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SECTORAL STUDY

Alternative Fruit Crops for Greece

Coordinator: Dr. Christos Vasilikiotis, Assistant Professor
Project Leader: Michalis Genitsariotis, Adjuct Lecturer & Researcher
Team members: Dr. Eleni Topalidou, Lecturer & Researcher
Dr. Ilias Kalfas, Researcher, Konstantinos Zoukidis, Adjuct Lecturer & Researcher

PLANNING AND IMPLEMENTATION : **AMERICAN FARM SCHOOL**

The program **NEW AGRICULTURE FOR A NEW GENERATION** is

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Perrotis College

Agriculture · Environment · Life Sciences

New Agriculture for a New Generation: *Recharging Greek Youth to Revitalize the Agriculture and Food Sector of the Greek Economy*

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Final Report

Sectoral Study No 1

Alternative Fruit Crops for Greece

Thessaloniki, December 2015

Executive summary

The economic crisis in Greece, leads more and more people to investigate potentials of swapping their current business professions, with the farming jobs (primary sector), or turns young unemployed people to the agricultural sector. Greece has the opportunity to start producing more intensively, and this opportunity especially for Greek exports, is provided by the global increase in demand for safe products of high nutritional value. Alternative Fruits in the last decade have attained great interest all over the world mainly due to the high levels of antioxidants, the potential benefits for human organization and the variety of uses.

The aim of this study is to determine the potential for cultivation of alternative fruit crops in Greece in order to improve the contribution of the small fruit crop sector to Greek agricultural productivity and the national economy. Moreover, proposing actions aims to strengthen the sector increasing its attractiveness so that it could be an answer for recharging youth and decreasing youth unemployment

Η οικονομική κρίση που βιώνει η Ελλάδα τα τελευταία χρόνια έχει οδηγήσει πολλούς ανθρώπους να ψάχνουν τη δυνατότητα να αλλάξουν το επάγγελμά τους και να ασχοληθούν με την πρωτογενή παραγωγή, όπως επίσης έχει στρέψει ανέργους νεαρής ηλικίας να θέλουν να ενταχθούν στον αγροτικό τομέα. Η Ελλάδα έχει την ευκαιρία έτσι να αρχίσει την πιο εντατική παραγωγή αγαθών. Οι ελληνικές εξαγωγές είναι μπροστά σε μια σημαντική ευκαιρία που προβάλει εξαιτίας της αυξημένης ζήτησης νέων τροφίμων που συνδυάζουν την ασφάλεια με την υψηλή διατροφική αξία. Τα Εναλλακτική φρούτα τη τελευταία δεκαετία έχουν προσελκύσει το ενδιαφέρον τόσο των καταναλωτών όσο και των παραγωγών κυρίως λόγω τη υψηλής περιεκτικότητάς του σε αντιοξειδωτικές ουσίες που ενισχύουν τον ανθρώπινο οργανισμό. Επιπλέον σημαντικό πλεονέκτημα για τα Εναλλακτικά φρούτα είναι και οι πολλές χρήσεις τους όπως στη φαρμακοβιμηχανία, στα καλλυντικά και τη αρτοζαχαροπλαστική.

Ο σκοπός της μελέτης αυτής είναι να εξετάσει την δυνατότητας της καλλιέργειας των Εναλλακτικών φρούτων στην Ελλάδα με στόχο την ενίσχυση της αγροτικής παραγωγής και της Ελληνικής οικονομίας. Επιπλέον με την κατάθεση προτάσεων που θα ενισχύσουν τον κλάδο στοχεύει να τον καταστήσει πιο ελκυστικό για επενδύσεις δίνοντας έτσι μία διέξοδο στην καταπολέμηση της ανεργίας και ειδικά των νέων.

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List of Abbreviations

AFs: Alternative Fruits

CAGR: Compound Annual Growth Rate

CAP: Common Agricultural Policy

ELSTAT: Hellenic Statistical Authority

EU: European Union

EUROSTAT: European Statistical Authority

FAOSTAT: Statistical service of Food and Agriculture Organization of United

Nations ITC: International Trade Center

MINAGRIC Ministry of Rural Development and Food (Ministry of Agriculture)

OECD: Organization for Economic Cooperation and Development

OPEKEPE: Greek Payment Authority of Common Agricultural Policy

UK: United Kingdom

UN COMTRADE: Trade database of United Nations

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1. Introduction

1.1 Agricultural sector in Greece

General information and Economic characteristics

Greece belongs to the Mediterranean basin and is divided into several geographical regions (Macedonia, Thrace, Epirus, Thessaly, Central Greece and Evia, Peloponnese, Ionian islands, Aegean islands – including Cyclades, Sporades, Dodecanese and Crete). The landscape is quite complex, characterized by different elements: sea, mountainous areas, river and coastal plains, interior valleys and basins. The largest plains are formed in Macedonia and Thrace and the second largest lowland area is found in Thessaly. The climate is characterized as temperate and mild, with hot, dry summers and mild, rainy winters. Snowfall is also common during winters in northern and north-western mountainous areas (Galanopoulos and Mattas, 2006). The different range of the landscapes and the differentiation in the climate among the different compartments of the country allow the creation of a wide variety of micro-climates and production conditions for many and diverse agricultural products.

The total area of Greece is estimated at 131,957 Km2, (European Commission, 2014) out of which 35,600.0 thousand stremmas (in 2012) are used in agriculture (ELSTAT, 2015). From 2010 to 2011 the utilized agricultural area was decreased by 2.9%, whereas from 2011 to 2012 was decreased by 0.2% (Table 1) (ELSTAT, 2015). In 2012, the utilization of the cultivated land/area was distributed as follows: 54.6% for arable farming, 2.8% for vegetables, 32.0% for permanent crops and 10.6% was fallow land (Table 1). In 2012 about the agricultural holdings of small or medium average size (5.8 hectares) were estimated at 717.000 (Tsiforos, 2015). Although, the physical context and the climate are ideal for the development of agriculture, the sector is significantly limited by the fragmentation of the agricultural land and the aging of the agricultural population, especially in the rural areas (Paseges, 2011, European Commission, 2013a) (Table 2).

The primary sector in Greece is a fundamental component of the national economy and especially for rural areas, which represent more than 80% of the territory in Greece

(Rural regions = 82%, Intermediate = 12.1% and Urban = 5.7%) (European Commission, 2013) (Table 2).

The contribution of the primary sector to the Gross Value Added (GVA) declined considerably within the last 20 years; it was 8.8% in 1995, 6.1% in 2000 and 4.3% in 2014 (Piraeus Bank, 2015). Nevertheless, the agricultural sector occupies an important position in the economy of the country and in 2012 contributed 2.8% of the Gross Domestic Product (GDP) (Tsiforos, 2015), whereas in 2014 the Gross Value Added of agricultural sector contributed 3.3% to the Gross Domestic Product (GDP) (Piraeus, 2015) and was estimated at 10.6 billion euros with crop output (€6.9 billion), animal output (€2.6 billion), the value of secondary services (€349 million) and secondary activities (€698 million) included (Tsiforos 2015). The GVA of the country at basic prices stands at the 5.5 billion euros and corresponds to approximately 5.2% out of the total economy. This ratio, although not high enough, is more than the double the average in the EU-27 (2.5%) (Tsiforos, 2015).

The implementation of the Common Agricultural Policy (CAP) of Europe in Greece during the last decades had a large impact on the agricultural structure and the economy of the country. Implementation of CAP encountered opposition due to certain particularities of the Greek agricultural sector (Hellenic Ministry for the Environment, Physical Planning and Public Works, 2008). Due to the continuous reforms the sector was limited, traditional Greek cultures (eg. legumes, forage crops) were abounded and replaced by crops under subsidy programs, the competitiveness and the farm income were reduced, whereas the need for hired labor was increased (Kaditi, 2013). However, the new CAP aimed to more efficient and more sustainable management of the agricultural land, the adaptation of environmentally friendly agricultural practices and the results are already satisfactory under the Operational Programs "Agricultural Development and Reform of the country-side,2000-2006" and "National Strategic Plan for Agricultural Development, 2017-2013" (Hellenic Ministry for the Environment, Physical Planning and Public Works, 2008).

During the period 2005-2014, the Gross Value Added declined considerably (about 32%). In the same period the intermediate consumption (which makes up most of the input costs in agricultural production) increased at about 20.4% (was 4.5 billion in 2005

and 5.4 billion euros in 2014). Since the beginning of the recession, the input costs increased at about 14.7% (Fig. 1) (Tsiforos 2015).

Table 1 Areas under cultivation in Greece total during 2010 – 2012 in thousand stremmas. The type of cultivated crops is also presented. (ELSTAT, 2012 Annual Agricultural Statistical Survey).

Crop type	2010	2011	2012	2011/2010	2012/2011
Total cultivated agricultural land	36,709.3	35,666.2	35,600.0	-2.9	-0.2
Irrigated	13,718.0	13,844.8	13,860.6	0.9	0.1
1. Arable land	19,619.2	19,478.3	19,441.6	-0.7	-0.2
Irrigated	8,368.0	8,536.8	8,499.6	2.0	-0.4
2. Crops under vegetables (net area)	1,041.3	1,004.6	985,7	-3,5	-1,9
Irrigated	1,014.7	980,4	962,1	-3,4	-1,9
3. Permanent crops [2]	11,373.7	11,374.8	11,384.8	0.0	0.1
Irrigated	4,335.3	4,327.6	4,346.8	-0.2	0.4
4. Fallow land	4,675.1	3,808.5	3,787.9	-18.5	-0.5
1. Arable land					
1.1 Cereals for grain	11,576.3	11,161.0	11,251.4	-3.6	0.8
Common wheat	1,553.0	1,563.3	1,724.4	0.7	10.3
Durum wheat	5,821.8	5,315.0	5,165.5	-8.7	-2.8
Barley	1,207.6	1,211.7	1,279.5	0.3	5.6
Rice	300.5	309.1	307.9	2.9	-0.4
Maize	2,059.8	2,140.4	2,129.0	3.9	-0.5
Other cereals	633.6	621.4	645.0	-1.9	3.8
1.2 Edible pulses	193.6	203.3	206.7	4.9	1.7
Beans	96.2	97.8	98.1	1.7	0.3
Chickpeas	29.5	30,.9	33.2	4.8	7.4
Lentils	41.1	46,.5	49.1	13.1	5.6
Other edible pulses	27.0	28.1	26.3	4.1	-6.4
1.3 Industrial Plants	3,765.8	4,092.9	3,905.6	8.7	-4.6
Tobacco	160.4	158.9	164.0	-0.9	3.2
Cotton	2,769.2	2,975.1	2.914.7	7.4	-2.0
Sunflower	534.8	691.4	613.8	29.3	-11.2
Groundnuts	5.6	5.6	6.7	0.0	19.6
Sugar beets	156.0	96.1	111.3	-38.4	15.8
Oil seed rape	...	.....	76.2	...	.....
Other industrial plants	139.7	165.8	18.9	18.7	-88.6
1.4 Aromatic plants	23.1	19.3	18.1	-16.5	-6.2
1.5 Fodder plants	3,584.9	3,548.6	3,599.0	-1.0	1.4
1.6Melonsandwatermelons		252.2	235.7	-2.1	-6.5
Watermelons	168.2	167.1	157.6	-0.7	-5.7
Melons	89.2	85.1	78.1	-4.6	-8.2
1.7 Potatoes	448.0	448.1	441.4	0.0	-1.5

Crop type	2010	2011	2012	2011/2010	2012/2011
2.Cropsundervegetables 2.1 Vegetable crops	1,105.0	1,069.7	1,050.5	-3.2	-1.8
Tomatoes	317.8	280.5	275.0	-11.7	-2.0
Industrial tomatoes	138.3	105.8	101.3	-23.5	-4.3
Tomatoes grown in the open	144.7	140.6	140.8	-2.8	0.1
Tomatoes grown in greenhouses	34.8	34.1	32.9	-1.9	-3.5
Green beans	74.0	73.9	72.1	-0.1	-2.4
Cabbages – cauliflowers	118.7	116.8	114.8	-1.6	-1.7
Lettuce	55.0	55.4	56.1	0.8	1.3
Other vegetables	539.5	543.1	532.5	0.7	-2.0
2.2 Market flower gardens	7.0	7.1	6.5	1.2	-8.5

[1] 1 stremma = 1,000 m^2 or 0.1 ha

[2] Areas under nurseries are not included due to their small contribution to the total of the cultivated area

[3] Also included greenhouses with vegetables and flowers. Vegetables include tomatoes, cucumbers,etc.

