galicia	La Rioja	Madrid	Murcia	Navarra	País Vasco	Valencia	TOTAL nº agreement holders	% AEM	% of total AEM
3.1		30																30	0	0
3.2				20									988	1,498				2,506	17	5
3.3	586	432							4,678	1,452		59		127			569	7,903	53	16
3.4	2,137	191	5	127	228	1	883	42	214		70	131	45	258			227	4,559	30	9
3	2,723	653	5	147	228	1	883	42	4,892	1,452	70	190	1,033	1,883	0	0	796	14,998		30
4.1	3,906	62	48	15					2,223				221	259				6,734	1	13
4.2													0					0		0
4.3																		0		0
4	3,906	62	48	15	0				2,223				221	259	0	0		6,734		13

Opened 2003
No data
AEM start off

Source: MAPA, 2003

Chart 74: Evolution of the number of agreement holders of AE measures 3 and 4



Source: MAPA, 2003

Table 45: Number of hectares of AE measures 3 and 4 in 2001

	Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castilla La Mancha	Castilla y León	Cataluña	Extremadura	Galicia	La Rioja	Madrid	Murcia	Navarra	País Vasco	Valencia	TOTAL ha	% AEM	% of total AEM
3.1		5,302																5,302	4%	1%
3.2														18,101				18,101	15%	3%
3.3									32,40	2,750				2,555			5,907	43,617	36%	6%

									6										
3.4	32,020	8,450	6.4		426	3.2			2,662					7,094			1,954	52,616	44%	7%
3	32,020	13,752	6.4		426	3.2			35,068	2,750				27,749			7,861	119,635		17 %
4.1	48,091		22						8.935					11,199				68,247	100 %	9%
4.2																				0%
4.3																				0%
4	48,091	0	22						8,935					11,199				68,247		9%

Opened 2002
No data
AEM start off

Source: MAPA, 2003

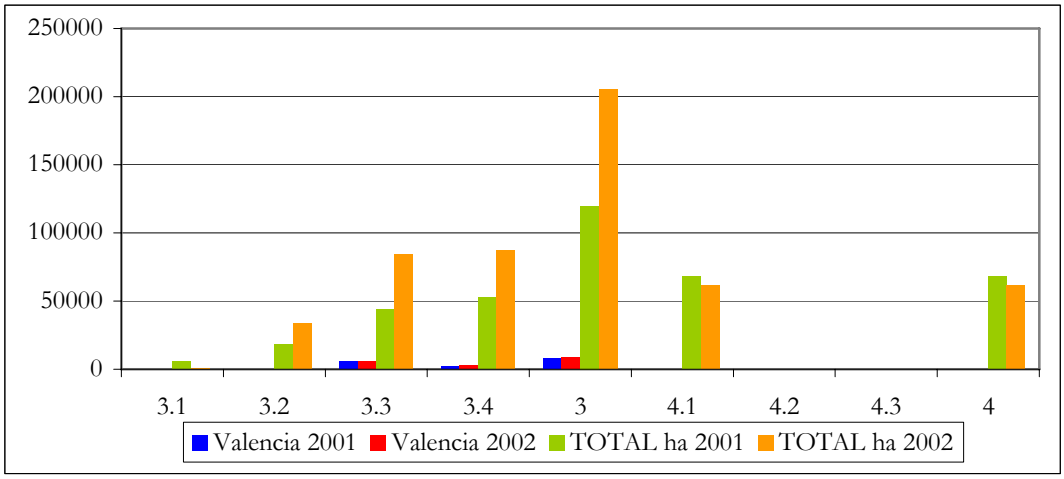
Table 46: Number of hectares of AE measures 3 and 4 in 2002

	Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castilla La Mancha	Castilla y León	Cataluña	Extremadura	Galicia	La Rioja	Madrid	Murcia	Navarra	País Vasco	Valencia	TOTAL ha	% AEM	% of total AEM
3.1		488																488	0.2	0
3.2				100									9,774	23,406				33,280	16	2.2
3.3	14,458	6,456							35,066	19,162		142		2,919			5,975	84,178	41	5.6
3.4	33,929	5,684	10	1,770	431	3	28,805	1000	3,518		287	902	1,215	7,240			2,498	87,293	43	5.8
3	48,387	12,628	10	1,870	431	3	28,805	1000	38,584	19,162	287	1,045	10,989	33,565			8,473	205,239		13.6
4.1	50,522	246	26	150		7430							617	2,361				61,352	100	4.1
4.2													0						0	0
4.3																			0	0
4	50,522	246	26	150		7430							617	2,361				61,352		4.1

Opened 2003
No data
AEM start off

Source: MAPA, 2003

Chart 75: Evolution of the number of hectares of AE measures 3 and 4



Source: MAPA, 2003

Analysis

According to almost all the authorities met, there is not overlap between environmental measures in the CMO and the agri-environmental measures or it is not significant. They explain that this situation is not possible because the same regional bureau is in charge of managing both funds and instruments to avoid this situation are highly implemented. Moreover, some experts met assert that environmental measures in the CMO and the agri-environmental measures are complementary.

In addition, another reason which confirms that overlap does not exist is the lack of knowledge among polled farmers of agri-environmental measures. Only 25% of those polled have answered the question related to this matter.

Conclusions

- **All measures concerned are implemented at national level** with substantial **differences between regions.**
- **Measure 3** and all its actions increased at national level and are **more significant than measure 4.1.**
- There is **not overlap** between environmental measures in the CMO and the agri-environmental measures or it is not significant, because the **same regional bureau** is in charge of **managing both funds** and instruments to avoid this situation are highly implemented
- Another reason which **confirms that overlap does not exist** is the **lack of knowledge among polled farmers of agri-environmental measures.**

3.2 Horizontal questions

3.2.1 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)

Measure description

CMO measures may lead to changes in land use related to abandonment, expansion and set-aside of fruit orchards. Changes in land use can have both positive and negative effects on the environment. This question tries to determine if there are any statistical data reflecting these changes in Spain and which type of cultures have substituted or have been substituted fruit orchards.

Level of implementation

As shown in both national and regional context, and summarize in Table Q1H1-1, the area of fruit crops concerned has slightly increased in a national scope, but it has decreased 0,6% in C. Valenciana from 1995 to 2001. Citrus fruit area has increased at national and regional level, balancing the loss of the crop surface of non citrus fruit. Nuts area is important in terms of absolute values and its variation is positive from a national point of view, but it has decreased 3.5% in C. Valenciana.

Effects on the environment

The aim of this question is to determine if CMO measures have promoted significant changes in land use over time either abandonment or expansion. It is necessary to establish if any positive or negative environmental impacts have been involved by these possible changes. Environmental effects could be related to: landscape, forest fires, erosion, water consumption and water pollution.

Table 47: Evolution of the areas of fruit concerned (thousand hectares)

	National			Regional		
	1995	**2001**	**Variation**	**1995**	**2001**	**Variation**
Lemon	42,4	47,5	11,9%	13.8	14.3	3.6%
Orange	134.2	138.1	2.9%	87.0	79.5	-8.7%
Tangerine	92.5	114.3	23.6%	82.1	95.6	16.4%
Citrus fruit	269.1	299.9	11.4%	183.0	189.3	3.5%
Apple	51.5	45.4	-11.8%	2.4	1.6	-32.9%
Pear	39.8	38.2	-4.1%	2.3	1.6	-33.2%
Peach and nectarine	74.6	74.9	0.4%	10.6	8.3	-22.3%
Non citrus fruit	165.9	158.5	-4.5%	15.4	11.4	-25.6%
Almond	639.7	658.8	3.0%	123.5	119.3	-3.5%
Hazelnut	31	22.5	-26.3%	-	-	-
Walnut	2.9	4.3	49.2%	-	-	-
Nuts	673.2	685.6	1.9%	123.5	119.3	-3.5%
Total	**1108.2**	**1144.0**	**3.2%**	**321.9**	**320.1**	**-0.6%**

Source: INE, Boletín Estadístico and Generalitat Valenciana, 1998-2003

Table Q1-H1 shows the cultural successions of permanent crops in C. Valenciana from 1990 to 2004. No specific data of fruit crops nor national data are available, so particular conclusions of the evolution of these crops can not be extracted.

Table 48: Statistics of the cultural successions of permanent crops in C. Valenciana from 1990 to 2004

	CULTURE year+1 (%) new use																			
	Winter grains																			
Year	Wheat	Barley	Oats	Rye	Total	Corn	Other grain crops	Pulses	Tuber	Sugar beet	Sunflower	Cotton	Other industrial crops	Fodder crops	Vegetables and flowers	Total arable crops	Fallow	Permanent cultures	Other associations	Other surfaces	TOTAL
1990	No available data																				
1991																					
1992																					
1993																					
1994																					
1995																					
1996																					
1997	0.05	0.11	0.03	-	0.19	0.01	0.01	0.01	0.05	-	-	-	0.01	0.02	0.18	0.67	1.29	89.68	0.40	7.78	100
1998	0.05	0.11	0.03	-	0.19	0.01	0.01	0.01	0.05	-	-	-	0.01	0.02	0.19	0.48	1.29	90.02	0.40	7.81	100
1999	No available data																				
2000																					
2001																					
2002																					
2003																					
2004	-	0.00	0.00	-	0.00	-	-	0.00	0.00	-	0.00	-	-	0.00	0.01	0.02	0.70	96.90	0.10	2.10	100

Source: INE, Boletín Estadístico, 1998-2003

Analysis

According to national and regional authorities met, no significant abandonment has been caused by CMO measures. 58% of farmers polled confirm this statement. On the contrary, some productions have suffered an increase in terms of area, especially citrus fruits crops. New orchards have been established, replacing arable crops, tobacco or sugar beet, especially in the southern part of the country. But most of the changes occurred are related to replanting. In most cases, new and more marketable varieties have replaced other varieties of the same crop. This fact is also asserted by the surveys of the farmers.

Concerning environmental effects, in those cases that abandonment has occurred and there has not been replacing by other crops, some negative effects could arise: erosion, fires and landscape degradation, according to farmers' surveys. The loss of permanent crops is generally negative for environment.

However, farmers declare that new orchards do not have negative or positive environmental effects. Almost 100% of producers state that expansion of fruit crops has not caused any change in environment. In spite of this, national and regional experts assert that replacing arable crops causes positive effects as the reduction of water consumption.

