Strawberries from Poland
Oranges from Spain
Apples from Turkey
Apples from Poland

2013

Fruit Juice Supply Chain Analysis - Europe

EU Fruit Juice CSR Platform

This project received funding from the European Union

UTZ Certified Better farming Better future

the sustainable trade initiative

sociability RESPONSIBLE BUSINESS

A.I.J.N.

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Contents

Introduction

In June 2013, five organizations formed the coalition that has been tasked by the European Union to work towards a CSR platform within the EU Fruit Juice sector. The objective of the platform is to inspire and support the European fruit juice industry to integrate corporate social responsibility in their business operations and core strategy. The consortium consists of UTZ Certified (an NGO focused on sustainable farming based in the Netherlands),AIJN (the European Fruit Juice Association), AZTI-Tecnicalia (a Spanish technology center for marine and foodstuff research), IDH (the Dutch Sustainable Trade Initiative) and Sociability (an international network-based consultancy from Denmark) The CSR platform project is co-financed by the European Union for a period of 18 months starting the first of June 2013.

As part of this project, UTZ Certified, as lead partner in the solution strategies component of the platform, has requested the consultancy AidEnvironment to conduct research into the fruit juice supply chain in general, and CSR issues specifically, in Eastern and Southern Europe. The goal of this research was to generate and distribute knowledge on the fruit juice sector in Europe. The focus regions are Eastern and Southern Europe as CSR knowledge and capacity is generally less widespread compared to Western Europe. The Southern and Eastern regions of Europe were therefore indicated as priority areas by the EC.

This research gives an overview of supply chain characteristics and CSR issues for the following countries and types of fruit:

1. Apples from Turkey. Turkey is the biggest EU producer of apples and produces 4% of global apple production.
2. Oranges from Spain. Spain is the largest orange producer in the EU. Spain produces 50% of total orange production within the EU.
3. Apples from Poland. Within the EU Poland accounts for 26% of total EU production and is the largest EU producer of apple juice concentrate.
4. Strawberries from Poland. Poland is the second largest producer of strawberries in the EU after Spain and the largest player on the market of frozen strawberries, together holding 20% EU market share.

The four combinations of commodity and country listed above are described in this report looking at the following three aspects:

1. Characteristics of production / 'Leverage' for sustainable supply by assessing farm types, production regions and the supply chain from farm to retail or export, including percentages of fresh versus processed fruit and production for the local market versus export.
2. Farm and primary processing related 'sustainability issues'.
3. Sustainability landscape in terms of available standards and coverage of these standards; giving an indication of the progress of certification and sustainability initiatives, including international schemes and national mainstream initiatives.

The main findings from this research are summarized in the table below, grouped based on the three aspects listed above.

Summary of key issues per combination of commodity and country

Production and supply

Topic	Apples Turkey	Oranges Spain	Strawberries Poland	Apples Poland
Production statistics	4th largest producer for apples (1st China,2nd US,3rd India) fresh fruit 80-85% 15% Processed fruit 2% and exported	Produces 50% of EU orange production Fresh fruit 80% Processed 20%	20% of EU strawberry market Fresh fruit +/- 98.5% Processed fruit +/- 1.5%	26% of EU apples Fresh fruit 50% Processed fruit 50%
Proportion smallholders	90-95% are smallholders producing for local market, declining	78% smallholders, declining numbers.	Mainly smallholders: 99% < 5 hectare	70% has area of 1-5 hectare. 35% of Polish apple sector is organized and with larger scale areas than in Turkey.
Proportion export	2-3% only; strong increase but also fluctuating, much goes to Middle East and EU.	Around 40% for export	Poland is world's 3rd IQF producer. 11% is for fresh export, additionally IQF and processed, increasing (Russia, Scandinavia and Germany mainly)	30% for fresh apples, 10% processed (declining prices for farmers while industry increases sales price). Export increasing. Main market is Russia 66% & Europe 12.5%
Types of producers involved in export	Hardly any smallholders involved, mainly large-scale and young investors	All farm sizes involved, but small ones often outsourced	Many smallholders involved in export, but now declining	Also many smallholders involved

Farm and primary processing related sustainability issues

Topic	Apples Turkey	Oranges Spain	Strawberries Poland	Apples Poland
Productivity	Commercial yields are high, but yields for smallholders are probably much lower, gradually increasing	Yields are high or increasing, not much scope for improvement	Low, but unreliable data, much room for improvement mainly by irrigation. Production and profitability is falling, yet market demand and prices are increasing	Average commercial yields are 10-20% lower than European average and probably lowest for smallholders. Yields moderately increasing. 56% of agricultural land is unfavourable and large investments need to be made by farmers to increase returns.
Irrigation / water use efficiency	All apples are irrigated, (risk of soil erosion). Hardly any use of drip irrigation. Water scarcity is a growing problem.	All production is irrigated. Water is increasingly scarce, may lead to conflicts. Drip irrigation much promoted but covers only about 2%.	Generally lack of irrigation systems, which contributes to low productivity. Water used p/kg very high compared to other countries, due to low productivity.	Estimated for 10% of apple farmers, mainly large ones.
Pesticide use	Residues are frequently found on fruits and vegetables; the problem is being addressed. Smallholders probably use few and not much on apples.	Not a major problem, being adequately controlled Agro-chemical (herbicides) use is a relevant problem, organic has proven to be beneficial to soil quality	Serious problem, much pesticides being used and residues surpass MRL levels.	In Poland a lot of pesticides are being used and often residues found. The problem does not become less but on the contrary seems to get worse.

Labour conditions	Cheap Syrian refugees are involved but this vulnerable group is increasingly protected. Probably low problem because plenty of local labour. Conflicting reports, 5% are using child labour but probably incidence is decreasing. Exporting farms not involved.	Many migrant workers for seasonal labour but many are formally registered. No indication of child labour	Migrant workers from Ukraine and Belarus, but often too few are accepted so that products remain unpicked. Probably lower incomes than minimum wage levels. Child labour in strawberry production is most likely similar to apple	It is common to use seasonal labourers from Ukraine and Belarus; they are generally undeclared labourers and are paid less than the formal minimum wage. Some indication of child labour in the past. The problem has probably become less but there are no recent data.
Farmer age / social dynamics	*Average age 40-45 years* *Total number of smallholder farms decreases.* *Young farmers take up professional farming and are oriented at export.*	*+/- 57 years. Farm size is increasing.* *Young people professionalise in providing services (response to outsourcing) or cooperatives take over (Spain).*	*50% of farmers is 40-55 years old* *1/3 is younger,* *Many migrants.*	*Half is 40-55 years old* *Most smallholder farms have ageing people.* *Young farmers are linked to more professional farms.*
Supply chain efficiency	*Poorly organized, very fragmented.* *Importance of middle-men*	*Development of cooperatives as a solution to international marketing challenges*	*Fragmented and through intermediaries for most producers.* *Lack of contractual- and pricing agreements.*	*Fragmented and trade through intermediaries for smallholder producers; direct link to wholesalers for large-scale producers.*

Landscape of certification and sustainability initiatives

Topic	*Apples Turkey*	*Oranges Spain*	*Strawberries Poland*	*Apples Poland*
GlobalGAP	Being promoted, increasing but still small number (10 producer groups, all large and medium scale, all for export production).	5% of citrus producers	Only 14 farmers certified, 0.02% market share.	6% of Polish apple farmers are GlobalGAP certified.
Organic	About 5% of total production, steadily increasing. Prices are 30-50% higher than conventional, exported to Western Europe.	2.2% in terms of area. Spain is 3rd largest producer of organic citrus.	2% of strawberry farms are organic certified. Rapidly increasing.	0.6% of Polish apple farmers produce under organic criteria. Rapidly increasing.
Integrated production 'standard'	Probably around 20% of producers	16% in terms of fruit production area	15% of strawberry farmers	6% of apple producers

Apples from Turkey

1 Production and supply

1.1 Overview of main production statistics

Turkey is the fourth largest producer of apples in the world after China (36 million tons), United States (4 million tons) and India (2.9 million tons) in 2011. Turkey's produced 2.7 million tons[1] (representing 4% of the world's total) in 2011 and its production has gradually been growing (see table 1), reaching 2.9 tons in 2012. The total number of hectares under apple cultivation was 175,000 hectares in 2012 and has been increasing since 2009, albeit with a slow growth rate (see table 1).[2,3] The average number of apple trees per hectare was 43 million in 2005[4].The total number of trees in 2012 was 61 million consisting of 45 million old trees and 15 million fruit bearing trees.[5]

YEARS	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PRODUCTION ('000 TONS)	2,200	2,600	2,100	2,570	2,002	2,458	2,504	2,782	2,600	2,680	2,889
AREA HARVESTED ('000 HA)	150	159	160	160	163	158	158	163	165	167	175

TABLE 1: PRODUCTION VOLUME AND ACREAGE OF APPLES IN TURKEY

Average commercial apple yield has consistently increased (see table 2) from 17,460 kg/ha in 2005 to 23,070 kg/ha in 2012.[6] The average production of commercial apples in Europe is 20 - 21 tons per hectare and the Netherlands average is 38 Mt tons per hectare.

Years	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Yield (Kg/ha)	17,460	19,670	15,680	19,140	14,940	19,180	20,160	23,100	22,980	23,070	23,100

TABLE 2: COMMERCIAL APPLE PRODUCTIVITY IN TURKEY

The main apple varieties produced in Turkey are Red Delicious (Strakling and Starkimson Delicious) (47% of the apple production) and Golden Delicious (29%), the most popular native variety is Amasya (which

[1] FAOSTAT 2011 data

[2] USDA (2012) Turkey Fresh Deciduous Fruit Annual: Turkish Apple and Grape Production See Modest Growth. USA Foreign Agricultural Service Global Agricultural Information Network

[3] See the Apples from Poland chapter

[4] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

[5] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

[6] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report.

constitutes about 9% of total production), followed by others: Granny Smith, Gala, Fuji, Braeburn and Jonagold are becoming more popular among growers due to their higher export potential (see Figure 1).[7]

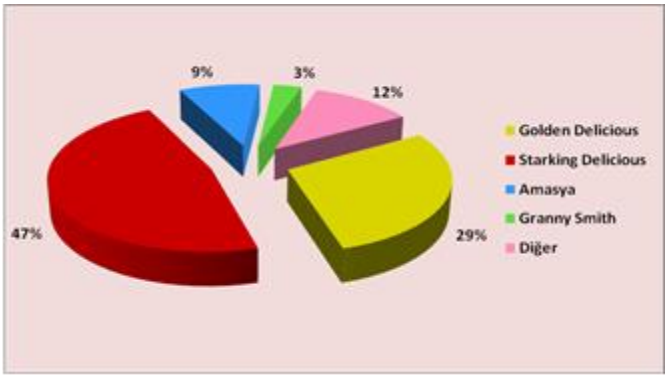

FIGURE 1: THE DISTRIBUTION OF APPLE VARIETIES PRODUCED IN TURKEY (SOURCE: TUIK 2012)

Apples are grown in many regions across Turkey but approximately 50 % of all commercial apple production comes from five provinces; Isparta, Nigde, Denizli, Karaman and Antalya.[8] Isparta alone produces 25% of the whole apple production (see figure 2):

Isparta is a province in south-western Turkey, in what is known as the Lakes Area in the Mediterranean region. The province is well known for its apples, sour cherries, grapes and roses.[9] It is characterized as a less humid region with an average annual temperature of 12.5°C and annual precipitation of 595.64 millimetres.[10] It has a total population of 416,663 and its surface is 8,993 square kilometre.[11] Isparta has 20,236 hectare under apple production[12], it reached an output of 634,795 tons in 2012 representing *a share of 22%*.[13] Karaman Province is located in the Central Anatolia region. It is classified as a semi-dry area with annual precipitation of 326.5 millimetres and an average annual temperature of 12°C.[14]

[7] USDA (2012) Turkey Fresh Deciduous Fruit Annual: Turkish Apple and Grape Production See Modest Growth. USA Foreign Agricultural Service Global Agricultural Information Network

[8] TUIK (Turkish Statistical Institute)

[9] Agricultural master plan of Isparta

[10] Tu Tiempo website http://www.tutiempo.net/en/Climate/Isparta/172400.htm

[11] TurkStat 2012 data

[12] Data of Isparta Province Directorate of Food, Agriculture and Livestock

[13] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

[14] Agricultural Provincial Directorates, General Directorate of Meteorology

Karaman has a total population of 235,424 and covers 9,163 square kilometres.[15] Karaman has 21,166 hectare under apple production,[16] reaching an output of 388,404 tons in 2012 representing *a share 13%.*[17]

Nigde is also located in the Central Anatolia region. The province is surrounded on three sides by ranges of the Taurus Mountains and opens up to west in the Plain of Emen. This plain has volcanic soil which makes it highly fertile and thus a successful agricultural region, particularly for apples and tomatoes.[18] It is a semi-dry area with an average annual temperature of 16°C and precipitation of 452.12 millimetres per year.[19] Nigde has a population of 340,270 and is 7,312 square kilometres in size.[20] It has a total of 20,733 hectare under apple production[21], with an output of 317,271 tons in 2012 representing *a share of 11%.*[22]

Denizli Province is located in the Western Anatolia on high ground above the Aegean coast. Approximately 28% of the land is plain, 25% is high plateau and table land, and 47% is mountainous.[23] Average temperature is 17.5°C and annual precipitation 781.32 millimetres[24]. Denizli has a population of 931,823 and is 11,868 square kilometres in size.[25] It has 6,746 hectare under apple cultivation, reaching an output of 209,870 tons in 2012 representing *a share of 7%.*[26]

Antalya Province is located on the Mediterranean coast of southwest Turkey, between the Taurus Mountains and the Mediterranean Sea.[27] The average temperature is 19.3°C and it has an annual precipitation of 1410.20 millimetres.[28] It has a population of 1,978,333 and is 20,723 square

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[15] TurkStat 2012 data

[16] Eğridir Fruit Investigation Institute, personal communication

[17] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

[18] Wikipedia website http://en.wikipedia.org/wiki/Ni%C4%9Fde_Province

[19] Tu Tiempo website http://www.tutiempo.net/en/Climate/NIGDE/2010/172500.htm

[20] TurkStat 2012 data

[21] Eğridir Fruit Investigation Institute, personal communication

[22] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

[23] Agricultural Provincial Directorates, General Directorate of Meteorology

[24] Tu Tiempo website http://www.tutiempo.net/en/Climate/DENIZLI/172370.htm

[25] TurkStat 2012 data

[26] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

[27] Agricultural Provincial Directorates, General Directorate of Meteorology

[28] Tu Tiempo website http://www.tutiempo.net/en/Climate/Antalya/173000.htm

kilometres in size.[29] It has 14,694 hectares under apple cultivation (which is more than double the size of Denizli) and its output reached 185,181 tons in 2021 which represents *a share of 6%*.[30]

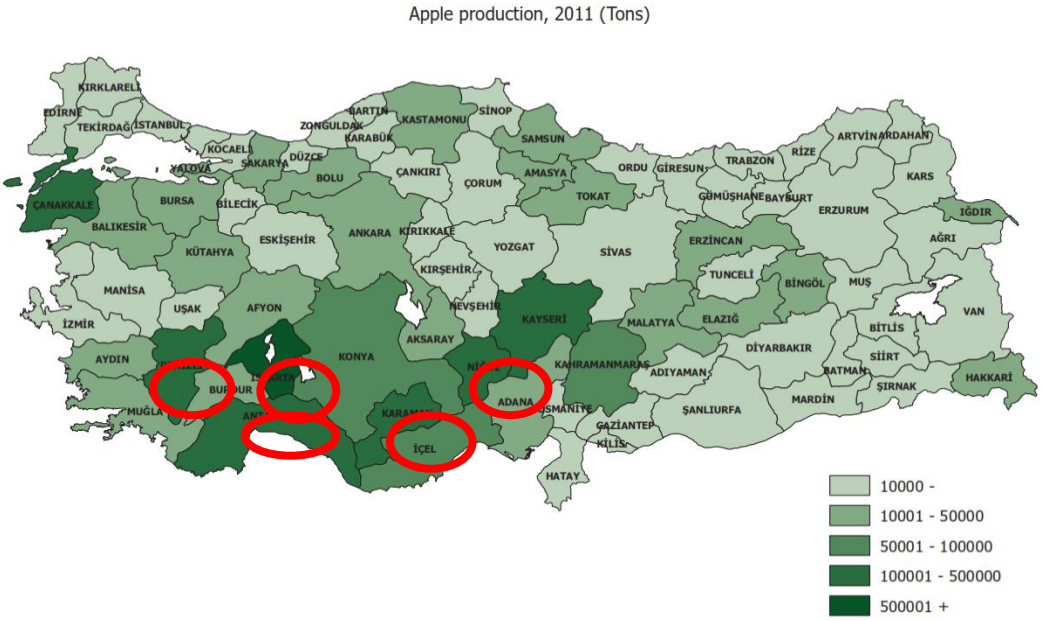

FIGURE 2 APPLE PRODUCING REGIONS IN TURKEY (SOURCE: TURKISH MINISTRY OF AGRICULTURE, 2013)

1.2 Export market chain

Fresh apple exports have increased from 20,000 tons in 2008 to 69,000 tons in 2012, which corresponds to 2.5% of national production (table 3). As a result of the problems in some of the Middle Eastern countries, especially Iraq, the amount of fresh apple exportation decreased lately (Table 4). Export of single strength juice is very small (between 0.1 and 0.2 % total production), export of concentrate amounts to about 2% of apple production. Traditionally about 80 – 85% of Turkey's apple production is consumed as fresh fruit, 15% are processed into juice, canned products, vinegar or dried products. Imports are a marginal contributor of Turkish apple supply.[31] The amount of apple juice/concentrate exported went down from 58,000 tons in 2011 to 43,000 tonnes in 2012.[32]

[29] TurkStat 2012 data

[30] Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

[31] USDA (2012) Turkey Fresh Deciduous Fruit Annual: Turkish Apple and Grape Production See Modest Growth. USA Foreign Agricultural Service Global Agricultural Information Network.

[32] Turkish Ministry of Economic Affairs General Directorate of Export – Department of Agricultural Products' Juice Report, 2012

	2010/2011	2011/2012	2012/2013
Area planted (ha) (1)	165,077	166,672	174,813
Bearing trees (n) (1)	41,423	42,721	45,255
Non-bearing trees (n) (1)	12,929	14,418	15,846
Production (ton) (1)	2,600,000	2,680,075	2,888,985
Imports (ton) (2)	2,643	5,592	3,284
Exports (ton) (2)	80,569	87,303	68,916
Total supply (ton) (1 + 2)	2,602,643	2,685,667	2,892,269
For processing for juice industry (3)	376,000	424,000	448,000

TABLE 3: FRESH APPLES FROM TURKEY (SOURCES: SEE BELOW)

1) TUIK (Turkish Statistical Institute)
2) Trademap.org
3) MEYED

2008	2009	2010	2011	2012
19,972	59,791	80,569	87,303	68,916

TABLE 4: FRESH APPLE EXPORTS FROM TURKEY

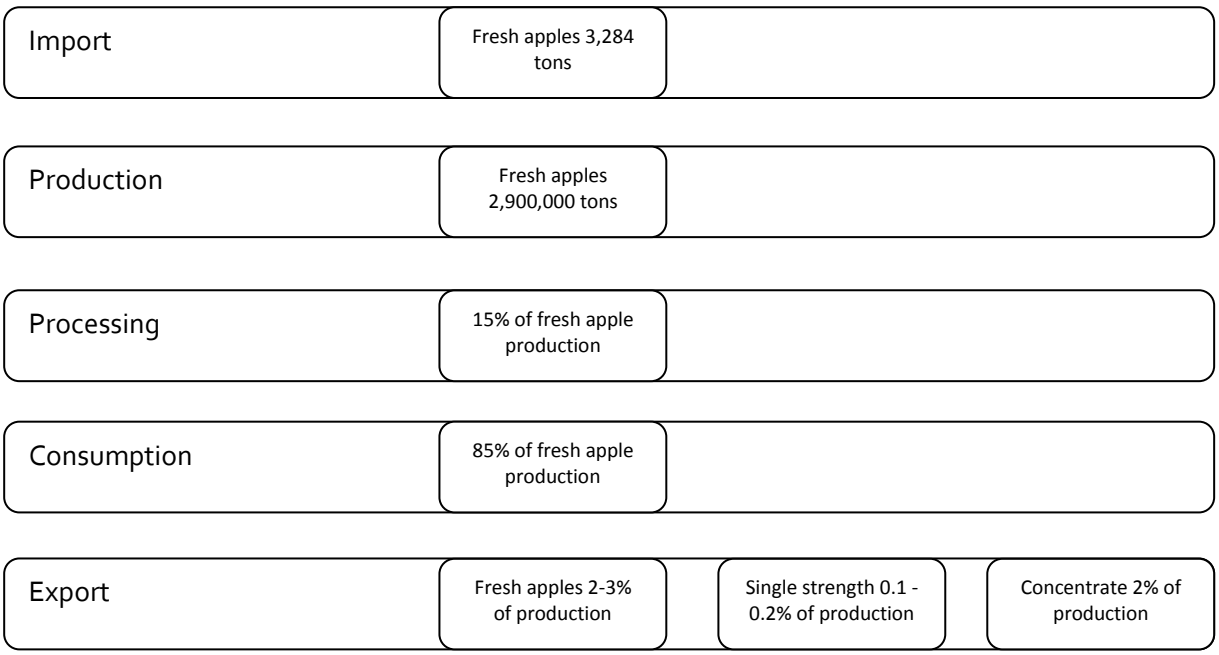

FIGURE 3 IMPORT, PRODUCTION, PROCESSING AND EXPORT OF APPLES IN TURKEY (2012)

In Turkey fresh deciduous apples are traditionally sold domestically, but recently there is a trend of increasing export through private traders and specialized marketing firms. The recent growth of the export market is caused by a government regulation in 2003 allowing entrepreneurs to establish wholesale fresh vegetable and fruit trading places, in the past parties were not allowed to sell their produce before it was recorded in the local municipal market place. Produce of small-scale producers is barely being exported.[33] Within the period of 2007-2011, exports of agricultural and food products increased by 57% and reached to 14.3 billion dollars from 9.1 billion dollars. The share of these products in total exports increased over the years, from 8.5 per cent in 2007, to 10.6 per cent in 2011. This increase resulted from the increase of the processed products exported to especially to Middle East and EU countries besides the increases in the prices.[34]

In each growing region in Turkey there are a number of cooperatives but none of them is remarkably large and their budgets are usually limited; they help small-scale growers market their products domestically and do not have any overseas marketing activities.[35] However we should note that each day more investors are going into the fruit growing industry, seeing the potential and thus aiming mainly for exportation. (i.e. Alara Company). Also some of the juice companies started producing their own fruits, although this is just at the beginning period.

For an overview of the domestic and export chain in Karaman Province see table 4 below.

Short supply chain description	Percentage domestic vs export	Percentage fresh vs processed	Names of links in the chain	Number of actors per link	Scale and share of actors
Domestic chain	98% of Karaman output goes into the domestic chain	95% fresh; 5% processed	Producer; trader; retail	9,096 producers; 100 traders; 40 retail outlets	90% of producers are small-scale, 10% are large-scale; 80% of traders are small-scale and 20% medium scale; all retail points are small-scale
Export chain	2% of Karaman output is being exported	100% fresh	Producer; trader; exporter		Large scale producers; large-scale traders; medium and large-scale exporters

TABLE 4: CHAIN OVERVIEW IN KARAMAN PROVINCE (SOURCES: AGRICULTURAL CHAMBER OF KARAMAN; YILDIZBAŞLAR COLD STORAGE COMPANY IN KARAMAN)

1.3 Producer farm types

Turkish agricultural production typically takes place at family-owned farms with family members providing most of the farm labour. An agricultural census conducted in 2001 recorded 3 million agricultural holdings, the majority of which being small farms. About 65% of farms are less than 5

[33] Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

[34] 10th Development Plan, 2013 - 2018 – Efficiency of Agricultural Structure Working Group Report

[35] USDA (2012) Turkey Fresh Deciduous Fruit Annual: Turkish Apple and Grape Production See Modest Growth. USA Foreign Agricultural Service Global Agricultural Information Network

hectares in size and 79 % less than 10 hectares and 34 % of the total land is under the possession of those businesses. Only 6 % of the holdings have a size larger than 20 hectares.[36]

The pattern of land ownership is skewed and varies regionally due to differences in incomes and the crops grown; 84 % of the farmers own and cultivate 42 % of the area. Average farm size was 6.1 hectare with an average of six plots per farm. The past 15 years the total number of agricultural holdings decreased by about 20 %, which is in line with the fall in agricultural employment.[37]

In the deciduous fruit chain a few large commercial orchards were established in recent years which use better quality seedlings and newer technology. New varieties that are in high demand in importing countries are grown in these orchards. Most of the production is exported and there is an increasing trend of establishing new orchards specifically for exported-oriented production as it is more profitable.[38] For characteristics of farm types in Karaman Province see table 5.