Note: Any discrepancies in the sums are due torounding.

Percentage changes were calculated beforerounding.

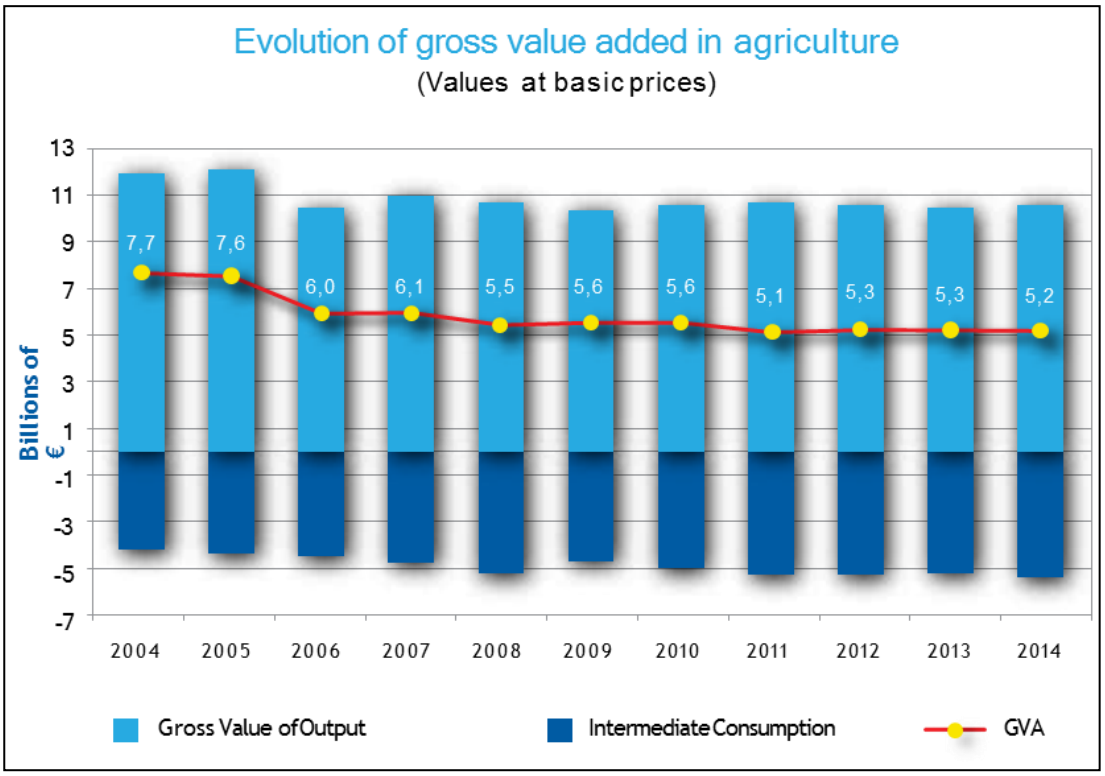

Figure 1 Evolution of Gross Value Added in Greek Agriculture in relation to the Intermediate Consumption throughout the period 2005-2015. (Tsiforos, 2015)

Table 2 Importance of rural areas. Source European Commission, Agriculture in the EU, Statistical and Economic Information, Report 2013, December 2013

	Territory (%)	Population (%)	Employment (%)	GVA (%)
		2010		
Rural	82	42.8	41.4	34.2
Intermediate	12.1	10.6	10.2	8.8
Urban	5.7	46.7	48.4	56.9
Age structure by typology of regions				
		2012		
	% 0-14 y.o	% 15-64 y.o	% 65+ y.o.	
Rural	14.0	64.2	21.8	
Intermediate	15.2	66.0	18.8	
Urban	14.5	67.5	18.0	

The agricultural sector plays a pivotal role in the food and beverage industry, because it is the most important supplier for processing, consisting of 21.2% of the enterprises, people employed at 25.2% and the Gross Value Added at 25.2% among all the sectors of the processing branches for 2012 (Tsiforos, 2015).

Crop production in Greece dominates the agricultural sector and in terms of the total agricultural production remains more important than livestock as indicated by the following numbers during the period 2012-2014: 19% vegetables, 18.5% fruits, 14.5% livestock, 14% livestock products (e.g. milk, eggs etc), 15% cereals and 8% olive oil (Piraeus Bank, 2015). During the past few years, significant changes were observed in terms of volume production of agricultural products (durum wheat, grain maize, cotton, sugar beets, potatoes, fruits etc) by groups and species of products as presented in Table
3 (ELSTAT, 2015). The agricultural sector is one of the key contributors to the

country's external balance and remains stable and dynamic even during the period of economic recession. Agricultural products comprise 19% of total exports (Piraeus Bank, 2015) and represent a value close to 5 billion euros. In recent years the main exported products (olives and virgin olive oil, dairy products, fruits such as apricots, cherries, cotton etc) are highly ranked in terms of quality, which makes them more competitive (Piraeus Bank 2015, Tsiforos, 2015). On the other hand, the imported agricultural products (including food and beverages) cover 12.9% out of the total imports resulting in a negative trade balance, estimated at approximately 1.6 billion euros in 2013 (Tsiforos, 2015).

Employment Data

The unemployment rate in Greece, estimated at 24.6% in August 2015, was slightly reduced since August 2014 (26.2%) (ELSTAT, 2015) but it is still the highest rate among the EU countries, followed by Spain (22.2%) (Eurostat, 2015a). The total number of employed people in August 2015 was estimated at 3.614.192 people, the unemployed at 1.180.001 and economically inactive population was estimated at 3.286.686 people. In regards to the two genders, unemployment is higher in women than in men, estimated at 28.5% in August 2015 (Table 4) (ELSTAT, 2015). At the same time unemployment rate in youth (young persons under 25) was estimated at 47.9% and was again the highest among the EU countries (Eurostat 2015). Unemployment rate is also high (31.3%) in the age group of 25-34 years old (Table 5) (ELSTAT 2015). Moreover, according to the Organization for Economic Cooperation and Development (OECD) 27% of youth (aged 15-29 years old) was neither in employment nor in training (OECD 2015).

Table 3 Production of agricultural products. Greece total, 2010 – 2012 in thousand tones. (ELSTAT, 2012 Annual Agricultural Statistical Survey).

				Change (%)	
Croptype	2010	2011	2012	2011/2010	2012/2011
Arable land					

				Change (%)	
Crop type	**2010**	**2011**	**2012**	**2011/2010**	**2012/2011**
1.1 Cereals for grain					
Durum wheat	1,504.5	1,416.0	1,373.9	-5.9	-3,0
Rice	208.2	250.7	230.7	20.4	-8,0
Maize	2,138.5	2,291.8	2,226.2	7.2	-2,9
1.2 Edible pulses					
Beans	20.2	22,7	18.2	12.6	-19.8
1.3 Industrial plants					
	29.9	32.0	34.2	7.2	6.9
Cotton	710.5	814.5	795.5	14.6	-2.3
Sunflower	116.0	147.7	137.6	27.3	-6.8
Groundnuts	1.9	2.0	2.5	4.6	24.0
Sugar beets	889.4	581.5	647.8	-34.6	11.4
Oil seed rape	…..	…..	14.1	……	……
1.4 Fodder plants	Fodder 2,490.2	2,457.6	2,522.7	-1.3	2.6
1.5 melons					
Melons	185.4	176.6	170.9	-4.7	-3.3
1.6 Potatoes	926.7	905.9	882.8	-2.2	-2.5
2. Vegetables					
	1,475.7	1,294.6	1,234.3	-12.3	-4.7
Industrial tomatoes	811.8	643.9	617.0	-20.7	-4.2
Tomatoes grown in the open	405.0	400.3	396.4	-1.2	-1.0
Tomatoes grown in greenhouses	259.0	250.4	220.8	-3.3	-11.8
Green beans	69.9	68.3	66.3	-2.3	-2.9
Cabbages - cauliflowers	223.7	230.1	224.7	2.9	-2.3
Lettuce	82.6	83.7	80.1	1.3	-4.3
3.Permanent crops					
Wine	545.3	512.3	526.1	-6,1	2.7
Table grapes	174.9	147.5	139.4	-15.7	-5.3
Vines for currants	179.2	173.2	184.2	-3.3	6.3
Must	339.1	327.1	337.3	-3.5	3.1
3.2 Compact plantations					
3.2.1 Citrus trees					
Orange trees	905.1	847.3	849.6	-6.4	0.3

				Change (%)	
Croptype	2010	2011	2012	2011/2010	2012/2011
Mandarin trees	137.1	144.3	160.5	5.3	11.2
3.2.2 Fruit trees					
Apples trees	273.8	274.1	265.8	0.1	-3.0
Peach - Nectarine trees	822.3	821.0	825.9	-0.2	0.6
Apricot trees	62.7	66.8	79.5	6.5	19.0
Cherry trees	44.9	49.4	47.3	10.0	-4.3
3.2.3 Nut trees					
Walnut trees	22.6	22.9	23.7	1.3	3.5
Pistachio trees	7,8	8,0	8.0	2,6	-0.7
Fig trees	9.6	10.9	11,3	13.5	3.7
3.2.4 Olives					
Edible olives	308.9	273.5	359.3	-11.5	31.4
Olive oil	300,5	357,2	331.9	18.9	-7.1

Table 4 Unemployment rates (%) for males and females as estimated in August of 2015. (ELSTAT 2015)

Gender	August					
	2010	2011	2012	2013	2014	2015
Male	10.3	15.9	22.6	24.5	23.5	21.5
Female	16.5	22.3	29.5	31.7	29.6	28.5
Total	12.9	18.6	25.6	27.7	26.2	24.6

Table 5 Unemployment rates according to the different age groups during the period 2010-2015. (ELSTAT, 2015)

	August					
Age Group	2010	2011	2012	2013	2014	2015
15-24 years old	32.2	45.5	56.6	57.6	49.8	47.9
25-34 " "	17.2	25.5	32.8	36.5	34.7	31.3

35-44 "	"	10.8	15.4	21.9	24.1	22.8	22.2
45-54 "	"	8.8	12.8	19.1	20.5	20.5	19.9
55-64 "	"	5.8	8.4	14.2	15.9	16.4	16.2
65-74 "	"	1.6	4.1	3.7	9.3	11.4	11.0
Total		12.9	18.6	25.6	27.7	26.2	24.6

Structure of farm labor force

Agriculture plays a vital role in the workforce of the country, since a large number of the active population is occupied in the sector (Table 6). Greek agriculture is traditionally dominated by small sized family farms, which seldom utilize hired labor (Kaditi 2013). Due to this particular characteristic, in terms of employment there is a large number of farm owners who manage the farm by themselves and a large number of family members who work unpaid (Table 6). In more detail, about 98% of labor force consists of family holdings (Table 7), women are more frequently occupied in larger holding (42%) and the Annual Work Units (AWUs) are also increased in holdings over 2 hectares (Table 7). Consequently, the employment data in agriculture are not easily comparable with similar data of other sectors. According to Eurostat data (2015), 491.000 people (out of which 86.0% self-employment) were employed in the agricultural sector in 2011, which accounted for 11% of the total employment of the country. The number was reduced by 195.000 since 2000. Traditionally men are more frequently occupied in agriculture compared to women (Table 8) and the majority of people who work in this sector are aged between 40-64 years old (66.7%), followed by 15-39 years old (Table 8) (Eurostat, 2015). Moreover, it was estimated that 80.6% of the labor input in a total of about 396000 AWUs in 2012 was not paid (Eurostat 2015).

Table 6 Farm Labor Force in the Greece, in persons. Source Eurostat, FSS (online data codes:ef_lflegaa, ef_lflegecs, ef_kvage).

	Total	Sole holders	Family members	Non- Family members	By sex-men**	Average workers per holding	Working holdings with SO<4000 EUR	Working full time
	1000 person	% of total			% of total	Persons/ holding	% of total	% of total
Regular (in persons)	1212.7	59.6	38.3	2.2	60.4	1.7	47.3	8.6

NOTE: *Labor Force directly employed by the holding in persons only includes regular labor force (sole holders working on the farm + members of the sole holder's family + non- family regular workers								
	Total	Sole holders	Family members	Non-family regular workers	Non-family non regular workers	By sex-men	Average workers per holding	Working holdings with SO<4000 EU
	1000 person	% of total				% of total	AWU/ holding	% of total
Regular and non-regular	429.5	54.1	28.4	4.3	13.2	59.9	0.6	21.2
NOTE: *Labor force directly employed by the holding in AWUs includes both regular (sole holders working on the farm + members of the sole holders' family +non-family regular workers) and non-regular (non-family non-regular workers) labor force ** Only regular labor force								

Table 7 Structure of Agricultural holdings in Greece. Source Eurostat, Farm Structure Survey and Agricultural Census. Updated: October 2013.