Conclusions

- CMO measures have **not caused significant abandonment**. On the contrary, **new fruit orchards have been established**, replacing arable crops, tobacco or sugar beet, especially in the southern part of the country.
- **Replanting has been significant** especially related to **new and more marketable varieties** replacing other varieties of the same crop.
- The **loss of permanent crops** could be **negative for environment**. When abandonment occurs and there is no replanting, erosion, fires and landscape degradation could arise.
- **New orchards** do not seem to have negative or positive environmental effects, although **replacing arable crops** could cause **reduction of water consumption.**

3.2.2 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?

Measure description

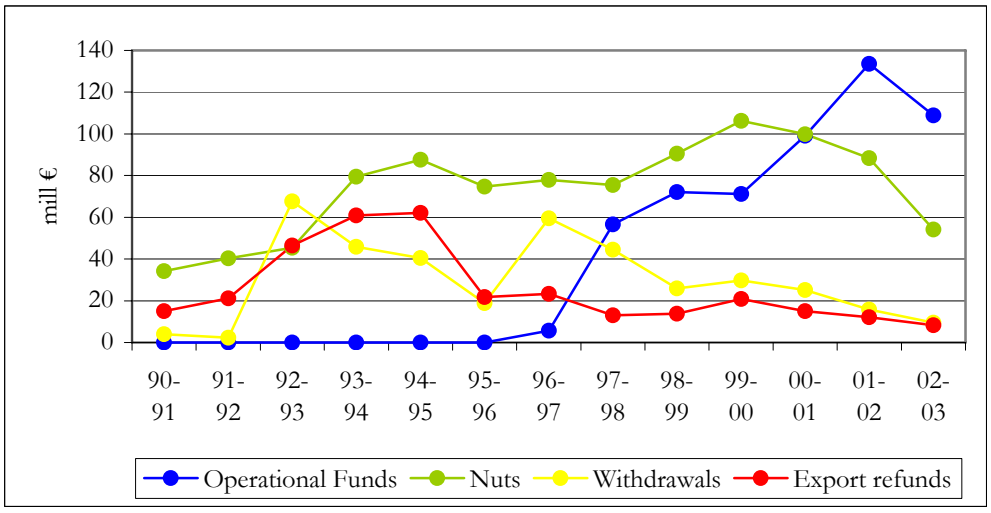
In this question, we need to find out whether some changes in the distribution of expenditures within the total budget for this CMO would help to reduce the negative environmental effects or to improve the positive ones.

Level of implementation

The main measure of CMO has been constituted by the aids to PO and their Operational Funds (OF). During the period from 1996 to 2003, the importance acquired by these OF in the budget of the OCM compared to the other types of aid of the CMO is spectacular (Chart Q1H2-1). According to FEGA data, since 1996 OF have become the most important type of CMO aid with a striking increase up to 2001-2002 campaign, when it reached its peak (133.62 million euros, 53% of these aids). On the contrary, aids to withdrawals and export refunds have suffered a sustained decrease since 1996, as expected due to the CMO purposes (in 2002-2003 each one of them do not reach 10 million euros).

The evolution of the aids to nuts has increased up to 2000-2001 campaign, but from that moment this kind of expenses declined, when the specific aids for quality and marketing improvement began to expire[2].

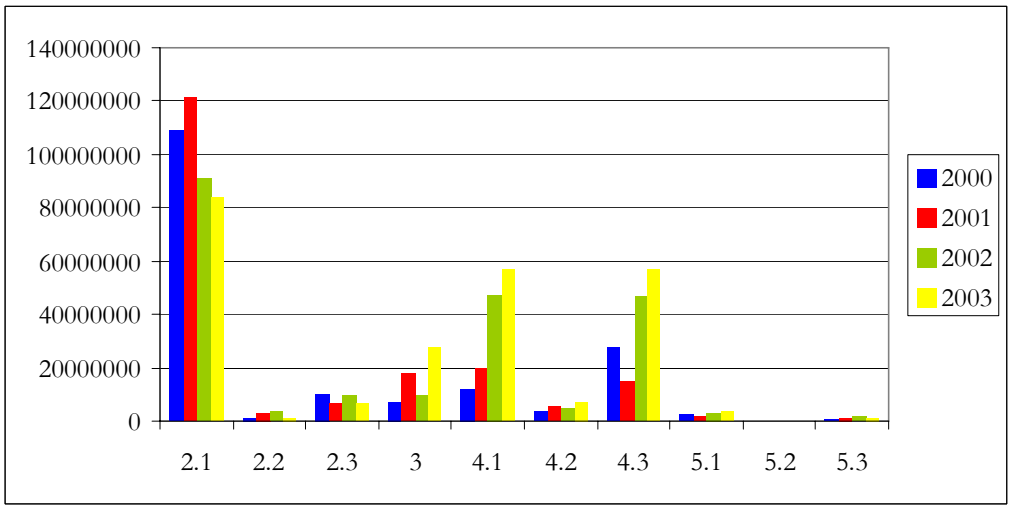
Chart 76: Evolution of the expenses (mill €): intervention measures and operational funds



Source: FEGA, 1990-2003

The evolution of the distribution of OF by measures is shown in Chart Q1H2-2 and Table Q1H2-1. According to MAPA data, production measures are the most relevant in expenditure terms, especially those referred to technical measures, which represented 33% of the expenditure in 2003 (Chart Q1H2-3). This expenditure in technical measures increased from 2000 to 2001 in more than €12 million, but it has decreased to 83,735,245 euros in 2003. On the contrary, marketing measures have increased their relative importance, especially those referred to technical measures and special environmental measures, which have increased 385% and 52% respectively, from 2000 to 2003. It is necessary to point out that no expenditure was assigned to mergers and acquisitions during the period under analysis.

Chart 77: Evolution of the distribution of OF by measures (euros)



Source: MAPA

[2] In 1999-2000 finished the specific aids for quality and marketing improvement of nuts, established in 1989 by Reg. (ECC) 790/89 with 10 years of duration and deferred two more years through Reg. (ECC) 558/01 and 545/02.

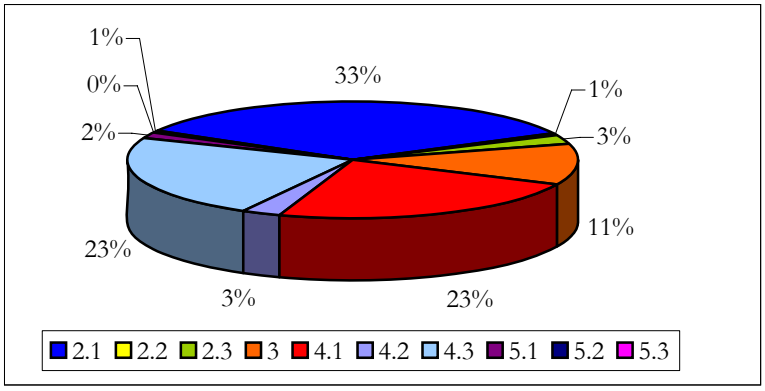
2-1: Production - Technical measures (phytossanitary measures, irrigation, machinery, greenhouses, plants, R&D)
2-2: Production - Services, training, research (advice, warning, training courses, R&D)
2-3: Production - Special environmental measures (organic / integrated production, R&D))
3: Control - Quality and phytossanitary measures (equipment, personnel costs, residue analysis, R&D)
4-1: Marketing - Technical measures (land, real estate, storage, packaging, transport, R&D)
4-2: Marketing - Sales, promotion, outlets (production planning, market research, sales offices, R&D)
4-3: Marketing - Special environmental measures (waste management, additional transport costs, research, R&D)
5-1: Other - Overheads (admin costs)
5-2: Other - Merges and acquisitions
5-3: Other - Other (ISO 9000 systems, other)

Table 49: Evolution of the distribution of OF by measures (euros)

Year	Production (euros)			Control (euros)	Marketing (euros)			Other (euros)			Total (euros)
	2-1	2-2	2-3	3	4-1	4-2	4-3	5-1	5-2	5-3	
2000	108,680,558	1,189,598	9,898,878	7,179,425	11,771,659	3,432,330	27,304,060	2,178,137	0,00	629,103	172,263,749
2001	121,462,727	2,884,214	6,386,493	17,735,039	19,983,100	5,629,346	15,228,748	2,078,187	0,00	1,241,894	192,629,747
2002	90,659,973	3,519,153	9,448,393	9,865,625	47,397,129	4,866,589	46,503,927	2,933,716	0,00	1,783,474	216,977,979
2003	83,735,245	1,281,836	6,309,983	27,354,793	57,064,125	7,147,543	56,608,952	3,755,889	0,00	1,428,870	244,687,237

Source: MAPA

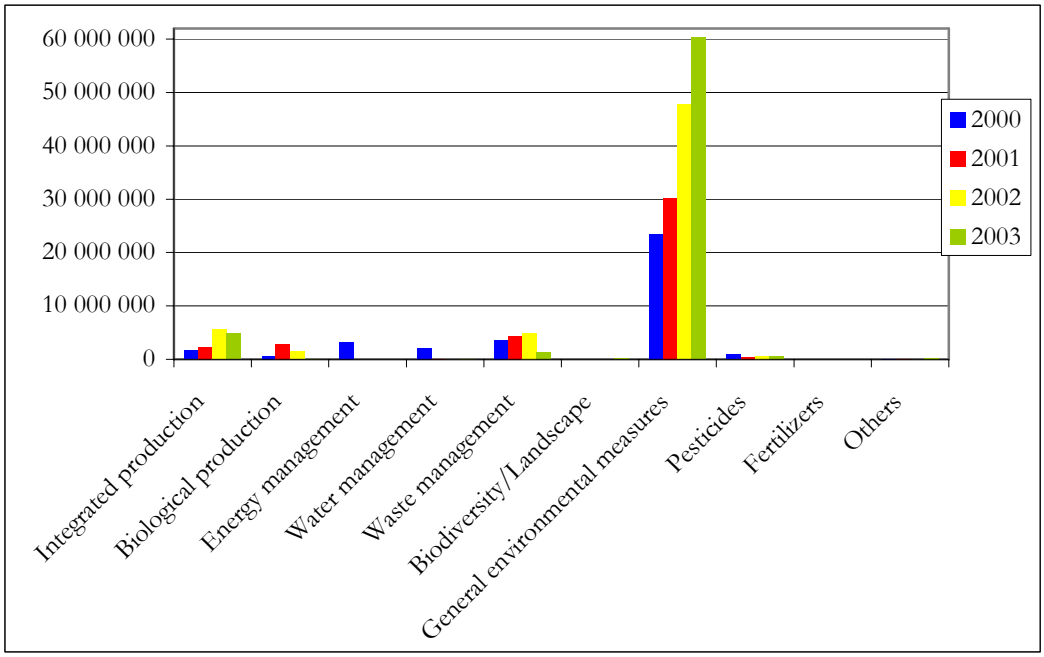
Chart 78: Distribution of OF by measures (euros), in 2003



Source: MAPA

According to MAPA data, the distribution of OF concerning to environmental measures shows that general environmental measures represent 90% of the expenditure in 2003 (Chart Q1H2-5), followed by integrated production (7%) and waste management (2%). Moreover, expenditure on general environmental measures has increased sharply from 2000 to 2003, according to the evolution of the distribution of OF (Chart Q1H2-4 and Table Q1H2-2), while other measures have stayed steady.