Farm type	Number of farms	Average acreage	Total acreage	Average productivity	Total production	Share in national production	Average farmer age	Top ethnicities plus share
Small-scale farmers	8,180	2.23 hectare	18,212 hectare	15.7 ton per hectare	287,485 ton	9.95%	45 years	All Turkish
Medium-scale farmers	850	5 hectare	4,250 hectare	20 ton per hectare	85,000 ton	2.94%	40 years	All Turkish
Large-scale farmers	66	10 hectare	660 hectare	25 ton per hectare	16,500 ton	0.55%	40 years	All Turkish

TABLE 5: MAIN FARM TYPES IN KARAMAN PROVINCE (SOURCE: AGRICULTURAL CHAMBER OF KARAMAN)

1.4 Leverage

It can be concluded that export of apples from Turkey is so far very limited and for about 50% oriented at Middle Eastern countries. By far most apple production is for domestic use and originates from relatively small (family) farms. Export is mainly driven by relatively large farms and young investors. An example is the joint venture that was created in 2009 by Anadolu Group, Özgörkey Holding and Cutrale Group of Brazil that is investing in fruit plantations. The produce will not only be used for processing, but also for the fresh market.

[36] Turkish Statistical Institute (TUIK, 2012)

[37] Bayaner, A. (2009) Possible impact of the EU CAP on the sustainability of farming in Turkey. In: A. Cristoiu, T. Ratinger, S. Gomez y Paloma (eds.) Sustainability of the farming systems: Global issues, modeling approaches and policy implications. EC Institute for Prospective Technological Studies

[38] USDA (2012) Turkey Fresh Deciduous Fruit Annual: Turkish Apple and Grape Production See Modest Growth. USA Foreign Agricultural Service Global Agricultural Information Network

2 Farm and primary processing related sustainability issues

2.1 Agronomic sustainability

Agricultural practices

Orchards reach maturity and maximum production capacity in the seventh year after planting. The fruit is harvested in September and October.[39] On the typical small-scale Turkish farm this is all done by hand using traditional techniques that are sub-optimal compared to more modern techniques. There is minimal knowledge transfer by state extension services.[40] Farms are highly fragmented and this poses a challenge to the implementation of modern farming methods such as mechanization.

Fertilizer use

In the agricultural sector, until the 1950s Turkish agricultural practices have been almost completely organic by default, but especially in the 1970s there was a sharp increase in the use of synthetic fertilizers and pesticides. In 2005 Turkey used a yearly amount of 102.4 kilograms of chemical fertilizer per hectare, a figure that is similar to the world average (105 kg/ha) and lower than the European average (132 kg/ha).[41] Fertilizer use has remained relatively stable during the past decade (see figure 4),[42] but agricultural land has decreased in the same period (see figure 5).[43] This actually indicates an increase in the amount of fertilizer used per hectare in Turkey.

Fertilizer use on apple orchards is probably very low, but data are not available. The Antalya Province, which is the fifth apple producer in Turkey, is a region characterized by naturally unfavourable conditions for apple farming. However, apple can be grown under special climatic conditions that are found in some river valleys and lake basins. In these areas high levels of sodium and potassium are added to the soil to boost production. Farmers do generally not conduct soil and leaf analysis to determine the amounts of nutrients required.[44]

Pesticide use

The consumption of pesticide in Turkey has increased more or less every year since 1980s to 2008, but this trend has been reversing in the last 10 years. The overall pesticide use in Turkey has decreased from 50,000 tons to 40,000 tons (27 % decrease) between 2002 and 2012 (note the different periods of measurement above - see table 6 below).

Pesticide consumption in Turkey is relatively low compared to more developed countries. Although the pesticide consumption in the Mediterranean and Aegean regions of Turkey, where intensive agriculture is

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[39] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

[40] Eğridir Fruit Investigation Institute, personal communication

[41] Olhan, E., Y. Ataseven and S. Gun (2005) Organic farming in Turkey. Pakistan Journal of Biological Sciences 89 (3) pp. 505-509

[42] TurkStat (2012) The Summary of Agricultural Statistics 2011

[43] Trading Economics website http://www.tradingeconomics.com/turkey/agricultural-land-sq-km-wb-data.html

[44] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

being performed, is more than the country's average level, the consumption of these regions does not supersede the level of more developed countries[45] [46] [47]. Turkey's average consumption is at the levels of about 0.4-0.7 kg/ha which is far below the levels consumed in EU countries.[48] [49] [50]

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
55,000	50.500	41.223	43.362	45.375	48.715	39.991	37.183	38.703	40.110	40.011

TABLE 6: PESTICIDE USAGE IN TURKEY (TON)

Residue analysis carried out shows that products in Turkey have a decreasing level of pesticide contamination.[51] In Turkey the licenses of the preparations, including active ingredients that didn't pass EU evaluations, have started to be cancelled gradually. Production and importation of 75 active ingredients has been banned in early 2009 and in August of that year 49 additional active ingredients were taken off the market.[52] 180 more active ingredients have been banned between 2009 and 2013.[53]

One of the formulations that had been used in the past, but that is not allowed anymore in the EU and other more developed countries are powdered formulations. In Turkey, the production and importation of the pesticides in powdered formulations were banned on January 2006.[54]

In the apple sector folimat (which contains the chemical agent omethoate, for more information see section 3.3) is still occasionally used in practice although it is prohibited by the Turkish government.[55] It is estimated that about 5% of small-scale producers still use folimat.[56]

A study conducted by Greenpeace in 2012 shows a different picture from the one described above: it found an alarmingly high rate of pesticides in fruits and vegetables from Turkey. Products that contained a level of pesticides that pose a high risk to health were bell peppers, pears and table grapes (*apples were not a part of the study*). Turkish peppers even contained the most excessive and dangerous amounts of

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[45] Delen, N., N. Tosun, S. Toros, S. Öztürk, A. Yücel, S. Çalı, 1995. The usage and production of pesticides. Turkey Agricultural Engineering IV. Technical Congress. Republic of Turkey Agricultural Bank Cultural Publications No: 26, 1015-1028.

[46] Delen, N., Durmuşoğlu, E., Güncan, A., Güngör, N., Turgut, C., Burçak, A. 2005. Pesticide Use, Residue and Sensitivity Decrease Problems in Turkey, Turkey Agricultural Engineering 6th Technical Congress, 3-7 Ocak 2005, 629-648

[47] Anonymous, 2010. Republic of Turkey Ministry of Food, Agriculture and Livestock, General Directorate of Protection and Control of Records, Ankara.

[48] Oskam, A. J., R. N. A. Vijftines and C. Graveland, 1997. Additional E.U. Policy instruments for plant protection, Wageningen Agricultural University, Wageningen, the Netherlands.

[49] Turabi, M. S., 2004. Pesticides, registration and licensing system in Turkey. Pesticides and Organic Farming Conference, KTMMOB Chamber of Agricultural Engineers, 9 June 2004, Nicosia, Turkish Republic of Northern Cyprus

[50] Delen. N. (2008) Fungicides. Nobel Publishing House, İzmir

[51] *DURMUŞOĞLU, E., O. TİRYAKİ ve R. CANHİLAL, 2010. Pesticide Use, Residue and Sensitivity Decrease Problems in Turkey, Turkey Agricultural Engineering 7th Technical Congress, 11-15 January 2010, Ankara. Proceedings 2, 589-607*

[52] Anonymous, 2009. Republic of Turkey Ministry of Food, Agriculture and Livestock, General Directorate of Protection and Control of Records, Ankara.

[53] Anonymous, 2009. EU Action on Pesticides. Directorate-General for Health and Consumers, European Commission. http://ec.europa.eu/food/plant/protection/evaluation/docs/factsheet_pesticides_web.pdf.

[54] Anonymous, 2013. Republic of Turkey Ministry of Food, Agriculture and Livestock, General Directorate of Protection and Control, Department of Plant Protection Products Records

[56] Yıldızbaşlar Cold Storage Company in Karaman, personal communication

pesticide chemicals of all 76 different fruits and vegetables evaluated. Of all 23 major fruit and vegetable exporting countries, Turkey had the highest number of crops in the category 'not recommended by Greenpeace for precautionary reasons'. [57]

Productivity
As can be observed from above data (table 2), commercial apple yields have gradually increased over recent years and are highest on large–scale farms (>25 ton per hectare). There is scope for productivity increase on small- and medium farms, but there is little incentive to do so if production is mainly for the domestic market.

2.2 Environmental sustainability

Population growth, unequal economic growth and degradation and loss of cropland pose threats to Turkish agriculture. Interactions between croplands and ecosystems are increasingly disturbed by degrading land uses and management practices through the emission of greenhouse gases, pollution of water, soil and air, loss of soil organic matter and biodiversity, erosion, salinization and desertification. This development can be reversed by increasingly adopting sustainable management practices, such as maintenance of soil organic matter by conservation tillage and residue management, windbreaks, selection of crops ecologically adapted to local climate regimes, efficient crop rotation, and enhancement of agro-biodiversity through intercropping and agroforestry, and adoption of proper drainage techniques.[58]

Water
In Turkey 4.3 million hectares were irrigated in 2005, which represents 15% of Turkish agricultural land. Irrigation has been growing steadily since the 1950s and is expected to grow further in the near future because of the importance of agriculture to Turkish economy. There are serious efficiency challenges in terms of water and financial resource use and in some regions water is scarce.[59]

The water consumed in Turkey in 2011 is 44 billion cubic meters and 73 % of this consumption is used in the agricultural industry.[60] Most of the irrigation systems are designed and operated by DSI (State Hydraulics Works) and GDVS (General Directorate of Village Services). Generally traditional methods are used in irrigation systems. In 81 % of the DSI operated schemes surface irrigation is being used, while 14 % is being irrigated by sprinkler and 5 % by drip irrigation. For GDVS 92 % of irrigated area was irrigated by surface irrigation, 7 % by sprinkler and 0.9 % was irrigated by drip irrigation methods. Land was mostly irrigated by well-sourced water (38 %), stream water (29 %) or water from a dam (16 %). Types of irrigation systems used, their water sources and their efficiency vary greatly all over Turkey.[61]

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[57] Greenpeace (2012) Food Without Pesticide: Shopping Guide for Fruits and Vegetables

[58] Evrndilek, F. and C. Ertekin (2002) Agricultural sustainability in Turkey: integrating food, environmental and energy securities. Land Degradation and Development 13 (1) pp. 61-67

[59] Cakmak, E.H., R. Kanber, M. Tuzun and M. Unlu (2005) Irrigation systems performance: Turkey. In: Lamaddalena, N. (ed.) Irrigation systems performance. Bari, Ciheam.

[60] 10th Development Plan, 2013 - 2018 – Efficiency of Agricultural Structure Working Group Report

[61] Cakmak, E.H., R. Kanber, M. Tuzun and M. Unlu (2005) Irrigation systems performance: Turkey. In: Lamaddalena, N. (ed.) Irrigation systems performance. Bari, Ciheam.

In the river valleys and lake basins of the Antalya Province mentioned above all apple farmers use irrigation to provide their orchards with sufficient water.[62] An increasing amount of land is being irrigated in Turkey, opening up opportunities for fruit and vegetable production, but consuming significant amounts of water.[63] For Karaman Province it is also being reported that all apple farmers, small, medium and large scale, use irrigation to water their lands and as a result of that there is soil erosion, rinsing out of nutrients and local flooding.[64]

Energy

A study into energy use in apple production in the Antalya Province shows that of total energy consumption chemical fertilizer (mainly nitrogen) is the biggest consumer of energy with 41 %, followed by electricity with 29 %. Out of all the energy used 96 % came from non-renewable sources and 4 % from renewable sources.[65] Comparison with energy use in other agricultural sectors shows that energy use in the apple sector is a bit higher than the sugar beet sector, but much lower than in tomato and cotton production.

2.3 Food security, quality, health and nutrition

Quality

Proper storage, transport and packaging are crucial in maintaining fruit quality. In Turkey, the main external influences affecting fruit are frost in wintertime and heat during the summer. [66] Under humid circumstances a fungal disease can develop, *Benturia inaqualis,* which causes the apple scab disease which is a source of significant loss. The summer heat causes burns.[67] Currently good storage and transportation facilities are largely lacking, leading to significant losses of between 30 and 40% of fruit and vegetable harvests. In the case of apples there was a loss of 750,000 tons out of total production of 2.5 million tons in 2009. It is estimated that only half of the apples are stored in more or less proper facilities in Turkey, but the government is investing in establishing cold storage warehouses in the countryside.[68]

There are apple varieties that have to be put on the market immediately or that can only be stored for a short period of time. Improving transportation is therefore another attention point, focussing on transportation without disturbances and conservation of apples at the right temperature. Easily decomposing varieties need special care in terms of air cooling and protection against damages.

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62 Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

63 Erkan, O. (1992) Fruit and vegetable production trends in Turkey. In: F. Lauret (ed.) Les fruits et legumes dans les economies meditarraneennes: Actes du colloque de Chania.

64 Yıldızbaşlar Cold Storage Company in Karaman, personal communication

65 Akdemir, S. H. Akcaoz and H. Kizilay (2012) An analysis of energy use and input costs for apple production in Turkey. Food, Agriculture and Environment 10 (2) pp. 473-479

66 Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

67 Anadolu company, personal communication

68 Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

Addressing these issues means a significant increase in transportation costs for which investors are needed.[69]

Health

The pesticide folimat, mentioned above as being abolished under law but still occasionally used, contains the chemical agent omethoate which can affect the nerve system.[70] Another attention point regarding health is patulin[71], a mycotoxin produced by a variety of moulds and commonly found in apples. In the European Union the limit is set to 50 micrograms per kilogram in both apple juice and cider and to 25 micrograms per kilogram in fresh apples.[72] The Turkish Food Codex lists the maximum residue levels allowed on food products. Turkey is currently harmonizing its food import regulations to those of the EU and Turkish Ministry of Agriculture officials sample products to ensure compliance with Turkish Maximum Residue Levels (MRL).[73]

2.4 Economic sustainability

Income

In a study conducted in Antalya Province in 2005 gross margin of apple accounted for 68 % of total gross margin of farm income. Apple production cost per unit was calculated to be 161,269 Turkish liras per kilogram; an apple is sold at a price of 280,581 TL/kg so the profit margin was 119,312 TL/kg. Material cost including fertilization, spraying and irrigation water was the biggest cost item representing 24 % of total production costs; harvesting and marketing is the second highest item (19 %), followed by depreciation, seasonal labour and interest on investment.[74] The following table 7 compares the different cost components of apple production between different countries, showing that production costs in Turkey are relatively low with a high proportion of costs from material inputs. Table 8 shows that in Turkey the costs per production unit are among the lowest.

COUNTRY	Manpower		Material		Total Variable Cost		Total Fixed Costs		Total Production Cost	
	€/ha	%	€/ha	%	€/ha	%	€/ha	%	€/ha	%
Italy	5.336	35,36	1.426	9,45	6.762	44,81	8.330	55,19	15.092	100
France	4.435	42,42	953	9,11	5.388	51,53	5.068	48,47	10.456	100
Germany	3.503	35,11	1.100	11,03	4.603	46,14	5.374	53,86	9.977	100
USA	3.978	41,02	871	8,98	4.849	50,00	4.849	50,00	9.698	100

[69] Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

[70] Wikipedia website http://nl.wikipedia.org/wiki/Omethoaat

[71] Elif Seckin Onen of ASYA, personal communication

[72] Wikipedia website http://en.wikipedia.org/wiki/Patulin

[73] Northwest Horticultural Council website http://www.nwhort.org/turkey.html

[74] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

Chile	2.024	39,72	786	15,42	2.811	55,16	2.285	44,84	5.096	100
Brazil	1.136	31,64	981	27,33	2.117	58,97	1.473	41,03	3.590	100
Poland	629	17,62	674	18,88	1.303	36,51	2.266	63,49	3.569	100
China	725	24,20	1.138	38,00	1.863	62,20	1.132	37,80	2.995	100
Turkey	911	23,75	963	25,08	1.874	48,83	1.963	51,17	3.837	100

TABLE 7: DISTRIBUTION OF THE COST ELEMENTS AT THE MAJOR APPLE PRODUCER COUNTRIES (BRUILLE AND BARRITT, 2005; DEMIRCAN ET AL, 2005)

COUNTRY	Total Production Costs (€/ha)	Yield (ton/ha)	Unit Cost (€/kg)	Ready to Pack Fruit %	Ready to Pack Fruit Cost (€/kg)
Italy	15.092	55,0	0,27	85	0,32
France	10.456	42,0	0,25	84	0,30
Germany	9.977	38,0	0,26	82	0,32
USA	9.698	42,0	0,23	72	0,32
Chile	5.096	50,0	0,10	70	0,15
Brazil	3.590	35,0	0,10	70	0,15
Poland	3.569	32,7	0,11	78	0,14
China	3.831*	16,0	0,24	85	0,28
China**	3.735*	30,0	0,12	85	0,15
Turkey	3.837	29,0	0,13	65	0,20

* Includes 836 €/ha packaging cost for Fuji variety

** The target yield that China may achieve in the near future (30 ton/ha)

TABLE 8: UNIT PRODUCT COSTS AT SOME OF THE MAIN APPLE PRODUCER COUNTRIES (KARAMÜRSEL ET AL, 2011)

Supply chain efficiency

In order for smallholders to further capitalize on apple income there are two major challenges: increasing production and improving marketing of apple as a commercial crop (which includes maintaining quality during storage and production). The apple market is not regulated and marketing receives little attention.[75]

[75] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

In the traditional chain smallholders mostly supply middlemen or dealers (80 % of the total apples sold[76]) who play a central role in the chain and capture a 'considerable share of value added'[77]. Because of the highly fragmented and small scaled structure of the agriculture, a sustainable and efficient economic relationship is not established between fruit growers and the industry. This structural deficit results in a high cost, inefficient system which is open to speculations by middlemen. Within this system, quantity planning, pricing and the quality are mainly the initiative of those middlemen.

Aggregation of products in specific gathering centres where the product is processed and distributed to the retail centres are an important element of the value chain. However, commercial centres are generally lacking. For successful commercial marketing, this would be an important area of attention.[78]

The fundamental cause of marketing problems is that in general producers are not organized. Issues like selecting and buying certain varieties, acquiring and applying new growing techniques in the orchards, buying and applying inputs, quality control, packaging and labelling should be organized by farmer groups to reduce cost and capture a bigger share of apple market value. This could be done by founding a federation, cooperative or union.[79]

2.5 Social sustainability

Demography

The number of agricultural employees in Turkey was more than 9 million in the 1980s, decreasing to around 4.9 million people in 2007. Since then the agricultural employment has been increasing, though with some fluctuation. According to the most recent figures, the agricultural employment has reached 6,3 million people in 2013, which is 24 % of the total employment in Turkey. The percentage of men employed in agriculture has decreased from 55,1 % in 2004 to 52,1 % in 2011; while the female employment increased from 44,9% in 2004 to 47,9 % in 2011.[80] In addition, 2.7 million women are working as unpaid family labour. This group is characterised by a high labour participation rate, low unemployment and a high illiteracy rate. Nowadays agriculture is still the most important source of employment in the Turkish economy.[81]

A study conducted in 2005 in Antalya Province found that the average farmer age was 48.62 years. There were no significant differences between farm groups with respect to growers' ages and education levels.

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[76] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

[77] Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

[78] Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

[79] Oguz, C., Z. Karakayaci and I.H. Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, June 9-10-2009 Sarajevo

[80] 10th Development Plan, 2013 - 2018 – Efficiency of Agricultural Structure Working Group Report

[81] Bayaner, A. (2009) Possible impact of the EU CAP on the sustainability of farming in Turkey. In: A. Cristoiu, T. Ratinger, S. Gomez y Paloma (eds.) Sustainability of the farming systems: Global issues, modeling approaches and policy implications. EC Institute for Prospective Technological Studies

About 11.9% of the population was illiterate, 6.9% could read and write and 55.6% were graduates from primary school.[82]

Working conditions

The employment of children as seasonal harvest pickers is an ongoing problem in Turkey's hazelnut, sugar beet, fruit and cotton sectors. During the summer entire families travel great distances to earn extra money as casual labourers and as a result the children may miss of school before and after the summer holidays.[83] Work is ongoing under the coordination of the Turkish Ministry of Labour and Social Security, with the help of related public institutional organizations and non-governmental organizations, to take precautionary actions and educate families to avoid child labour. With respect to the export market, all the major retailers follow EurepGAP or GlobalGAP procedures and are very sensitive towards issues that are not in line with social responsibility procedures. (See 3.1 for more information)

Refugees are another vulnerable group of workers in Turkish agriculture, especially refugees from the ongoing civil war in Syria. A significant group finds work in agriculture; in some cases illegally. Their daily wage, set by the Minimum Wage Determination Committee is between 9 and 13 lira per day, which is far below Turkish minimum wage (see section below). Local Turkish farmers are generally eager to employ migrant workers and refugees as they form an abundant and cheap labour force.[84] Companies that were caught illegally employing refugees were being levied with high fines. There are over 80 companies in Osmaniye, Gaziantep and Kilis that have faced legal processing.[85] Some Turkish businessmen are eager to legally employ more Syrians and advocate proper regulations.[86]

2.6 Governance and accountability

Agricultural policy

Turkey has a large agricultural sector that relies heavily on state support and policy intervention. Although there is general agreement that the sector has to become more innovative and more competitive, there is a tendency to be primarily concerned with mitigating the impact of trade liberalisation through social policy.[87]

Land rights

As 50% of agricultural land in Turkey is state-owned some farmers do not own the land they cultivate.[88] This is a problem for example in certification where farmers are in some cases required to have their own land title (see also the next section).

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[82] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

[83] Dutch Government website http://www.government.nl/news/2012/11/06/dutch-contribution-to-eliminating-child-labour-in-turkey.html

[84] Hurriyet Daily News website http://www.hurriyetdailynews.com/Default.aspx?pageID=238&nid=29404

[85] Sabah website http://english.sabah.com.tr/economy/2013/02/21/job-opportunities-for-40000-syrian-refugees-staying-in-turkey

[86] International Crisis Group (2013) Blurring the Borders: Syrian Spillover Risks for Turkey. Europe Report No 225

[87] Aerni, P. (2009) Editorial: Agriculture in Turkey – Structural Change, Sustainability and EU-Compatibility. International Journal of Agricultural Resources, Governance and Ecology 6 (4/5) pp. 429-439

[88] Konsten, C. (2008) Biologische landbouw in Turkije: De kinderschoenen moeten uit. Berichten Buitenland Sectorspecial 10.

Consolidation efforts of the government to resolve the problem of scattered lands have been on-going. By the end of 2011, approximately 2.89 million hectares of land consolidation area have been completed.[89]

3 Sustainability landscape of certification and sustainability initiatives

3.1 International initiatives or standards

EU cross-compliance

All farmers in EU member states have to comply with the law and EU farmers can apply for subsidy under the Common Agriculture Policy (CAP). Cross-compliance is the link between the two: it checks whether farmers receiving CAP money actually comply with all relevant regulation. In case of infringements there is a cut of budget for the receiving farmer. Compliance with relevant regulation and payment of CAP subsidies in managed by member states themselves.

Cross-compliance mainly includes two elements: statutory management requirements and good agricultural and environmental condition. Statutory management requirements refer to 18 legislative standards in the field of environment, food safety, animal and plant health and animal welfare. Good agricultural and environmental condition refers to a range of standards related to soil protection, maintenance of soil organic matter and structure, avoiding the deterioration of habitats, water management.

Since Turkey is applying for EU membership it is preparing to implement relevant laws and policies, including cross-compliance.[90]

GLOBALG.A.P.

GlobalGAP is the worldwide standard for good agricultural practices. It is a not-for-profit organization that sets voluntary standards for safe and sustainable agricultural production worldwide and more and more producers, suppliers and buyers are harmonizing their standards to match GlobalGAP. The organization began in 1997 as EUREPGAP, an initiative by European retailers in reaction to consumers' growing concerns regarding product sustainability and safety.[91]

GlobalGAP has a standard on fruits and vegetables covering soil, management, substrates, pre-harvest controls for plant protection product application, organic fertilizer application, pre-harvest check, harvesting, final produce packaging at points of harvest, produce handling covering hygiene, sanitary facilities, packaging and storage areas, quality control, pest control, post-harvesting washing, and post-harvest treatment.[92]

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[89] 10th Development Plan, 2013 - 2018 – Efficiency of Agricultural Structure Working Group Report

[90] This section is based on EU cross-compliance website (http://ec.europa.eu/agriculture/envir/cross-compliance/index_en.htm), the Turkish Ministry of Agriculture website (http://www.tarim.gov.tr/Sayfalar/Eng-1033/Anasayfa.aspx) and personal communication with Aymeric Berling of the EU cross-compliance unit

[91] GlobalGAP website http://www.globalgap.org/uk_en/who-we-are/

[92] GlobalGAP website http://www.globalgap.org/uk_en/for-producers/crops/FV/

The Turkish government has a project to promote the adoption of GAP criteria in Turkey. Besides a tool for cleaner and more sustainable production GlobalGAP certification is also a marketing tool to access the EU market: "it is aimed to provide safe food for consumers and to increase the export of fresh fruits and vegetables of Turkey". Trainings on good agricultural practices are given by the ministry. Training on quality management systems is provided by personnel from the Turkish Statistical Institute. Special focus is devoted to the fruit and vegetable sectors in the Project on the Expansion and Control of Good Agricultural Practices and organic farming. It starts with 13 provinces in fruits (citrus fruits, cherry, hazelnut, fig, grape and apple) and vegetables (onion, tomato, pepper, lettuce and cucumber) because of their great importance for Turkish export. [93]

Besides that the government provides a number of financial incentives for fruit and vegetable producers to adopt good agricultural practices and convert to organic production:[94]

- A support payment of 20 lira per decare [95] for fruits and vegetables and 80 lira per decare for farming dedicated to environmental protection.
- Farmers engaged in good agricultural practices are provided with 50% reduced interest on their agricultural loans.
- There is a project for the environmental protection of agricultural land called ÇATAK Support. The project is implemented 25 provinces and participating farmers receive a support payment of 135 lira per decare in 25 provinces.
- Certified raw materials, semi-finished products or organic farming products are not subject to a percentage of market tax (1% for those sold in wholesale market and 2% for others).