Holdings less than 2 hectares			
	Status	persons	AWUs
Family labor force	Holders	373090 (of which 36.2% women)	72810
	Other family members	201200 (of which 51.8%)	33730
	Total	574290 (of which 41.7% women)	106540
Non family labor force	Regular non family labor force	5610 (of which 12.5% women)	3870
	Non regular (seasonal) labor force		12140
	Total		16010
Holdings more than 2 hectares			
Family labor force	Holders	349310 (of which 29.4%)	159630
	Other family members	262910 (of which 51.4% women)	88250
	Total	612220 (of which 38.8% women)	247880
Non family labor force	Regular non family labor force	20610 (of which 11.7% women)	14450
	Non regular (seasonal) labor force		44630
	Total		16010

*AWUs=Annual work units. An AWU is equivalent to a worker employed on a full time basis for one year.

Table 8 Employment in Agriculture in Greece. Source Eurostat (2015), Labor Force Survey (LFS)

Employment in Agriculture	
1000 persons	471.6
% men	58.7

% of persons aged 15-39	28.3
% of persons aged 40-64	66.7
% of persons aged 65 and more	4.9

1.2 Financial crisis and rural development

Financial crisis and the impact on the agricultural income

The Greek recession started six years ago and is still in progress. Weak competitiveness, low productivity, rigid labor, product markets, large public deficit and debt levels are some of the most important causes which brought the Greek economy on the brink of default (European Commission, 2015). Uncertainty about the overall economic situation, tight financial conditions, difficulties and hesitations in prioritizing investments of many actors, cash flow deficiency, especially for small-sized enterprises and industries, high unemployment rates are only some of the obvious and most visible results observed due to the recession and the austerity measures which were applied to Greece (European Commission, 2015).

Despite the recession agriculture remains one of the most important and dynamic sectors for the recovery of the Greek economy, since the sector has enormous potential for improving the competitiveness of the country. However, the crisis has affected largely the primary sector and the effects can be viewed on supply and demand, as well as on consumer behavior since many consumers shifted to buying Greek products in order to support the Greek economy.

As indicated by the Economic Accounts for Agriculture with reference to the Income of the Agricultural Industry (growing crops, farming of animals) during the period 2009- 2013 the total number of the agricultural units and the utilized land for agriculture declined (Table 9). The area cultivated perennial crops (e.g. vines and trees) was reduced, whereas the area of the annual crops was increased, as well as the irrigated areas (ELSTAT, 2015).

During the recession years, the cost of production in the agricultural sector was highly increased. The input costs in agricultural production were increased significantly during

the period 2009-2013 as presented in Fig.2 (Tsiforos, 2015). Moreover, during the period 2009-2014 investments in Greek agriculture were reduced by 2% (from 27% in 2009 to 25% in 2014). The amount of taxes in agricultural production from 2009 to 2013 was increased by about 247% (Fig. 3). The agricultural income during the recession period was reduced considerably as presented in Fig. 3 (Tsiforos, 2015). The shortage of capitals and cash flow is major obstacles to financing agricultural industries; it should be mentioned that according to Tsiforos (2015) the average financing for Greek agricultural enterprises was 1.8% during 2009-2014 and was the lowest among other sectors such as shipping (12.2%), tourism (6.6%), trade (21.1%) etc.

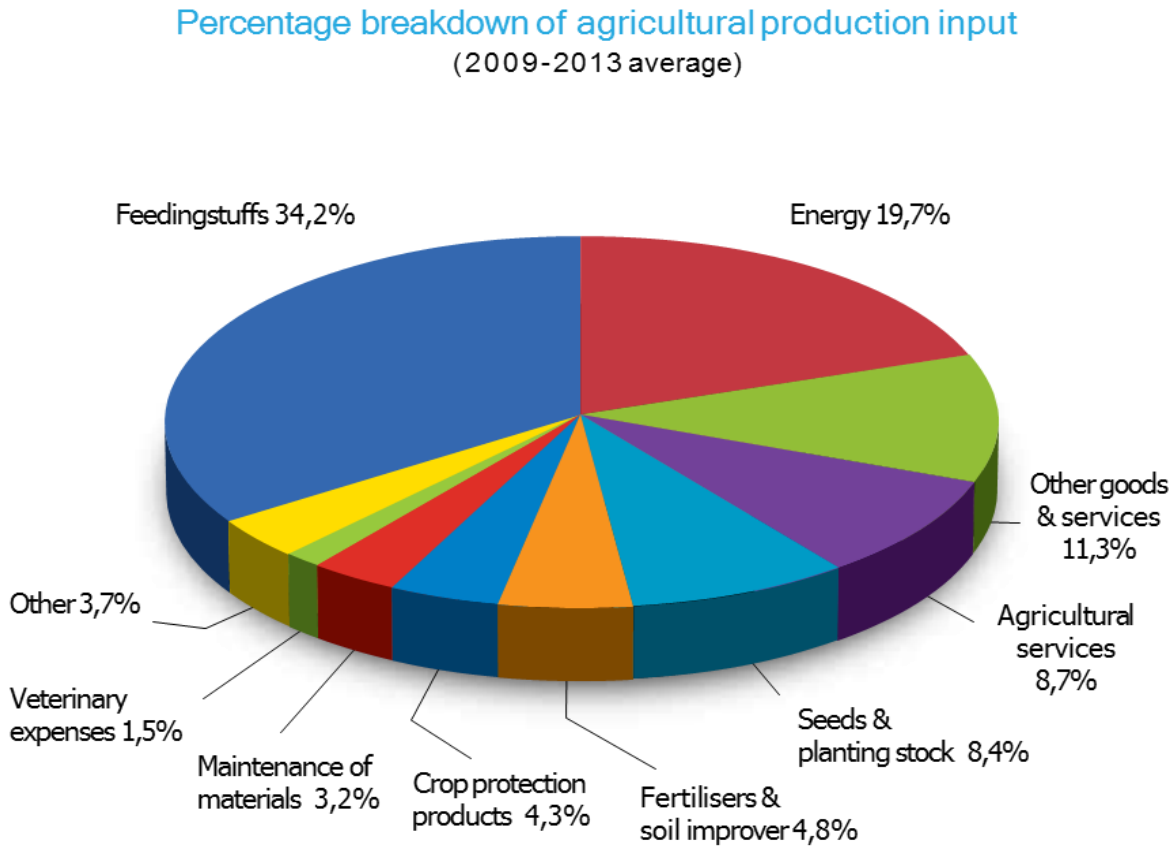

Figure 2 Input cost breakdown for the Greek agricultural sector during the period 2009- 2013. (Tsiforos, 2015)

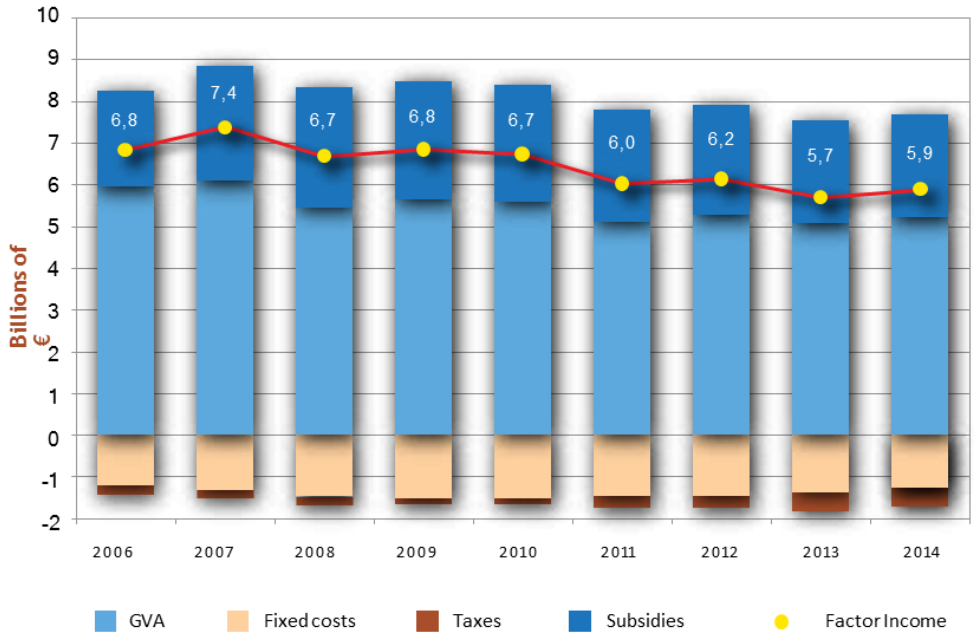

Figure 3 Evolution of agricultural income (values at current, basic prices). (Tsiforos 2015).

Rural development as an alternative for employment

The agricultural sector in Greece contributes substantially to the development of the country. It is extremely important to promote the integrated development of rural land based on local resources and reinforce the multifunctional character (Hellenic Ministry for the Environment, Physical Planning and Public Works, 2008). The rural development should be based on strategic plans in order to generate opportunities for employment. Agriculture is one of the important pillars for rural development and provided that important structural problems faced by the sector are solved, the sector has enormous potential to expand, modernize and increase employment, especially for young people.

Certain EU policies (e.g. new CAP) and investment funds, which are available to Greece for the period 2014-2020, should be used in order to reform the agricultural sector and prioritize certain actions which will promote the development of quantitative and qualitative Greek agricultural products.

The importance for rural areas in Greece was demonstrated in Table 2. The new EU policy framework (through the reform of CAP) allows the development of rural areas and points to the following targeted axes (European Commission, 2013):

- increase competitiveness of agriculture
- sustainable management of natural resources and environmentally friendly cultivation practices and natural ecosystem conservation
- Development of rural economies and communities in a balanced manner based on the use of local land and exploitation of local resources. The creation and maintenance of employment should be a key element in the strategic development of the rural areas.

For the implementation of the above development actions, a series of measures and reformations (some of which are already ongoing) should be applied. Such measures and reformations include (European Commission 2013): promote education and training of farmers, improve the social-cohesion and social services of rural areas in order to make living in those areas more attractive (especially for young people), adapt the use of land according the farmer needs and take measures in order to avoid land multi- fragmentation, enhance the research for promoting sustainable agriculture and implementation of modern technological advancements in agriculture, make advisory services and guidance from specialists easily accessible to the farmers, help farmers in marketing their products and establishing cooperative bodies for promoting rural products, improve quality and certification of agricultural products, simplification of the bureaucracy involved in certification, packaging, transporting etc., especially for the organic products.

Trend to move from big town to rural areas, farming as new occupation

Until recently, young Greeks were unwilling to work in agriculture, primarily due to the quality of life in rural areas (especially in the mountainous and remote areas), which relates to the lack of adequate infrastructure for product and human transportation, education, e-commerce, social services (Katidi, 2013). However, there is growing evidence that migration to rural areas and adaptation of agricultural livelihood is a good

option and an opportunity to survive the economic crisis (Daudon and Vergos, 2015). Growing evidence is showing that more people and especially youth find appealing the idea of getting involved in agriculture (Daudon and Vergos, 2015). Certainly there is a lot of room in agriculture to occupy people and according to ELSTAT (2013) the percentage of employment in the agricultural sector was raised (from 11.4% to 13.8%) during 2008-2013, while the total number of people employed in the sector has fallen during the same period (from 516,900 to 493,900) (ELSTAT 2009, 2014). In addition, from 2008-2013 net job creation for agriculture there was an increase of 9,600 for non- youth, while for youth there was a loss of 16,800 jobs. So it appears that the decline was primarily from job losses of the youth (ELSTAT 2015).

According to European Commission (2015) more than 149000 (>50%) Greeks below the age of 25 were unemployed at the begging of 2015. This in relation to the EU resources, which are available for the support of young farmers who aim to set up small businesses (European Commission, 2015) provides an incentive for young people who are thinking to migrate in rural areas, especially if family land is available for use and exploitation. According to Daudon and Vergos (2015) a "back-to-the-land" or "farmitization" movement is generated in Greece, a trend which is also supported by the media that promote educated young adults who left urban areas and moved to rural areas and set up successful agricultural business (Daudon and Vergos, 2015). It has to be mentioned that from 2007-2013, the amount of 3,906,228,424 EUR was given by the EU for the support of rural development in Greece (European Commission, 2013).