Chart 79: Distribution of OF environmental measures (euros)



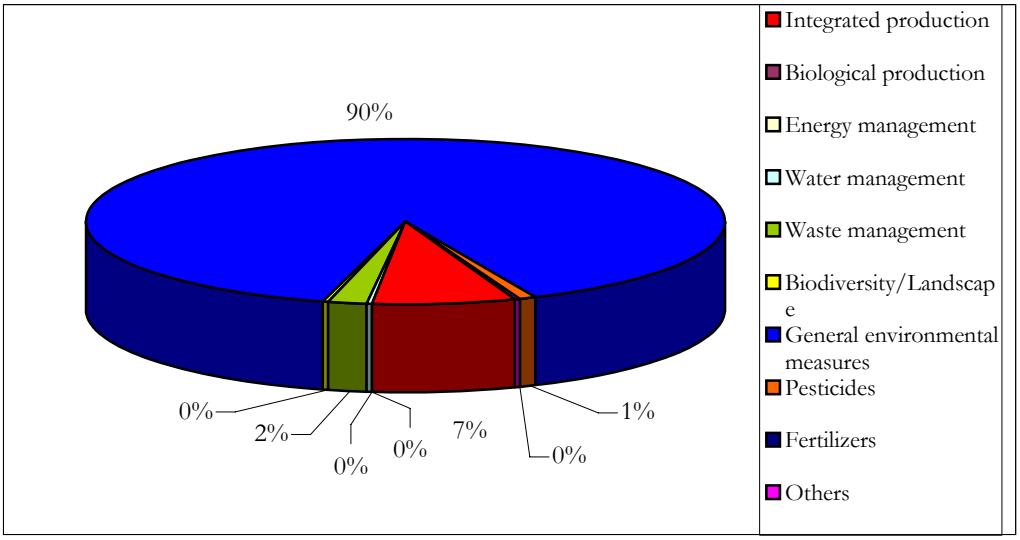
Source: MAPA

Table 50: Distribution of OF environmental measures (euros)

Year	Special environmental measures						Other environmental measures				Total
	Integrated production	Organic production	Energy management	Water management	Waste management	Biodiversity / Landscape	General environmental measures	Pesticides	Fertilizers	Others	
2000	1,678,323	628,938	3,278,688	2,090,186	3,639,702	0	23,526,598	887,521	0	67,901	35,797,857
2001	2,342,662	2,825,966	5,143	148,630	4,288,547	0	30,260,819	497,697	0	142,295	40,511,760
2002	5,588,598	1,453,533	0	11,406	4,932,184	0	47,776,354	606,832	0	0	60,368,907
2003	4,859,718	81,436	0	94,268	1,354,442	203,069	60,341,703	605,894	0	227,223	67,767,753

Source: MAPA

Chart 80: Distribution of OF environmental measures (euros), in 2003



Source: MAPA

Analysis

Special environmental measures related to marketing (measure 4.3) and control measures of quality and phytosanitary (3) have increased from 2000 to 2003. But those linked to production, both special environmental measures (2.3) and technical measures (2.1) have decreased in the same period. In this expenditure framework, environmental measures of OF are mainly located in general environmental measures, while any other measure loses its little importance.

Some authorities met consider there is no need to modify or eliminate any CMO measure in order to enhance environmental protection. In their opinion, there is a suitable balance between the several measures of OF. On the contrary, most of experts met at national and regional level assert that it is necessary to increase environmental expenditure level. Moreover, reductions in the budget of Operational Funds could cause subsequent decreases in the PO efforts of environmental protection.

These statements are clearly confirmed by farmers surveys. 80% of producers polled declare that a reduction in total spending on the CMO would have a substantial negative environmental effect. Thus, farmers consider CMO expenditure essential to protection of the environment.

As shown, general, integrated production and waste management measures are the most important, according to MAPA data. Tables Q1H2-3 and 4 describe the positive or negative environmental effects of measures these measures, except for general environmental measures, because this measure includes different and indefinite actions depending on PO, and it is imposible to summarize in a table their effects.

Table 51: Significant environmental impacts of CMO integrated production measures

Evaluation Parameters	Notation Type
Impact nature	Inputs Reduction
Target	Water and soil
Spatial range	National
Level	Primary
Duration	Long term
Intensity	High
Reversibility	Reversible
Sensibility	High
Width and gravity of the impact with all factors combined	Negative

Source: Own work

Table 52: Significant environmental impacts of CMO waste management measures

Evaluation Parameters	Notation Type		
Impact nature	Water pollution	Soil pollution	Landscape degradation
Target	Water	Soil	Landscape
Spatial range	National	National	National
Level	Primary	Primary	Terciary
Duration	Long term	Long term	Short term
Intensity	High	High	Medium
Reversibility	Irreversible	Irreversible	Reversible
Sensibility	High	High	Medium
Width and gravity of the impact with all factors combined	Very negative	Very negative	Negative

Source: Own work

Conclusions

- **25.3%** of the budget of OP was dedicated to **environmental actions** in 2001 and it is mainly located in **general environmental measures**, while **any other measure loses its little importance**.
- Most of authorities met assert that it is necessary to **increase environmental expenditure level**. Producers consider **CMO expenditure essential to protection of the environment.**

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?

Measure description

The CMO of fruit and vegetables establishes aids to PO according to a percentage (4.1%) of the marketed production value, so they are linked to production. The aim of this question is to determine which other means could be possible to pay the aid to fruit and vegetable PO which could be their environmental effects.

Discussion

Some possibilities to decoupling of spending are established by people met:

- Aid per hectare of each producer: this method could bring an increase of abandonment of the orchards, owing to fixed incomes of farmers. This reason could cause an increase of the prices paid by processing industry. Farmers would have guaranteed their incomes and could increase prices on offer to processing fruit companies. It could also cause environmental negative effects, related to waste management. Increasing of the prices could lead to a substantial reduction in the environmental budget of processing industries and waste management could be affected. In order to maintain competitive prices, processing industries should reduce costs, and environmental budget could be one of the most affected.

According to some people met, requirements to develop this system are: aid per hectare should be invariable, that is, these aids should be fixed to a certain surface and should not change. Moreover, aids should be suitable for farmers incomes.

- Aid per hectare of PO: present aid system brings a difficult situation. If one year PO's production decreases, aid decreases too, because actual system is based on a percentage of the marketed production value. Thus, some authorities met, especially regional ones, state that aid per hectare of PO could be a good method of paying the aid to fruit and vegetable PO.

- Aid to quality: this method of decoupling is difficult to evaluate and would need many controls.

- Aid linked to agricultural insurances: apart from decoupling, some experts have assert a first step to separate aids from production is to increase aids to agricultural insurances, in order to reach the maintenance of farmers income in case of crop damages.

Concerning to environmental effect of decoupling, people met at national level assert that the effects on environment would be negative. CMO measures guarantee some protection of the environment and without these measures protection could disappear. However, 87.5% of farmers polled declare that decoupling of spending would not bring environmental effects, because present agricultural practices would not change.

Conclusions

- People met establish the following **possibilities to decoupling of spending**: aid per hectare of each producer, aid per hectare of PO, aid to quality, aid linked to agricultural insurances.
- **Aid per hectare of each producer** could bring **several problems**, for instance, abandonment of the orchards or the increase of the prices paid by processing industry.
- **Aid per hectare of PO** could **solve present problem** of reducing of aids to PO due to a decreasing of their production.
- **Aid to quality** is **difficult to evaluate**.
- **Aid linked to agricultural insurances** could be a **first step to separate aids from production** maintaining farmers' income in case of crop damages.
- **Environmental effect of decoupling** would be **negative** according to some people met. But most of the farmers polled declare that decoupling of spending would **not bring environmental effects**.

3.2.3 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?

Measure description

Regulation (EC) No 1259/1999 establishing common rules for direct support schemes under the Common Agricultural Policy, says in Article 3 that "Member States shall take the environmental measures they consider to be appropriate in view of the situation of the agricultural land used or the production concerned and which reflect the potential environmental effects" and that "Member States shall decide on the penalties that are appropriate and proportionate to the seriousness of the ecological consequences of not observing the environmental requirements referred to".

In Spain, Real Decreto 172-2004 specifies the application of REG (EC) No 1257/1999. Measures 3 and 4 of this regulation are not specific for fruit production but affect these crops:

- Measure 3: Environmental techniques or rationalizing chemical products use
  - Measure 3.2 Integrated Control
  - Measure 3.3 Integrated Production
  - Measure 3.4 Organic farming

- Measure 4: Fight against erosion at fragile environments
  - Measure 4.1 Woody crops at slopes or terrace

Concerning Organic farming, although CCAA stipulate their specific rules, Spanish framework is composed by the following regulations:

- Real Decreto 1852/1993, about Organic farming and its certification requirements (BOE nº 283)
- Orden de 6 de diciembre de 1993, including regulations of Real Decreto 1852/93.
- Orden de 28 de diciembre de 1993, including regulations of Real Decreto 1852/93.
- Orden de 14 de marzo de 1995, including regulations of Real Decreto 1852/93 and establishing *Comisión Reguladora de la Agricultura Ecológica* composition and functions.