Despite these efforts the number of GlobalGAP certificate holders in the Turkish apple industry is limited: there are only 10 certificates belonging to 10 producers (groups).[96] A more detailed overview of the progress of GlobalGAP certification for Karaman and Nigde provinces is provided in table 9.

Name and description, including start date	Market share	Types and share of farmers involved	Share of fresh versus processed	Main drivers for compliance	Main barriers for uptake
GlobalGAP in Karaman	4% of Karaman apple production	100% medium and large scale producers	95% fresh; 5% processed	Demand by foreign markets	Traditional practices Turkish agriculture
GlobalGAP in Nigde	8 % of apple production	100% large scale	85% fresh; 15%% processed	Demand by foreign markets	

TABLE 9: OVERVIEW OF GLOBALGAP CERTIFICATION IN KARAMAN AND NIGDE PROVINCE (SOURCE: AGRICULTURAL CHAMBER OF KARAMAN; MIN. OF AGRICULTURE DEPARTMENT IN KARAMAN; AGRICULTURAL CHAMBER OF NIGDE)

[93] Turkish Ministry of Agriculture website http://www.tarim.gov.tr/Sayfalar/Eng-1033/Anasayfa.aspx

[94] Republic of Turkey Ministry of Food, Agriculture and Livestock, website www.tarim.gov.tr/Sayfalar/Eng-1033//Icerikler.aspx?rid=375&NodeValue=375&KonuId=290&zGroup=0&ListName=Icerikler

[95] A decare is one-tenth hectare

[96] Kerstin Uhlig of GlobalGAP, personal communication

As mentioned above the two main incentives for GlobalGAP certification are the market opportunity of exporting mainly to the EU and protecting consumers by addressing food safety issues.[97] Retailers in the EU are increasingly asking for certified produce[98] and in the Netherlands and Scandinavia retailers demand at least GlobalGAP certification for fresh fruits.[99]GlobalGAP is seen as the most important certification instrument to access these markets and though its share is gradually growing, the share of certified apples in Turkey remains very low.[100]

The main reason for slow uptake is that traditional Turkish farming families cope with a lack of information on certification, lack of marketing channels to sell certified produce, limited understanding of quality control, and certification is an expensive process for them (see also the discussion on organic agriculture below).

Traceability is a specific barrier for certification of processed fruit (which is actually a small part of GlobalGAP certified fruit, see table 5 for example). Processed fruits (juice, concentrate and puree) are usually bought as bulk commodities with no indication of origin. In general there is very little known of where supply comes from and how it is being produced, apart from the occasional pesticide issues.[101]

Organic

In Turkey organic production started in the year 1984-85 with the production of sun-dried fruits and nuts.[102] The portfolio of organic products is growing steadily as can be seen in table 5.

[97] Akkaya, F., R. Yalcin and B. Ozkan (2004) Good Agricultural Practices (GAP) and Its Implementation in Turkey.

[98] Kerstin Uhlig of GlobalGAP, personal communication

[99] Kebba Colley of IDH, personal communication

[100] Akkaya, F., R. Yalcin and B. Ozkan (2004) Good Agricultural Practices (GAP) and Its Implementation in Turkey.

[101] Kerstin Uhlig of GlobalGAP, personal communication

[102] Olhan, E., Y. Ataseven and S. Gun (2005) Organic farming in Turkey. Pakistan Journal of Biological Sciences 89 (3) pp. 505-509

Years	Number of products	Number of producers	Acreage (ha)	Production (ton)
1996	26	1,947	6,789	10,304
1997	53	7,414	15,906	47,612
1998	67	8,199	24,042	99,300
1999	92	12,275	46,523	168,306
2000	95	18,385	59,985	237,210
2001	98	15,795	11,324	280,328
2002	145	12,428	89,827	310,125
2003	170	13,016	103,500	359,131

TABLE 5: ORGANIC PRODUCTION, NUMBER OF FARMERS, NUMBER OF PRODUCTS AND ACREAGE IN TURKEY (SOURCE: OLHAN ET AL., 2005)

In 2005 total organic apple output in Turkey was 50,000 tons (which was about 2% of total production).[103] In 2011 there was 11,764 hectare planted with organic temperate fruit in Turkey (of which 4,254 hectare was under conversion and 7,511 hectare was fully converted) of which approximately 50% were apples.[104] This area corresponds to about 4% of apple production area (see Table 1). About 5% of certified organic apple production is processed and there is an increase in organic apple juice exported from Turkey.[105] There is considerable potential interest among farmers in switching over to organic farming as traditional agriculture was organic by design in Turkey.[106]

Prices for organic products are 30 to 50% higher and thus have a significant contribution to the nation's agricultural exports earnings.[107] They are mostly exported to West European countries like Germany, Netherlands, Switzerland, United Kingdom, Denmark and France.[108]

Certainly organic agriculture is an opportunity for Turkish farmers and exporters who use traditional means of production, but this does not mean that it is easy for these farmers to become certified. Farmers lack knowledge and means to become certified, they are generally not part of a joint marketing organization and do not apply appropriate quality control: there is presence of mycotoxins because of

[103] Konsten, C. (2008) Biologische landbouw in Turkije: De kinderschoenen moeten uit. Berichten Buitenland Sectorspecial 10.

[104] FiBL and IFOAM (2013) The World of Organic Agriculture: Statistics and Emerging Trends 2013.

[105] Olhan, E., Y. Ataseven and S. Gun (2005) Organic farming in Turkey. Pakistan Journal of Biological Sciences 89 (3) pp. 505-509

[106] Olhan, E., Y. Ataseven and S. Gun (2005) Organic farming in Turkey. Pakistan Journal of Biological Sciences 89 (3) pp. 505-509

[107] Konsten, C. (2008) Biologische landbouw in Turkije: De kinderschoenen moeten uit. Berichten Buitenland Sectorspecial 10.

[108] Olhan, E., Y. Ataseven and S. Gun (2005) Organic farming in Turkey. Pakistan Journal of Biological Sciences 89 (3) pp. 505-509

bad storage and drying practices. In some cases farmers do not own the land they cultivate, which is a requirement for certification.[109] Certification is a costly process so processors and exporters apply on behalf of a number of individual supplier producers.[110]

3.2 Schemes at the national level

Integrated and Controlled Product Management (EKUY)
Integrated and Controlled Product Management (EKUY) is a Turkish Integrated Production (IP) system by the Turkish Ministry of Agriculture for fruits, especially apple and citrus.[111] The goal of EKUY is "to ensure that natural environment and resources are protected during agricultural production, to increase productivity and quality, to train the producers to be the expert of their own fields and gardens."[112]

EKUY has the following criteria:[113]

- Agricultural production is done in accordance with the right technique.
- A blue flag is displayed on production sites.
- EKUY is implemented in accordance with the principles of plant protection applications.
- All methods for agricultural control are applied in conformity with each other.
- Environmental-friendly methods are prioritized.
- Use of chemicals is the last resort.
- Chemical applications are recorded.
- Samples are taken for chemical residues and analysed.
- Production and application of chemicals are constantly controlled.
- Following the analysis, the products meeting the requirements are certified.
- Certified products are marketed with EKUY logo.
- Quality and consumer preferences are taken into consideration in production.

Integrated production or integrated crop management is a sustainable production system that can be positioned somewhere along the continuum between conventional and organic agriculture. In Spain and Poland there are integrated production certification systems set up by the government (see the chapters on oranges from Spain and apples and strawberries from Poland). As far as we could assess by the information available from the Turkish Ministry of Agriculture there is no specific focus on water under the EKUY scheme, which is surprising given water scarcity in many areas (section 3.1).

In the main apple producer cities such as Isparta, Denizli, Çanakkale, Antalya, Karaman, the production is carried out in accordance with EKUY. About 20% of the farmers in Karaman Province produce under the EKUY scheme.[114]

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[109] Konsten, C. (2008) Biologische landbouw in Turkije: De kinderschoenen moeten uit. Berichten Buitenland Sectorspecial 10.

[110] Olhan, E., Y. Ataseven and S. Gun (2005) Organic farming in Turkey. Pakistan Journal of Biological Sciences 89 (3) pp. 505-509

[111] Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540.

[112] Turkish Ministry of Agriculture http://www.tarim.gov.tr/Sayfalar/Eng-1033//IceriklerDetay.aspx?rid=543&NodeValue=295&KonuId=280&ListName=Icerikler

[113] Turkish Ministry of Agriculture http://www.tarim.gov.tr/Sayfalar/Eng-1033//IceriklerDetay.aspx?rid=543&NodeValue=295&KonuId=280&ListName=Icerikler

[114] Agricultural Chamber of Karaman, personal communication

The effect of increased knowledge of the Turkish consumers about products manufactured in a healthier way and the demands coming from overseas in this direction has translated to the growers. For instance, according to the surveys conducted on apple growers in 2002 only 12% of producers were found to have knowledge about organic farming (Karamürsel et all, 2002). This proportion has risen up to 88% in 2011. In addition to that, the number of enterprises familiar with Integrated Pest Management and GlobalGAP and implementing those systems has also increased (Öztürk et all, 2011). In the coming years this is expected to increase more.

Drivers for compliance are the increasing awareness amongst consumers and producers in the internal market, increased profit margins, healthier food and the adoption of new production methods. Though on the increase, consumer awareness is still quite low and profit margins fluctuate. Knowledge transfer is limited because of the reach of extension services.[115]

ASYA's Green TAG

An example of company action in Turkey is Green TAG by company ASYA Fruit Juice and Food, one of the top five fruit processors in Turkey with a turnover of 20 million euro. It is located in Isparta and apple juice is one of its major products, other fruits include cherry, peach, pomegranate, apricot and pear.[116] The Green TAG initiative is about raising the sustainability and quality awareness amongst farmers by educating them on how to raise productivity and improve efficiency considering environmental and social effects.[117] The criteria of Green Tag are:

- Limiting omethoate to 0,02 mg/kg and patulin to 25 ppb (parts per billion)
- Clean fruit without mud
- Participation in all Green TAG farmer meetings[118]

The focus on product quality is the first step in the process of making ASYA supply more sustainable; environmental and social issues will be the next steps to be addressed under Green TAG.[119] This is the first year of Green TAG and ASYA is working with 100 small-scale farmers, by the end of 2015 the company wants to raise this number to 250. Initial trainings have been provided by the company in collaboration with public authorities and ASYA is satisfied about the progress so far, the first results have yet to become available.[120]

Sources

In order to gather relevant information the following main sources were consulted:

- FAOSTAT database
- TurkStat database
- Turkish Ministry of Agriculture website
- Turkish Ministry of Agriculture (2013) Plant Production Head Office Formal Report

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[115] Eğridir Fruit Investigation Institute, personal communication

[116] Elif Seckin Onen of ASYA, personal communication

[117] Elif Seckin Onen of ASYA, personal communication

[118] Elif Seckin Onen of ASYA, personal communication

[119] Hande Arzu Buyuklimanli, former ASYA, personal communication

[120] Elif Seckin Onen of ASYA, personal communication

- USDA (2012) Turkey Fresh Deciduous Fruit Annual: Turkish Apple and Grape Production See Modest Growth. USA Foreign Agricultural Service Global Agricultural Information Network
- Oguz, C., Z. Karakayaci, I.H, Kalyoncu (2009) Apple Production and Marketing in Turkey. International Symposium on Sustainable Development, Sarajevo
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- Erkan, O. (1992) Fruit and vegetable production trends in Turkey. In: F. Lauret (ed.) Les fruits et légumes dans les économies méditerranéennes: Actes du colloque de Chania
- Öztürk et al. (2011), The adoption levels and impact assessments of the results of innovations and investigations at the apple enterprises in the provinces of Isparta and Denizli : Concluded TAGEM (General Directorate of Agricultural Research and Policies) Project
- Karamürsel, D., Öztürk, F. P., Öztürk, G., Kaymak, S., Eren, İ. ve Akgül, H., 2003. Economic evaluation of the apple production in Egridir Region by determining the status and the problems. Horticultural Research Institute Directorate Publications, Eğrifir. V.
- Demircan V., Yılmaz, H., Binici, T., 2005. Determining the cost of apple production and the income in the province of Isparta. Journal of Agricultural Economy, 11(2) : 71 – 80.
- Karamürsel, D., Öztürk, P., Emre, M., 2011. Global Apple Industry and Economy of Production. Apple Culture, Akgül, H., Kaçal, E., Öztürk, F., Özongun, Ş., Atasay, A. ve Öztürk, G. (eds.). Eğirdir Horticultural Research Institute Publication No: 37.

Furthermore the following organisations and experts were consulted:

- Ebru Akdag, Food Engineer - Secretary General of MEYED (Turkish Juice Industry Association)
- Agricultural Chamber of Karaman
- Agricultural Chamber of Nigde
- Fruit Research Station, Eğridir
- Elif Seckin Onen of ASYA company
- Anadolu company
- Hande Arzu Buyuklimanli, former ASYA
- Aymeric Berling of EU cross-compliance
- Kerstin Uhlig of GlobalGAP
- Kebba Colley of IDH

Note that due to the summer holiday period, which coincided with the end of the Muslim fasting month, it was difficult to get hold of all experts and gather information. We have received good input on one of the main producing regions in Turkey, Karaman. The same goes for the results used from a study in Antalya.[121] We expect that the findings for Karaman and Antalya are representative.

[121] (Gul, M. (2005) Technical Efficiency and Productivity of Apple Farming in Antalya Province of Turkey. Pakistan Journal of Biological Science 8 (11) pp. 1533-1540).

Oranges from Spain

1 Production and supply

1.1 Overview of main production statistics

Oranges are the second largest EU fruit crop in terms of volume after apples. Within the EU Spain is the largest producer, representing over 50% of total orange production. Spanish orange production mainly focuses on fresh fruit; both for the domestic and the export market. The main orange varieties from Spain are navels, mostly used for direct consumption, and Valencia and Salustiana, which are either consumed fresh or in juice form. Processing is a buffer for production surpluses and for fruit that does not meet commercial standards for fresh oranges; more fruit is processed in years when fruit size is small or in case of overproduction. The orange juice sector in Spain is specialized in 'not from concentrate' juice and is therefore not a direct competitor of concentrated orange juice from Brazil or the United States.[122]

Spanish orange production amounted to 3.4 million tons in 2006, 2.7 million tons in 2007, 3.4 million tons in 2008, 2.7 million tons in 2009[123] and 3.1 million tons in 2010 (see figure 1).[124] Favourable weather conditions are the main determinant for production,[125] though alternate bearing and abandonment of unprofitable orchards caused a general trend of decline.[126] In 2009 there was a total of 288 thousand hectare planted with citrus[127], of which approximately 50% was devoted to orange production.[128]

The most important production regions are the Valencian Community, Andalusia and the Region of Murcia:

Valencian Community is the biggest orange production region in Spain: in 2008 total production equalled 1.4 million tons (*53% of Spanish total*); between 1999 and 2008 Valencia's production share went down from approximately 70% to little over 50% (see figure 1).[129] Citrus cultivation in 2009 took place on 170 thousand hectares (59% of total Spanish citrus area), of which approximately half was reserved for orange production.[130] Comunitat Valenciana has an average annual temperature of 18.3°C, 637.2 millimetre of rain per year; it has a size of 23,255 square kilometres and a total population of 4.9 million people.[131]

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[122] USDA (2009) GAIN report: EU-27 Citrus Annual

[123] IneBase 2010 data

[124] FAOSTAT

[125] It has to be noted that 99.95% of Spanish orange production is irrigated (source: Ministry of Agriculture (2012) Detallada hectareas citricos)

[126] USDA (2009) GAIN report: EU-27 Citrus Annual

[127] IneBase 2009 data

[128] EuroMedCitrusNet (2007) National Citrus Sector Analysis: Spain. Part of: Safe and High Quality Supply Chains and Networks for the Citrus Industry between Mediterranean Partner Countries and Europe

[129] Planels, J.M. and J. Mir (2009) Presente y futuro de la comercialización de cítricos

[130] IneBase 2009 data

[131] IneBase 2013 data

Andalucía is the second production region of Spain: in 2008 its total production was 1 million tons (*38% of total*); its share has gradually been increasing from 20% in 1999 to almost 40% in 2008 (see figure 1).[132] The citrus areas of Andalucía was 71 thousand in 2009 (which is 25% of the total Spanish citrus area), half of which was reserved for oranges.[133] Andalucía's average annual temperature is 19.6°C and has 487.3 millimetre of rain each year, its size is 87,300 square kilometres and its population totals 8.4 million people.[134]

Region of Murcia is the third production region but significantly smaller than the previous two: in 2008 its total production was 160,255 tons (*6% of national production*); its share remained relatively stable in the period 1999-2008 (see figure 1).[135] The citrus area of 2009 in Murcia was 34 thousand hectare (which is 12% of Spain's total citrus area, half of that was planted with orange trees.[136] Murcia's average temperature is 18.9 degrees, it has 261.4 mm of annual rainfall, its size is 11,313 square kilometres and its population counts 1.5 million people.[137]

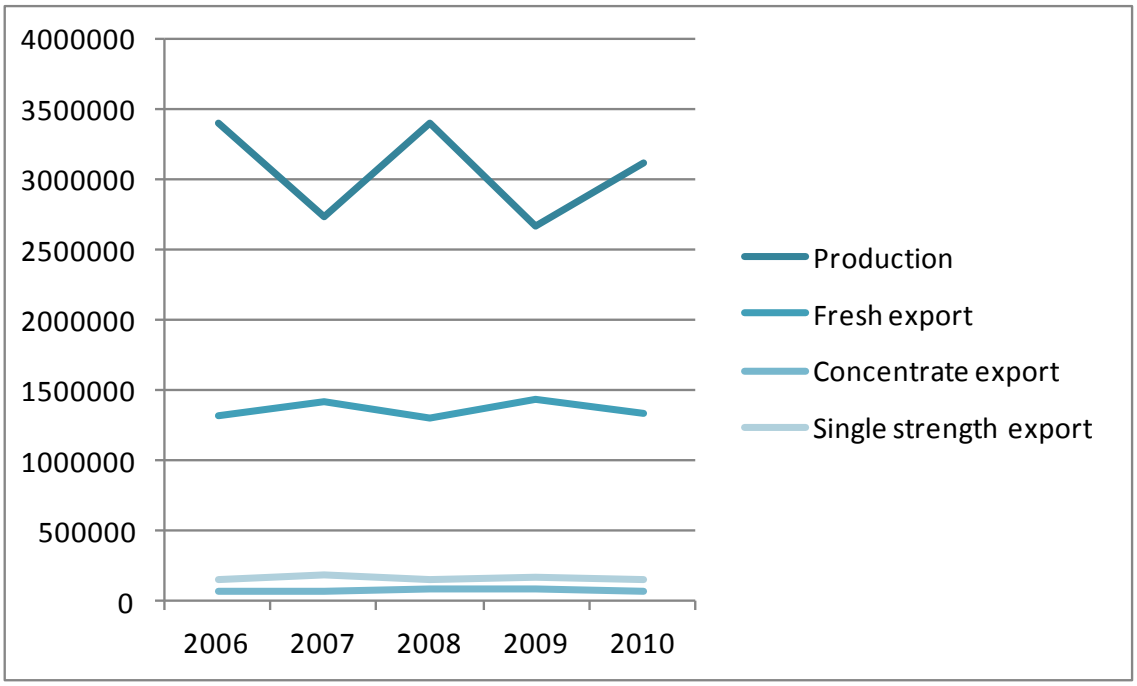

FIGURE 1 PRODUCTION AND EXPORT OF ORANGES FROM SPAIN (SOURCE: FAOSTAT)

[132] Planels, J.M. and J. Mir (2009) Presente y futuro de la comercialización de cítricos

[133] IneBase 2009 data

[134] IneBase 2013 data

[135] Planels, J.M. and J. Mir (2009) Presente y futuro de la comercialización de cítricos

[136] IneBase 2009 data

[137] IneBase 2013 data

1.2 Export market chain

The Spanish fresh citrus chain is basically divided into production; trade in origin, trade at destination and sales in store. The fruit goes from producers, through traders, to a central storage for fruit and vegetables. From there, logistical operators first take the fruit to wholesalers and from there to traditional shops or to distribution for modern retailers (see figure 2).

At the production side there were 103,400 citrus farms in Spain in 2012[138]; out of which 73,475 (or 71% of Spanish total) were in the Valencian Community, 11,886 (11%) were in Andalucía and 9,449 (9%) were in the Region of Murcia (these numbers vary from the production shares mentioned above; Valencia for example has a large proportion of small farms with relatively low output, see also section 2.3).[139] In 2011 there were 514 companies active in handling and packaging of fresh fruit and vegetable products and 221 companies involved in the canned, semi-preserved foods and vegetable juices industry (percentage of companies involved in the citrus or orange chain is unknown).[140] Out of the latter group there were 7 companies in the Valencian Community, 76 in Andalucía and 31 in the Region of Murcia.[141]

There are a number of sector organizations in the citrus chain. Asozumos is the main fruit juice association with 18 members, consisting of juice producers and packers. Other similar organizations are AIZCE, which is especially for citrus, and AILIMPO, specific for lemon and grapefruit, CLAM is the organization for Mediterranean citrus producers. ANECOOP is a large cooperative with nation-wide representation that has citrus producers amongst its members for which it has developed a standard based on GlobalGAP criteria see section 4 below). There is also Instituto Valenciano de Investigaciones Agrarias (IVIA) that amongst others conducts research into the citrus sector and irrigation.[142]

Spain is the fifth largest importer of oranges in the EU; in 2010 it imported 137,011 tons of fresh oranges, 68,387 tons of single strength orange juice and 17,788 tons of orange juice concentrates.[143] Between 2005 and 2010 imports decreased by 2.2% per year, with the most significant drops in 2008 (-4.4%) and 2009 (-32%), which can be explained by the economic crisis. In 2010 imports grew again by 19%.[144]

About 20% of fresh orange production is designated for processing, as stated above this is mostly done with abundant fruit or fruit that doesn't meet commercial standards.[145] The main market is the fresh market: between 20% and 50% of annual production is consumed domestically and around 40% is being exported annually. In 2010 export of fresh oranges was 1,341,222 tons, export of single strength juice 147,465 tons and export of concentrate 63,571 tons. For an overview of import, production, processing, consumption and export see figure 3.

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[138] Ministry of Agriculture (2012) Detallada hectareas citricos

[139] IneBase 2009 data

[140] A list with the names of the main companies in the sector is available

[141] IneBase 2011 data

[142] IVIA website http://www.ivia.es/

[143] FAOSTAT 2010 data

[144] CBI (2011) Fresh oranges in Spain

[145] EuroMedCitrusNet (2007) National Citrus Sector Analysis: Spain. Part of: Safe and High Quality Supply Chains and Networks for the Citrus Industry between Mediterranean Partner Countries and Europe

As indicated above the processed fruit chain is supplied with fruit that does not meet commercial standards for fresh fruit or in cases of over production. This means that the side-products of the entire fresh supply chain go into the processed chain and thus that production by all types of farmers feed into both the fresh and chains. As can be seen in figure 4 most oranges are fed into the fresh chain (20-50% is consumed domestically and around 40% is exported) and a much smaller portion is processed (about 20% with minor portions exported as single strength and concentrated juice).

CUADRO 3

Evolución de la producción de naranjas españolas. Toneladas

CAMPAÑAS	C. VALENCIANA	MURCIA	ANDALUCÍA	CATALUÑA	OTRAS	TOTALES
1998-99	1.668.463	104.380	519.179	40.143	56.200	**2.388.365**
1999-00	1.750.738	105.380	558.405	41.700	52.700	**2.508.923**
2000-01	1.683.295	144.070	778.594	51.920	57.380	**2.715.259**
2001-02	1.666.203	156.350	814.922	51.920	57.380	**2.746.775**
2002-03	1.645.666	172.540	952.586	46.490	59.000	**2.876.282**
2003-04	1.742.783	179.315	1.035.247	40.430	60.000	**3.057.775**
2004-05	1.572.133	183.720	978.093	63.390	75.580	**2.872.916**
2005-06	1.081.945	175.610	848.339	46.573	52.000	**2.204.467**
2006-07	1.736.449	187.580	1.070.523	72.000	73.250	**3.139.802**
2007-08	1.425.210	160.255	1.021.780	43.481	35.000	**2.685.726**

FUENTE: MAPA/Previsiones Cosecha de Cítricos.