Although agriculture has the potential to offer a viable livelihood for many young people who are willing to return to rural areas and take over the family land or move to rural areas and start from scratch an agricultural business, there are some serious challenges and obstacles which should not be ignored when it comes to take that decision. Such challenges involve the shift to a different lifestyle, family land is often too small to set up a viable business and they need to have a clear business plan and some available capital before initiating their business in order to avoid financial struggles latter on, lack of training and experience in farming knowledge and agricultural methods and techniques.

Growing evidence demonstrates that young people are willing to take advantage of revitalizing agriculture in Greece (Daudon and Vergos, 2015). However, as indicated by the recent Daudon and Vergos (2015) study, it is highly important to provide individuals with the necessary tools and support (financial and technical) in order to help them overcome the serious economic, education and governmental barriers.

1.3 Alternative Fruit Crops

The appearance of new crops, the so-called "alternative", which promise satisfactory financial returns, are the new agricultural trend all over the world, questioning the cultivation of traditional crops that have reached the end of their production cycle (Gatsios, 2010).
Cultivation of alternative fruits, with the exception of pomegranates and strawberries, was practically unknown in Greece, as most of them are native to other regions, such as Central and Eastern Europe, North America and Asia, which are also the biggest producers. Pomegranates were cultivated mainly in Southern Greece in Peloponnese, where a local variety named “Ermioni” is still cultivated. Strawberries were cultivated in many regions in Greece but were not organized. For the past ten years alternative fruits have received significant attention mainly for their high concentration in antioxidants and their health related benefits. Many articles and scientific studies were published promoting such benefits of fruits like pomegranate, blueberries, goji berry, aronia berry, hippophaes, blackberries, strawberries etc.

Alternative fruits have many applications and uses. They can be consumed fresh, dried, and processed as jams, preserves and juices. In the pharmaceutical industry extracts are used for production of syrups and dietary supplements. They are also important source of anthocyanins, which can be used as safe food colorants in food industry, confectionary and bakery.

Health-conscious consumers are driving the demand for products that aim to promote better health, increase longevity and prevent the onset of chronic diseases. AFs are set to become one of the main beneficiaries of healthy eating trends. They tap into the trend of all natural and intrinsically healthy products (SITRA, 2008).

2. Methodology

The main objective of the primary research was to elaborate at least 10 case studies of successful and unsuccessful attempts on cultivation of Alternative Fruits. Sub-objectives included determination of critical success factors, identification of good practices applied by growers, exploration of major topics where the growers need support and training, identification of main problems faced by growers and elaboration of a business plan.

Exploratory research in the form of in depth interviews was used to gain insight and understanding of the sector. Interviews were chosen over focus group, as some of the information is sensitive and to promote spontaneous responses. Interviews were conducted in two phases of stakeholder interviews. The first phase involved farm visits for in-depth interviews of existing farmers, using a structured questionnaire consisting of a series of open-ended questions, related to qualitative characteristics, to probe and encourage extensive and meaningful responses.

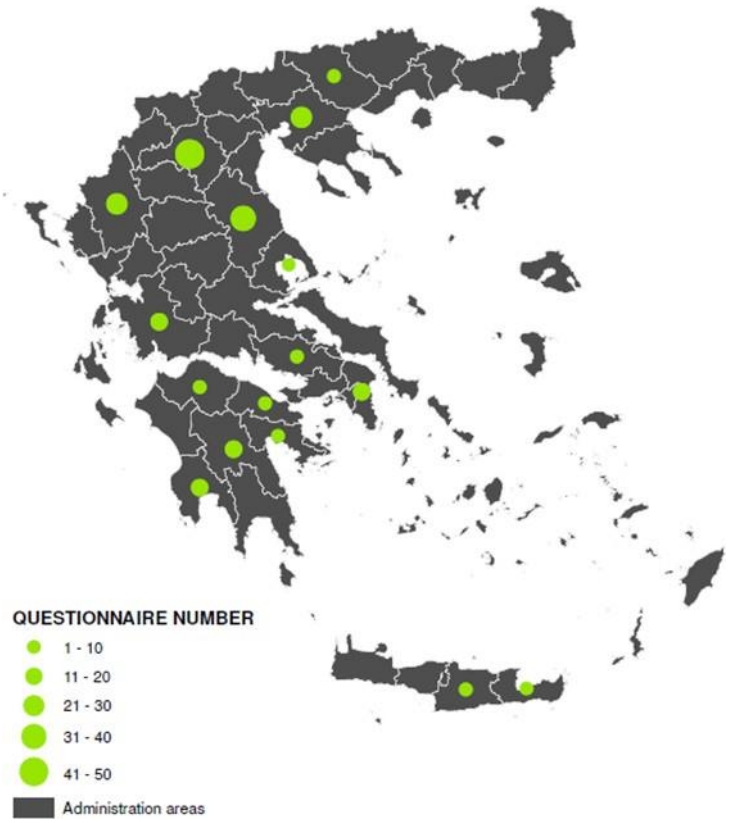

Figure 4 Questionnaire mapping in Greece

Based on these farm visits and interviews, 13 case studies were developed. The second stage involved on-site interviews of farmers and processors using a structured questionnaire to collect economic and technical data for the elaboration of a business plan. A total of 45 on-site interviews were performed for the economic analysis of the sector. To ensure the reliability of the data, the interviewers were trained in order to have the ability to control the quality of the data. It is important to note that newly established cultivations were also included in these on-site interview.

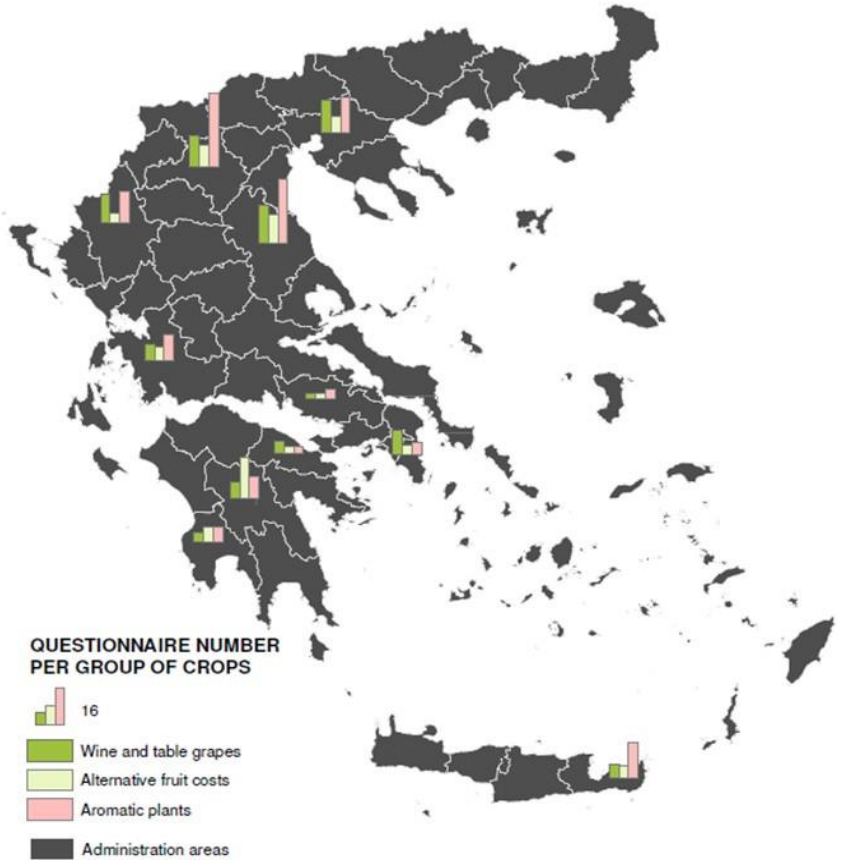

Figure 5 Questionnaire mapping per group of crops

Secondary research (literature review) examined the history, development, size of the sector, statistical information related to market size, imports and exports. Extensive literature review was made through internet research, books and articles, to collect historical data, botanic characteristic, soil-climate requirements and uses for each crop. Statistical information and data were retrieved from Greek Authorities such as Hellenic

Statistical Authority (ELSTAT), Greek Payment Authority of Common Agricultural Policy (OPEKEPE), Ministry of Rural Development and Food and European and International authorities and organizations such as Eurostat, FAOSTAT, UN COMTRADE, MarketLine, and International Trade Centre (ITC).

3. Literature Review/ Desk research

Blueberries

Blueberries are members of the genus Vaccinium and belong to the Rhododendron family (Ericaceae). Of the many species belonging to Vaccinium genus commercially cultivated blueberries is the specie *V. corymbosum* and are native to North America. Commercially cultivated blueberries (*V. corymbosum*) were not introduced to Europe until the 1930's. In Europe there is a native the species *V. myrtillus* (European blueberry or bilberry), which is different even if it resembles very much and by mistake many times is confused with blueberry. In Greek language blueberry is translated to "Myrtilo" and thus the confusion is becoming more complex.

Blueberries are perennial deciduous shrubs that can vary in height from 10 cm to 4 meters thus the smaller species are known as "low-bush blueberries" and the larger as "high-bush blueberries".

In general blueberry is a highly specialized crop that has exact soil and climatic requirements, which differ from other fruit. There are many different blueberry varieties, that need acidic, and well-drained soil to thrive, like the highbush blueberry, rabbiteye, half-high and low bush. Blueberry varieties are distinguished by the adaptability to climatic conditions and ripening, so farmers have to be confident, and choose varieties with good suitability for adapting to the selected field (King 2011). Different varieties ripen at different times, or feature large fruit (best for fresh eating and desserts) or small fruit (best for muffins and pancakes).

Furthermore, as blueberries grow best in sunny locations, spring is the best time to plant young blueberry bushes, as it ensures that hot weather will not stress the new plant, and good air circulation will help prevent fungal diseases (Gatsios, 2010). Although blueberries need winter's chill hours, and they should be planted in areas where there are at least 2 months below 5^{o}C, these limits can be extended by planting cultivar crossings. Also, the term "microclimate" can be successfully implemented when there are climate limitations, by selecting a field location with the characteristic of being warmer or cooler

than the surrounding area. If the area is protected from the cold Northern winds, it will be warmer than an exposed area, and it will also reduce drying injury.

Blueberries are sweet with excellent firmness and shelf life, low in sugar and high antioxidant levels. The levels of Vitamins A, C, E, beta-carotene, potassium, magnesium, phosphorus and fiber are completing the nutritious puzzle, which places them in the first step of a healthy diet (Krasovskaya, 2012). Blueberries are also rich in anthocyanins (fruit color), consequently they can become a natural food colorant and act as a functional food with therapeutic properties such as prevention of cardiovascular diseases, anticancer, antitumor and antimutagenic, antidiabetes, and treatments for age related diseases and antibacterial activity, (Wang 2009). Also, many studies of American universities and organizations have recognized the beneficial properties of blueberries, due to the phytoestrogen content, considering eye vision, urinary infections, allergies, "bad" cholesterol (LDL), atherosclerosis and hypertension.

Aronia

Aronia berries or Chokeberries are in the Rosaceae family and are multi-stemmed, deciduous shrubs. Two species of Aronia are generally recognized: *A. arbutifolia* (red chokeberry) and *A. melanocarpa* (black chokeberry). The red chokeberry grows 1.8 to 3 meters tall and 1.0 to 1.5 meters wide. It is a multi-stemmed shrub with a distinctly upright growth habit. They give way to dark green, glossy leaves that consistently turn a rich, orange-red in fall. Also appearing in fall are the bright red, pear-shaped, berries. The black chokeberry can generally be distinguished from the red chokeberry (when fruit are absent) by the lack of pubescence on stems and leaf undersides. Black chokeberries are also shorter than their red-fruited counterparts, attaining a mature height of 1.2 to 2.4 meters. Flowers are white, borne in May, and are similar in landscape effectiveness to the red chokeberry. The black fruits, from which *A. melanocarpa* gets its common name, are shiny and larger (0.8 to 1.3 cm in diameter) than the fruits of *A. arbutifolia.* Fruits can ripen as early as mid-July, but they primarily ripen during the month of August. A third species *A. prunifolia* (purple chokeberry), is generally recognized as having purple-black fruits and amounts of pubescence intermediate between the red and black species and some researchers believe more work

is needed to determine if it is a hybrid between *A. melanocarpa* and *A. arbutifolia* (Brand, 2009).