Spanish regulations in Integrated Production are included in Real Decreto 1201/2002, which contains basic and general requirements about Integrated Production. Specific regulations are

implemented by CCAA. Cataluña, Andalucía, Murcia, Extremadura y Navarra stand out because of the high number of regulations implemented for different products.

Level of implementation

Integrated production importance in Spain is increasing. Concerning to fruit crops, there were certified 37,015 hectares of non citrus fruit in 2003 (Fernández-Zamudio, MªA.; Pavia, I. and Caballero, P., 2004). Integrated production of citrus fruit crop represented 18,227 hectares in 2003. As shown in Table Q1H3-1, citrus fruit certified area has increased in 10,551 hectares from 2000 to 2003.

Table 53: Integrated Citrus fruit area (ha) and production (tonnes) in 1999/2000

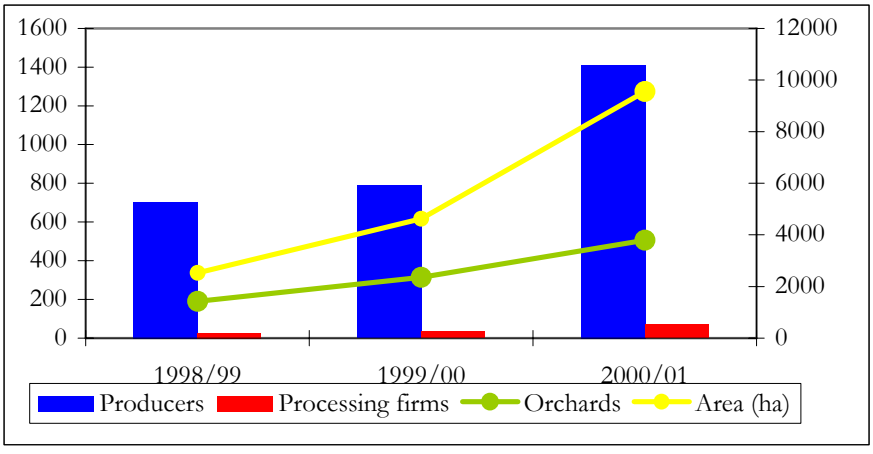
	Certified Area (ha)	Certified Production (ton)
C. Valenciana	4,623	131,831
Andalucía	2,093	52,325
Murcia	616	14,735
Cataluña	344	4,488
Spain	**7,676**	**203,379**

Source: Coscollá, R.; Malagón, J. and Fabado, F., 2000

In 1999/2000 campaign, citrus fruit certified production was 4% of total national production and a similar rate to citrus fruit certified production in C. Valenciana. In this region, importance of integrated production has increased and 7,496 hectares were certified in 2003 (Fernández-Zamudio, MªA.; Pavia, I. and Caballero, P., 2004). But apart from official certification, there are other possibilities used by producers to satisfy quality demands. Among them, Naturane (ANECOOP Integrated Production), EUREPGAP and AENOR Integrated Production systems have been highly implemented. Especially Naturane system in which more than 150 cooperatives are integrated, most of them located in C. Valenciana.

Organic farming implementation in Spain has increase. In 1991 there were just 4,235 ha and 396 organic farms but in 2003 they increased to 725,254 ha and 17,028 organic farms (MAPA, 2004b). In terms of organic farming area of fruit crops, in 2003 there were 1,409 hectares of citrus fruit and 3,438 hectares of non citrus fruit. In regional terms, Andalucía concentrates most of the organic citrus fruit area with more than 70% of total area, followed by C. Valenciana (16,4%) and Murcia (6.2%). According to non citrus fruit area, Extremadura has 35.3% of the total area, followed by Andalucía (12.7%) and C. Valenciana (12%).

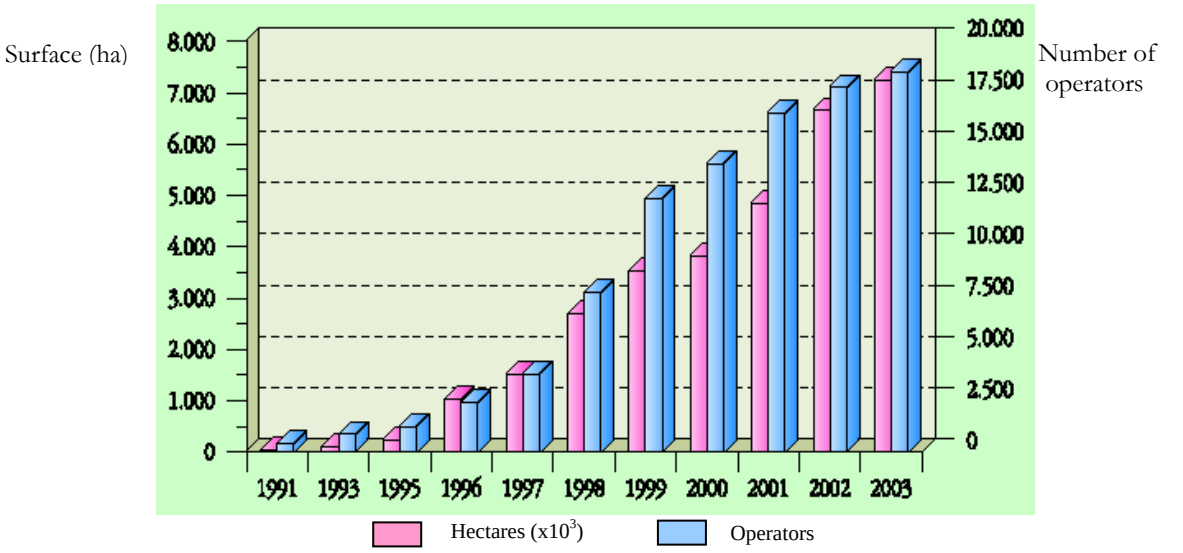
Chart 81: Evolution of integrated production in C. Valenciana



Source: Coscollá, R.; Malagón, J. and Fabado, F., 2000

In C. Valenciana, the evolution of organic area is showed in Table Q1H3-3. Organic nuts area has increased sharply, from 968.4 hectares in 1998 to 3925 hectares in 2003. On the contrary, organic surface of citrus fruit has remained steady, around 230 hectares. This number of hectares is very low according to the total area of citrus fruit crop in the region of C. Valenciana.

Chart 82: Organic farming evolution in Spain (1991-2003)



Source: MAPA, 2004b

Table 54: Organic farming area of fruit crops in 2003 (ha)

	Citrus fruit	Non citrus fruit
Andalucía	994	436
Aragón	-	179
Asturias	-	47
Baleares	63	68
Canarias	26	21
Cantabria	-	34
Castilla-La Mancha	-	143
Castilla y León	-	12
Cataluña	8	107
C. Valenciana	231	402
Extremadura	-	1,213
Galicia	-	137
Madrid	-	5
Murcia	87	383
Navarra	-	62
País Vasco	-	71
La Rioja	-	118
TOTAL	**1,409**	**3,438**

Source: MAPA, 2004b

Table 55: Organic area (ha) in C. Valenciana 1998-2003

	1998	1999	2000	2001	2002	2003
Citrus fruit	196.3	234	230.7	243	224	231
Nuts	968.4	2321	3046.1	3243	3839	3925

Source: Generalitat Valenciana, 1998-2003

Discussion

Agri-environmental schemes and environmental requirements are generally oriented to those situations of high risk of environmental degradation, according to most of the authorities met. They are directed toward the achievement of environment protection. For instance, Valencian Good Farming Practices Code (Annex 4) is mainly related to irrigation and fertilization in the case of permanent cultures. Some experts met assert that expenditure level for agri-environmental measures and other environmental requirements does not meet real needs.

According to data shown, Integrated Production (IP) importance is increasing in Spain. This trend is more marked in C. Valenciana, in terms of citrus fruit crop. Concerning organic farming, it implementation is increasing in Spain, according to MAPA data. But its importance is lower than IP. For instance, while 7,496 IP hectares of citrus fruit were certified in 2003, there were only 230 hectares of organic farming.

Regional and national authorities met confirm this situation. Export requirements cause the development of Integrated Production. Most of the importing countries demand IP certification or similar (Naturane, EUREPGAP or AENOR, for instance). Thus, Spanish PO have to adapt these production systems, especially those producing citrus fruit, because of the importance of citrus exportations. Spain exportations represented 3.312.900 tonnes in 2002/2003 campaign, 57.2% of Mediterranean countries exportations (Generalitat Valenciana, 1998-2003). Specifically, in Comunidad Valenciana exportations were 80% of national ones, with 2,640 thousand tonnes.

On the contrary, organic farming is less expanded, mainly due to the limited demand of Spanish consumers, according to the opinions of most people met. However, half of the farmers polled state there is enough integrated and organic production. According to surveys, it can also be said that PO promote both IP and Organic farming, but a high effort must be made in this sense. Almost half of the producers met consider that promotion made by PO of these productions is not enough.

Conclusions

- Agri-environmental measures and other environmental requirements **are oriented to situations of high risk of environmental degradation** but **expenditure level** for them **does not meet real needs**.
- **Integrated Production importance is increasing** in Spain. This trend is more marked in C. Valenciana, in terms of citrus fruit crop. But though **organic farming** implementation is increasing, its importance is **lower** than IP.
- **POs promote both IP and Organic farming**, but a **high effort must be** made in this sense.