GRÁFICO 2

Evolución porcentual de la producción de naranjas

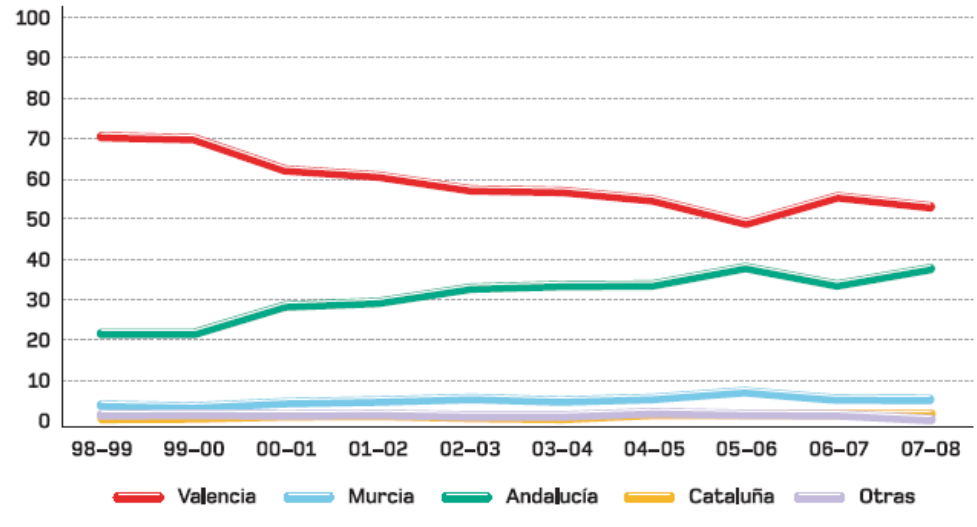

FIGURE 2 OVERVIEW OF THE ABSOLUTE SPANISH ORANGE PRODUCTION PER REGION (CUADRO 3) AND THEIR RELATIVE RELATIONSHIPS (GRÁFICO 2). SOURCE: PLANELS, J.M. AND J. MIR (2009) PRESENTE Y FUTURO DE LA COMERCIALIZACIÓN DE CÍTRICOS

FIGURE 3 OVERVIEW OF THE FRESH DOMESTIC CITRUS CHAIN IN SPAIN. SOURCE: CAPGEMINI AND TRAGSATEC FOR MARM. ESTUDIO DE LA CADENA DE VALOR Y FORMACIÓN DE PRECIOS DE CÍTRICOS

Import	Fresh oranges 137,011 tons	Single strength 68,387 tons	Concentrate 17,778 tons
Production	Fresh oranges 3,114,800		
Processing	20% of fresh orange		
Consumption	20% - 50% of fresh orange		
Export	Fresh oranges 1,341,222 tons	Single strength 147,465 tons	Concentrate 63,571 tons

FIGURE 4 IMPORT, PRODUCTION, PROCESSING, CONSUMPTION AND EXPORT OF ORANGES IN SPAIN 1.3 PRODUCER FARM TYPES

There is a range of farm types in the Spanish citrus sector in terms of size and technology use, moreover there are significant differences between producer regions. Generally speaking farms with up to 5

hectares are considered small, between 5 and 50 hectares medium and 50 and over large.[146][147] Based on the above definition, out of the total 103,400 citrus farms in Spain 78% are small-scale, 19% is medium-size and 2% is large-scale.[148] For the three main production areas the division is as follows:

- In the Valencian Community the division is 84% small-scale, 15% medium size and 1% large-scale;[149] average farm size in the three provinces of the Valencian Community in 1999 was 1.8 hectare for Alicante, 1.6 hectare for Castellon and 1.3 hectare for Valencia (compared to 1.4 hectare, 1.1 hectare and 1.0 hectare respectively in 1989).[150]
- Production in Andalucía is more large-scale, the division is 61% small-scale, 31% medium size and 8% large-scale.[151] Average farm size in 1999 was 5.7 hectare in the province of Sevilla and 8.2 hectare in the province of Huelva (compared to an average of 4.2 for both provinces ten years earlier).[152] West Huelva, the western-most point of Andalucía, is the most large-scale production region in Spain with an average farm size of 25 to 30 hectare (though it was 57.8 hectare in 2001). In Huelva there are roughly two types of farms: 1) mixed farms of around 25 hectare that produce citrus fruit and strawberries and 2) farms that produce citrus only on an area greater than 30 hectare.[153]
- In Murcia the division is 78% small-scale, 18% medium size and 4% large-scale farmers;[154] average farm size was 1.7 hectare in 1999 (compared to 1 hectare ten years earlier).[155]

In Valencia production is mostly small-scale. Large-scale production is concentrated in the Cartagena area of Murcia and in Andalucía . West Huelva in Andalucía is the region with the most large-scale production in Spain; farms with over 50 hectares cover 60% of total citrus-planted area. The general trend in all three regions is that farms are getting bigger and that the total number of farms is decreasing.[156] In West Huelva however the trend of increasing farm size has reversed during the last ten years.[157]

In terms of degree of technological innovation and externalisation of costs Spanish citrus farms can be classified into five groups:[158]

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[146] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España

[147] Natera Rivas, J.J. and A.E Batista Zamora (2013) Caracterización de las explotaciones cítricas ecológicas en Andalucía. Revista Pilquen Sección Agronomía Ano XV no 13

[148] Ministry of Agriculture (2012) Detallada hectáreas cítricos

[149] Ministry of Agriculture (2012) Detallada hectáreas cítricos

[150] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España

[151] Ministry of Agriculture (2012) Detallada hectáreas cítricos

[152] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España

[153] iG4 Andalucía S.L. (2009) Resultados del estudio de costes producción cítricos – Provincia de Huelva

[154] Ministry of Agriculture (2012) Detallada hectáreas cítricos

[155] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España

[156] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España

[157] iG4 Andalucía S.L. (2009) Resultados del estudio de costes producción cítricos – Provincia de Huelva

[158] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España

1. *Modern farms* with state of the art technology to reduce (labour) costs and simplify management. Their owners are mostly persons that have other activities besides the farm and are often involved in management only, not in production activities. Outsourcing of harvesting and pruning activities is common on these farms, especially in case that there are no permanent employees.
2. *Family farms of small or medium size*, managed by professionals of above 50 or 55. At these farmers out-sourcing is limited to a minimum amount, though labourers are hired for the harvest and sometimes phytosanitary treatment is done by external parties. This type of farmer is becoming less common because of its age profile; when they are succeeded by their children the tendency is to outsource more and more activities. There is an increasing trend of cooperatives taking over the entire management of citrus farms.
3. *Young professionals with a business focus* that increasingly manage other farms as opportunities for expansion are limited due to high land prices. These people mostly play an overseer role, checking the development of the crop and making sure tasks are undertaken in due time. They either conduct these tasks themselves or hire sub-contracted to do so and thus become a kind of agro-service businessmen.
4. *Part-time farmers* that have their main job outside agriculture. These farmers outsource most of their work (like pruning and those tasks that require machinery) and execute overall management and non-specialized tasks themselves.
5. *Small-scale farms that are completely outsourced*: the owner leases out the farm to cooperatives or companies that take care of farm management and production tasks.

Especially in Valencia outsourcing is becoming common practice. This is partially caused by technological developments such as drip irrigation that significantly reduce the work load of tasks that were earlier conducted by the farmer himself (including fertilizer and pesticide application). This certainly facilitates a new form of agriculture in which the farmer becomes a part-timer or disappears from the farm altogether. The "old professionals" (see type 2 in the above classification) is slowly disappearing because external service providers take over the different roles that were inherent in these professionals. The practical tasks that have to be conducted on the farm are more and more done by cheap non-specialized workers, mostly from abroad.[159]

Box 1 Production in Huelva

Farmers in Huelva produce a wide range of citrus varieties, between 8 and 12 on average, which enables them to produce fruit year round and harvest from September until June (so that labour is needed in a balanced way throughout the year). The selection of varieties thus not only depends on their profitability but also on harvest time (to cover gaps in production). About 30% of production is sold in local markets and 70% is sold to merchants. Farms all make use of irrigation and are highly modern, although no use is being made of mechanized pruning and harvesting. Also in Huelva production is aimed at the fresh market; the fruit that does not qualify for that is destined for processing.[1]

[159] Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agriculture familiar en Espuma

Pests

Most of the citrus pests occurring in Spain at present are under satisfactory natural biological control (BC), either by indigenous or introduced natural enemies. However some pests are not controlled by natural enemies and the management of these species is based on insecticide use. Nevertheless, recent restrictions on pesticide usage within the EU have led to a renewed interest on alternative BC strategies. Present trends indicate that augmentative and conservation BC will probably play an increasing role in the Spanish citrus industry. Additionally, strategies aimed at the conservation of native natural enemies of all these pests are in progress.[160]

An example is Kelly's Citrus Thrips (KCT), *Pezothrips kellyanus*. KCT is a recently reported citrus pest worldwide and was first identified in eastern Spain in 2005. Nowadays it is the most abundant thrips species found in citrus flowers, causing important economic losses due to fruit scarring. Higher populations of some predatory mite species were associated with lower fruit damage caused by KCT suggesting potential for biological control.[161] Tests have also been done with the insecticides chlorpyrifos and spinosad, which were successful in terminating the thrips but also eliminated its natural enemies.[162]

Productivity

Productivity has increased significantly in Valencia, Andalucía and Murcia between 1999 and 2006 (but not in Catalonia and the Balearic Islands, the fourth and fifth production regions respectively).[163]

- As can be seen in figure 5 the citrus area in Valencia shrunk by 9.4% whereas its output grew by 10.6%. The area planted with orange trees decreased whereas the mandarin area increased. For orange specifically the area decreased by 19.5% and production increased by 10.6%.
- The biggest growth both in terms areas and output was in Andalucía: its area grew by 47.3% and its production by 69.2%. The trend here is an increase in productivity and area for mandarins and increased intercropping of citrus varieties. The area planted with orange trees increased by 43.5% and production increased by 72.5%.
- The citrus area in Murcia grew by 12.9% and its output by 21.7%, in fact all citrus varieties grew in terms of area and production. For orange there was a growth in area of 16.5% and increase in production of 33.7%.

2.2 Environmental sustainability

Soil

Lack of nitrogen, magnesium, iron, zinc and manganese are most common problems in the nutrient balance of Mediterranean soils.[164] Moreover erosion is a major cause of the rinse of nutrients[165][166], caused

[160] XII International Citrus Congress (2012) Book of Abstracts pp. 275

[161] XII International Citrus Congress (2012) Book of Abstracts pp. 281

[162] Tena, A., J. Catalan, C. Monzo, J.A. Jacas and A. Urbaneja (2009) Control químico de Pezothrips kellyanus, nueva plaga de los cítricos, y sus efectos sobre la entomofauna auxiliar. Levante agrícola 48 (397) pp. 281-289

[163] Server Izquierdo, R.J., A. Mateos Ronco and N.L. de Camilleri (2009) Cuestiones referentes al sector citrícola más relevantes para de definición de la política se seguros agrarios: situación actual y tendencias a corto y medio plazo. Centro de Investigación en Gestión de Impresas, Universidad Politécnica de Valencia

[164] Alfons Domínguez Gento. La citricultura ecológica. Junta de Andalucía – Conserjería de Agricultura y Pesca

[165] Gimenez Morera, A., J. Carles Membrado, A. Cerda and F.A. Gonzalex Penaloza (2013) Production, soil erosion and economic failure in new citrus plantations in Eastern Spain. EGU General Assembly 2013.

by the application of herbicides that have greatly reduced plant cover on valley slopes in Spain.[167] These are common problems on citrus orchards across Spain.

Organic production is an alternative to conventional use of agro-chemicals. A study on organic citrus in Andalucía found that soil enzyme activity is almost four times higher in organically managed system and the number of insects found in the soil 10 times higher.[168]

Water

Irrigation is applied in 99.95% of Spanish citrus plantations.[169] Water scarcity is a serious issue in the entire Spanish citrus production region, leading to regional conflicts, but nonetheless new citrus plantations continue to be developed.[170]

	% Variación 1999-2006	
	Superficie	**Producción**
Com. Valenciana	**-9,4**	**10,6**
Naranjo	-19,5	10,6
Mandarino	1,3	14,7
Limonero	-14,5	-14,5
Andalucía	**47,3**	**69,2**
Naranjo	43,5	72,5
Mandarino	100,0	123,6
Limonero	10,1	12,7
Región Murcia	**12,9**	**21,7**
Naranjo	16,5	33,7
Mandarino	124,2	75,9
Limonero	4,1	8,7
Cataluña	**41,1**	**30,1**
Naranjo	-42,4	-4,9
Mandarino	107,5	55,1
Limonero	-57,1	-9,1
Baleares	**-40,6**	**-71,7**
Naranjo	-44,4	-73,2
Mandarino	-11,1	-55,6
Limonero	-67,9	-71,9

Fuente: Elaboración propia a partir de MARM

FIGURE 5 CHANGE IN AREA AND PRODUCTION IN SPAIN'S FIVE MOST IMPORTANT CITRUS PRODUCTION REGIONS 1999-2006 (SOURCE: SERVER IZQUIERDO, R.J., A. NMATEOS RONCO AND N.L. DE CAMILLERI (2009) CUESTIONES REFERETES AL SECTOR CITRÍCOLA MAS RELEVANTES PARA DE DEFINICIÓN DE LA POLÍTICA SE SEGUROS AGRARIOS: SITUACIÓN ACTUAL Y TENDENCIAS A CORTO Y MEDIO PLAZO. CENTRO DE INVESTIGACIÓN EN GESTIÓN DE IMPRESAS, UNIVERSIDAD POLITÉCNICA DE VALENCIA)

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166 Cerdà, A. (2012) The impact of citrus production: An approach from the soil system

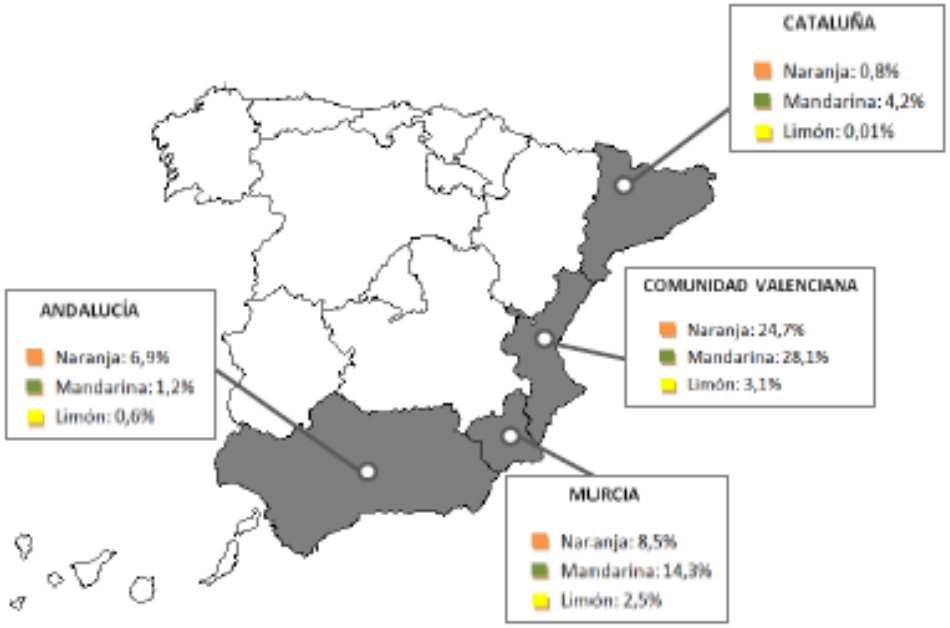
167 Cerda, A. and M.F. Jurgensen (2008) The influence of ants on soil and water losses from an orange orchard in eastern Spain. Journal of Applied Entomology 132 (4) pp. 306-314

168 Alfons Domínguez Gento. La citricultura ecológica. Junta de Andalucía – Conserjería de Agricultura y Pesca

169 Ministry of Agriculture (2012) Detallada hectareas citricos

170 EuroMedCitrusNet (2007) National Citrus Sector Analysis: Spain. Part of: Safe and High Quality Supply Chains and Networks for the Citrus Industry between Mediterranean Partner Countries and Europe

There is high awareness about water scarcity in Spain and a number of initiatives have been started to address it; an example is Royal Decree 1799/2008 which forms the legal basis for farmers to receive grants to modify citrus plantations. It is aimed at promoting new varieties of better quality and activities for more efficient irrigation. The plan is related to the EU Framework on agro-forestry grants in the period 2007-2013.[171]



Fuente: Elaboración propia a partir de MARM (2008)

FIGURE 6 DISTRIBUTION OF IRRIGATED CITRUS AREA PER AUTONOMOUS COMMUNITY IN SPAIN (SOURCE: SERVER IZQUIERDO, R.J., A. MATEOS RONCO AND N.L. DE CAMILLERI (2009) CUESTIONES REFERENTES AL SECTOR CITRÍCOLA MAS RELEVANTES PARA DE DEFINICIÓN DE LA POLÍTICA SE SEGUROS AGRARIOS: SITUACIÓN ACTUAL Y TENDENCIAS A CORTO Y MEDIO PLAZO. CENTRO DE INVESTIGACIÓN EN GESTIÓN DE IMPRESAS, UNIVERSIDAD POLITÉCNICA DE VALENCIA)

Following the EU Water Framework Directive there are a number of regulations in Spain that aim at adequately managing water in agriculture through efficient use and environmental protection and conservation. The 'Plataforma tecnologica Española del agua' (Spanish technical water platform) is a multi-stakeholder initiative to promote efficient irrigation.[172]

However, implementing new irrigation technology is progressing slowly. In Acequia Real in Valencia for example most farmers are hesitant to change from their centuries-old surface irrigation practices to drip irrigation (which is much more efficient). The aim was to transform the irrigation system by 2007, but by 2012 only 600 of the 25,000 hectare have been equipped by pressurized drip installations.[173]

[171] Spanish Government http://www.aesan.msc.es/en/AESAN/web/legislacion/subdetalle/etiquetado_alimentos.shtml

[172] Plataforma tecnológica española del agua website http://www.plataformaagua.org/index.php?id=36

[173] Boelens, R. and J. Vos (2012) The danger of naturalizing water policy concepts: Water productivity and efficiency discourses from field irrigation to virtual water trade. Agricultural Water Management 108 pp. 16-26

Energy use, air pollution and greenhouse gas emission

The pump used for irrigation uses about 80% of all energy consumed in citrus production[174] ; use of energy for watering machinery plays a role in photo-chemical oxidant (an air pollutant) formation and ozone depletion.[175] Besides the production process transportation is a major source of energy consumption and greenhouse gas emissions.[176] As described above initiatives to make irrigation in Spain more efficient are implemented but do not progress as quickly as anticipated. Therefore, there is still a lot of room for greater energy and water efficiency in irrigation.

2.3 Food security, health and nutrition

There is a whole range of chemicals, biological agents and materials that could end up in (processed) fruit. The presence of these matters in Spain is minimal[177] as they are regulated under EU law. Big companies moreover are generally HACCP (hazard analysis and critical control points) certified. HACCP is a method to identify food safety and allergenic, chemical and biological hazards in the production process and designs measures to reduce these risks to a safe level.[178] For the juice industry the main control points are pasteurization, cleaning and disinfection, cooling, handling. Best practices have been developed to deal with these points, moreover monitoring and taking corrective action, verification and documentation guarantee a constant check-up and correction of irregularities.[179]

In Spain all pesticides used in the citrus industry are under authorization and their concentrations regulated by maximum residue levels (MRLs). The problems arise when citrus fruit is exported to other countries that have different MRL standards, even within the EU.[180]

Since the EU is Spain most important export market the citrus industry has to adopt ever stricter norms to be able to continue exporting to other EU countries. In practice there have been export problems because pesticide levels exceed MRLs, but quantities rejected represented a small portion of total export. Moreover these cases are avoidable as long as regulations in the country of destiny are followed.[181]

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[174] Alfons Domínguez Gento. La citricultura ecológica. Junta de Andalucía – Conserjería de Agricultura y Pesca

[175] Sanjuán, N. and G. Clemente and L. Úbeda LCA of the integrated production of oranges in the Comunidad Valenciana (Spain). In: Halberg, N. (ed.) Life Cycle Assessment in the Agri-food sector: Proceedings from the 4th International Conference. October 6-8, 2003, Bygholm, Denmark

[176] XII International Citrus Congress (2012) Book of Abstracts pp. 370

[177] Aintzane Esturo of AZTI, personal communication

[178] Wikipedia: Hazard analysis and critical control points

[179] Murcia Salud website http://www.google.nl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CC8QFjAA&url=http%3A%2F%2Fwww.murciasalud.es%2Farchivo.php%3Fid%3D37720&ei=a7klUrSQK6Wy7AaF-ICwBA&usg=AFQjCNHTwRfxl-pqwHPwqYYOxhDdhyNGZQ&bvm=bv.51495398,d.ZGU

[180] Coscolla Ramon, R, Los residuos de plaguicidas en frutos cítricos: problemas y soluciones. Comunitat valenciana agraria.

[181] Coscolla Ramon, R, Los residuos de plaguicidas en frutos cítricos: problemas y soluciones. Comunitat valenciana agraria.

2.4 Economic sustainability

Diversification

In eastern Spain the structural water resource deficits, as well as the gradual decline in citrus prices received by farmers, have stimulated the co-plantation of other crops that are more resistant to water shortage, such as pomegranates. [182]

Supply chain efficiency

Challenges at production level are the following:

- Recruitment: There is a decrease of qualified workers with good overall knowledge of the sector (as described in section 2.3 and see section 3.5 for information on age distribution), therefore it has been necessary to hire people that are not specialized in citrus production in general, but specialize in managing the farm and outsourcing activities to either highly specialized and/or mechanized third parties or unskilled (migrant) labour. A sector analysis conducted by EuroMedCitrusNet in 2007 mentions that this development could have repercussions for the quality of the product, but no proof of this has been found.[183]
- Operational cost: harvesting is highly cost-intensive (around 60% of production costs) as labour is scarce and specialised machinery capital-intensive.[184]
- Cost reduction: costs have to be brought down for harvesting, planting, phytosanitary treatment, access to plantation[185]. As described this is increasingly done by mechanization and outsourcing to specialized parties or contracting cheap (migrant) labour.
- Commercial challenges: insecurity of production and market conditions, keeping fruit in good condition through cooling, adapting production to needs of clients, deviations of price indices, innovation of production and inter-sectoral and commercial relation-building.[186]

Challenges posed by increasingly concentrated international retail

European distribution is increasingly concentrated (the beginning was marked by the 1999 Carrefour Promodes merger) and increased competition, for example by German discount retailers (Aldi, Lidl). This process is characterized by: diminishing sales points and increase of their size; increasing size of distribution chains; unification, absorption and merger between chains/retailers; increased organization in chains of selling points; internationalization and globalization of distribution; development of the discount concept. Other challenges are saturated markets, increasing competition, increased bargaining power for concentrated retailers versus decreased bargaining power for their suppliers; reduction of the procurement structures (the big get bigger and push the smaller ones out); reduction of commercial margins; excessive dependence on supply; and increased complexity of risk in the chain.[187]

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[182] XII International Citrus Congress (2012) Book of Abstracts pp. 371

[183] EuroMedCitrusNet (2007) National Citrus Sector Analysis: Spain. Part of: Safe and High Quality Supply Chains and Networks for the Citrus Industry between Mediterranean Partner Countries and Europe

[184] Gil Ribes, J.A., G.L. Blanco Roldán and S. Casto Gacía (2009) Avances en la recolección mecanizada de la naranja. MAQ-Vida Rural

[185] Planels, J.M. and J. Mir (2009) Presente y futuro de la comercialización de cítricos

[186] *Ibid.*

[187] *Ibid.*

Cooperatives as an intermediate

Cooperatives are one of the most significant elements in the production and marketing of food products in Spain, as in other European countries. Cooperatives have emerged as the driving forces of rural areas, allowing the adoption of technology, leading the internationalization and developing important management tasks. In recent decades, their role has been intensified by globalization, ongoing regulatory requirements and the need for diversification that has emerged in rural settings in order to counteract urbanisation. Structural problems of holdings (small holdings in certain crops) have marked the need to group farmers in order to concentrate supply, internationalize, concentrate financial resources to promote joint R&D and ultimately to improve profitability. Through the strengths of the cooperative model are clear, in practice there is about organising amongst individual farmers (especially the old, professional farmer type mentioned above). On the other hand cooperatives increasingly take over farmers all over the Spanish citrus sector.[188]

2.5 Social sustainability

Migration

The largest groups of migrant workers working in Spanish agriculture are from Morocco, Ecuador, and Romania and, less prominently, from Bulgaria and other Eastern European countries.[189] Most of these workers execute seasonal labour during the harvesting season in the strawberry and grape sectors and less so in the citrus sector.[190] There are no exact numbers available and neither was there any specific issues found with regard to hiring migrant labourers.