The geographical range for Aronia centered in the southeastern Coastal Plain, but it can be found extending out into suitable habitats westward into the Appalachian Mountains. It ranges from eastern Texas to northern Florida and continues up the eastern seaboard and the Great Lakes region. In Europe Aronia is cultivated mostly in Central and Eastern European countries (Poland, Denmark, Russia, Siberia etc.) (King, 2011). Chokeberries are considered to be hardy to USDA hardiness zone 4 and, with proper genotype selection, the red species can exhibit good heat tolerance as well. Plants can be grown successfully in partial shade or full sun, but better flowering, fruiting, and fall color occur in full sun situations. Both red and black chokeberries seem to tolerate dry or wet soil conditions, even though the red species naturally occurs most often in wet areas. Best growth can be expected in moist soils, but soil type is not critical.

Like most members of the Rosaceae, Aronia has a seemingly endless list of insects and diseases that could attack it, but the plants seem to tolerate them and not be affected much and are considered relatively carefree.

Several cultivars of Aronia plants are presently in the market. Two of the most popular which were developed in Europe are 'Viking' and 'Nero', both very similar in yield performance. The aronia berry has a strong, stable and natural color, with a dry and sour strong flavor and high levels of antioxidants. It is also deep purple color that can be used as a dye (Ristvey, 2011). In Europe the strongly colored, pungently flavored fruit is quite popular for juice, jams, preserves and even wine production ("Aronijos" in Lithouania).

Aronia is considered a valuable plant for its pharmaceutical properties, due to high content of essential polyphenols. The extracts of its fruit and leaf have useful antioxidant properties and can be used by pharmaceutical companies because they contain substances with useful therapeutic properties (anthocyanins, polyphenols, vioflavonoles, tannins, histamine, serotonin, etc.). In pharmacies abroad there are available formulations of Aronia in the form of capsules, drops, etc (Krasovskaya, 2012).

Pomegranate

Pomegranate (*Punica granatum* L.) is subtropical and although naturally grows as a multitrunked small tree or large shrub (3–6 m at maturity), it can be trained to form a

single trunk (Minagric, 2015). Plants are typically deciduous, though evergreen types are noted. Branches are often spiny, with small, narrow, oblong leaves and short stems, and aggressive sprouts often develop from the crown area and the roots. Flowers occur as single blossoms or in clusters of up to five and are usually borne on short lateral branches older than 1 year.

The fruit is berry-like and has a prominent calyx which is maintained to maturity and contributes to the fruits' distinctive shape. The leathery rind includes a pericarp, comprising a cuticle layer and fibrous mat, and the mesocarp which is the inner fruit wall and is further elaborated into membranes dividing a number of locules. The juicy arils are the edible portion of the fruit and are attached to the mesocarp. In different cultivars, arils range from deep red to virtually colorless, seed softness varies greatly based on content of schlerenchyma tissue, and acidity varies from 0.2 to 3% of the expressed juice. At maturity, soluble solids are quite high (15–20%) and differing levels of acid result in fruits which range from sweet to sweet/tart to very tart indeed (Stover et al, 2007).

Pomegranate is especially well adapted to hot summer/cool winter Mediterranean climates, but can be grown in the humid tropics or subtropics, and is injured by temperatures below –11°C. Dry summer climates are most conducive to commercial production. While extremely drought tolerant, pomegranate crops better with regular moisture. Pomegranate has high salinity resistance and is adapted to a wide variety of soils.

The major problem of the commercial cultivation of pomegranate is tearing fruit. The physiological phenomenon has multiple causes such great variation between day and night temperature variation of soil moisture, delaying harvest attacks from insects and diseases and the lack of boron in young fruits (Tzouramani et al., 2008).

Human use of pomegranate has a long history, with cultivation projected as early as 3000 BC. Pomegranates are important and are present in the symbolism and literature of many middle-eastern cultures such as Greek, Hebrew, Middle East and Indian. Apart of the symbolism pomegranate was used widely for therapeutic reasons by all ancient civilizations in the Mediterranean region, in Asia and general in sub-tropical regions. In modern times pomegranates are used in pharmaceutical and chemist industry, cosmetology and last but not least for aesthetic uses both the shrubs (ornamental and landscape) and the seeds in bakery and food styling.

Blackberries

As blackberries we refer to fruits produced by many species of the genus *Rubus* which is native to almost all the countries which characterized by Mediterranean climate conditions. The taxonomy of the blackberries has historically been confused because of the many hybridizations with other species.

Blackberry plants have biennial canes (stems) covered with prickles and grow erect, semierect, or with trailing stems. Borne on terminal clusters, the flowers are white, pink, or red and produce black or red-purple fruits. Though commonly called berries, the fruits of Rubus species are technically aggregates of drupelets. Unlike the hollow fruits of raspberries, the drupelets of blackberries remain attached to a juicy white core, thus distinguishing the two.

Raspberries and blackberries have similar growing requirements. Usually they grow best in full sun on a well-drained (but not droughty), slightly acid to neutral soil that has a pH of 5.6 to 7.0. Brambles are shallow-rooted, with about 90 percent of the roots lying in the top 50 cm of soil.

The soft fruit is popular for use in desserts, jams, seedless jelly, and sometimes wine. It is often mixed with apples for pies and crumbles. Blackberries are also used to produce candy. Cultivated blackberries (R. laciniatus and R. ursinus) are notable for their significant contents of dietary fiber, vitamin C, and vitamin K. A 100 gram serving of raw blackberries supplies 43 calories and 5 grams of dietary fiber or 25% of the recommended Daily Value (DV). In 100 grams vitamin C and vitamin K contents are 25% and 19% DV, respectively, while other essential nutrients are low in content.

Hippophaes

It is a spiny deciduous diocious shrub which means that the male and female flowers grow on different shrubs. Hippophae rhamnoides is a native plant throughout Europe, including Britain, from Norway south and east to Spain and Asia to Japan and the Himalayas. It is grown as an agricultural plant in Germany, France, Finland, India and China. China is the largest agricultural producer. The origin of the plant is Nepal and it migrated to other parts of Eurasia.

The fruits of sea buckthorn are used in a wide variety of products. Due to difficult harvest conditions and long ramp-up time of 6 to 8 years buckthorn is a relatively

expensive raw material. Especially in France hippophaes is commonly sold as fruit juice or as an ingredient in non-alcoholic and alcoholic mixed beverages. Other uses include the berries to be processed as fruit wine or into liquor as well as jam. Hippophaes tea is also made out of the fruits and leaves and originates from India. The fruits have a very high vitamin C content, on average exceeding that of lemons and oranges.
Hippophaes was used in traditional medicine medicine internally as tea, juice, or syrup for treatment of infections, colds, and flu.
Also various pharmacological activities such as cytoprotective, anti-stress, immunomodulatory, hepatoprotective, radioprotective, anti-atherogenic, anti-tumor, anti-microbial and tissue regeneration have been reported.

Goji berry

Goji, goji berry or wolfberry is the fruit of *Lycium barbarum* and *Lycium chinense,* two closely related species which belong to the family, *Solanaceae.* These species produce a bright orange-red, ellipsoid berry 1–2 cm in diameter with tiny edible yellow seeds inside. The berries ripen from July to October in the Northern Hemisphere.
The fruits are traditionally used as a nutraceutical in Asian countries such as China, Mongolia and Tibet. The fruits are normally first dried in the shade and then exposed to the sun for further drying until the skin is hard and dry but the pulp remains soft. The reddish-orange colour of the berry derives from a group of carotenoids, zeaxanthin being predominant. The well-researched chemical constituents of Lycium barbarum fruit are water-soluble glycoconjugates, collectively termed Lycium Barbarum Polysaccharides (LBP), they comprise 5% to 8% of the dried fruit.
Goji berry can be used as a food, dried fruits are traditionally cooked before consumption. Dried goji berries are often added to rice congee and almond jelly, as well as used in Chinese tonic soups, in combination with chicken or pork, vegetables, and other herbs The berries are also boiled as a herbal tea, often along with chrysanthemum flowers and/or red jujubes, or with tea, and packaged teas are also available. Various wines containing wolfberries are also produced, including some that are a blend of grape wine and wolfberries. Young wolfberry shoots and leaves are also harvested commercially as a leaf vegetable. Goji berry is also the subject of basic research to determine if it has physiological properties.

Strawberries

The strawberry (Fragaria) is in the family Rosaceae. While there are numerous Fragaria species, the most common commercially grown strawberry is Fragaria × ananassa.

The strawberry is comprised of a crown (shortened stem), where the leaves and axillary buds are formed. Runners (stolons) arise from the axillary leaf buds, and at the end of the runner a runner, or daughter plant forms. Strawberry flowers develop from buds that arise from a node on the flowering stem.

Strawberries are arguably the most popular summer-time fruit. In addition to the wonderful flavor they also provide many nutritional benefits. They are low in calories and a good source of many vitamins and nutrients that a healthy body needs. Besides vitamin C, strawberries contain folate, potassium and ellagic acid, a nutraceutical that has powerful anti-oxidant and anti-carcinogen properties.

Strawberries require full sunlight. The strawberry field should be fairly level with a 2 to 3 percent slope to allow good air circulation and to minimize soil erosion. A southern exposure will result in an earlier bloom, while a northern exposure will delay flowering, an advantage in an area of late spring frosts.

For purposes of commercial production, plants are propagated from runners and, in general, distributed as either bare root plants or plugs. Cultivation follows one of two general models—annual plasticulture, or a perennial system of matted rows or mounds. Strawberries can also cultivated in greenhouses mostly for producing strawberries during the off season.

Strawberries grow well on many different soil types. A well-drained soil is needed to maintain plant vigor and reduce disease potential. Very light and heavy soils are not as desirable as a well-drained loam or sandy loam soil.

In addition to being consumed fresh, strawberries can be frozen, made into preserves, as well as dried and used in prepared foods, such as cereal bars. Strawberries and strawberry flavorings are a popular addition to dairy products, such as strawberry-flavored milk, strawberry ice cream, strawberry milkshakes, strawberry smoothies and strawberry yogurts.

4. Analysis & Discussion

4.1 Alternative Fruits Crops in Greece

Systemically cultivation of alternative fruits in Greece, has started just recently following the consumer demand for healthier food and products that could benefit humans. Thus the last decade new cultivations have been established and Greek farmers started to cultivate new crops such as hippophaes, gojiberry, blueberry, aronia and others.

In the following section the current situation will be presented regarding the cultivation of alternative fruit crops in Greece. Data were collected from Greek Authorities such as Hellenic Statistical Authority (ELSTAT), Greek Payment Authority of Common Agricultural Policy (OPEKEPE) and Ministry of Rural Development and Food. It must be noted that there were many difficulties in finding all the data needed for the appropriate elaboration of this study. Thus in some occasions (e.g. yield, total production) data are missing. In the graphs information is presented for each crop about the yearly development of cultivating area, number of agricultural holdings and regional units where they are cultivated.

Total cultivation area of AFs and total number of agricultural holding cultivating AFs are as well as their growth rate for the period of 2012-2015 are presented in Figures 6 and 7. Tables 9 and 10 summarize the current situation of AFs in Greece showing the spatial distribution of AFs cultivation to the Greek Regional units. The most widespread crop is pomegranates which is cultivated in almost all regions in Greece (59), followed by strawberries (46), hippophaes (43), goji berry (41), aronia (40), blackberries (28) and in last place is blueberries (24).