Table 56: Matrix of possible environmental impacts of the fruit and vegetables CMO and the RDR measures

Measures Effects	**Measures**							
	Market CMO measures	Transferring price support from fruit processors to PO	Market standards	Environmental cross-compliance and OF environmental measures	Invest-ment in irrigation	Grubbing-up grants	Income support measures to improve nut quality	Co-ordination between environmental CMO measures and AEM
Change in the technical production: intensification increase	+		+	=	+	=	=	
Change in the technical production: reduction of specialization	=		=	=	=	=	=	
Use of water increase	-		=	-	-	=	=	
Use of fertilizers increase	-		=	-	-	=	-	
Use of pesticides increase	-		=	--	-	=	-	
Changes in soil use (biodiversity)	+(marketable) /-(local)		+(marketa-ble)/-(local)	=	=	=	+	
Changes in soil use (landscape)	=	=	=	=	-	=	+	
Changes in land use (abandonment)	=		=	=	-	=	++	
Changes in land use (new plantations)	=		=	=	-	=	=	
Change of the type of land maintenance	=		=	=	+	=	++	
Total elimination of certain productions	+		+	=	=	=	+	
Change in the specific agricultural practices	+		+	++	++	=	+	
Effects of culture substitution	=		=	-	=	=	=	
Trend to monoculture	-		-	-	=	=	=	
Competition, synergy or interference with AE measures of the RDR					=			=
Competition, synergy or interference with other RDR measures like investment and irrigation ones								
Diversification to other activities					=			
Influence on the first transformations at local level, little transformation units and transports					=			

++: very positive effect
+: positive effect
-: negative effect
--: very negative effect
=: It does not affect

APPENDICES

Annex 1: List of people met or contacted

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

Annex 3: Typology of the producers met

Annex 4: Good Farming Practices Code of Comunidad Valenciana

Annex 1: List of people met or contacted

- **D. Alfonso Pino Maeso.** Jefe de Área de Productos Hortofrutícolas Frescos. Subdirección General de Productos Hortofrutícolas. Ministerio de Agricultura, Pesca y Alimentación.

- **Dña. Anabel Siguan Bohemer.** Doctora Ingeniera Agrónoma. Directora Técnica de la Interprofesional Citrícola Española (INTERCITRUS).

- **D. Angel Luis Álvarez Fernández**. Director General de Agricultura. Ministerio de Agricultura, Pesca y Alimentación.

- **D. Carlos Ramos Mompó.** Doctor Ingeniero Agrónomo. Investigador del Departamento de Recursos Naturales del Instituto Valenciano de Investigaciones Agrarias (IVIA).

- **D. Carlos G. Hernández Díaz-Ambrona.** Doctor Ingeniero Agrónomo. Departamento de Producción Vegetal: Fitotecnia de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- **D. Carlos Mateos García.** Responsable técnico del Departamento de Frutas y Hortalizas de la Coordinadora de Organizaciones de Agricultores y Ganaderos (COAG).

- **D. Enrique Bellés Llopis.** Ex-Director General de Producción Agraria de la Consellería de Agricultura, Pesca y Alimentación de la Generalitat Valenciana. Director de la Federació de Cooperatives Agràries de la Comunitat Valenciana (FECOAV).

- **D. Enrique Llorca.** Jefe de Administración de la Cooperativa Hortofrutícola de Alzira (ALZICOOP) , Comunidad Valenciana.

- **D. Félix Rodríguez Vosmediano.** Técnico del Departamento de Frutas y Hortalizas de la Confederación de Cooperativas Agrarias de España (CCAE).

- **D. Fernando Gil-Albert Velarde.** Doctor Ingeniero Agrónomo. Director del Departamento de Producción Vegetal: Fitotecnia de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- **D. Fernando Pomares García.** Investigador del Departamento de Recursos Naturales del Instituto Valenciano de Investigaciones Agrarias (IVIA).

- **D. Francisco Montero.** Fondo Español de Garantía Agraria (FEGA).

- **D. Francisco Ramírez Fernández.** Jefe de Area de Regulación de Frutas y Hortalizas de la Subdirección General de Intervención de Mercados y Gestión de la Tasa Suplementaria de la Cuota Láctea del Fondo Español de Garantía Agraria (FEGA).

- **Dña. Isabel Bardají de Azcárate.** Doctora en CC. Económicas. Departamento de Economía y Ciencias Sociales Agrarias de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- **Dña. Isabel de Felipe Boente.** Doctora en CC. Económicas. Departamento de Economía y Ciencias Sociales Agrarias de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- **D. Juan Ramón Castel.** Investigador del Departamento de Recursos Naturales del Instituto Valenciano de Investigaciones Agrarias (IVIA).

- D. Jesús María Ortiz Marcide. Doctor Ingeniero Agrónomo. Catedrático del Departamento de Biología Vegetal de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- D. Jesús Moreno García. Jefe de Área de Control. Subdirección General de Intervención de Mercados y Gestión de la Tasa Suplementaria de la Cuota Láctea. (FEGA)

- D. Joaquim Colom. Técnico de la Cooperativa Hortofrutícola de Alzira (ALZICOOP), Comunidad Valenciana.

- D. José Carlos Caballero. Director Técnico de la Asociación Agraria de Jóvenes Agricultores (ASAJA).

- D. José Manuel Delgado Pérez. Gabinete Técnico de la Unión de Pequeños Agricultores y Ganaderos (UPA).

- D. José Mariano Aguilar Esteve. Presidente de la Cooperativa Agrícola de Puçol, Comunidad Valenciana.

- **D. José Miguel Ferrer**. Dirección General de Producción y Comercialización Agraria de la Consellería de Agricultura, Pesca y Alimentación de la Generalitat Valenciana.

- **D. José Ramón Conde**. Profesor Titular. Departamento de Producción Vegetal: Fitotecnia de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- Dña. Mª Carmen Cartagena Causapé. Doctor Ingeniero Agrónomo. Catedrática del Departamento de Química y Análisis Agrícola de la Escuela Técnica Superior de Ingenieros Agrónomos de la Universidad Politécnica de Madrid.

- Dña. Paloma Sáncuez Pello. Directora del Departamento Técnico de la Federación Española de Industrias de la Alimentación y Bebidas.

- Dña. Paula Kreisler Moreno. Responsable del Departamento de Frutas y Hortalizas de la Confederación de Cooperativas Agrarias de España (CCAE).

- **D. Pedro Cabellero.** Investigador del Departamento de Economía y Sociología Agrarias del Instituto Valenciano de Investigaciones Agrarias (IVIA).

- **D. Pedro Castaño.** Jefe de Servicio de Medidas Agroambientales. Consejería de Medio Ambiente y Ordenación del Territorio de la Comunidad de Madrid.

- D. Ricardo Fernández Pérez - Área de Regulación de Frutas y Hortalizas. Subdirección General de Intervención de Mercados y Gestión de la Tasa Suplementaria de la Cuota Láctea (FEGA).

- D. Salvador Zaragoza. Investigador del Departamento de Citricultura y otros frutales del Instituto Valenciano de Investigaciones Agrarias (IVIA).

- **D. Tomás González González.** Subdirector General Adjunto de Intervención de Mercados y Gestión de la Tasa Suplementaria de la Cuota Láctea del Fondo Español de Garantía Agraria (FEGA).

Annex 2: Main bibliography identified in relation with the study

AGUSTÍ, M. (2002). *La citricultura en la Comunidad Valenciana. Evolución técnica y problemática estructural.* En Jornada Autonómica de la Comunidad Valeciana para "Libro Blanco de la Agricultura y el Desarrollo Rural", Valencia.

ARNALTE, E.; ESTRUCH, V. (1996). *El sistema de producción en la citricultura valenciana*. Convengo L'Agrumicoltura Spagnola e Italiana in Europa, Rende.

BALDOCK, D.; DWYER, J.; SUMPSI, J.M. (2002). *Environmental Integration and the CAP*. Ed. Institute for European Environmental Policy. Págs. 57-60.

BATLLE, I. Et al. (1998). *Bancos de germoplasma de especies de frutos secos y desecados: avellano, nogal, pistachero y algarrobo*. Fruticultura Profesional, nº 104. Ed. Agrolatino.

CABALLERO, P.; DE MIGUEL Mª D.; JULIÁ J.F. (1992). *Costes y precios en hortofruticultutra.* Ed. Mundi-Prensa. Madrid.

COSCOLLÁ, R.; MALAGÓN, J. AND FABADO, F. (2000). *La Producción integrada de cítricos en la Comunidad Valenciana*. Fruticultura Profesional, nº 112. Ed. Agrolatino.

CCAE (2000). *La aplicación en España de la OCM de frutas y hortalizas. Las organizaciones de productores y los fondos operativos.* Ed. CCAE. Bruselas

COAG (2002). *La PAC en las producciones agrícolas.* Págs. 48-57. Madrid.

Commission of the European Communities (2004). *Analysis of the common market organisation in fruit and vegetables. Commission Staff Working Document*. SEC(2004) 1120. Brussels.

FEGA (Serie anual, 1990-2003). *Informe de actividad*. Ed. Secretaría General Técnica del Ministerio de Agricultura, Pesca y Alimentación. Madrid.

FERNÁNDEZ-ZAMUDIO, MªA.; PAVIA, I. AND CABALLERO, P. (2004). *La producción integradda en el sector citrícola y su adopción por las pequeñas explotaciones*. pp – 145 – 164. Información Técnica Económica Agraria, Vol.100V Nº3.

GENERALITAT VALENCIANA (Serie anual, 1998-2003). *Informe del Sector Agrario Valenciano*. Ed. Consellería de Agricultura, Pesca y Alimentación de la Generalitat Valenciana. Valencia.

GINÉS, I. (2004). *Situación actual de la fertirrigación en España*. pp 33-36 en Vida Rural, nº 185.

GONZÁLEZ-ALTOZANO, P.; CASTEL, J.R. (1999). *Regulated deficit irrigation in Clementina de Nules citrus trees. I. Yield and fruit quality effects*. pp 706-713 in Journal of Horticulture Science & Biotechnology.

IGLESIAS, I.; CARBÓ, J. (2002). *Variedades de manzana: situación actual y perspectives*. Fruticultura Profesional, nº 128. Ed. Agrolatino.

INE (1989). *Censo Agrario 1989* Ed. Instituto Nacional de Estadística. Madrid

INE (1999). *Censo Agrario 1999* Ed. Instituto Nacional de Estadística. Madrid

INE (Serie mensual). *Boletines mensuales de estadística*. Ed. Secretaría General Técnica del Ministerio de Agricultura, Pesca y Alimentación. Madrid.

LIDÓN, A. (1993). *Lixiviación de Nitrato en Huertos de Cítricos bajo diferentes tratamientos de abonado nitrogenado*. Director: Carlos Ramos. Universidad Politécnica de Valencia. Valencia.

LEDERMANN, M. (1998). *The new CMO for fruit and vegetables: Implementation and Prospects*. pp 102-106 in Tracey, M ed, op cit.