In the Horta Nord region in Valencia foreigners represent 9% of the total population. The largest group are Romanians with a share of 18%, other significant groups are Ecuador, Morocco and Columbia (all around 6%). The current rise in unemployment in Spain means even higher unemployment for migrants compared to Spaniards. Many migrants are seasonal workers in agriculture.[191]

Age

The average age of Spanish farmers is 57, both for women and for men. 61% of male and female farmers are 55 or older (see figure 4). These data are representative for the Valencian Community, Andalucía and the Region of Murcia.[192] As we have seen above (see section 2.3) the group of farmers is ageing and slowly disappearing, their role is increasingly being taken over by service providers, machinery and foreign labourers.

[188] XII International Citrus Congress (2012) Book of Abstracts pp. 368

[189] Arango, J. (2008) Immigration and Spanish Agriculture. University of Madrid

[190] Aintzane Esturo of AZTI, personal communication

[191] Council of Europe website http://www.coe.int/t/dg4/cultureheritage/culture/sparda/valencia/valencia_en.asp

[192] IneBase 2009 data

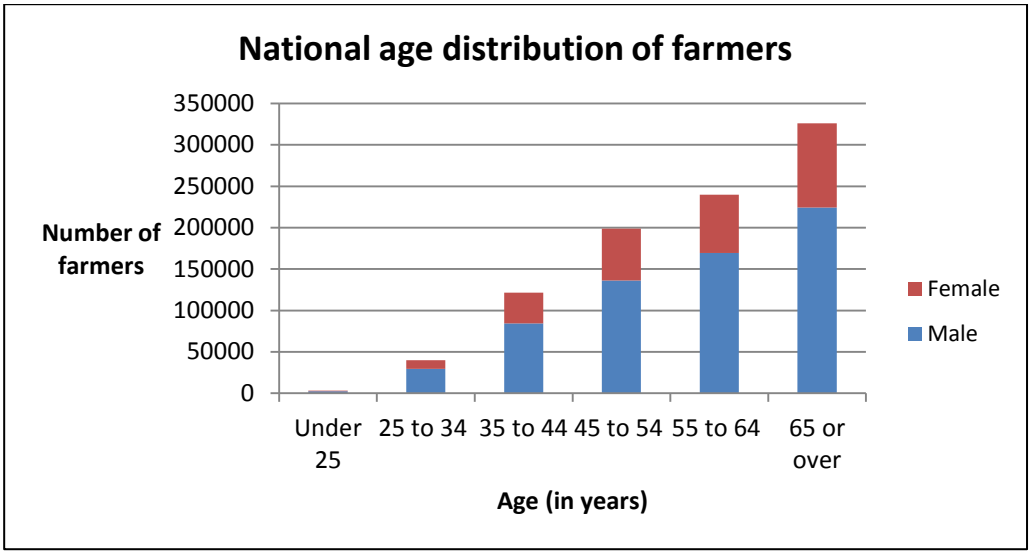

FIGURE 7 AGE DISTRIBUTION OF SPANISH FARMERS

3 Landscape of certification and sustainability initiatives

3.1 International schemes

EU cross-compliance

All farmers in EU member states have to comply with the law and EU farmers can apply for subsidy under the Common Agriculture Policy (CAP). Cross-compliance is the link between the two: it checks whether farmers receiving CAP money actually comply with all relevant regulation. In case of infringements there is a cut of budget for the receiving farmer. Compliance with relevant regulation and payment of CAP subsidies is managed by member states.

Cross-compliance mainly includes two elements: statutory management requirements and good agricultural and environmental condition. Statutory management requirements refer to 18 legislative standards in the field of environment, food safety, animal and plant health and animal welfare. Good agricultural and environmental condition refers to a range of standards related to soil protection, maintenance of soil organic matter and structure, avoiding the deterioration of habitats, water management.

Roughly 95% of all farmers in the EU receive CAP money; however the large, specialized fruits and vegetables producers in Spain are part of the minority group that does not receive any payment. Because of the scale and profitability of their companies they are not eligible for subsidies.[193]

[193] This section is based on EU cross-compliance website (http://ec.europa.eu/agriculture/envir/cross-compliance/index_en.htm), the Turkish Ministry of Agriculture website (http://www.tarim.gov.tr/Sayfalar/Eng-1033/Anasayfa.aspx) and personal communication with Aymeric Berling of the EU cross-compliance unit

GLOBALG.A.P.

GlobalGAP is the worldwide standard for good agricultural practices. It is a not-for-profit organization that sets voluntary standards for safe and sustainable agricultural production worldwide and more and more producers, suppliers and buyers are harmonizing their standards to match GlobalGAP. The organization began in 1997 as EUREPGAP, an initiative by European retailers in reaction to consumers' growing concerns regarding product sustainability and safety.[194]

GlobalGAP has a standard on fruits and vegetables covering soil, management, substrates, pre-harvest controls for plant protection product application, organic fertilizer application, pre-harvest check, harvesting, final produce packaging at points of harvest, produce handling covering hygiene, sanitary facilities, packaging and storage areas, quality control, pest control, post-harvesting washing, and post-harvest treatment.[195]

The number of certificate holders in the Spanish orange sector is 463, representing a total number of 5,542 certified producers (which is about 5% of total Spanish citrus producers).[196]

Organic

The total number of organic farms in Spain in 2009 was 20,788; out of this number 2,046 farms were located in Andalucía, 793 in Comunitat Valenciana and 287 in Region de Murcia.[197]Organic citrus production in 2013 in Spain has a share of 2.2% in terms of surface; there are 5,856 hectare under organic management of which 3,716 hectare is fully converted and 2,141 hectare is under conversion.[198] In total 55% of the organic citrus production is dedicated to oranges. Spain is the world's third producer of organic citrus after Italy (21,940 hectare) and Mexico (6,024 hectare)[199].

In Andalucía 1,361 out of 64,840 hectare (which corresponds to 2%) was planted with citrus under organic production criteria in 2006.[200] Andalucía has a 70% market share in organic citrus production; Valencia has 314 hectare (0.2% of total Valencian citrus area) and Murcia 183 hectare (0.5% of total Murcian citrus area) under organic citrus production. Within Andalucía the province of Almeria has 478 hectare, Malaga 298 hectare, Huelva 232 hectare and Sevilla 114 hectare.[201]

Organic production generally generates more income and has lower or equal incidence of pests. Moreover organic production is less costly on average as energy consumption for organic production is lower: 312 Kcal/Kg versus 662 Kcal Kg for conventional production. On the other side organic agriculture requires more work in fertilization and weed control and the cost of fertilizer is higher. Yields are lower or fruits tend to be smaller.[202]

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194 GlobalGAP website http://www.globalgap.org/uk_en/who-we-are/

195 GlobalGAP website http://www.globalgap.org/uk_en/for-producers/crops/FV/

196 Kerstin Uhlig of GlobalGAP, personal communication

197 IneBase 2009 data

198 FiBL and IFOAM (2013) The world of organic agriculture: Statistics and emerging trends 2013.

199 Organic World website http://www.organic-world.net/2408.html?&L=0

200 Alfons Domínguez Gento. La citricultura ecológica. Junta de Andalucía – Conserjería de Agricultura y Pesca

201 Directo del campo website http://www.directodelcampo.com/noticias/citricos-en-espana--txt--2j3gh57lm.html

202 Alfons Domínguez Gento. La citricultura ecológica. Junta de Andalucía – Conserjería de Agricultura y Pesca

3.2 National schemes

Producción Integrada

Producción Integrada is the Spanish initiative for Integrated Pest Management (IPM). It is a certification system managed by the Ministry of Agriculture. Biological and chemical control is used in such a way that demands of society are met, environmental protection and agricultural productivity are maintained and industrial standards are respected. [203] The criteria for PI are regulated under Spanish law and include the following topics:[204]

1. Soil preparation for new plantations
2. Planting material
3. Irrigation
4. Fertilizer use
5. Phytosanitary measures
6. Pruning
7. Soil and weed management
8. Pest and disease management
9. Harvesting
10. Post-harvesting

In 2008 13.6% of the citrus producing area in Spain was managed under Producción Integrada regulation. Under EU regulation it will be required that all farmers produce under IPM criteria from the first of January 2014 onwards.[205]

In 2012 was 47,020 hectare of citrus under PI regulation (which is about 16% of total area) at the national level. In the Valencian Community there was 35,912 hectare of PI citrus (about 20%), in Andalucía there was 4,320 hectare of PI citrus (around 5%) and in the Region of Murcia there was 5,695 hectare of PI citrus (around15%)of which 2,046 hectare of orange (which is also about 15%).[206]

Naturane

Naturane is a quality assurance scheme that aims to guarantee products from members of the cooperative Anecoop are of high quality and produced using environmentally friendly methods. Anecoop was founded in 1975, spans 11 regions of Spain and is recognized as the leading fruit and vegetable producer in the Mediterranean. It exports to 60 different countries and has 76 cooperative members with thousands of farmers 20. Naturane is approved by GlobalGAP.[207]

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[203] Ministry of Agriculture website http://www.magrama.gob.es/es/agricultura/temas/produccion-integrada/

[204] Info Agro website http://www.infoagro.com/calidad/prod_integrada/prod_integrada_citricos.htm

[205] Instituto valenciano de investigaciones agrarias – Gestión integrada de plagas de cítricos website http://gipcitricos.ivia.es/area/gestion-integrada

[206] Ministerio de Agricultura, Alimentación y Medio Ambiente (2012) Encuesta Producción Integrada a las comunidades autónomas

[207] Hart K and Menadue H (2013) Equivalence mechanisms used for complying with greening requirements under the new Common Agricultural Policy (CAP), Institute for European Environmental Policy, UK

In the growing season 2011/12 output at the national level was 339,539 tons of citrus (which is about 6% of Spanish citrus production). Anecoop is active in the Valencian Community (in Alicante, Castellon, Valencia), in Andalucía (in Almeria, Cadiz, Huelva, Sevilla) and in the Region of Murcia (Murcia).[208]

There are currently 1,852 Naturane certified citrus producers (which is about 2% of total Spanish citrus producers), organized in 11 producer groups. (These farmers are part of the larger group of GlobalGAP certified producers).[209]

Sources

The main statistical sources used in this report are:

- FAOSTAT database
- IneBase Spanish National Statistics Bureau
- Ministry of Agriculture (2012) Detallada hectáreas cítricos

The main publications used in this report are:

- Domínguez Gento, A. La citricultura ecológica. Junta de Andalucía – Conserjería de Agricultura y Pesca
- Estruch Guitart, v. (2007) La citricultura española: Evolución y perspectivas de futuro. Agricultura familiar en España
- EuroMedCitrusNet (2007) National Citrus Sector Analysis: Spain. Part of: Safe and High Quality Supply Chains and Networks for the Citrus Industry between Mediterranean Partner Countries and Europe
- iG4 Andalucía S.L. (2009) Resultados del estudio de costes producción cítricos – Provincia de Huelva
- Planels, J.M. and J. Mir (2009) Presente y futuro de la comercialización de cítricos
- Server Izquierdo, R.J., A. Mateos Ronco and N.L. de Camilleri (2009) Cuestiones referentes al sector citrícola más relevantes para de definición de la política se seguros agrarios: situación actual y tendencias a corto y medio plazo. Centro de Investigación en Gestión de Impresas, Universidad Politécnica de Valencia

Sector exports that were consulted:

- Aintzane Esturo of AZTI-Tecnicalia. Due to the summer period, which coincides with a gap in citrus production between September and June, it was virtually impossible to get the reactions of citrus sector experts in Spain.

[208] Anecoop CSR report 2011-2012

[209] GlobalGAP database https://database.globalgap.org/globalgap/search/SearchMain.faces?init=1

Strawberries from Poland

1 Production and supply

1.1 Overview of main production statistics

Poland is the world's third most important player in the market for individually quick frozen (IQF) strawberries[210]. In 2011 Polish strawberry supply consisted of 166,000 tons commercial production, 8,000 tons backyard production and 6,000 tons import. 85,000 tons of those strawberries were IQF, 56,000 tons were consumed fresh domestically, 20,000 tons were processed into puree and concentrate and 19,000 tons (11%) of fresh strawberries were exported (see figures 1 and 3). The EU is Poland's largest market for its strawberry exports. Among the EU member states Germany is the largest importer, while Russia is Poland's largest non-EU importer.

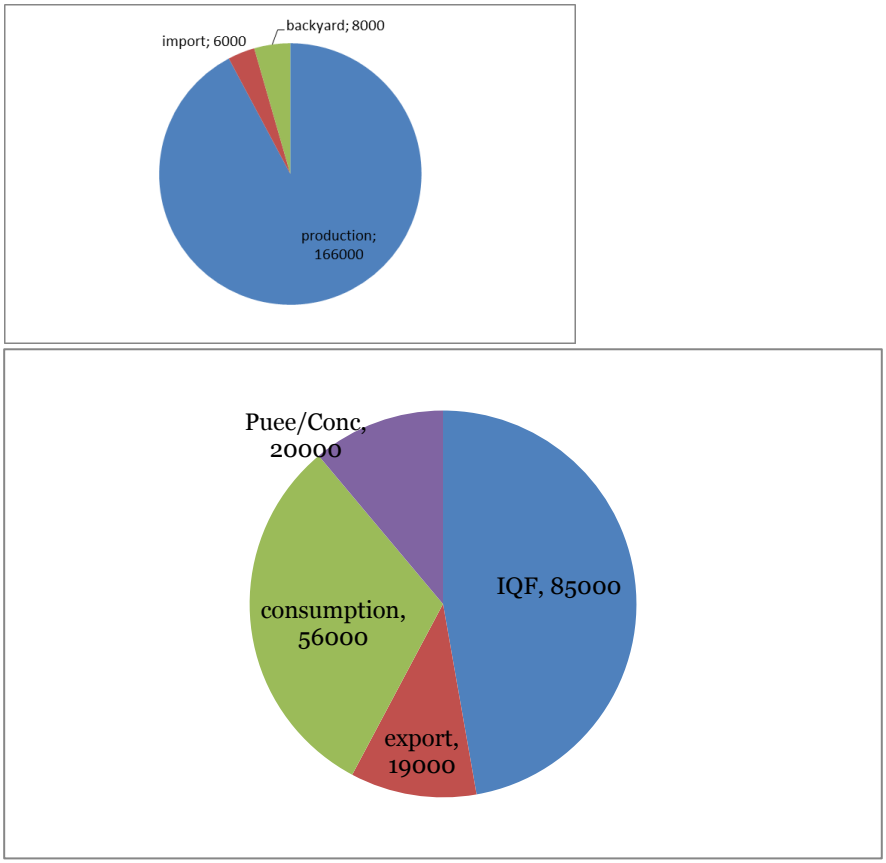


FIGURE 1 SUPPLY (LEFT) AND DEMAND (RIGHT) OF POLISH STRAWBERRIES IN 2011 (SOURCES: FAOSTAT, SVEND JENSEN, POLISH MINISTRY OF AGRICULTURE)

The total production of strawberries is more or less stable (see figure 2), however the production of strawberries for the processing industry is slightly decreasing (see figure 3). The production of fresh

[210] (04-2013), Poland Loses Ground in the Global Frozen Strawberry Market, http://www.fruitinform.com/en/news/153340#.Uih8xnKnu8U

strawberries is increasing; this is mainly because prices for fresh strawberries are increasing whereas the price for processed strawberries fluctuates.

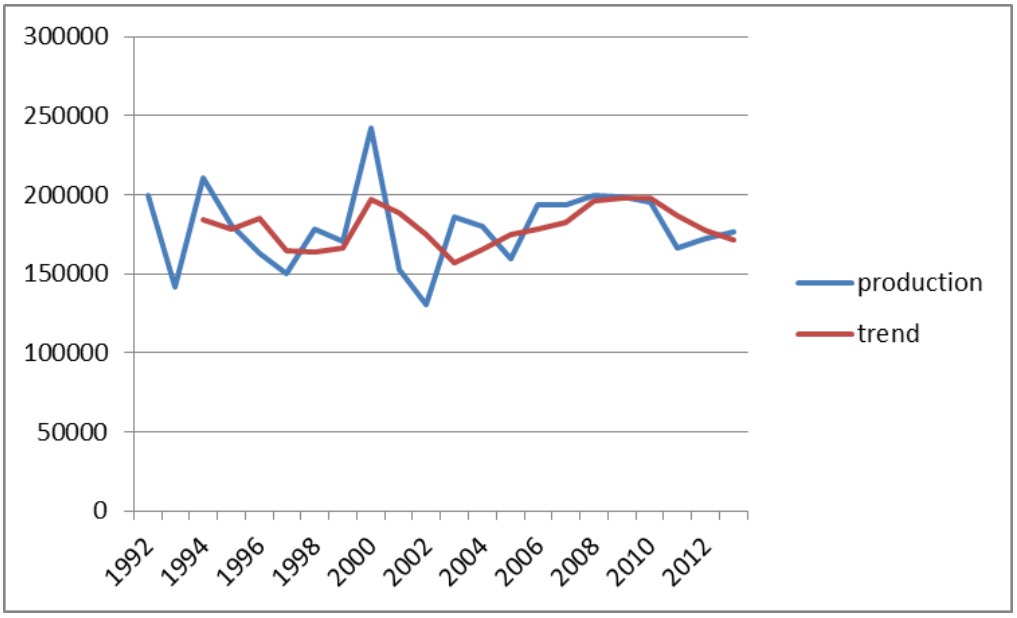


FIGURE 2 PRODUCTION AND THREE-YEAR AVERAGE TREND OF STRAWBERRIES IN POLAND 1992-2012 (SOURCE (STRAWBERRY PRODUCTION SYSTEMS IN POLAND T. JECZ, E. ZURAWICZ, A. MASNY)

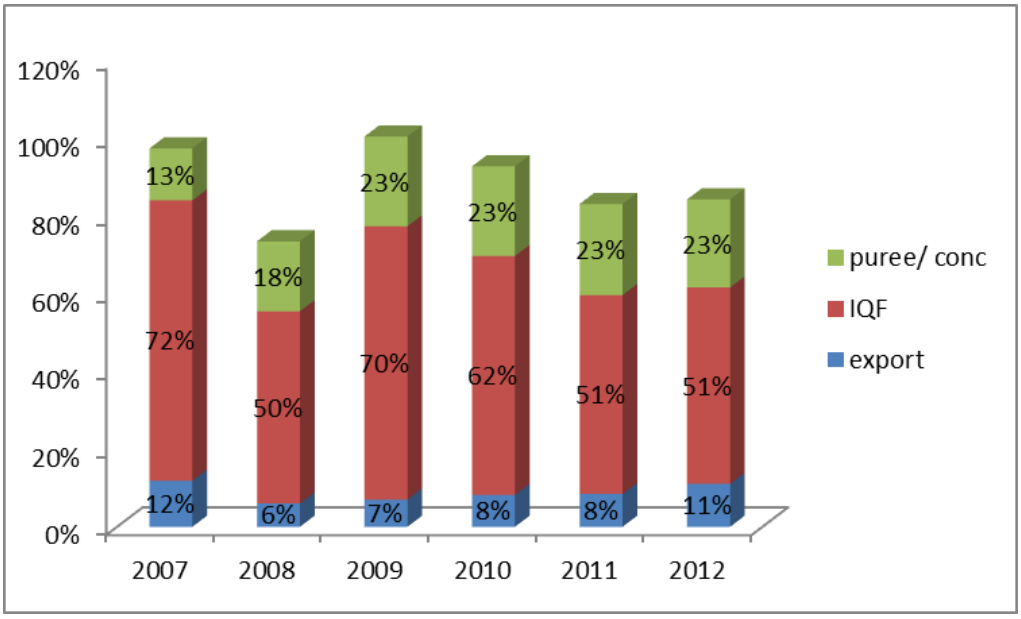


FIGURE 3 PROCESSED (PUREE/CONCENTRATE) AND INDIVIDUALLY QUICKLY FROZEN AND FRESH EXPORT POLISH STRAWBERRIES (SOURCES: FAO AND GERBERT DIJKGRAAF)

The main strawberry variety in Poland is Senga sengana, which has a 60% share in production (see figure 4). Senga Sengana is a variety especially developed by the German fruit processing industry as being more resistant towards diseases such as phytophtora and botrytis. Other varieties are Honeoye and Elsanta, which respectively represent 10 and 15% of the market. It is expected that in the future Honeyoe

and Elsanta production will increase because of increasing demand for fresh strawberries. Other varieties include Selva, Aromas, Diamante and Albion', which are grown on a much smaller scale.[211]

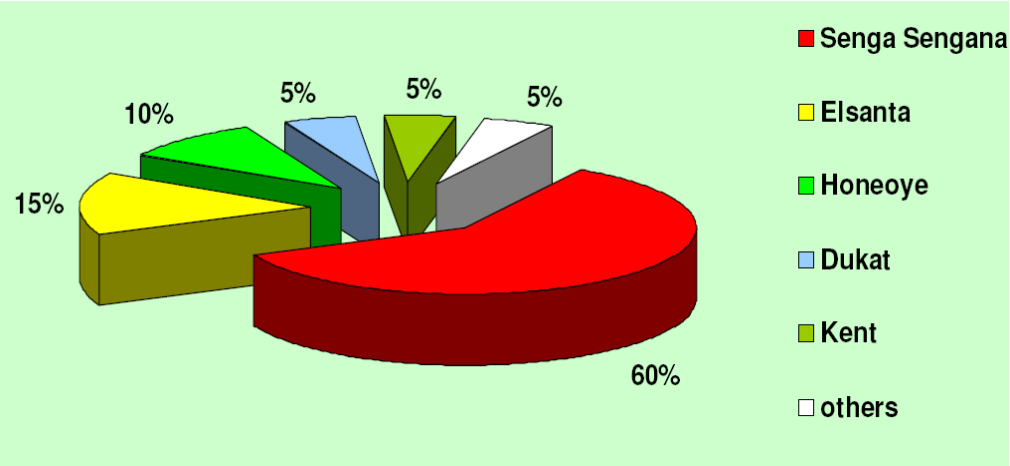


FIGURE 4 PLANTED STRAWBERRY CULTIVARS IN POLAND IN 2009 (SOURCE: LEO KLAASSEN, GERBERT DIJKGRAAF, AD VAN GOOL)

The biggest strawberry producing province in Poland is Mazowieckie with a share of 25% in national strawberry production. Other main production regions are Lublinskie and to a lesser extent Łódzkie and Świętokrzyskie (see figure 5). These provinces are located in the central-eastern part of Poland, relatively close to Belarus and Ukraine. There tend to be a lot of migrants from those countries working as seasonal labourers during strawberry harvest.[212]

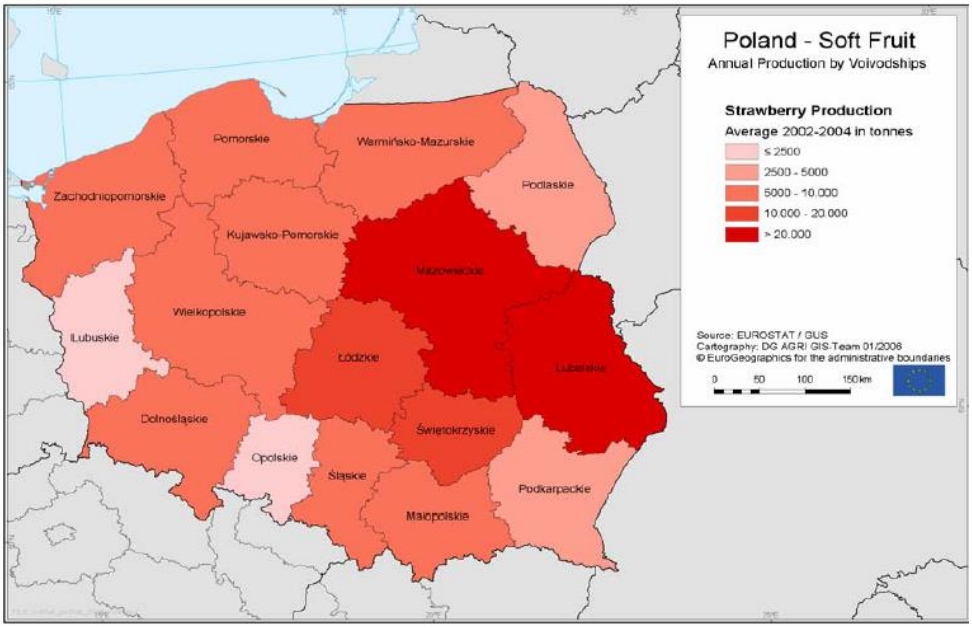


FIGURE 5 STRAWBERRY PRODUCING PROVINCES OF POLAND (SOURCE EUROSTAT)

[211] Flevoplant, Leo Klaassen, Ad van Gool

[212] Ministry of Agriculture, Ad van Gool, Gerbert Dijkgraaf

1.2 Export market chain

Figure 6 represents the Polish strawberry supply chain. Polish strawberry production is small-scale; 99% of farmers have less than 5 hectare under strawberry cultivation. Small-scale farmers typically supply local markets (40% of total supply) or sell their produce through intermediaries (around 25%). Around 20% of supply goes directly to wholesale markets or retailers; mainly from relatively larger and more organized farmers. Companies like SVZ and Austria Juice have direct contact with these larger farmers and farmer groups, however contracts between farmers and processors or factories tend to be the exception rather than the rule. About 15% of production is sold directly by farmers to consumers. Through intermediaries and wholesalers strawberries either find their way into the processing industry or are directly traded to retail parties and other sales points.