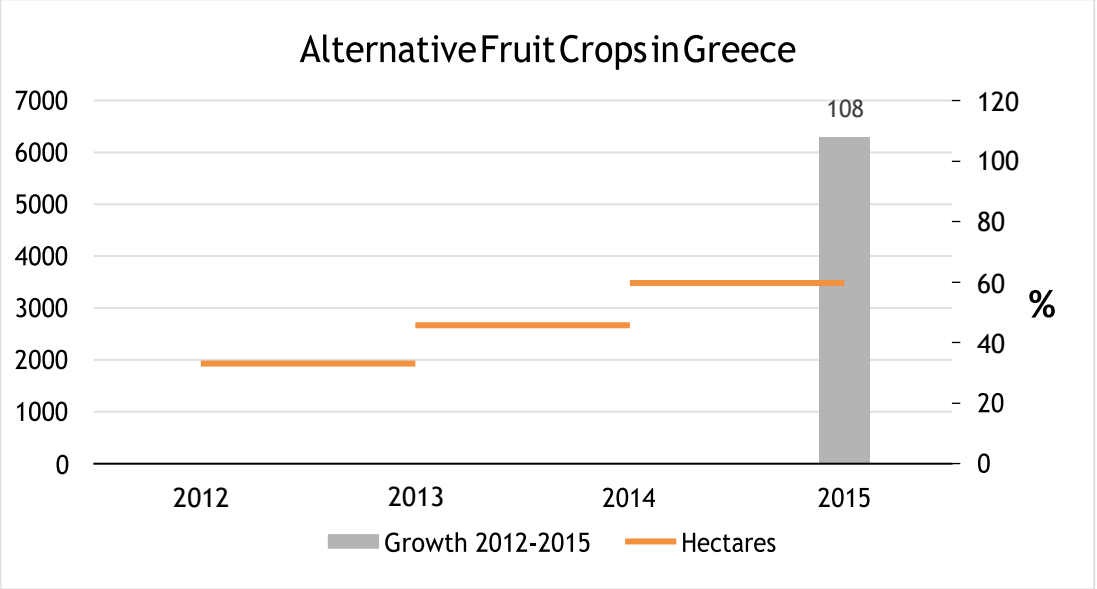

Figure 6 Total cultivated area of Alternative Fruits in Greece

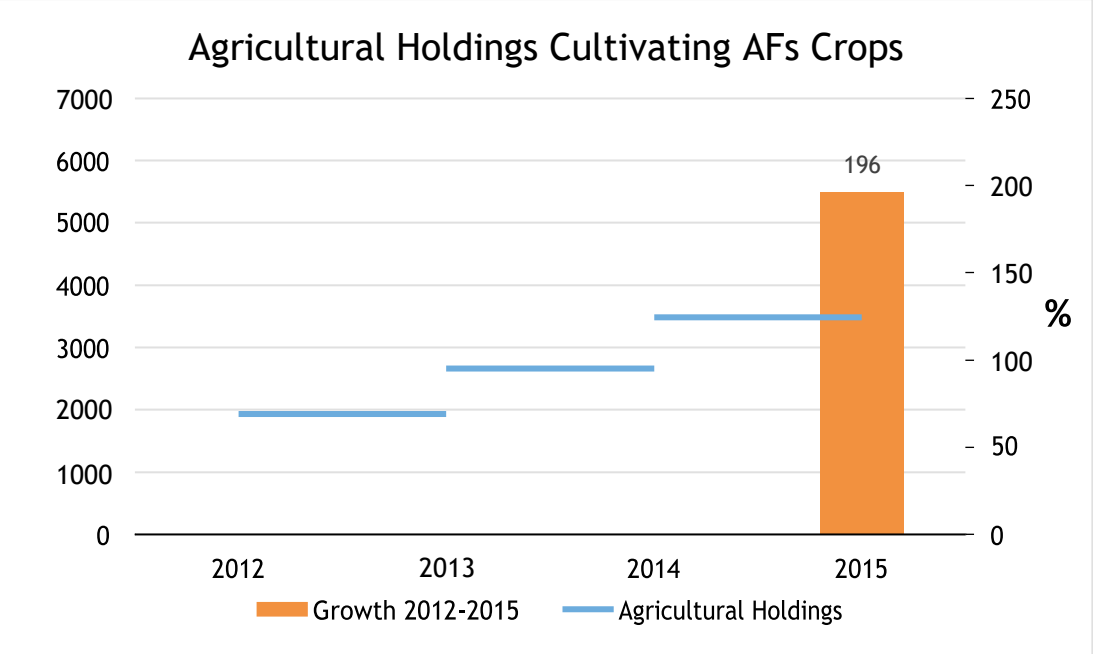

Figure 7 Agricultural Holding cultivating Alternative Fruits in Greece

Table 9 Spatial distribution of Alternative Fruits crops in Greece per Regional unit

Regional Unit → / Species ↓	ACHAIA	AITOLOAKARNANIA	ARCADIA	ARGOLIDA	ARTA	CHALKIDIKI	CHANIA	CHIOS	DRAMA	EASTERN ATTIKA	EVOIA	EVRITANIA	EVROS	FLORINA	FOKIDA	FTHIOTIDA	GREVENA	HERAKLEION	IKARIA	ILEIA	IMATHIA	IOANNINA	KARDITSA	KARPATHOS	KASTORIA	KAVALA	KEA	KEFALONIA	KERKYRA	KILKIS	KORINTHOS	KOS
Goji berries	*	*	*	*	*	*			*	*	*		*	*	*	*	*	*		*	*	*	*		*	*				*	*	
Sea buckthorn (Hippophaes)	*	*	*	*	*	*			*	*	*	*	*	*		*	*			*	*	*	*		*	*			*	*	*	*
Aronia berries (Chokeberries)	*	*	*	*	*	*			*	*	*		*	*	*	*	*			*	*	*	*		*	*				*	*	
Blackberries	*		*		*	*			*		*		*	*			*			*	*	*	*		*	*				*		
Blueberries			*		*	*			*		*		*	*	*	*	*					*	*		*			*		*		
Pomegranate	*	*	*	*	*	*	*		*	*	*		*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*
Strawberries	*	*	*	*	*	*	*		*	*			*	*		*	*	*		*	*	*	*		*	*		*	*		*	*

Regional Unit → / Species ↓	KOZANI	LAKONIA	LARISA	LASITHI	LEMNOS	LESVOS	LEYKADA	MAGNESIA	MESSINIA	NAXOS	PAROS	PELLA	PIERIA	PREVEZA	RETHIMNO	RHODOPE	RHODOS	SAMOS	SANTORINI	SERRES	SPORADES	SYROS	THASOS	THESSALONIKI	THESPROTIA	TINOS	TRIKALA	VOIOTIA	WESTERN ATTIKA	XANTHI	ZAKYNTHOS
Goji berries	*	*	*	*	*			*	*			*	*			*		*		*				*			*	*	*	*	
Sea buckthorn (Hippophaes)	*	*	*	*		*		*	*			*	*		*	*		*		*				*	*		*	*		*	*
Aronia berries (Chokeberries)	*	*	*	*		*		*	*			*	*			*	*			*				*			*	*	*	*	
Blackberries	*		*					*	*			*	*			*				*				*	*		*			*	
Blueberries	*		*	*					*			*	*							*				*			*				
Pomegranate	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*		*	*	*	*	*
Strawberries	*	*	*	*				*	*		*	*	*	*	*	*	*	*		*		*		*			*	*	*	*	

Table 10 Spatial distribution of Alternative Fruits in Greece per Regional Unit (continue)

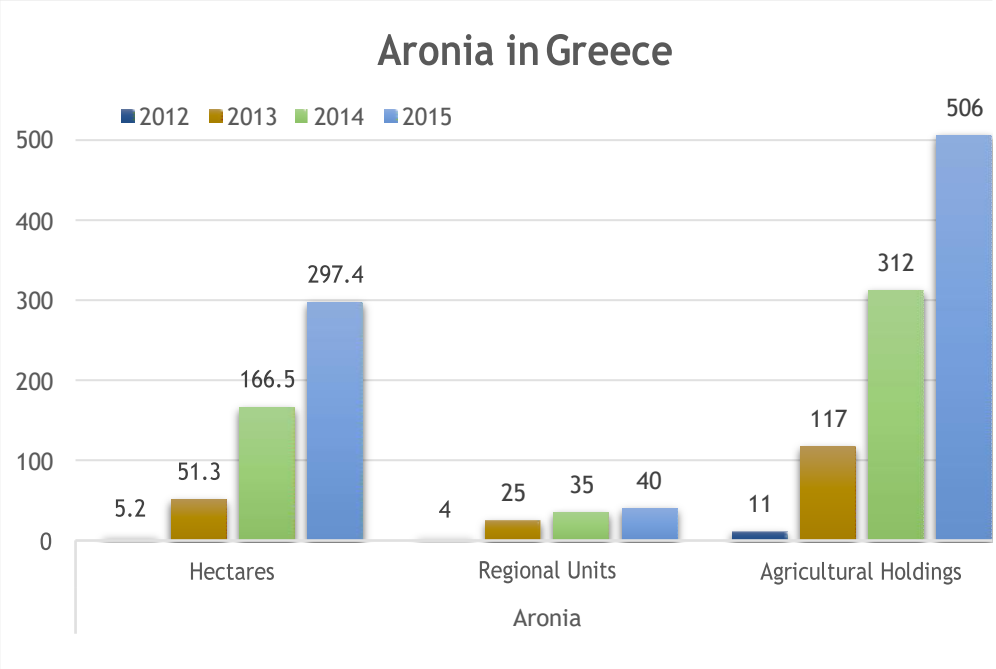

Figure 8 Cultivated Area, Agricultural holdings and Regional Unit where cultivated

More specific aronia cultivation in Greece (Figure 8) begun registered, acc the data collected, in 2012 with 5.2 hectares and today 297.4 hectares are cult 40 regional units and there are 506 agricultural holdings cultivating aronia. cultivating varieties in Greece are "Viking" and "Nero". The top 10 Regional aronia cultivation based on cultivated are presented in Table 11.

Table 11 the best ten Regional units for aronia cultivation in Greece

Regional Units	Agricultural Holdings	Area (ha)
SERRES	96	47.5
LARISA	70	42.7
KARDITSA	31	32.1
PIERIA	42	25.4
THESSALONIKI	30	21.1
PELLA	28	16.2
KOZANI	20	12.1
EVROS	22	11.4
TRIKALA	17	10.9
KILKIS	20	10.0

In the first place is the region of Serres (47.53 ha) followed by Larisa (42.72 ha) and Karditsa in the third place (32.11 ha). In fourth place we found Pieria (25.46 ha). The common thing about these region is the presence of a cooperative in each region.

Blackberries' cultivation (Figure 9) is spread in 28 Regional units, there are 110 agricultural holdings and totally an area of 30.4 hectares is cultivated.

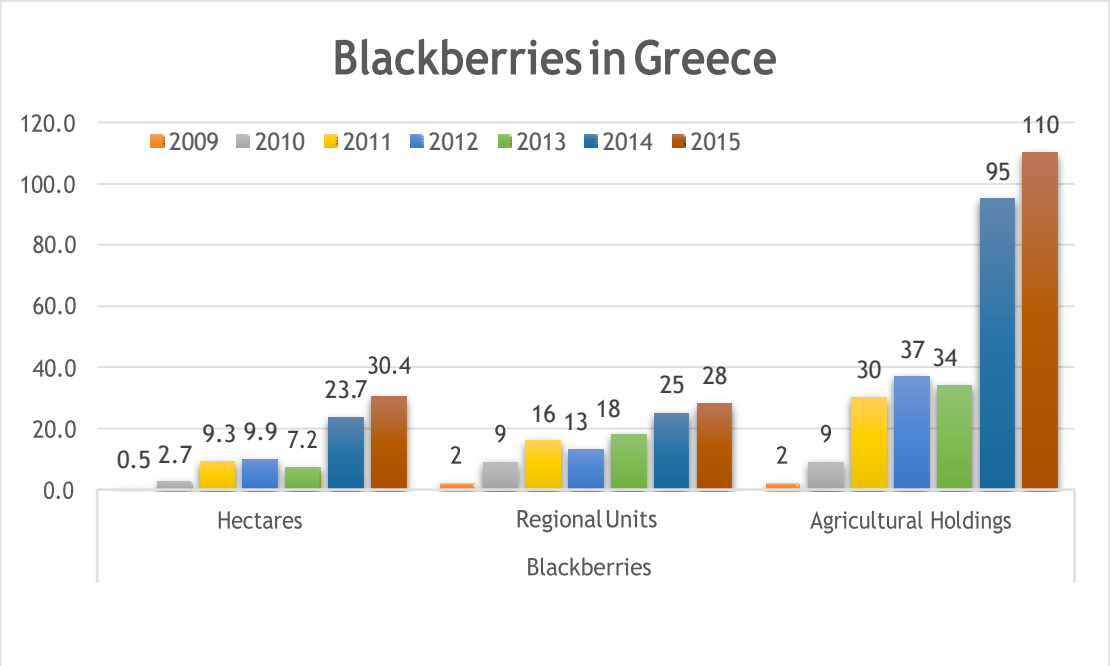

Figure 9 Cultivated Area, Agricultural holdings and Regional Unit where blackberries is cultivated

First records of systemic cultivation of blackberries begin in 2009 (0.5 ha) as they were subsidized by the Greek Ministry of Rural Development and Food programs. There is no record of a certain variety that is cultivated in Greece. Blackberries are cultivated mostly in mountainous areas of the regional units of Florina, Serres, Kozani, Larisa and Ioannina (Table 12).

Table 12 Best five Regional units for blackberries cultivation in Greece

Regional Units	Agricultural Holdings	Area (ha)
FLORINA	23	8.47
SERRES	16	4.03
KOZANI	9	2.91
LARISA	8	2.25
IOANNINA	3	1.62

In 2011 the cultivated area of hippophaes in Greece was 30.3 hectares in 21 Regional units and nowadays it is cultivated in 43 region by 357 agricultural holdings and the total are is 173.1 hectares. As mentioned before hippophaes is the third most widespread of the AFs crops. The predominant variety is Leikora followed by Hergo. Other varieties which are cultivating are Ascola and Furgana.