MAPA (Serie anual, 1990-2003). *La Agricultura, la Pesca y la Alimentación en España*. Datos estadísticos oficiales de la Secretaría General Técnica del Ministerio de Agricultura, Pesca y Alimentación. Madrid.

MAPA (2003). *Evaluación Intermedia del Programa de Desarrolo Rural para las medidas de acompañamiento en España. Periodo 2000/2006.* Ministerio de Agricultura, Pesca y Alimentación. Madrid.

MAPA (2004a). *Libro Blanco de la Agricultura y el Desarrollo Rural*. Ed. Secretaría General Técnica del Ministerio de Agricultura, Pesca y Alimentación. Madrid.

MAPA (2004b). *Hechos y Cifras de la Agricultura, la Pesca y la Alimentación en España*. Ed. Secretaría General Técnica del Ministerio de Agricultura, Pesca y Alimentación. Madrid.

MORENO, M.A. (2005). *Selección de patrones y variedades de melocotonero*. pp 28-32 en Vida Rural, nº 206.

MONTAÑA, C.; CAROT, M.; QUIÑONES, A.; MARTÍNEZ-ALCÁNTARA, B.; PRIMO-MILLO, E.; LEGAZ, F. (2005). *Riego deficitario en goteo superficial y subterráneo*. Págs. 40-44 en Vida Rural, nº 210.

ROCCUZZO, G.; POMARES, F. et al. (1998). *Calidad del suelo en huertos de cítricos ecológicos*. Págs. 239-246 en Actas del III Congreso de la Sociedad Española de Agricultura Ecológica SEAE.

V.V.A.A. (1999). *Frutos de cáscara y algarroba: un sector amenazado*. Ed. Dap. Madrid.

Annex 3: Typology of the producers met

Table 57: Types of producers met

Typology of producers	Expected numbers	Number of producers actually interviewed
Producers of citrus fruits in PO	18	20
Producers of citrus fruits out of PO	2	20
Producers of nuts under old decennial plans	0	0 Nut producers
Producers of citrus fruits and nuts having used the subsidies for irrigation of the CMO or the RDR	7	20
Producers of citrus fruits and nuts members of PO who have implemented measures relating to the environmental programmes of the PO	18	18 Those at PO
Producers under Agri-environmental contract	2	
Producers practicing organic production or integrated production system	2 eco 12 integrated	
Total number	20	

Annex 4: Good Farming Practices Code of Comunidad Valenciana

Orden de 29 de marzo de 2000 (Conselleria de Agricultura, Pesca y Alimentación), por la que se aprueba el Código Valenciano de Buenas Prácticas Agrarias (DOGV núm. 3727, de 10 de abril de 2000)

PREAMBULO

La Directiva 91/676/CEE, de 12 de diciembre, se refiere a la protección de las aguas contra la contaminación por nitratos procedentes de fuentes agrarias. La trasposición de esta directiva al ordenamiento jurídico español por el Real Decreto 261/1996, de 16 de febrero, establece en su artículo 5 que los órganos competentes de las comunidades autónomas elaborarán códigos de buenas prácticas agrarias, que los agricultores podrán aplicar de forma voluntaria, con la finalidad de reducir la contaminación producida por los nitratos de origen agrario. El objetivo prioritario es ofrecer una información que, por un lado, evite el uso inadecuado de abonos nitrogenados, ya sea por excesos en las cantidades aportadas o por épocas incorrectas de aplicación, y, por otro, restrinja el vertido incontrolado de líquidos generados en las instalaciones ganaderas intensivas, ya que ambos factores son causa de dicha contaminación, sin que sean descartables aportaciones producidas por otros agentes.

El presente código pretende que el sector agrario valenciano obtenga sus producciones mediante sistemas de cultivo que sean compatibles con la conservación del medio ambiente, y que eviten, en lo posible, la contaminación del medio natural. Asimismo, la extensión de prácticas que tiendan a incrementar la eficiencia de la utilización de los fertilizantes disminuirá cuantitativamente su aportación, produciendo un ahorro efectivo en los costes de producción y mejorando la calidad de las cosechas, lo cual incidirá en un incremento de la competitividad de las explotaciones.

Por todo ello, teniendo en cuenta la obligación por parte de la Conselleria de Agricultura, Pesca y Alimentación de divulgar su contenido, además de considerar oportuno, por razones de interés público, el general conocimiento del mismo, y en uso de las atribuciones conferidas por el artículo 35 de la Ley 5/1983, de 30 de diciembre, de Gobierno Valenciano (DOGV núm. 138, de 30.12.1983),

ORDENO

Hacer público el Código de Buenas Prácticas Agrarias de la Comunidad Valenciana para la protección de las aguas contra la contaminación producida por los nitratos de origen agrario, en el que se establecen las recomendaciones que a continuación se especifican:

Artículo 1

Tipos de fertilizantes nitrogenados recomendados en las zonas vulnerables y su comportamiento en el suelo

a) Abonos minerales

a-1) Nítricos: se considera en este grupo aquellos abonos cuyo nitrógeno se encuentra exclusivamente en forma de nitratos (anexo I).
Puesto que el ion nitrato (N0-3) es muy móvil en el suelo, esta expuesto a ser arrastrado y desplazado de la zona radicular, como consecuencia de los fenómenos de lixiviación y escorrentía que ocasiona el exceso de agua.

Por otra parte, el ion nitrato es absorbido por las raíces de las plantas de forma inmediata y, por ello, los abonos nítricos deben utilizarse en los momentos en que los cultivos muestran una mayor capacidad de asimilación de este ion.

a-2) Amoniacales: este grupo incluye los abonos cuyo nitrógeno esta en forma de amonio (anexo I) El ion amonio (NH +4) es retenido por el complejo de intercambio catiónico del suelo y, por ello, es menos lixiviable que el nitrato. Dicha retención está en función del tipo de suelo, siendo más alta en los arcillosos que en los arenosos.

La mayor parte del nitrógeno amoniacal es absorbido por las raíces de las plantas después de la conversión del ion amonio en nitrato, mediante la acción de determinados microorganismos del suelo que realizan la nitrificación.

Por ello, la absorción de los abonos amoniacales suele ser más lenta que la de los nítricos, y su acción más retardada, con lo cual pueden aplicarse en periodos de moderada capacidad de asimilación de nitrógeno por la planta.

a-3) Nítrico-amoniacales: estos abonos contienen parte de su nitrógeno en forma nítrica y parte en forma amoniacal (anexo I) Por ello, reúnen las características de los dos grupos anteriores y su efecto es, en cierto modo, intermedio entre el ejercido por ambos tipos de compuestos.

a-4) Ureicos: la urea, que es el producto fundamental de este grupo, no es por si misma directamente asimilable por las plantas y debe descomponerse para producir ion amonio, que posteriormente se transforma en nitrato, absorbible por las raíces. La urea es un compuesto muy soluble en agua y con gran movilidad en el suelo.

a-5) De liberación lenta: este grupo comprende productos muy diversos, que poseen un alto contenido en nitrógeno. Entre estos, pueden destacar los productos con baja solubilidad inherente, como son algunos polímeros de la urea, o bien los granulados recubiertos con una película cuya permeabilidad se incrementa al ir degradándose en el suelo. También pueden incluirse en este concepto aquellos abonos que llevan adicionados inhibidores de la nitrificación, que ralentizan la transformación del ion amonio en nitrato.

Con estos abonos, el aporte de nitrógeno se hace de forma más regular y continua, con lo cual se adapta mejor al ritmo de absorción de este elemento por los cultivos y se reducen las pérdidas por lixiviación.

Los efectos sobre el suelo de los distintos abonos nitrogenados minerales se exponen en el anexo I y su elección en función del tipo de suelo se expone en el anexo II.

b) Abonos orgánicos Dentro de este apartado se agrupan una serie de productos de naturaleza orgánica, muy heterogéneos, que pueden utilizarse como fertilizantes o enmiendas del suelo.

En el anexo III se exponen los principales abonos orgánicos, así como los valores entre los que suele oscilar su riqueza en nitrógeno y el porcentaje de este que se mineraliza durante el primer año, tras su aplicación.

La mayor parte de estos proviene de los residuos de los animales que se crían en las granjas o explotaciones ganaderas, aunque también se consideran los compuestos procedentes de la transformación de los residuos sólidos urbanos y los lodos de las depuradoras.

Para que pueda ser absorbido por las raíces, el nitrógeno contenido en las moléculas orgánicas de estos productos complejos debe mineralizarse, es decir, transformarse en formas inorgánicas a través de diversos procesos de degradación propiciados por los agentes químicos y biológicos que actúan en el suelo. La velocidad con que se produce la mineralización del nitrógeno orgánico es

muy variable en función del producto y depende también de la naturaleza del suelo, así como de su temperatura, humedad, etc.

No obstante, este es un proceso relativamente lento y, por tanto, la liberación de iones inorgánicos, por parte de la materia orgánica, es muy pausada en comparación con los abonos minerales.

A los efectos, se entiende por:

Lixiviación. La lixiviación o lavado del nitrato es el arrastre del mismo por el agua del suelo que percola más abajo de la zona radicular de las plantas. Este proceso es el que produce la contaminación de las aguas subterráneas por nitrato, ya que, en general, una vez que éste deja de estar al alcance de las raíces, continúa su movimiento descendente hacia los acuíferos sin apenas ninguna transformación química o biológica.

Escorrentía. La escorrentía de agua en los suelos agrícolas es el flujo del agua sobre la superficie del suelo, de modo que no se filtra, sino que fluye normalmente hacia terrenos más bajos o cursos superficiales de agua. Se produce como consecuencia de lluvias o riegos excesivos. Si la escorrentía se produce poco después de un abonado nitrogenado, las perdidas de nitrógeno pueden ser importantes.

Artículo 2

Dosis recomendadas para la aplicación de abonos nitrogenados en diversos cultivos La dosis de abonado nitrogenado para un determinado cultivo se establece en función de las necesidades del mismo, tratando, por un lado, de evitar carencias de este elemento que afecten al normal desarrollo de las plantas y, por otro, intentando conseguir un equilibrio óptimo entre el rendimiento y la calidad de la cosecha. Obviamente, deben evitarse los aportes excesivos de nitrógeno, ya que pueden provocar efectos adversos sobre el cultivo, aparte de que los excedentes de nitratos, que no llegan a ser absorbidos por las raíces, están expuestos a ser lavados por las aguas.