Storage is an important element in the strawberry chain: the highest concentration of cold storage centres and processing plants for apples and red fruit like strawberries is also found in the provinces of Mazowieckie, Lublinskie, Łódzkie and Świętokrzyskie (see figure 7).

The export of fresh strawberries is becoming more important. This is mainly because Poland is increasingly exporting to Scandinavia and Russia; together they have a market share of 80% of the fresh strawberry export from Poland. For the export of processed strawberries Germany is an important country. Germany is a large consumer of puree and concentrate; the former is used in the marmalade and dessert industry, the latter goes into the juice industry.[213] Figure 8 gives an overview of frozen fruit (IQF and other frozen fruit) export in different years, of which approximately 32% are strawberries.

[213] Global Fruit and Marek Povlanka

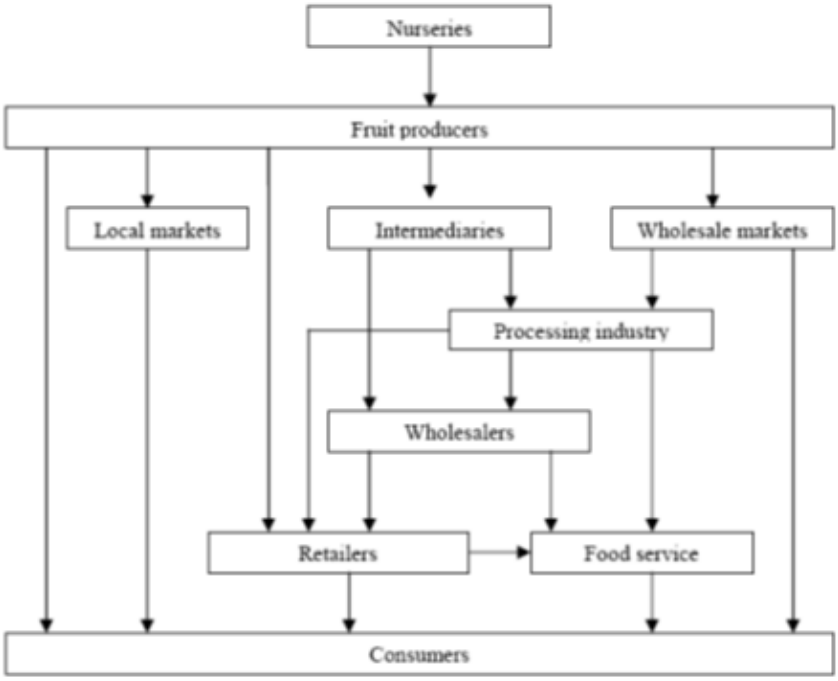


FIGURE 6 OVERVIEW OF THE POLISH STRAWBERRY SUPPLY CHAIN

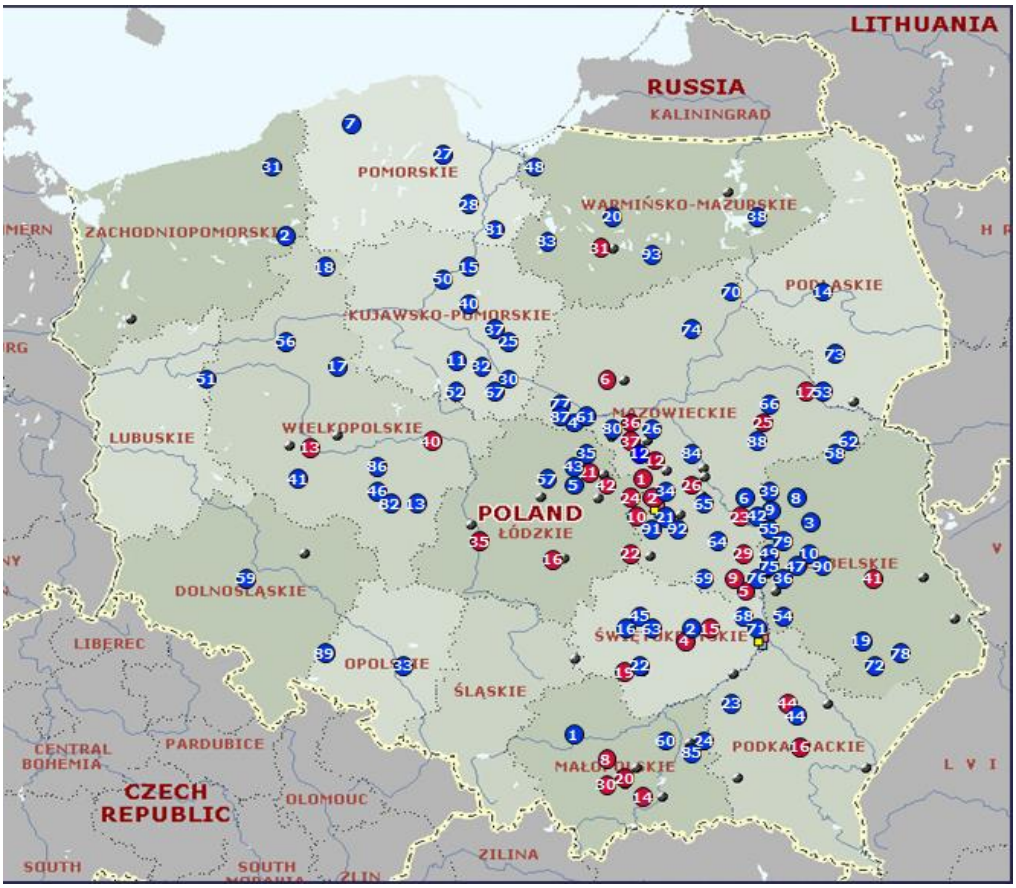


FIGURE 7 DISTRIBUTIONS OF 90 COLD STORAGE FACILITIES AND 40 PROCESSING PLANTS FOR APPLE AND RED FRUIT IN POLAND (SOURCE: MAREK POVLANKA)

Countries	2007/08	2008/09	2009/10	2010/11	2011/12
UE – 15 and	197,1	227,3	230,9	213,7	213,0
Germany	89,7	106,1	110,4	97,2	93,9
Belgique	17,7	21,8	17,2	20,0	21,5
Nhederlands	26,9	30,3	31,6	24,9	25,4
UE - 12 w tym:	5,9	5,4	5,9	6,9	7,1
Lituenia	0,3	0,4	0,7	0,7	1,0
Latvia	1,5	1,1	0,6	1,1	1,7
WNP w tym:	35,1	32,0	37,0	39,6	40,5
Russia	31,1	28,3	32,5	35,6	36,4
Ukraine	2,5	2,6	3,7	2,9	3,1
EFTA w tym:	7,1	8,7	8,0	7,9	7,1
Norway	4,7	5,8	5,3	5,8	5,2
Anothers	4,3	6,0	5,4	4,7	5,6
Total	249,5	279,4	287,2	272,8	273,3

FIGURE 8 POLISH EXPORT OF FROZEN FRUIT (SOURCE: CENTRAL STATISTICAL OFFICE OF POLAND)

1.3 Producer farm types

There are around 70,000 commercial strawberry farmers in Poland, which are mostly small-scale. About 30 -35,000 farmers produce strawberry of approximately one hectare and only 500 farmers have an area of over five hectares. There is a small group of farmers with an area of between 15 and 40 hectares and there are probably two farms between 300 and 500 hectares in size. Moreover there was a small-scale, non-commercial backyard production of 8,000 tons in 2011.[214]

In Poland there is a chronic lack of statistical data concerning both the supply and distribution of fruit. This is largely due to the fragmented production (i.e. many small-scale farmers produce small quantities of total production). This fragmentation causes difficulty in forging relationships with other chain participants and leads to high transaction costs due to the fact that information is dispersed. Also for this reason product quality is often very difficult to control.

According to Lemanowicz and Krukowski, "the majority of small farms are subsistence oriented and have only marginal contacts with the market. These small farms have practically no direct relations with large processing companies."[215] Some would argue that large companies make no investments to increase their relationships with producers (organizations) but see the scattered production as an opportunity for "cheap" sourcing of strawberries. This adds to the situation that small farmers know little about the market demands, product quality or up-to-date prices. These farmers will normally bring their produce to intermediaries at local collection points which are generally operated by private traders or processors. This delivery takes place on a casual basis with no contractual obligation for both parties. Over 60% of all deliveries to fruit processors are made by these intermediaries.

[214] Polish Ministery of Agriculture 2007/2012

[215] M. Lemanowicz, A. Krukowski, (2009), Qualitative and Quantitative Issues in the Fruit Supply Industry.

Strawberry picking is highly labour-intensive and still completely done by hand. Polish families are getting smaller and thus have less laboured available themselves. In addition, Polish strawberry farmers are generally ageing.[216] This is partially being compensated by a high influx of seasonal labourers from the Ukraine and Belarus.

The majority of Polish strawberry farms are characterised by traditional open cultivation in the field (see figure 9), in which fruits are picked from the beginning of June till the middle of July. During the last fifteen years more intensive production techniques have been coming up. These include:

- Cultivation of strawberries in greenhouses (mostly made from plastic). In this cultivation system the first strawberry fruits can be obtained in the end of April.
- Low covering of plants in early spring with perforated foil or needled cloth. This method of production allows obtaining ripe fruits 3-7 days earlier than from traditional plantations.
- Planting of late ripening or ever bearing cultivars as well as delayed planting of frigo plants (plants that are kept in cool and are planted late in order to extend the growing season). This is getting more and more popular and is combined with covering of cultivars, with black foil or with straw or vegetation. These strawberry plants are planted from mid-May till the beginning of July and picked from July till the middle of September.[217]

FIGURE 9 TRADITIONAL STRAWBERRY HARVESTING

[216] Polish Ministry of Agriculture

[217] STRAWBERRY PRODUCTION SYSTEMS IN POLAND T. JECZ, E. ZURAWICZ, A. MASNY

2 Farm and primary processing related sustainability issues

2.1 Agronomic sustainability

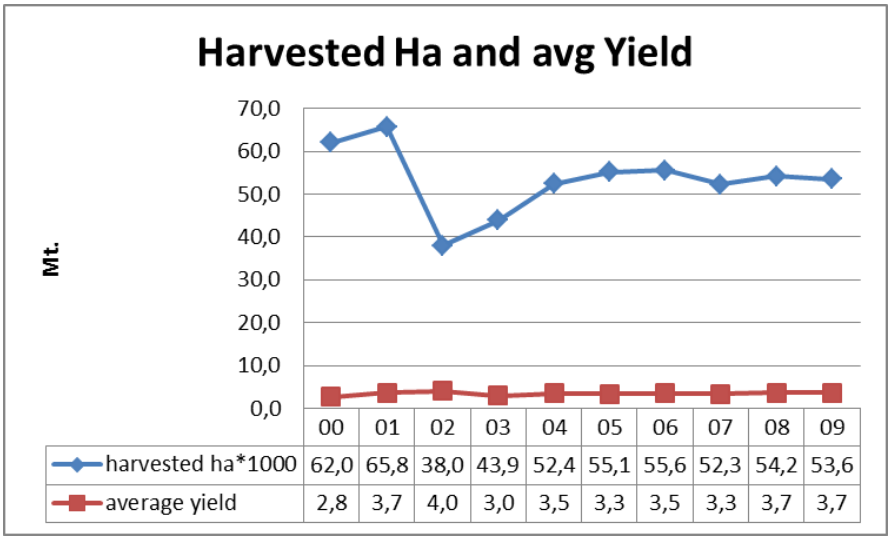
Productivity

Strawberry productivity in Poland is comparatively low: in 2009 it ranked 70 out of 76 producing countries in terms of productivity. Figure 10 shows harvested area and average yield between 2000 and 2009. Experts interviewed suspected that productivity is much higher in reality because Polish farmers claim they have more land than they actually have to receive more EU CAP payment (see also the section on cross-compliance below).

Another factor explaining remarkably low yields is the lack of irrigation systems on small farms: during dry periods only a few percent of Polish strawberry areas are irrigated.[218]

Plant material

In 2008 25 million strawberry seedlings were produced in approximately 1,150 nursery gardens in Poland, the vast majority of which were very small in size: 0.5 hectare or less. By comparison the second most important berry produced in nurseries is the black berry of which between 1.5 and 3.2 million seedlings were produced. Strawberry planting material mostly comes from abroad and 40% of the seedlings are supplied by non-Polish companies that have representation in the country.[219]



	00	01	02	03	04	05	06	07	08	09
harvested ha*1000	62,0	65,8	38,0	43,9	52,4	55,1	55,6	52,3	54,2	53,6
average yield	2,8	3,7	4,0	3,0	3,5	3,3	3,5	3,3	3,7	3,7

FIGURE 10 HARVESTED AREA AND AVERAGE YIELD FOR POLISH STRAWBERRIES 2000-09 (SOURCE: FAOSTAT)

[218] Makowska et al. 2005

[219] M. Lemanowicz, A. Krukowski, (2009), Quantitative Description of the Fruit Industry and Fruit Supply Chains in Poland.

2.2 Environmental sustainability

Pesticide use

Strawberries rank among the fruits with the highest pesticide usage and highest pesticide residues. In 2013 the fruit was rated 11th for the highest level of pesticide residue by the "Shoppers Guide to Pesticides".

In 2012 out of 121 samples tested in Poland the most common pesticide residue was found to be Pyrimethanil, found in 39 of 121 samples tested, the second most common was Procymodone, which was found in 20 out of 121 samples tested (see figure 12). In less than half of the samples residues of more than one pesticide was found (see figure 11).

Pyrimethanil is a fungicide which is potentially carcinogenic (an agent directly involved in causing cancer), a (ground) water pollutant and a reproductive and endocrine (hormonal) disruptor; the same accounts for Procymidone. The Pesticide Action Network rates it as one of the pesticides which gives cause for the highest level of concern due to its effects on both the natural environment and humans. Due to these risks Procymidone has been banned in the EU since the 30th of June 2008.[220] Experts indicate that sample tests probably represent the 'top of the iceberg' and state that it is alarming that Procymidone is found in so many samples.

In addition to the above, 25% of the samples tested showed residues of pesticides which are not registered for use in Poland, while 4% showed residues which exceeded the allowed Maximum Residue Level (see figure 13). Unregistered pesticides included Metalaxyl, Bifenthrin and Dietofencarb.[221]

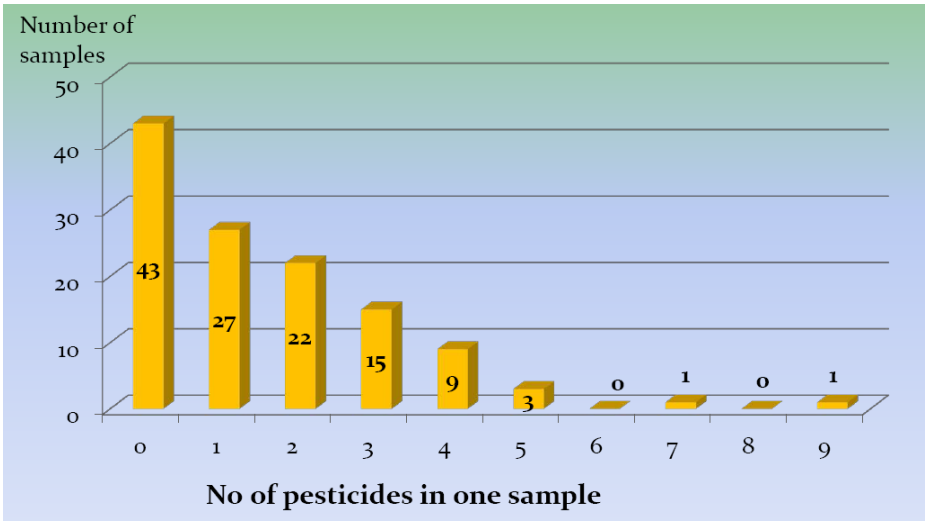


FIGURE 11 NUMBER OF PESTICIDES FOUND IN ONE SAMPLE FOR POLISH STRAWBERRIES (SOURCE: A. MISZCAK, (2012), PESTICIDE RESIDUES IN POLISH APPLES AND STRAWBERRIES)

[220] Miszczak, A. (2012) Pesticide Residues in Polish Apples and Strawberries. International Horticulture Institute

[221] Miszczak, A. (2012) Pesticide Residues in Polish Apples and Strawberries. International Horticulture Institute

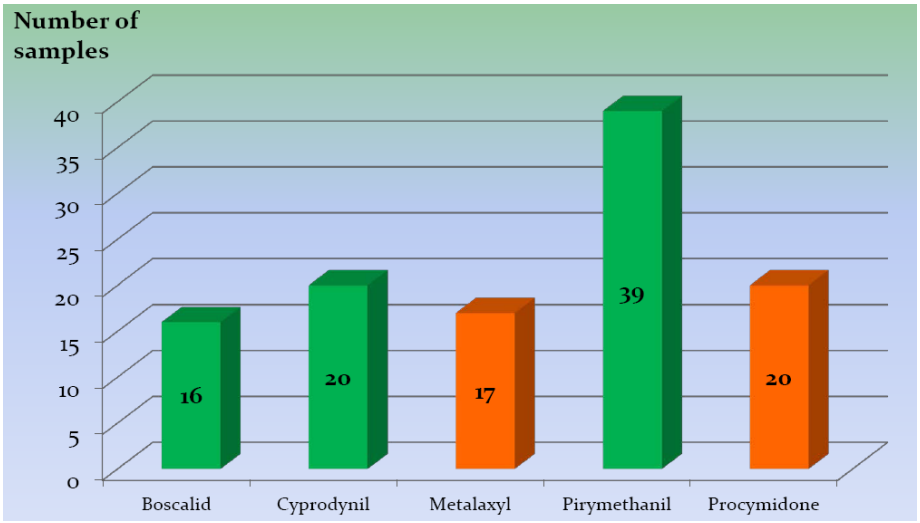


FIGURE 12 NUMBER OF SAMPLES IN WHICH A SELECTION OF PESTICIDES WAS DETECTED IN STRAWBERRIES (SOURCE: A. MISZCAK, (2012), PESTICIDE RESIDUES IN POLISH APPLES AND STRAWBERRIES)

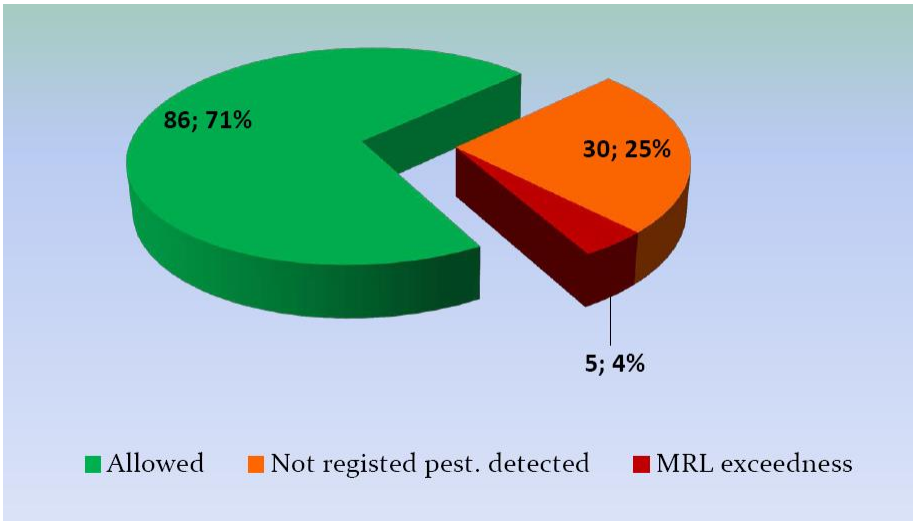


FIGURE 13 PERCENTAGE OF STRAWBERRIES WITH ALLOWED, NOT REGISTERED AND MRL EXCEEDING DETECTIBLE PESTICIDE RESIDUES (SOURCE: . MISZCAK, (2012), PESTICIDE RESIDUES IN POLISH APPLES AND STRAWBERRIES)

Water

Strawberry production consumes a lot of water in general. The water used per hectare in Poland is relatively low: 2,730 m^3 per hectare (see figure 14: compared with other main strawberry production countries). However, the amount of water used in Poland to produce a kilogram of strawberries is very high: 0.876 m^3/kg (see figure 14: compare with other main strawberry production countries). This can be explained by the low strawberry productivity in Poland (see section 2.1). The input of water per hectare is low, as indicated in section 3.1 Polish strawberries are generally not irrigated and therefore the only water source is rainfall but yields are low.

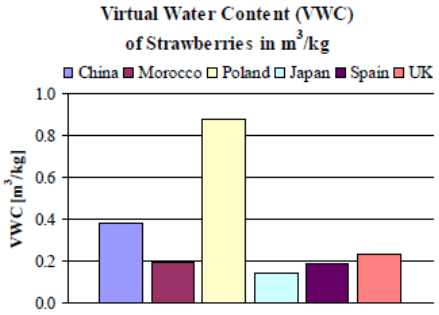


Figure 5: Virtual water content of strawberries in m^3/kg for selected countries. Source: Chapagain & Hoekstra (2004a; 2004b).

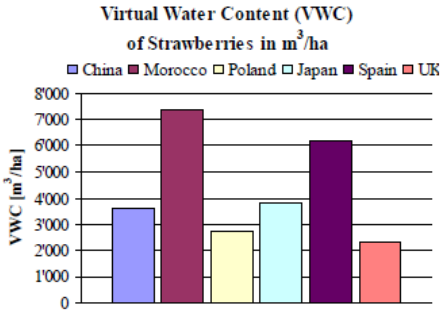


Figure 6: Virtual water content of strawberries in m^3/ha for selected countries. Source: Chapagain & Hoekstra (2004a; 2004b). Data converted (see section 2.4).

Table 7: Yield and Virtual Water Content (VWC) of strawberries for selected countries. Source: Chapagain & Hoekstra (2004a; 2004b).

Country	Yield [kg/ha]	VWC [m^3/kg]	VWC [m^3/ha]
China	9'619	0.379	3'646
Morocco	37'618	0.196	7'373
Poland	3'117	0.876	2'730
Japan	26'369	0.146	3'850
Spain	32'802	0.190	6'232
UK	10'079	0.229	2'308

FIGURE 14 VIRTUAL WATER CONTENT OF STRAWBERRIES PRODUCTION IN CHINA, MOROCCO, POLAND, JAPAN, SPAIN AND UK

2.3 Food security, health and nutrition

The findings under section 2.1 indicate that pesticide use is relatively high in the Polish strawberry sector and even banned pesticides like Procymidone are used. Health effects have already been described.

2.4 Economic sustainability

Market price fluctuation

Frozen strawberry (IQF) production in Poland has been falling over the last few years at a rate of about 1.5% to 2% per annum. According to Fruit-Inform this is due to a combination of lower profitability in the market for processed strawberries and shortage of seasonal workers needed to harvest the crop. Profitability of Senga Sengana; a variety that is typically grown for processing is likely to further decrease in the coming years. Due to the decline in production prices are expected to increase slightly this year: from €1.56 to €1.65.[222]

[222] Pawlonka, M. (2012) European Market for Processed Berries

On the other hand production of fresh strawberries is increasing due to growing demand and rising market prices. Farmers choose to increasingly plant strawberry varieties for the fresh market and less for the processing market.

Competitiveness

Poland faces fierce competition from other strawberry producing countries that export to the EU, mostly from China and Morocco. These countries have been gaining a larger market share because they supply strawberries at a very low price. It is expected that labour costs will continue to rise the coming years and that this will negatively affect Poland's competitiveness *vis-a-vis* countries that export to the EU. [223]

2.5 Social sustainability

Education

The education level in rural areas of Poland can be described as well below the average level found in larger cities. Access to kindergarten can be very limited or non-existent in rural areas. The quality of teachers' at all educational levels is also a major problem in these areas. Additionally most villages also have poorly developed cultural infrastructures such as community centres and libraries which further aggravate differences in educational levels. In 2007 6.6% of those working in agriculture had a higher education diploma, 29.3 % had followed an education course at a secondary level, 39.2% had a basic level education and 24.9% had only achieved primary level education. These are figures which are well below the EU average. The levels of specific agricultural training of farmers are also low (see figure 15).

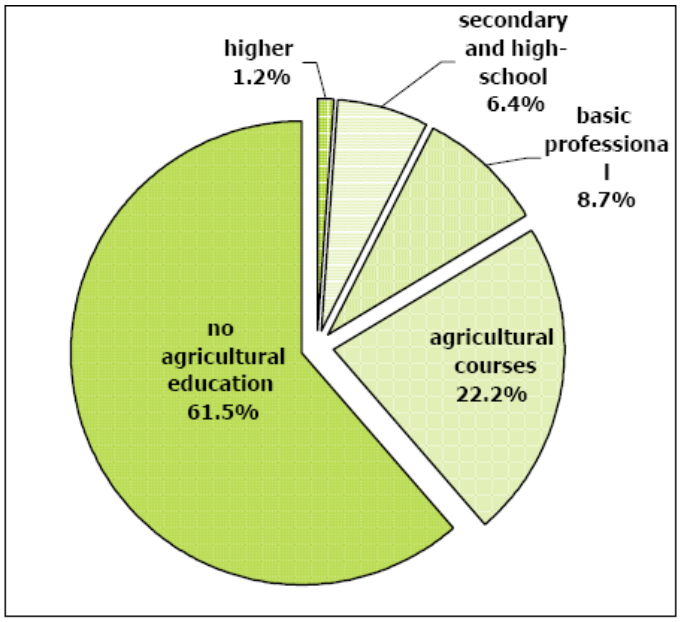


FIGURE 15 LEVEL OF AGRICULTURAL EDUCATION HELD BY POLISH FARMERS IN 2005

[223] EU Comission (2006) Review of the Sector for Soft Fruits and Cherries Intended for Processing in the EU.