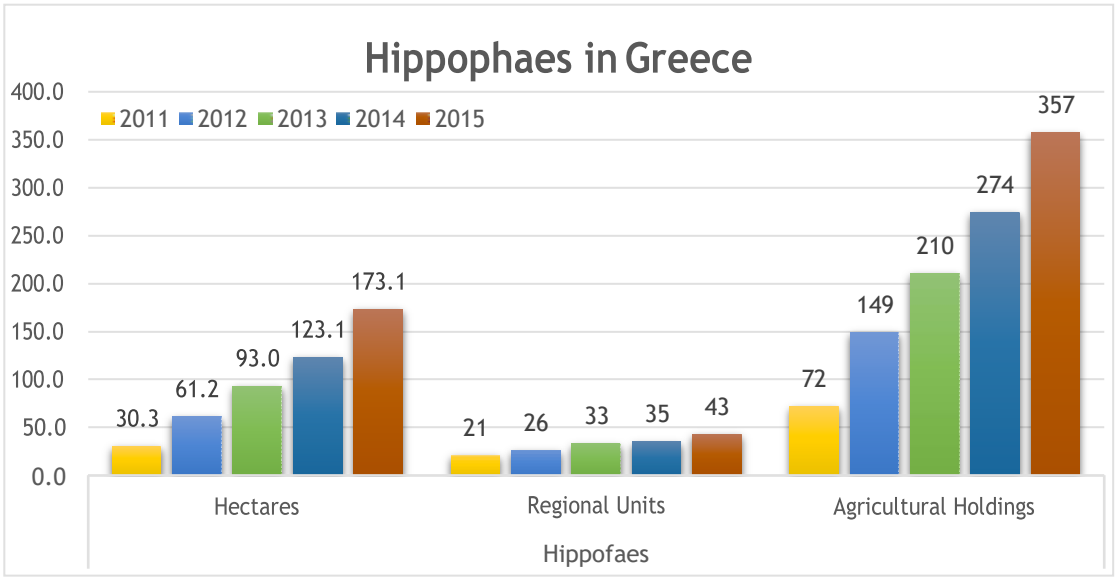

Figure 10 Cultivated Area, Agricultural holdings and Regional Unit where hippophaes is cultivated

In Karditsa region are clustered the largest area of hippophaes cultivation (Table 5). In the second place is Larisa and Trikala in the Third place. Totally in the region of Thessaly is produced almost one third of the national hippophaes production. A reason for that could be the transition to hippophaes from other traditional but less profitable crops such as wheat and maize.

Table 13 Best ten Regional units for hippophaes cultivation in Greece

REGION	FARMERS	AREA (ha)
KARDITSA	42	25,0
LARISA	43	18,1
TRIKALA	13	10,4
THESSALONIKI	20	10,4
PELLA	23	10,0
MESSINIA	17	9,9
KOZANI	22	7,6
HALKIDIKI	10	6,2
KORINTHIA	7	6,1
EAST ATTIKI	1	6,0

Blueberries is the least wide spread of AFs crops in Greece as it is cultivated only in 24 Regional units by 80 agricultural holding and the total area covers 39 hectares. This is not strange because it is the most demanding crops in terms of soil and climate requirements of all the AFs crops.

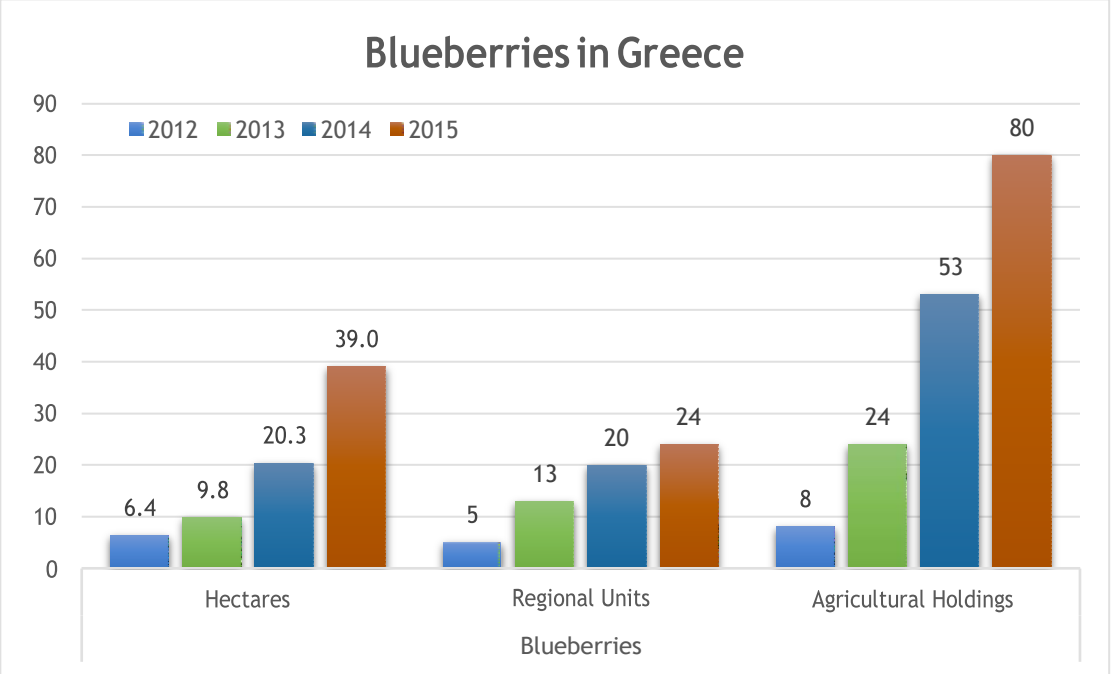

Figure 11 Cultivated Area, Agricultural holdings and Regional Unit where blueberries are cultivated

The region where Blueberries are mostly cultivated is Arcadia (Table 14) where 6 agricultural holdings cultivate about 12 hectares. Karditsa and Drama are following with 3.82 and 3.73 hectares respectively. Most common varieties for blueberry

cultivation are “Buecrop” and “Patriot” both producing large fruits and are freeze tolerant.

Table 14 Top ten Regional units for blueberries cultivation in Greece

Regional Unit	Agricultural holdings	Area (ha)
ARKADIA	6	12,39
KARDITSA	7	3,82
DRAMA	3	3,73
KOZANI	10	3,33
SERRES	10	3,14
FLORINA	7	2,43
KILKIS	7	1,9
TRIKALA	3	1,41
FTHIOTIDA	3	1,27
KASTORIA	2	1,03

The first establishment of goji berry in Greece were in 2012 by 10 agricultural holdings in an area of 2.3 hectares. Since then a remarkable growth is noticed and today there are 397 agricultural holding where goji berry is cultivated in 41 region and the total cultivated area is 142.5 hectares.

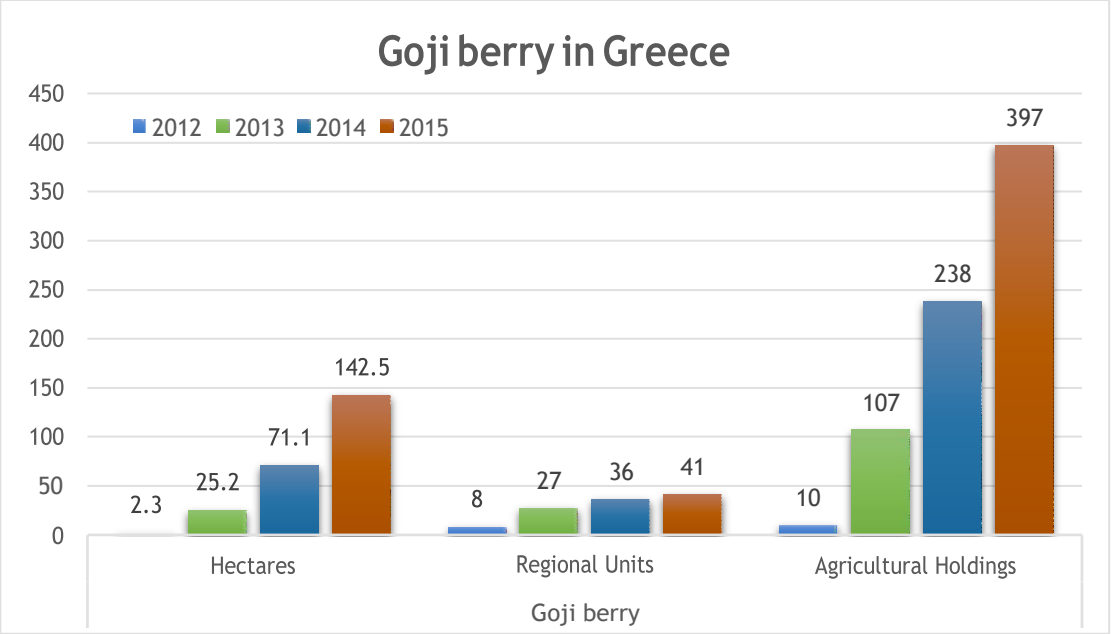

Figure 12 Cultivated Area, Agricultural holdings and Regional Unit where goji berry is

cultivated

Larisa is the predominant region in goji berry cultivation with 15.19 hectares (Table 15). Other Regional units where goji berry is cultivated are Viotia (12.07 ha), Karditsa (11.9 ha) and Thessaloniki (10.2 ha).

Table 15 Best ten Regional units for goji berry cultivation in Greece

Regional Unit	Agricultural holdings	Area (ha)
LARISA	39	15.19
VIOTIA	17	12.07
KARDITSA	29	11.89
THESSALONIKI	32	10.18
LAKONIA	13	8.38
KOZANI	24	8.14
FTHIOTIDA	13	7.20
AITOLOAKARNANIA	14	6.68
KILKIS	12	5.59
EVROS	18	5.21

The most wide spread AFs crop in Greece is pomegranates in a total area of 2796 hectares in 59 Regional units and 3865 agricultural holdings (Fig. 13). First registered data of systemically cultivated pomegranates are from 2008 although pomegranates where partially cultivated before.

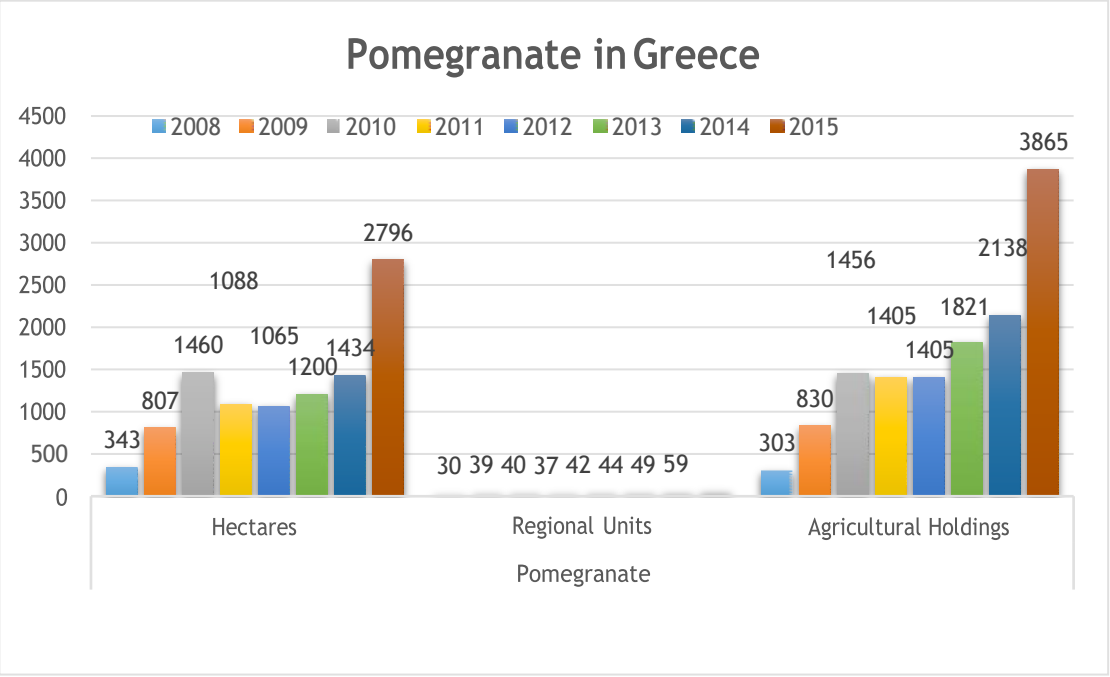

Figure 13 Cultivated Area, Agricultural holdings and Regional Unit where pomegrnanate is

cultivated

Regions where pomegranates are mostly cultivated includes the Fthiotida, Kilkis, Xanthi, Serres and Drama. In these region pomegranates have been arisen as an alternative crop of tobacco whose cultivation at that time was limited to certain areas. The majority of the new establishment cultivate the variety "Wonderful" which is suitable for juice. Also there are some plantation which cultivates "Acco" in combination with "Wonderful". "Ermioni" the most known Greek variety is cultivated mostly in Southern regions.