En el anexo IV se indican las cantidades de nitrógeno que se consideran óptimas para cubrir las necesidades de los principales cultivos de las zonas vulnerables de la Comunidad Valenciana. Los intervalos de valores que se exponen en cada caso son consecuencia de la variabilidad generada por la diversidad de variedades, densidades de plantación, modalidades en el manejo del cultivo, rendimientos, etc.

No obstante, en las zonas vulnerables no deben sobrepasarse las dosis máximas establecidas para cada especie y sistema de riego.

Cuando se apliquen fertilizantes orgánicos en zonas vulnerables, se establece la condición de no aportar al suelo una cantidad de éstos cuyo contenido en nitrógeno supere los 210 kilogramos por hectárea y año. Sin embargo, para el cálculo de las dosis suplementaria de abonado mineral se considerará únicamente la fracción de nitrógeno mineralizada anualmente (anexo III).

Artículo 3

Determinación de la dosis de abonado nitrogenado mineral

La cantidad de abono nitrogenado mineral que debe aplicarse al terreno se establecerá por la diferencia entre las dosis de abonado indicadas (anexo IV) y el nitrógeno asimilable aportado al suelo por otras fuentes. El nitrógeno disponible por los cultivos procede de las siguientes fracciones:

1º) Nitrógeno inorgánico (soluble e intercambiable) en el suelo al inicio del cultivo.

2º) Nitrógeno procedente de la mineralización neta de la materia orgánica (humus) que se encuentra en el suelo de forma natural (anexo V).
3º) Nitrógeno mineralizado a partir de los fertilizantes y enmiendas orgánicas (anexo III).
4º) Nitrógeno aportado por el agua de riego, que depende principalmente de la concentración de nitrato y del volumen suministrado (anexo VI).

Por consiguiente el nitrógeno aplicado en forma de fertilizantes minerales deberá complementar las aportaciones estimadas de las anteriores fracciones, hasta completar la dosis de nitrógeno que se considera óptima.

Todo ello requiere la realización periódica de análisis de suelos y aguas, así como de los materiales orgánicos que se incorporan al terreno.

Artículo 4

Epocas adecuadas para la aplicación de los abonos nitrogenados minerales y selección del tipo de abono

Habiendo fijado la dosis, se recomienda fraccionar las aportaciones en base a que se maximice la eficiencia de la utilización del nitrógeno por parte del cultivo y por consiguiente se minimicen las pérdidas por lavado.

a) Hortalizas y tubérculos

Alcachofa. En el abonado de fondo, aportar una parte del nitrógeno mineral en forma de nitrógeno amoniacal. El resto de nitrógeno se deberá aportar en cobertera en forma nítrico- amoniacal, en al menos cuatro veces: estado de tres-cuatro hojas, iniciación de los primeros capítulos en el primer y segundo colmo y comienzo de la recolección en el primero y segundo colmo. En el riego localizado se realizarán aportaciones, al menos semanales, en forma de nitrógeno nítrico-amoniacal.

Cebolla. En el abonado de fondo, aportar una parte del nitrógeno en forma amoniacal. El resto del nitrógeno se debe aplicar antes de la formación de los bulbos, en una o dos aplicaciones en forma nítrica. En riego localizado, fraccionar el nitrógeno en, al menos, aplicaciones semanales aportando la mayor parte, antes de la bulbificación, en forma nítrico-amoniacal.

Lechuga. Una parte del nitrógeno se aportará en el abonado de fondo en forma amoniacal. El resto se aplicará en al menos dos veces en forma de nitrógeno nítricoamoniacal, debiendo realizarse la última unos 30 días antes de la recolección. En el riego localizado, fraccionar el nitrógeno en aplicaciones al menos semanales en forma nítrico-amoniacal, en función del ritmo de crecimiento del cultivo.

Melón y sandía. En el abonado de fondo, aportar una parte del nitrógeno en forma amoniacal. En el abonado de cobertera, realizar al menos dos aplicaciones a partir del cuajado de los primeros frutos, en forma nítrica. En el riego localizado, fraccionar el nitrógeno en, al menos, aplicaciones semanales en forma nítrico-amoniacal o nítrica.

Tomate. En el abonado de fondo, aportar una parte en forma amoniacal. En el abonado de cobertera, aplicar el resto del nitrógeno, en al menos tres aplicaciones a partir del cuajado del primer ramillete, en forma amoniacal, nítrica o nítrico-amoniacal. En el riego localizado, fraccionar el nitrógeno en, al menos, aplicaciones semanales en forma nítrico-amoniacal o nítrica.

Patata. En el abonado de fondo, aportar las enmiendas orgánicas, ya que este cultivo responde muy bien a las aportaciones de materia orgánica, junto con una parte del nitrógeno mineral en forma amoniacal. El resto del nitrógeno se deberá aportar en cobertera en al menos dos aplicaciones, preferentemente en forma de nitrógeno amoniacal o nítrico- amoniacal. En el riego localizado, el

nitrógeno se fraccionará en aplicaciones al menos semanales, desde la emergencia hasta unas dos semanas antes de la recolección, utilizándose la forma nítrico-amoniacal.

b) Cítricos y frutales Las épocas más adecuadas para efectuar el abonado nitrogenado son la primavera y el verano, para aprovechar los periodos de mayor capacidad de absorción radicular. Se recomienda no fertilizar en otoño e invierno. En las plantaciones regadas por inundación el abonado nitrogenado deberá fraccionarse, como mínimo, en dos aportaciones, una en primavera y otra en verano, excepto en los terrenos marcadamente arenosos, donde se aplicará, al menos, en tres fracciones distribuidas entre ambos periodos.
De cualquier forma se recomienda aportar el nitrógeno con el mayor grado de fraccionamiento posible, especialmente en suelos muy permeables o poco profundos. En general, para cítricos y frutales se recomiendan formas amoniacales o nítricoamoniacales en primavera, y nítrico-amoniacales o nítricas en verano. La fertilización en plantaciones con sistema de riego localizado se efectuará preferentemente mediante formas nítricas o nítrico-amoniacales solubles en el agua de riego. Estos se dosificarán con alta frecuencia, que deberá ser como mínimo semanal.

Artículo 5

Recomendaciones para la aplicación de los fertilizantes

En cultivos con riego localizado la fertilización se efectuará disolviendo los abonos en el agua de riego y aplicándolos al suelo a través de ésta. Estos se dosificarán fraccionadamente, durante el periodo de actividad vegetativa de las plantas. En el riego por inundación los abonos se aplicarán con el suelo en sazón y se enterrarán inmediatamente mediante una labor. Este sistema es preferible a su incorporación al terreno mediante un riego ya que, con ello, se pueden producir pérdidas de nutrientes por lavado, o una deficiente distribución de los mismos por arrastre superficial. En las plantaciones de secano, los abonos se incorporarán al terreno con una labor, aprovechando la sazón posterior a una precipitación. Esta práctica es especialmente importante en las parcelas con pendientes acusadas, para evitar el arrastre de los compuestos fertilizantes por la lluvia.

Es muy conveniente, también, seleccionar los abonos en función de que su naturaleza química cause los menores efectos adversos posibles sobre la estructura y pH del suelo, así como que no provoquen efectos tóxicos en las plantas (anexo I). Esto se debe a que determinadas alteraciones de las características físico-químicas del suelo, o bien los efectos depresivos sobre el estado fisiológico de la planta, especialmente si repercuten en su sistema radicular, pueden causar una inhibición de la capacidad de absorción de iones nitrato, con lo cual éstos quedan expuestos a sufrir mayores pérdidas.

Artículo 6

Recomendaciones para efectuar el riego

La correcta ejecución de la práctica del riego es fundamental para reducir la contaminación por nitratos, ya que un aporte excesivo de agua o una deficiente distribución de la misma pueden causar el arrastre de estos iones a las capas profundas del suelo, donde no pueden ser absorbidos por las raíces de las plantas. El volumen de agua a aportar en el riego deberá calcularse como la diferencia entre las necesidades de agua del cultivo y la precipitación efectiva. A su vez, las necesidades de agua se basarán en la evapotranspiración del cultivo (ETc) determinada como producto de la evapotranspiración de referencia (ETo) por el coeficiente de cultivo (Kc).

La dosis de agua por unidad de superficie utilizada en cada riego y la frecuencia de los mismos deberán acomodarse a la capacidad de retención de humedad del terreno, para evitar las pérdidas de agua en profundidad y la consiguiente lixiviación de nutrientes. Deberá utilizarse la técnica de riego que garantice la máxima eficiencia en la utilización del agua, teniendo en cuenta las condiciones de la parcela.

En el riego por inundación, la longitud de los tablares y su pendiente deberán adaptarse a la textura del terreno y al módulo de riego, con objeto de conseguir la máxima uniformidad posible en la distribución del agua. En este sistema de riego se recomienda no utilizar tablares con una longitud superior a los 120 metros en suelos arcillosos y 75 metros en los arenosos. En los terrenos de naturaleza arcillosa conviene que la pendiente del terreno, en el sentido del riego, se aproxime al 0,5 por mil, mientras que en los arenosos puede alcanzar el 2 por mil. No es aconsejable utilizar módulos de riego superiores a 40 litros/segundo.

En el riego por goteo, el número de emisores por árbol, el volumen de agua aportado por cada uno de ellos y la frecuencia de riego deberá establecerse en función de la textura del terreno, de forma que se consiga una superficie mojada a la profundidad radicular efectiva suficiente para el cultivo (normalmente se consideran valores próximos al 50% del área sombreada en los árboles frutales y cercanos al 80% en las hortalizas) y se eviten problemas de saturación de humedad o de pérdidas de agua en profundidad.

En el riego localizado, el coeficiente de uniformidad del sector de riego (eficiencia de aplicación) deberá superar el valor del 85%.

Artículo 7

Capacidad de los tanques de almacenamiento de estiércol y medidas para evitar la contaminación de las aguas por escorrentía y filtración de líquidos procedentes de estiércoles y purines

Deben considerarse dos puntos esenciales:

a) El volumen de almacenaje, en general, deberá permitir contener, como mínimo, los efluentes del ganado producidos en el periodo en el que su distribución es desaconsejable.