Demographics

Almost half of Polish strawberry farmers are between 40 and 55 years old, about a third of the farmers is younger than that (see figure 16). As stated above, the strawberry sector is one of the few where picking is still done by hand, which is mostly done by migrant labourers from Ukraine and Belarus.

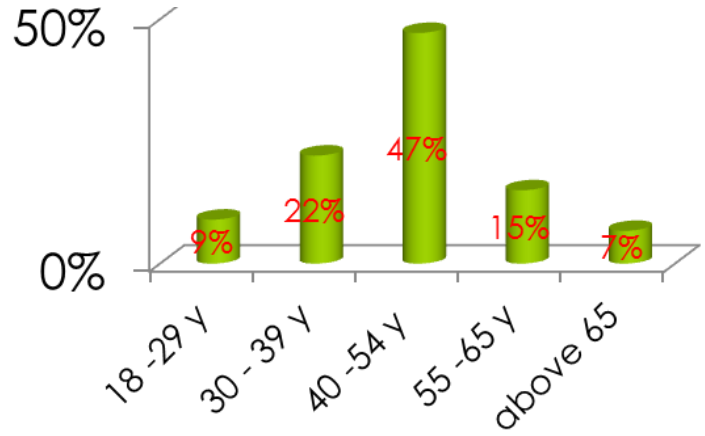


FIGURE 16 AGE DISTRIBUTION OF POLISH STRAWBERRY FARMERS (SOURCE: POLISH MINISTRY OF AGRICULTURE)

Migrant labour

Traditionally families producing strawberries used to do their own picking, which required low financial investment in labour. It was seen as an additional source of income for many rural households, which explains why there are so many small-scale strawberry farmers.

There is currently a shortage of labour in Polish strawberry harvesting, because families are getting smaller, Polish seasonal workers travel to western and southern Europe where they can earn more, and the sector has been growing over time. The labour shortage is partially being met by hiring migrant workers from Belarus and Ukraine.

While the Polish Ministry of Agriculture has allowed the employment of Ukrainian workers, many Polish farmers have complained that compliance with regulations is complicated and costly. Simultaneously most migrant workers are turned away at the border even though they can prove that they have employment. To indicate just how acute the situation is an article published in the Krakow Post detailed how one plantation owner had work available for 1,000 people but could only find 80. The result was that 70% of the fruit remained unpicked. This situation can lead to wild price fluctuations as one year the market if flooded with strawberries while the next there is a shortage.

The registered employment of foreigners (those who hold work permits) remained stable throughout the course of 1989-2007, when roughly 15,000-20,000 work permits were issued per year. Due to a new policy introduced in 2006, which originally covered the agricultural sector and was later on extended to other sectors in 2007, foreign workers who are seasonally employed are exempt from the requirement to hold a work permit. This policy granted citizens of neighbouring countries more extensive access to the Polish labour market. Throughout the last years, as many as 15,000 to 20,000 declarations of employment of foreigners were issued per month, meaning that the totals may top 200,000 annually. As far as irregular employment is concerned, according to various estimates, the number of undocumented migrants has

been systematically increasing since early 1990s – but precise numbers differ across periods of estimations.

Agriculture is a sector where, almost exclusively, "circular migrants" from nearby ex-USSR countries can be found. They frequently seek employment with the same farmer for several seasons. Their work is usually undeclared, however sometimes Polish farmers provide the migrant with housing registration. Nevertheless, migrants are exposed to police checks, a fact that limits their freedom of mobility in Poland. As a result, their ability to develop social ties to Poles and integration potential suffers. At the same time, it can be argued that working conditions are often exploitative, with average earnings lower than in other sectors of the Polish labour market. Information about work in agriculture in Poland is usually distributed through migrant networks and drivers who, acting as informal work-intermediaries, are eager to bring, for a fee, migrants to work in Poland. Migrants' relationships with employers are essential in bringing about an improvement in working conditions: doing lighter work, getting additional work for supplementary payment and being offered extra food. Migrants tend to form groups of family members, neighbours or friends, with one leader responsible for establishing informal rules of behaviour and for cultivating social ties with the employers. In the agricultural sector, chances for upward mobility or for changing the employment sector are very small. This is due to the limited contacts migrants have outside the farm. Moreover, migrants usually learn only basic Polish, only enough to suffice for communication with the farmers. Their heavy workload and the low earnings are not helpful in inspiring them to attempt professional advancement.[224]

2.6 Governance sustainability

Corruption

Poland is one of the less corrupt countries when it is compared to its neighbours: Poland ranks 41st out of 183 countries, ahead of most Eastern European states, with a score of 5.5 in the 2012.[225]

Land ownership

Although Polish agriculture was public in nature throughout the period of communism, the privatisation of land was not as drastic as in some Central and East European Countries (CEEC). State Farms were privatised through intermediation of the Treasury Agricultural Property Agency and taken over by individuals or companies. The size of the ownership change has varied from region to region. In the West and North Poland, where more than half of all farmland was in State Farm hands until 1989, there was a sharp increase in the share of land under private ownership. In Central and Eastern Poland, which is the main strawberry area, changes were very limited.[226]

[224] Centre of Migration Research, University of Warsaw

[225] Corruption Perceptions Index

[226] Source: Jerzy BAŃSKI Institute of Geography and Spatial Organization, Polish Academy of Sciences, Warszawa, Poland

3 Sustainability landscape of certification and initiatives

3.1 International schemes

EU cross-compliance

All farmers in EU member states have to comply with the national law and can apply for subsidy under the EU Common Agriculture Policy (CAP). Cross-compliance is the link between the two: it refers to whether farmers receiving CAP subsidy actually comply with all relevant EU regulations. In case of infringements there is a cut of budget for the receiving farmer. Compliance with relevant regulation and payment of CAP subsidies is managed by member states themselves.

Cross-compliance mainly includes two elements: statutory management requirements and good agricultural and environmental condition. Statutory management requirements refer to 18 legislative standards in the field of environment, food safety, animal and plant health and animal welfare. Good agricultural and environmental condition refers to a range of standards related to soil protection, maintenance of soil organic matter and structure, avoiding the deterioration of habitats, water management.

Roughly 95% of all farmers in the EU receive CAP money. In the Polish strawberry sector this number will be roughly the same as small-scale and medium-size farmers all apply for CAP subsidies.

GlobalGAP

GlobalGAP is the worldwide standard for good agricultural practices. It is a not-for-profit organization that sets voluntary standards for safe and sustainable agricultural production worldwide and more and more producers, suppliers and buyers are harmonizing their standards to match GlobalGAP. The organization began in 1997 as EUREPGAP, an initiative by European retailers in reaction to consumers' growing concerns regarding product sustainability and safety.

GlobalGAP has a standard on fruits and vegetables covering soil, management, substrates, pre-harvest controls for plant protection product application, organic fertilizer application, pre-harvest check, harvesting, final produce packaging at points of harvest, produce handling covering hygiene, sanitary facilities, packaging and storage areas, quality control, pest control, post-harvesting washing, and post-harvest treatment.

In Poland only 14 strawberry producers are GlobalGAP certified, managed by 13 certificate holders. This represents a market share of 0.02%.[227]

[227] GlobalGap

Organic

In the period 2003 and 2010 the total arable land certified as organic in Poland increased 8.5 fold (see figure 17). Organic production is also highly small-scale: 62% is smaller than 0.5 hectare and 78% is smaller than 1 hectare.

The market share of organic strawberries in Poland is approximately 2%. The average size of organic strawberry farms is 0.96 hectare. There are conflicting reports on yields: Brzozowski and Zmarlicki report that productivity is about 5.5 tons per hectare for organic agriculture against 3.7 tons per hectare for conventional agriculture, but a research conducted by the Polish Horticulture Institute found higher returns for conventional production. The direct costs per hectare for organic production were on average PLN 14,280 (€3,328) compared to PLN 12,730 (€ 2,974) for conventional. In both cases the highest cost was the cost of harvesting due to the fact that this must be done by hand. The input of man hours in organic production was found to be 25% higher than in conventional production mainly due to weeding. A breakdown of the direct costs can be seen in figure 18.

Organic strawberries provided a higher net income than conventionally produced strawberries. The income per hectare was PLN 12,323 (€2,873) for organic compared to PLN 9,630 (€2,246) for conventional. Noted in the study was the fact that the high labour requirements for organic strawberry production are a major barrier to further expansion. Again important to note is the fact that the labour costs is much lower in Poland than in other countries in the EU. Brzozowski and Zmarlicki noted that while the labour in Poland is between €1 and €2 per hour, in Sweden the same labour can cost as much as €22 per hour.

There is room to increase the crop yield and the quality of the strawberries in organic production and this can most probably be achieved through technological developments which might go some way to lowering the high labour requirements.

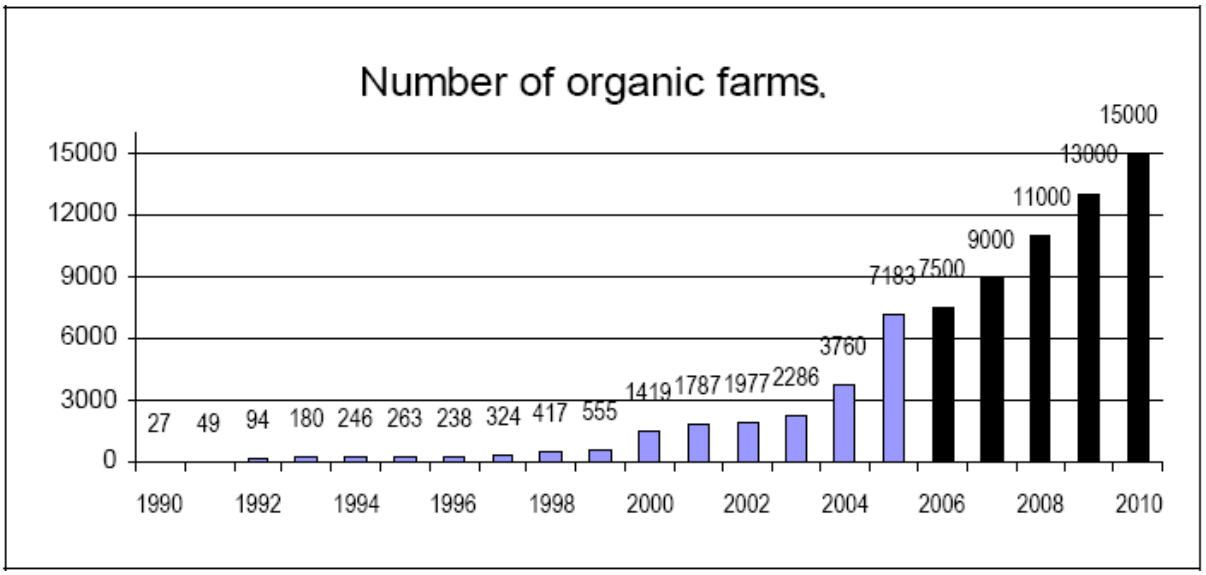


FIGURE 17 NUMBER OF ORGANIC FARMS IN POLAND 1990 – 2010 (SOURCE: SZEREMETA, A. (2010) ORGANIC FARMING AND MARKET IN POLAND)

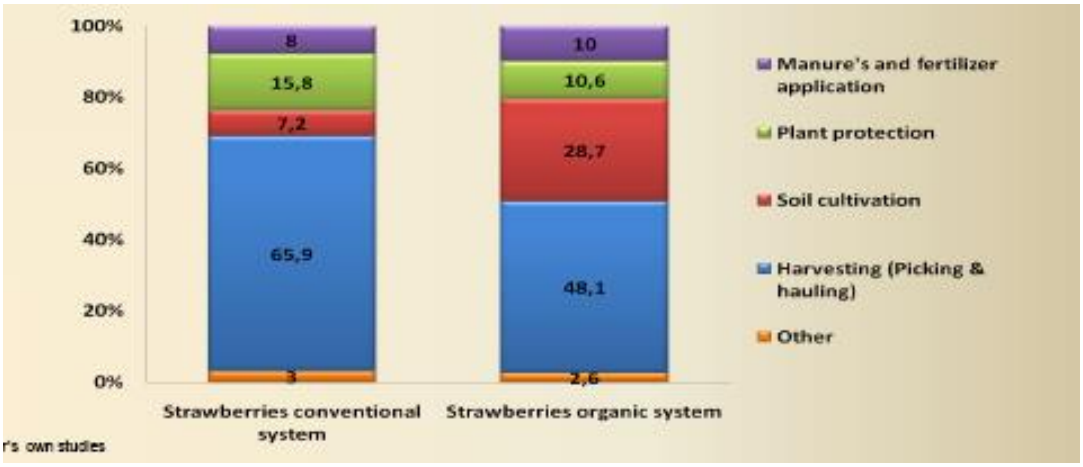


FIGURE 18 COST STRUCTURE FOR CONVENTION AND ORGANIC STRAWBERRY PRODUCTION (BRZOZOWSKI, P., K. ZMARLICKI (2012) ECONOMICS OF ORGANIC APPLE, STRAWBERRY AND SOUR CHERRY PRODUCTION IN POLAND)

3.2 National schemes

Integrated production

Integrated Crop Management (referred to as Integrated Agricultural Production in Poland) differs from other forms of farming in that it aims to produce economically viable, safe and sustainable products while at the same time conserving natural resources. This system of farming for example seeks to reduce farmers reliance on purchased inputs such as pesticides while making the utmost use of local (technical) knowledge and indigenous (traditional or cultural) practices. The system for example encourages the cultivation of naturally pest resistant varieties of fruit, techniques which discourage and reduce pest populations, building and maintaining populations of natural pest enemies (beneficial) and introduction of measures which inhibit the reproduction of pests etc.

In Poland the conditions for Integrated Production are regulated by law under the Plant Protection Act of 18 December 2003. Since 2004 the State Plant Health and Seed Inspection has been responsible for the implementation and supervision of this system. In 2007 Integrated Production gained full recognition in Poland as a national food quality system. The system is also fully compliant with the EU's Integrated Pest Management system (Directive 2009/ 120/ EC) which will be binding for all member states from 2014.

Integrated Fruit Production was established in Poland in 1991 shortly after the fall of the country's communist regime and has been expanding ever since. In 1999 13% (over 100,000 tonnes) of the total Polish apple crop was certified Integrated Production. A survey carried out in the year 2000 revealed that at the time 93% of farmers interviewed considered Integrated Production to the be future of fruit farming. The main reason that farmers gave for wanting to change to a system of Integrated Production was to lower the number applications of (synthetic) pesticides and chemical fertilizers. It is important to note that the use of a certain number of synthetic pesticides is permitted in Integrated Pest Management systems and so this system does not produce apples which are free of pesticide residue.

Farmers interested in taking part in the scheme can apply directly to the inspector of Plant Health and Seed Inspection in their Voivodeship. After this initial application a farmer will receive an individual

registration number and a logbook in which all activities must be documented. At this stage the farmer is not Integrated Production certified but may use only farming methods approved under the scheme. Certification is awarded only after a final inspection is carried out and all activities are deemed to be in line with the requirements. Under the Rural Development Programme 2007 – 2013 certified farmers can apply to have part of their costs reimbursed for up to five years for an amount not exceeding PLN 2,570 per year.

Regarding strawberry IP is applied by about 15% of all producers. Interest of this system is high and companies are collaborating with some producers on the implementation of the IP system. The benefits for producers are: increased protection of young plants, reduced environmental pollution and the production of food without minimal chemical residues. However, on the market there are no differences between prices for products originating from conventional or IPM systems. In some case IPM is subsidized by the state.[228]

Currently there is a critical evaluation of IP development and implementation going on in Poland. It focuses on the role of the government facilitating IP certification, reformulation of ecological and social criteria, increasing farmers' capacities to attain IP certification, and creating more market demand.[229]

Sources

Main sources of information:

- Agricultural council of the Dutch Embassy in Poland: Mr. Toine van Poppel
- Ministry of Agriculture in Poland
- Horticulture Institute Skienowice: Mr. Stan Pluta and Mr. Micsczak,
- Austria Juice: Mr. Mogens Christensen (responsible for the factory in Denmark) and Mr. Ennser (responsible for product flow)
- SVZ: Mr Gerbert Dijkgraaf (responsible for product flow)
- University of Warsaw: Anna Kordasiewicz (sociology professor)
- Fruit management: Ad van Gool
- Flevoplant: Rene Palings and Zbigniew Pisarek
- Limax: Leo Klaassen
- European Union

[228] Dr. Miczcak, Polish Horticulture Institute

[229] Prof. dr Zbigniew T. Dąbrowski, University of Warsaw

Apples from Poland

1 Production and supply

1.1 Overview of main production statistics

Poland is the biggest apple producer in Europe. Output was 2.9 million tons in 2012 and is expected to exceed 3 million tons this year; the overall production trend is increasing (see figure 1). The total area used for apple production is 183,000 hectares, but is recently decreasing by 1% per year.

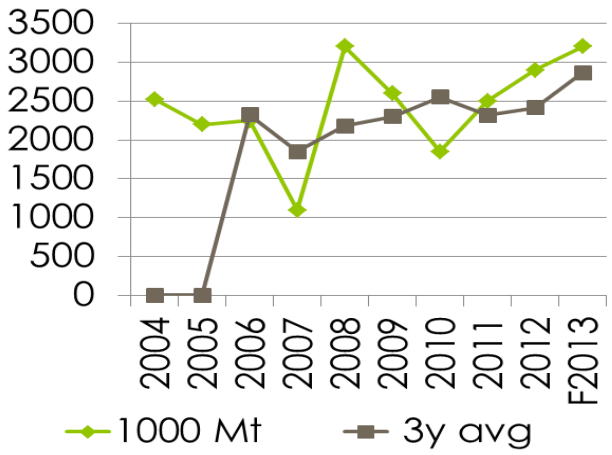


FIGURE 1 POLISH APPLE PRODUCTION AND 3 YEAR AVERAGE TREND 2004-2013 (SOURCE: WAPA 2013)

In addition to commercial apple production, there is backyard apple production which represents a percentage of about 20% of total production. In 2012, backyard production was roughly estimated at 700,000 tons (see table 1).[230]

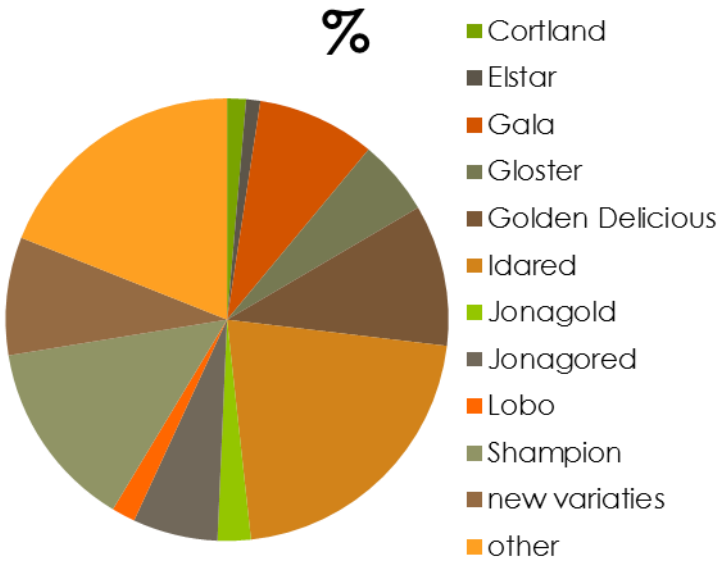
The main apple varieties produced in Poland are Idared, Champion, Golden Delicious, Gala, Jonagored (related to Jonagold) and Gloster (Figure 2). During the last 10 years the production of these international apple varieties has increased due to their export potential. A study into local apple varieties found a total number of 500 different cultivars in Poland.

The biggest production area is Grojec, which is located south of Warsaw. This is the largest apple producing area of Europe and Poland's major apple region. The expectation is that the output of this region will increase further through increased productivity.

[230] Jolanta Kazimierska of Fruit Union association

Balance - Poland	Balancing data in Mt	Comments
Production (Commercial)	3.030.500	
Production (Backyard)	700.000	incl 200,000 for fresh?
Production Total	**3.730.500**	
Export Intra&extra	-1.078.000	Eurostat (Sept -June)
Import Intra&extra	25.000	Eurostat (Sept- June)
Trade balance	**-1.053.000**	
Processing (from commercial)	-1.530.000	Asso data
Processing (from backyard)	-570.000	Juice industry data
Processing gap		if total processed is 2,1
Processing total	**-2.100.000**	
Consumption	-577.500	15 kg for 38,5 million
Consumption total	**-577.500**	
Balance	**0**	

TABLE 1 POLISH APPLE TRADE BALANCE 2012 (SOURCE: WAPA, JOLANTA KAZIMIERSKA, LEO KLAASSEN, GERBERT DIJKGRAAF, TOINE VAN POPPEL)



Variety	Quantity (1000 tons)
Cortland	40
Elstar	30
Gala	250
Gloster	160
Golden Delicious	300
Idared	620
Jonagold	70
Jonagored	180
Lobo	50
Champion	400
New varieties	250
Other	550

FIGURE 2 DISTRIBUTION OF APPLE VARIETIES PRODUCED IN POLAND (SOURCE: WAPA 2013)1

1.2 Export market chain

As can be seen in table 1, about a third of Polish apple production is exported in its fresh state, about half is processed and around 20% is consumed fresh domestically. In 2009 export of processed apples was around 300,000 tons (which is 20% of total processed apples, or 10% of total production). Russia is the main destination for fresh Polish apples (about a half to two thirds of total fresh export go there). Important markets are also eastern (mostly Czech Republic and Ukraine) and western (mostly Germany) Europe (each represent about 5%) and to a lesser extent Scandinavia (about 2.5%). North Africa is a minor market for Polish apples, but this might change in the future as demand from this region is increasing. Polish apple export is growing; this is mainly due to the fact that Polish apples are of good quality. [231]

The trend is that besides an increase of overall production and export of fresh apples, the export of processed apples is also growing. Apples that are selected for processing are often of inferior quality; it is the rest product of fresh apple production. Farmers thus receive a lower price for it. Prices for apples to be processed are in fact declining, whereas the sales price charged by the processing industry is actually increasing. In 2010-11 the price of apples was 16 euro per 100 kilograms and the sales price of the juice was 0.76 euro per kilogram. In 2012-13 the price of apples was 10 euro per 100 kilogram and the sales price of the juice was 0.84 euro per kilogram. [232]

Polish apple production is largely small-scale (two thirds of the farmers have less than five hectare). Small farmers supply local consumers or local markets directly, but the majority of their produce is sold to intermediaries. Larger farmers generally have direct links with wholesalers. Intermediaries and wholesalers supply the processing industry. The flow of fresh production that goes through intermediaries eventually all ends up with wholesalers. These wholesalers supply domestic and international retailers and food service points (see figure 3).

[231] WAPA

[232] AMI & WAPA

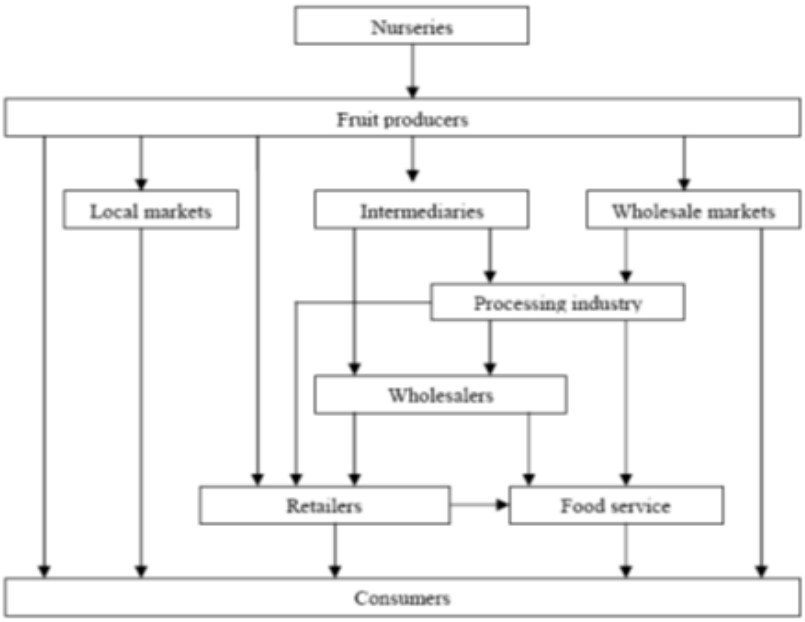


FIGURE 3 OVERVIEW OF THE POLISH APPLE SUPPLY CHAIN

1.3 Producer farm types

Polish apple production is largely small-scale: about two thirds of the farmers have less than five hectare (see table 2). In total there are about 21,000 apple farmers in Poland, 7,000 of which are non-small-scale and have a somewhat more commercial focus on apple production. About 35% of all farmers are member of an organization (no information was found of the typical size of an organization member). Fruit industry producers tend to be very small. In comparison to the strawberry sector the apple sector in Poland is more large-scale and better organised.

Years	Total	0-1 ha	1-5 ha	5-10 ha	10-20 ha	20-50 ha	>50 ha
1996	100,0%	33,3%	36,9%	17,0%	10,0%	2,4%	0,4%
2000	100,0%	34,0%	37,2%	15,7%	9,4%	3,2%	0,5%
2001	100,0%	35,5%	36,4%	15,6%	9,1%	2,9%	0,5%
2002	100,0%	33,3%	39,1%	14,6%	9,1%	3,2%	0,7%
2003	100,0%	34,8%	38,3%	14,4%	8,7%	3,1%	0,7%
2004	100,0%	34,7%	38,0%	14,2%	9,0%	3,3%	0,8%
2005	100,0%	34,7%	37,8%	14,4%	8,9%	3,5%	0,7%
2010	100,0%	31,4%	37,9%	14,3%	10,5%	4,2%	1,7%

TABLE 2 SIZE DISTRIBUTIONS OF POLISH FARMS (REPRESENTATIVE FOR STRAWBERRY FARMS) (SOURCE: POLISH MINISTRY OF AGRICULTURE)

2 Farm and primary processing related sustainability issues

2.1 Agronomic sustainability

Productivity

Current productivity of the Polish apple sector is between 17 and 18 tons per hectare. The European average is 20 to 21 tons per hectare and the Dutch average is 38 tons per hectare. Thus, yields of Polish apple producers are quite low in comparison. This is mainly due to the small size of many farms, lack of adequate training and machinery and lack of money to invest (many farmers must supplement their incomes with a second job). It is reported that yields are moderately increasing, probably most for large-sized farms.

Disease control

Anonymous sources express that there is room for improvement in the disease control in the Polish apple sector. They state that the institute that is responsible for control is not perceived to be sufficiently independent and that control is not always executed at the right time and the right parcel.

Site conditions

About 56% of the total agricultural land in Poland is described as being "less favourable" for production; with soil conditions in particular marked as unfavourable. This means apple farmers in some regions of Poland have to invest extra in their land to obtain good returns. Climatic conditions can also be harsh (see section 2.2).

Plant material

Plant material in Poland is produced by around 1,150 nursery gardens, with their total area in 2009 comprising some 1100 hectares. Fruit trees specifically are reared on an area totalling some 500 ha. The majority of these nursery farms are very small in size at 0.5 ha or less, with only 20% of nursery farms being 3 ha or bigger. In 2009 the production of apple trees accounted for 50% of all fruit tree production at 5 million pieces. In total 98% of these trees were produced as apple trees on vegetative rootstocks. While the quality is described as "meeting the needs of fruit farming" there is a need to improve the quality of trees coming from nurseries to produce high-yielding varieties to increase competitiveness of the Polish sector.[233]

2.2 Environmental sustainability

Pesticide use

Pesticide use in Poland continued to increase since 2007, as can be seen in figure 4 from the Horticulture institute (please note that the figure shows the percentage of samples without any detectable pesticides).

The most important pesticides that were found were Captan (in 83.5% of the samples), Boscalid (41,8%), Dithiocarbonate (31.5%) and Propargite(25.3%). There is discussion in the EU to ban Propargite, which is

[233] Lemanowicz and Krukowski (2009)

suspected to be a contributor to bee mortality. A few years ago Russia did not accept any residues of Captan, but this has changed again.[234]

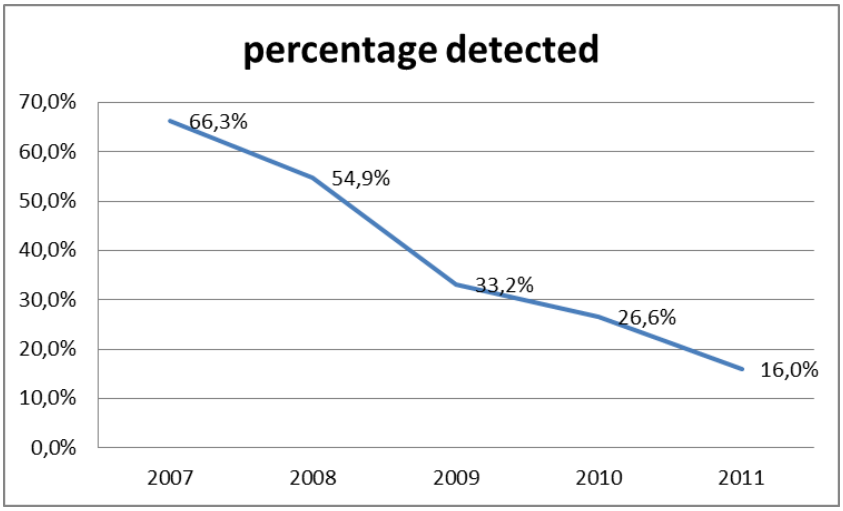


FIGURE 4 PERCENTAGES OF APPLE SAMPLES WITHOUT PESTICIDES DETECTED (SOURCE: HORTICULTURE INSTITUTE SKIENOWICE)

Water

Rainfall in Poland is highly inconsistent: in some years there has been heavy rainfall in May, even floods, and droughts at the end of July. Irrigation is a good instrument to guarantee stable water supply, but currently only approximately 10% of Polish apple farmers apply irrigation. Almost all the farmers which have a farm above the 25 ha have an irrigation system.[235]

2.3 Food security, health and nutrition

As described in section 2.1 the level of pesticides detected in Polish apples is actually increasing, which is alarming for consumer health. There are no reports indicating to what extent consumers have health effects.

2.4 Economic Sustainability

Competitiveness

One of the main strengths of the Polish apple sector is the low cost of labour compared to its European counterparts. An important element in this is the extensive use of large numbers of mainly Belarusian and Ukrainian migrants that work in the Polish apple sector for low wages. (Also see paragraph 2.5)

Supply chain efficiency

[234] Horticulture Institute Skienowice, Jos van Waes

[235] Jos de Wit, Erik Buitenhuis

A systematic lack of co-operation amongst smallholder farmers in general appears to be a major problem which leads to a fragmented and incoherent market. This is also a problem in the food/ juice production sector where lack of contractual agreements and (minimum) pricing agreements lead to problems of supply and quality. In this case many food producers seek to push costs down the chain or onto the farmers which leads to further supply chain problems in relation to competitiveness and quality. The lack of a strong and effective trade organization for Polish fruit farming is also a limiting factor for the industry especially in relation to international exports.

Income

The following table 3 compares the different cost components of apple production between different countries, showing that production costs in Poland are lowest of the countries included in the comparison, with the lowest proportion of labour costs. Table 4 shows that in Poland the costs per production unit are also lowest per production output unit.

COUNTRY	Manpower		Material		Total Variable Cost		Total Fixed Costs		Total Production Cost	
	€/ha	%	€/ha	%	€/ha	%	€/ha	%	€/ha	%
Italy	5.336	35,36	1.426	9,45	6.762	44,81	8.330	55,19	15.092	100
France	4.435	42,42	953	9,11	5.388	51,53	5.068	48,47	10.456	100
Germany	3.503	35,11	1.100	11,03	4.603	46,14	5.374	53,86	9.977	100
USA	3.978	41,02	871	8,98	4.849	50,00	4.849	50,00	9.698	100
Chile	2.024	39,72	786	15,42	2.811	55,16	2.285	44,84	5.096	100
Brazil	1.136	31,64	981	27,33	2.117	58,97	1.473	41,03	3.590	100
Poland	629	17,62	674	18,88	1.303	36,51	2.266	63,49	3.569	100
China	725	24,20	1.138	38,00	1.863	62,20	1.132	37,80	2.995	100
Turkey	911	23,75	963	25,08	1.874	48,83	1.963	51,17	3.837	100

TABLE 3: DISTRIBUTION OF THE COST ELEMENTS AT THE MAJOR APPLE PRODUCER COUNTRIES (BRUILLE AND BARRITT, 2005; DEMIRCAN ET AL, 2005)

COUNTRY	Total Production Costs (€/ha)	Yield (ton/ha)	Unit Cost (€/kg)	Ready to Pack Fruit %	Ready to Pack Fruit Cost (€/kg)
Italy	15.092	55,0	0,27	85	0,32
France	10.456	42,0	0,25	84	0,30
Germany	9.977	38,0	0,26	82	0,32
USA	9.698	42,0	0,23	72	0,32
Chile	5.096	50,0	0,10	70	0,15

Brazil	3.590	35,0	0,10	70	0,15
Poland	3.569	32,7	0,11	78	0,14
China	3.831*	16,0	0,24	85	0,28
China**	3.735*	30,0	0,12	85	0,15
Turkey	3.837	29,0	0,13	65	0,20

* Includes 836 €/ha packaging cost for Fuji variety

** The target yield that China may achieve in the near future (30 ton/ha)

TABLE 4: UNIT PRODUCT COSTS AT SOME OF THE MAIN APPLE PRODUCER COUNTRIES (KARAMÜRSEL ET AL, 2011)

2.5 Social Sustainability

Education

The education level in rural areas of Poland can be described as well below the average level found in larger cities. Access to kindergarten can be very limited or non-existent in rural areas. The quality of teachers' at all educational levels is also a major problem in these areas. Additionally most villages also have poorly developed cultural infrastructures such as community centres and libraries which further add to differences in educational levels. In 2007 6.6% of those working in agriculture had a higher education diploma, 29.3 % had followed an education course at a secondary level, 39.2% had a basic level education and 24.9% had only achieved primary level education. These are figures which are well below the EU average. The levels of specific agricultural training of farmers are also low (see figure 5).

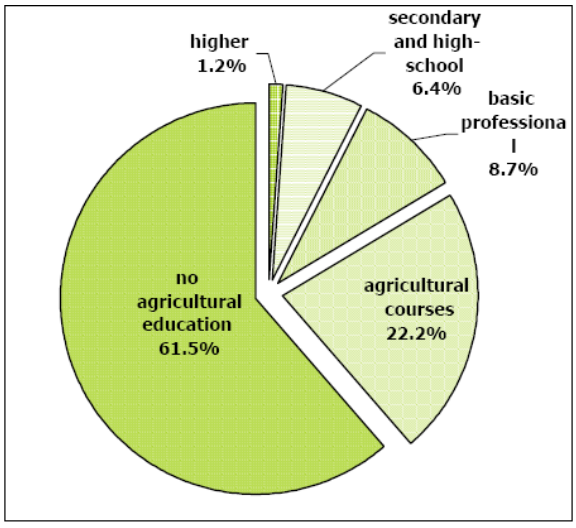


FIGURE 5 LEVEL OF AGRICULTURAL EDUCATION HELD BY POLISH FARMERS IN 2005

In order to increase the level of (agricultural) education in the sector the Polish Ministry of Agriculture and Rural Affairs initiated a Training Programme which has the following goal: "The vocational training of farmers and forest owners which will lead to the restructuring and modernisation, increased competitiveness and profitability of agricultural and forestry activity, and achieving relative compliance with national and EU standards".

Due to the relatively low level of education amongst the rural population the Polish Ministry of Agriculture and Rural affairs views vocational training as especially important. In many cases participation in a training course is a requirement if agricultural land owners are to become eligible for financial aid. Training courses are offered free of charge however the participant must be an agricultural land owner or forestry owner. Between 2007 and 2013 the Polish Government plans to spend Euro 40 million on vocational training in the agricultural sector. In general training programs focus on the following areas:

1. Minimum cross-compliance requirements for agricultural holdings.
2. Dissemination of up to date technology in agriculture and forestry.
3. Dissemination of environmentally friendly methods of agricultural production, particularly Integrated Agricultural Management and organic farming.
4. Dissemination of agricultural and forestry production quality standards.
5. Economics of agricultural production and/ or forestry management.
6. Establishment of market orientated farm production lines.
7. Popularisation of new directions in agricultural activity in order to obtain additional income.
8. Improvement of production quality and hygiene.
9. Observation of animal welfare conditions.
10. Environmental protection with particular focus on Nitrate Vulnerable Zones (NVS's).
11. Use of computer software to streamline agricultural holding and forestry management.
12. Requirements for the safe storage of feedstuffs on the farms in the context of food safety[236]

No information was found on the impact of this training program.

Working Conditions

In Poland the National Labour Inspectorate [Państwowa Inspekcja Pracy, PIP] is responsible for the monitoring of working conditions, protection of employee's rights and enforcement of occupational health and safety legislation. The agricultural sector is seen as one of the least safe working environments in Poland with historically a relatively high prevalence of child labour in rural areas (European Working Conditions Observatory).

In 2005[237] the PIP inspected a total of 161 farms, most of which were privately owned and employed, totalling around 3,283 people involved. Numerous breaches of safety regulations were found, with some being serious enough to warrant financial penalties. While improvement was noted in many areas, some aspects of farm safety such as storage and use of chemicals, field work and harvesting had deteriorated. Noteworthy is the fact that the PIP felt that the skills level of farm labourers was "largely inadequate".

In the same year there were on average 13.3 reported accidents per 1000 workers, down from 17.4 per 1000 in 2004. Nevertheless even at this level this was twice as high as the average accident level in other sectors of the economy and even exceeds the accident level in the constructions sector. The number of fatalities in the sector is decreasing from 316 in 1995 to 128 in 2005.

In 2001 children made up approximately 20% of the total agricultural workforce, by 2005 this figure had fallen to 13%. Particularly alarming was the fact that in 2005 33% of children were involved in operating heavy agricultural machinery. In 2003 there were 1,397 reported farm place accidents involving children.

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[236] Ministry of Agriculture and Rural Development RDP 2007 – 2013

[237] More recent research was not available

Children's involvement in agricultural production can largely be attributed to insufficient labour supply in rural areas especially during the planting and harvest seasons. In the absence of any (more current) figures however it can almost certainly be said that increased modernisation and mechanisation over the past decade will have lowered this percentage further.

Minimum wage and migrant workers

The Polish minimum wage is PLN 1,600 (Eur 384) per month. Most employees in the agricultural sector (including migrant workers) however work as undeclared labourers and are either paid an hourly wage (around 2 euro per hour) or are paid per quantity of fruit they pick. There are large numbers of migrant workers from Belarus and Ukraine active in the Polish apple sector. They earn around 2 euro per hour (when counting 20 working days per month of 8 hours, the monthly salary adds up to 320 euro, which is below the minimum wage).

See the strawberry case study for more general background on migrant workers in Poland.

Age

Farmers in Poland are relatively aged (see figure 6; there numbers are representative for the apple sector). Small-scale farmers are generally more aged than average and work only part-time as apple producers.[238] There is a correlation between the (high) age of farmers and the (small) size of farms. Older farmers mostly work part time. In general, compared with western Europe, a lot of farmers work part time (source Volkskrant 2006 and ministry of agriculture, Jos de Wit).

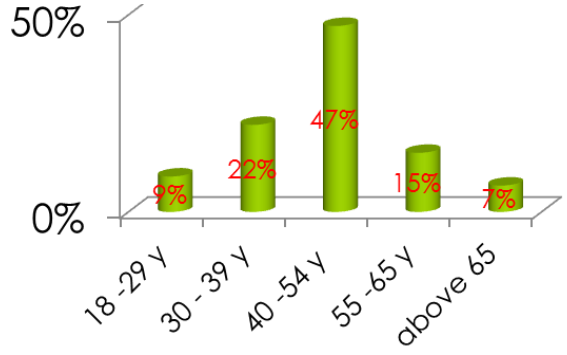

FIGURE 6 AGE DISTRIBUTION OF POLISH FARMERS (SOURCE: POLISH MINISTRY OF AGRICULTURE)

[238] Volkskrant 2006, Ministry of Agriculture, Jos de Wit

2.6 Governance sustainability

Corruption

On the Corruption Perceptions Index, Poland ranks 41st out of 183 countries, ahead of most Eastern European states, with a score of 5.5 in the 2012. In Poland, 57 % of the population thinks the government's actions are inefficient in the fight against corruption. When it comes to ranking corrupt institutions, Poles believe their political parties are most corrupt, followed by business and the parliament.[239]

Land ownership

Although Polish agriculture was socialist-public in nature throughout the period of communism, the privatisation of land has since then not been as drastic as in some Central and East European Countries (CEEC). State Farms were privatised through intermediation of the Treasury Agricultural Property Agency and taken over by individuals or companies. The extent of ownership change has varied by region in Poland. In West and North Poland, where more than half of all farmland was in State Farm hands until 1989, there was a sharp increase in the share of land under private ownership. In Central Poland, which is the main apple area, changes were very limited.[240] It is not known to what extent apple production is influenced by land ownership.

3 Landscape of certification and sustainability initiatives

3.1 International schemes

EU cross-compliance

All farmers in EU member states have to comply with the national law and can apply for subsidy under the EU Common Agriculture Policy (CAP). Cross-compliance is the link between the two: it refers to whether farmers receiving CAP subsidy actually comply with all relevant EU regulations. In case of infringements there is a cut of budget for the receiving farmer; 3% for negligence and a 20% for intentional non-compliance. Compliance with relevant regulation and payment of CAP subsidies is managed by individual EU member states.

Cross-compliance mainly includes two elements: statutory management requirements and good agricultural and environmental condition. Statutory management requirements refer to 18 legislative standards in the field of environment, food safety, animal and plant health and animal welfare. Good agricultural and environmental condition refers to a range of standards related to soil protection, maintenance of soil organic matter and structure, avoiding the deterioration of habitats, water management.

Roughly 95% of all farmers in the EU receive CAP money. In the Polish apple sector this number will be roughly the same as small-scale and medium-size farmers all apply for CAP subsidies.

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[239] Corruption Perceptions Index

[240] Jerzy BAŃSKI Institute of Geography and Spatial Organization, Polish Academy of Sciences, Warszawa, Poland

GlobalGAP

GlobalGAP is the worldwide standard for good agricultural practices. It is a not-for-profit organization that sets voluntary standards for safe and sustainable agricultural production worldwide. Increasingly, producers, suppliers and buyers are harmonizing their standards to match GlobalGAP. The organization began in 1997 as EUREPGAP, an initiative by European retailers in reaction to consumers' growing concerns regarding product sustainability and safety.

GlobalGAP has a standard on fruits and vegetables covering soil, management, substrates, pre-harvest controls for plant protection product application, organic fertilizer application, pre-harvest check, harvesting, final produce packaging at points of harvest, produce handling covering hygiene, sanitary facilities, packaging and storage areas, quality control, pest control, post-harvesting washing, and post-harvest treatment.

The market share of GlobalGAP in the Polish apple sector is 6%: a total of 1,178 producers are certified under 60 certificates.[241] The numbers are gradually increasing.

Organic

In 2012, the organic production of apples in Poland was 17,800 tons, which represents a share of about 0.6% of total production. Of this organic production, 3,700 tons are being processed, which is 21% of total organic production and 0.13% of total apple production.[242]

Of the 21,000 organic farms in Poland, 12% grow apples, with land varying from 0.1 to 350 hectare. The average size of the organic Polish apple farmer is 1.6 hectare. Sources about the productivity of organic apple production in Poland vary greatly: the Horticulture Institute Skienowice mentions a return of 15 ton per hectare whereas the Ministry of Agriculture gives an average production of only 3.8 ton per hectare.

It has to be noted that apples from backyard production are generally organic by default but not certified (as this is very small-scale, non-commercial production, mostly for own consumption).

3.2 National schemes

Integrated production (IP)

Integrated Crop Management (referred to as Integrated Agricultural Production in Poland) has the aim to produce economically viable, safe and sustainable products while at the same time conserving natural resources. This system of farming for example seeks to reduce farmers' reliance on purchased inputs such as pesticides while making use of local (technical) knowledge and traditional or cultural practices. The system for example encourages the cultivation of naturally pest resistant varieties of fruit, techniques that discourage and reduce pest populations, building and maintaining populations of natural pest enemies (beneficials) and introduction of measures which inhibit the reproduction of pests etc.

In Poland the conditions for Integrated Production are regulated by law under the Plant Protection Act of 18 December 2003. Since 2004 the State Plant Health and Seed Inspection has been responsible for the implementation and supervision of this system. In 2007 Integrated Production gained full recognition in Poland as a national food quality system. The system is also fully compliant with the EU's Integrated Pest Management system (Directive 2009/ 120/ EC) which will be binding for all member states from 2014.

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[241] GlobalGAP

[242] Gijhars, Polish Ministry of Agriculture, Landbouwraad

Integrated Fruit Production was established in Poland in 1991 shortly after the fall of the country's communist regime and has been expanding ever since. In 1999 13% (over 100,000 tonnes) of the total Polish apple crop was certified Integrated Production. A survey carried out in the year 2000 revealed that at the time 93% of farmers interviewed considered Integrated Production to be the future of fruit farming. The main reason that farmers gave for wanting to change to a system of Integrated Production was to lower the number applications of (synthetic) pesticides and chemical fertilizers. It is important to note that the use of a certain number of synthetic pesticides is permitted in Integrated Pest Management systems and so this system does not necessarily produce apples free of pesticide residue.

Farmers interested in taking part in the scheme can apply directly to the inspector of Plant Health and Seed Inspection in their Voivodeship. After this initial application a farmer will receive an individual registration number and a logbook in which all activities must be documented. At this stage the farmer is not Integrated Production certified but may use only farming methods approved under the scheme. Certification is awarded only after a final inspection is carried out and all activities are deemed to be in line with the requirements. Under the Rural Development Programme 2007 – 2013 certified farmers can apply to have part of their costs reimbursed for up to five years for an amount not exceeding PLN 2,570 per year.

In 2011 1,482 Integrated Production certificates were issued to farmers, 1,182 of these were issued to apple farmers, which means that these accounted for 79.8% of the certificates granted. Compared to 2010 the number of certificates granted increased by 38.7%.[243] Currently approximately 6% of all apple producers are Integrated Production certified.

In 2012 the Polish Horticulture Institute found 9 out of 141 samples of IP certified apples assessed had residues above maximum residue levels (MRL) or contained forbidden pesticides. However, in another study for IPM apples by the institute no pesticides were found in ~6% of the samples, 93% of the samples contained pesticides under MRL and in only 1% did residue levels exceed MRL.

Sources

In addition to the footnotes in this chapter, the following experts were consulted:

1 Agricultural council of the Dutch Embassy in Poland, Mr. Toine van Poppel
2 Ministry of Agriculture in Poland
3 World association of Pears and Apples (WAPA) (Prognosfruit)
4 Horticulture Institute Skienowice, Mr Stan Pluta, Mr. Micsczak,
5 Austria Juice Mr. Mogens Christensen responsible for the factory in Denmark, Mr Ennser responsible for product flow
6 SVZ, Mr Gerbert Dijkgraaf responsable3 for Product flow
7 Anna Kordasiewicz, Professor sociology University of Warsaw
8 Zbigniew D Browski - Professor Applied Entomology University of Warsaw
9 Fruit management - Ad van Gool
10 Dutch farmers Jos and Johan van Waes
11 European Union
12 Jos de Wit - Agronomist working with farmers in Poland
13 Polish Academy of Warsaw - Marta Dziubiak

[243] Polish Ministry of Agriculture

Recommendations / Concluding thoughts

1. Further research / inquiry into the working conditions, wages and contractual agreements for migrant workers. Note that this is a highly sensitive issue for national politics and reliable statistical data are hardly available. Also, the situation may change rapidly due to political decisions.

2. Further development of standards on criteria regarding water use, especially for smallholders. Water efficiency is only part of the story. Efficient irrigation systems (such as drip irrigation) are often expensive, computerized and centrally organized, therefore not accessible to smallholders and/or causing loss of autonomy by producers (evidence from Spain). Standards should also look at the footprint of production system on water (scarcity) at a regional level.

3. Local apple varieties are being pushed out of the market for the benefit of export varieties. This may be undesirable in view of drought and pest resistance and lead to loss of agro-biodiversity.

4. Although in general farm owners for the studied crops and countries are relatively old, in each case there are promising initiatives and new developments of young entrepreneurs, usually also looking for export markets and certification. In Spain new contractual arrangements and outsourcing of services are being developed. These farm dynamics would also merit closer study.

5. It seems that in Turkey and Poland pesticide use is not adequately controlled. In Poland there is a tradition of high use by smallholders, in Turkey not yet so much (smallholders do not have the funds to buy pesticides). In both countries the evidence is conflicting and probably national agencies try to cover this weakness (especially in Turkey).

6. There is much discussion and conflicting research findings on the benefits of growing organic in relation to conventional production: yields may be higher or lower, costs may be higher or lower. In general labour requirements are higher for organic, reason why organic is relatively profitable in the studied countries where labour costs tend be relatively low (except for Spain).

7. It will be useful to gain some more insight into the criteria and also national training schemes of national Integrated Production systems, as this is by far the standard with the greatest coverage so far in the studied countries. The IP system could be an interesting stepping stone towards a more advanced sustainability standard.