En las zonas declaradas vulnerables, las épocas de incorporación de abonos orgánicos es casi continua debido a la existencia de cultivos de hortalizas, cítricos y frutales. Por ello, se establece un periodo de almacenaje mínimo de tres meses.

A efectos de cálculo de la capacidad de almacenamiento, en el anexo VII se indican las cantidades de deyecciones sólidas y líquidas según el tipo de ganado.

b) El sistema de recogida de líquidos y purines, así como las instalaciones para su almacenaje deben ser estancos, de forma que se eviten los vertidos directos en el medio natural.

DISPOSICIONES ADICIONALES

Disposición 1ª

Con el objeto de informar y formar a los agricultores sobre las buenas prácticas agrarias para prevenir y corregir la contaminación de las aguas causada por los nitratos de origen agrario, se adoptarán las siguientes medidas dirigidas a difundir el contenido del presente código:

. Información a las organizaciones agrarias.
. Divulgación mediante artículos de prensa y programas de radio y televisión.
. Distribución de folletos informativos.
. Información personalizada a los agricultores en los servicios territoriales y las Ocapa.
. Inclusión de al menos tres horas de clase para explicar el código de buenas prácticas agrarias en los cursos de formación organizados por la Conselleria de Agricultura, Pesca y Alimentación, a través del Servicio de Desarrollo Tecnológico Agrario, en las zonas vulnerables.

Disposición 2ª

Para facilitar el cumplimiento por parte de los agricultores del código de buenas prácticas agrarias, se establecen los siguientes servicios complementarios:

1º) Se efectuarán análisis gratuitos de la concentración de nitratos en aguas de riego para aquellos agricultores o entidades agrarias que los soliciten en el Servicio de Análisis Agroalimentario de la Conselleria de Agricultura, Pesca y Alimentación.

2º) Se instalarán programas informatizados para la recomendación del abonado nitrogenado en los distintos cultivos de las zonas vulnerables. Dicha recomendación será individualizada para cada explotación agrícola, en función de sus características y siguiendo las especificaciones del código de buenas prácticas agrarias.

ANEXO I: Relación y efectos de los principales tipos de abonos nitrogenados químicos

* Tipo de abono
* Amoniacales
= Sulfato amónico
Riqueza en N (%) = 20,6
Reacción en el suelo = Acidificante
Reacción en la planta = Tóxico a dosis altas
Efecto sobre la estructura del suelo = Adversa
*
= Cloruro amómico
Riqueza en N (%) = 24
Reacción en el suelo = Acidificante
Reacción en la planta = Tóxico
Efecto sobre la estructura del suelo = Adversa
*
= Fosfato monoamónico
Riqueza en N (%) = 12
Reacción en el suelo = Neutra
Reacción en la planta = -
Efecto sobre la estructura del suelo = Adversa
*
= Fosfato biamónico
Riqueza en N (%) = 18
Reacción en el suelo = Neutra
Reacción en la planta = -
Efecto sobre la estructura del suelo = Adversa
* Nítricos
= Nitrato cálcico
Riqueza en N (%) = 15,5
Reacción en el suelo = Alcalinizante
Reacción en la planta = -
Efecto sobre la estructura del suelo = Favorable
*
= Nitrato sódico
Riqueza en N (%) = 16
Reacción en el suelo = Alcalinizante
Reacción en la planta = Tóxico a dosis medias-altas
Efecto sobre la estructura del suelo = Adversa
*

= Nitrato potásico
Riqueza en N (%) = 13,8
Reacción en el suelo = Neutra
Reacción en la planta = -
Efecto sobre la estructura del suelo = -
* Nítrico-amoniacales
= Nitrato amónico
Riqueza en N (%) = 33,5
Reacción en el suelo = Neutra
Reacción en la planta = -
Efecto sobre la estructura del suelo = Adversa
*
= Nitro-sultafo amónico
Riqueza en N (%) = 26
Reacción en el suelo = Acidificante
Reacción en la planta = -
Efecto sobre la estructura del suelo = Adversa
*
= Nitro-cal-amónico
Riqueza en N (%) = 20,5
Reacción en el suelo = Alcalinizante
Reacción en la planta = -
Efecto sobre la estructura del suelo = Favorable
*
= Urea
Riqueza en N (%) = 46
Reacción en el suelo = Neutra
Reacción en la planta = -
Efecto sobre la estructura del suelo = Adversa

ANEXO II: Elección del abono nitrogenado en función del tipo de suelo

* Suelos neutros y alcalinos no calizos
* Nitro-cal-amon
Suelos alcalinos calizos = Sulfato amónico
Suelos ácidos = Nitro-cal-amon
Suelos salinos = Nitro-cal-amon
* Nitrato cálcico*
Suelos alcalinos calizos = Nitro-sulfato Amónico
Suelos ácidos = Nitrato cálcico
* Fosfato biamónico**
Suelos alcalinos calizos = Nitrato amónico*
Suelos ácidos = Fosfato biamónico*
* Nitrato potásico*
Suelos alcalinos calizos = Urea*
Suelos ácidos = Nitrato potásico*
Suelos salinos = Urea*
*
Suelos alcalinos calizos = Fosfato Monoamónico
Suelos ácidos = Fosfato Monoamónico
*
Suelos alcalinos calizos = Fosfato biamónico*
Suelos salinos = Fosfato biamónico*
*
Suelos alcalinos calizos = Nitrato potásico*

Suelos salinos = Nitrato potásico*
[1] Esta tabla se refiere principalmente a la elección de abonos que se aplícan en cobertera.
[*] Los abonos marcados con el asterisco con utilizables en el riego localizado.
[**] Cuando se utiliza en suelos deficientes en calcio, es conveniente efectuar un aporte suplementario de Ca 2+.

ANEXO III: Principales fertilizantes orgánicos

* Tipo de fertilizante
* Estiércol de bovíno
Riqueza % N sobre materia seca = 1-2
% N mineralizado 1 er. Año = 20-30
* Estiércol de oveja o sirle
Riqueza % N sobre materia seca = 2-2,5
% N mineralizado 1 er. Año = 40-50
* Estiércol de porcino
Riqueza % N sobre materia seca = 1,5-2
% N mineralizado 1 er. Año = 40-50
* Purines de porcino
Riqueza % N sobre materia seca = 0,4*
* Gallinaza
Riqueza % N sobre materia seca = 2-5
% N mineralizado 1 er. Año = 60-90
* Lodos de depuradora
Riqueza % N sobre materia seca = 2-7
% N mineralizado 1 er. Año = 30-40
* Compost de resíduos sólidos urbanos
Riqueza % N sobre materia seca = 1-1,8
% N mineralizado 1 er. Año = 15 -20
* Este porcentaje se refiere a materia húmeda.

ANEXO IV: Dosis de nitrógeno recomendadas

* Cultivo
* Alcachofa
Riego por inundación = 250-300
Riego localizado = 200-240
* Cebolla
Riego por inundación = 200-250
Riego localizado = 160-200
* Lechuga
Riego por inundación = 150-220
Riego localizado = 120-175
* Melón-sandía
Riego por inundación = 200-250
Riego localizado = 160-200
* Tomate
Sistema = Aire libre
Riego por inundación = 200-250
Riego localizado = 160-200
*
Sistema = Invernadero
Riego por inundación = 400-450
Riego localizado = 320-360

* Patata
Riego por inundación = 250-300
Riego localizado = 200-240
* Cítricos*
Riego por inundación = 240-300
Riego localizado = 200-240
*
Sistema = Extensivo**
Riego por inundación = 120-160
Riego localizado = 100-130
* Frutales
Sistema = Semi-intensivo**
Riego por inundación = 160-200
Riego localizado = 130- 160
* Intensivo**
Riego por inundación = 200-240
Riego localizado = 160-190
* Las dosis que se recomiendan se refieren a plantaciones adultas en plena producción.
** Extensivo: <300 árboles/ha.; Semi-intensivo: 300-500 árboles/ha.; Intensivo: >500 árboles/ha.

ANEXO V: Nitrógeno procedente de la nitrificación del humus del suelo

* Materia orgánica del suelo (%)
Nitrógeno anual disponible (kg./ha) = Arenoso
= Franco
= Arcilloso
* 0'5
Nitrógeno anual disponible (kg./ha) = 10-15
= 7-12
= 5-10
* 1'0
Nitrógeno anual disponible (kg./ha) = 20-30
= 15-25
= 10-20
* 1'5
Nitrógeno anual disponible (kg./ha) = 30-45
= 22-37
= 15-30
* 2'0
Nitrógeno anual disponible (kg./ha) = 40-60
= 30-50
= 20-40
* 2'5
Nitrógeno anual disponible (kg./ha) = -
= 37-62
= 2,5-50
* 3'0º-
Nitrógeno anual disponible (kg./ha) = -
= -
= 30-60

ANEXO VI: Cantidad de nitrógeno/ha aportado por el agua de riego

.....[NO3-] x Vr x 22,6 x

kg N/ha = ----------X F
.....10 5
[NO3 -] = Concentración de nitratos en el agua de riego expresada en mgr/l (ppm)
Vi- = Volumen total de riego en m3/ha/año
22,6 = % de riqueza en N del NO3 -
F = Factor que depende de la eficacia del riego y considera la pérdida de agua. Sus valores pueden oscilar entre 0,6 y 0,7 en el riego por inundación y entre 0,8 y 0,9 en el localizado.

ANEXO VII

..... Deyecciones anuales (Kg).....
Animales..... Sólidas.....Líquidas....
Vacuno.....
Animales jóvenes..... 3650-4348.....1825.....
Animales de 500 kg..... 5840..... 2555.....
Vacas lecheras..... 9125..... 5475.....
Equino.....
Caballos 500 kg.....6205..... 1551.....
Caballos 700 kg.....9125..... 2737.....
Porcina.....
Cerdos de 40 kg.....365.....255.....
Cerdos de 80-90 kg..... 912.....657.....
Ovino.....
Corderos de 25 a 30 kg.... 219.....219.....
Ovejas de 40 kg.....365.....328.....
Ovejas de 60 kg.....547.....438.....
Aves.....
Gallinas..... 58..... -.....
Patos.....84..... -.....