Table 16 Best ten Regional units for pomegranate cultivation in Greece

Regional Unit	Agricultural holdings	Area (ha)
FTHIOTIDA	177	231,1
KILKIS	124	210,5
XANTHI	155	210,0
SERRES	190	192,8
DRAMA	157	187,4
PELLA	251	162,4
AITOLOAKARNANIA	190	159,0
ARGOLIDA	491	147,8
LARISA	167	134,2
RODOPI	124	109,0

Regarding strawberries although is a crop that was cultivated for many years in Greece the data we found are a bit confused. The first year of registered data for strawberries is 2011 and only a small number. From 2012 until today a decreased in cultivated areas is noticed (Russian embargo effect?) but both agricultural holdings and Regional units where strawberries are cultivated are increased.

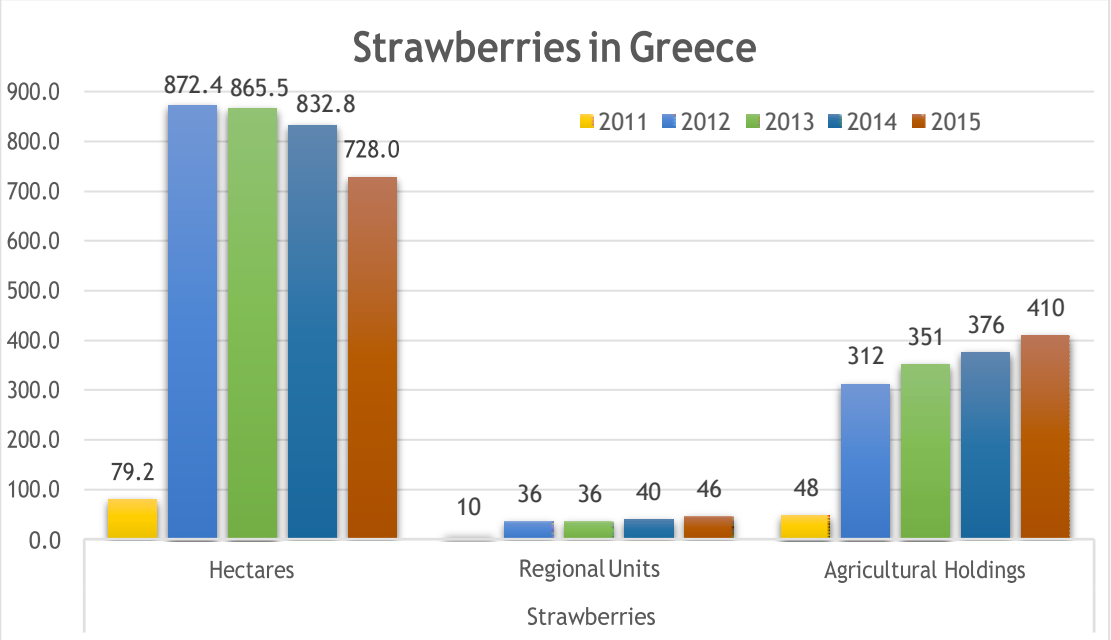

Figure 14 Cultivated Area, Agricultural holdings and Regional Unit where strawberries are cultivated

Western regions of Peloponnese and particularly Ileia and Achaia (406.54 and 277.43 hectares respectively) are the predominant region of strawberries where they are growing in low greenhouses (Table 17). In other regions of Greece strawberries are also cultivated extensively. The most cultivated variety is "Camarosa", which is an early season variety suitable for low greenhouses. Also "Renier" and "Chandler" are cultivated for late harvesting.

Table 17 Best ten Regional units for strawberry cultivation in Greece

Regional Unit	Agricultural holdings	Area (ha)
ILEIA	102	406.54
ACHAIA	78	277.43
PIERIA	18	8.47
ARGOLIDA	9	5.24
KORINTHIA	8	5.13
HERAKLEIO	17	3.93
FLORINA	24	3.42
AITOLOAKARNANIA	11	3.17
ISLANDS	5	1.59
PELLA	8	1.19

4.2 Market Analysis

AFs are set to become one of the main beneficiaries of healthy eating trends. They tap into trend all natural and intrinsically healthy. The AFs market is versatile and involves not only fresh soft fruits, but also dried products, extracts, jams and preserves, juices and beverages, oils and other highly specialized ingredients. Along with the growing trends of convenience, naturalness and intrinsic health, the role of AFs is more important than ever as they are experiencing a strong growth in all areas. Systematical cultivation of AFs has started in Greece just recently following an increase in consumer demand of these fruits and related products. However there is a lack of accurate data regarding their consumption, their trade and market size in Greece. Therefore in this section we will analyze the market of AFs based on information from the European and global experience.

4.2.1 Consumer habits and requirements

The demand for products without artificial additives, products made from whole fruits and products with natural fermentation has increased within the EU market. These trends can also explain the increasing consumption of 'not-from-concentrate' (NFC) juices. The production of homemade juices is also increasing, and many small producers of fruits produce juices only for their own households, thus influencing consumption of industrial juices. Dried fruits and edible nuts are also gaining in popularity on the EU market, with an annual increase of 3%-5% in home consumption, due to the reputation of healthy snacks and similar products.
AFs consumption in Europe is set to increase dramatically over the next couple of years and will require significantly greater supply in order to satisfy the bigger demand, according to one of the world's leading experts in developing international markets for the fruit (Eurofruit, 2014).

Eurofruit (2014). "Blueberry demand rising in Europe". May 2014. Accessed at http://www.fruitnet.com/eurofruit/article/160963/blueberry-demand-taking-off-in- europe on August 15, 2014

4.2.2 Domestic market

The Greek distribution market in general is highly distorted. Because of small land ownership, the majority of producers don't have the possibility to sell directly to large retail chains. In the graph below a schematic analysis of the Greek distribution and retail channels is presented.

Those who can manage the cost of transportation, sell their products directly to consumers through local markets and enjoy a large profit margin.

Those who are unable to sell their products directly have two options. The co-operatively operated auction houses and the wholesalers.

The Auction Houses are operated by the Producers' Organizations. Individual producers transfer their products and display them in a common exhibition room. The products are displayed with no identification of the seller's identity. The buyers examine the products and offer prices for the auctions. After the products are sold, the producer receives his payment through the Auction House, which keeps a fee for the auction (about 5%-7%).

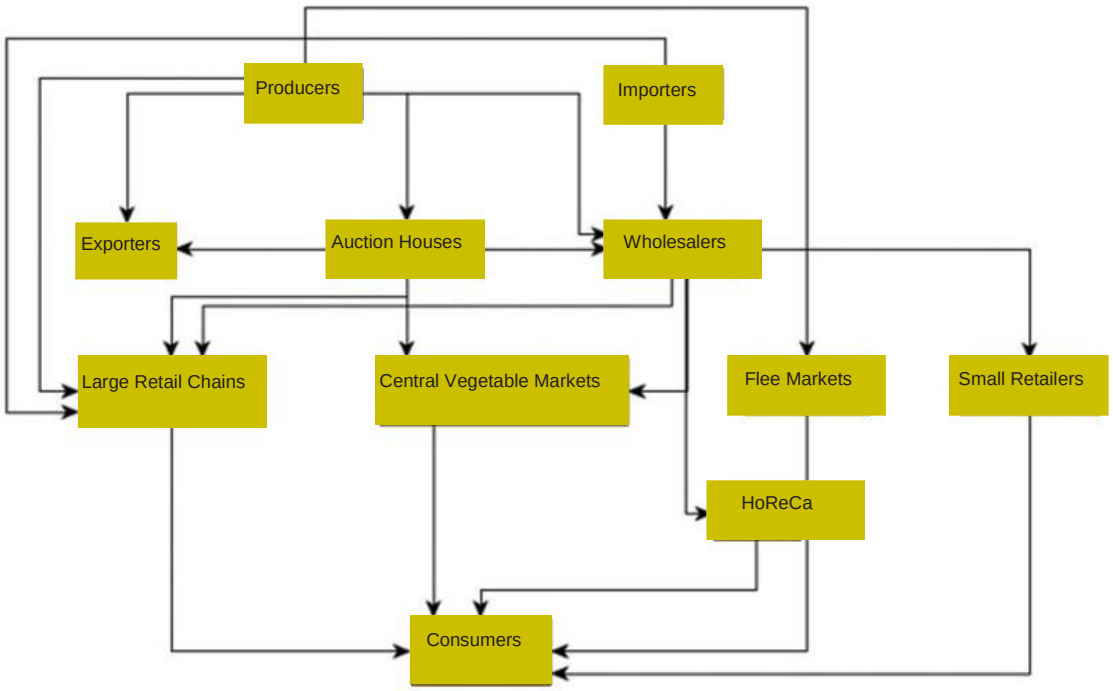

Figure 15 Structure of the Greek distribution and retail channels to consumer.

The producers' second option is the wholesalers. Unfortunately, because they act as intermediaries and have to look after their own margin as well, they offer very low prices to the producers. Especially for the products destined for the domestic market. Sometimes the producers can go directly to small retailers, but this is not done on a large scale.

It is clearly shown in the graph that because of the distorted nature of the market, there are ample opportunities for exporters and importers to bypass the middlemen and go directly to the large retail chains, or to large producers and producers organizations.

In the case of Alternative Fruits most growers sell their products to wholesalers or to processing units, but the level of satisfaction regarding the given prices is very low. Therefore, they keep a portion of their production to sell directly to small and specialized retail stores or directly to consumers, mostly through the internet. Another part of the growers distribute their production through cooperatives who substitute the role of the wholesalers.

Source: Developments in the Greek horticultural sector, Embassy of the Netherlands in Athens, 2014

4.2.3 Import-exports analysis

AFs sector in Greece in not very well organized, thus data for commerce and trade of Greek AFS are not available separately for each crop. In the total berries market Greece's imports and exports as well as the balance is presented in the following figure 16.

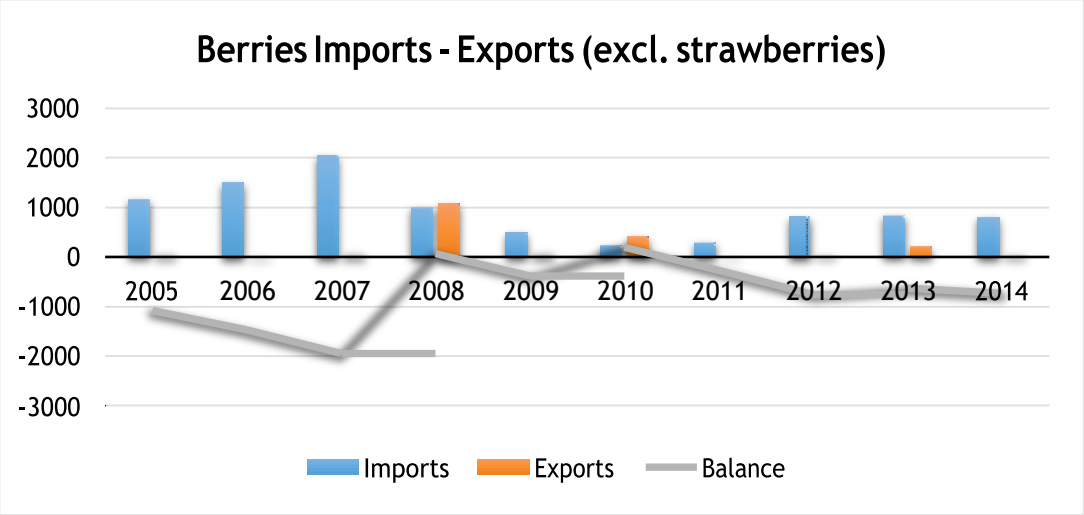

Figure 16 Total berries Import-Export balance in Greece

Greek imports of berries have decreased since 2007 but the net balance of import-exports is still negative. Thus there is place for import substitution by Greek produced berries

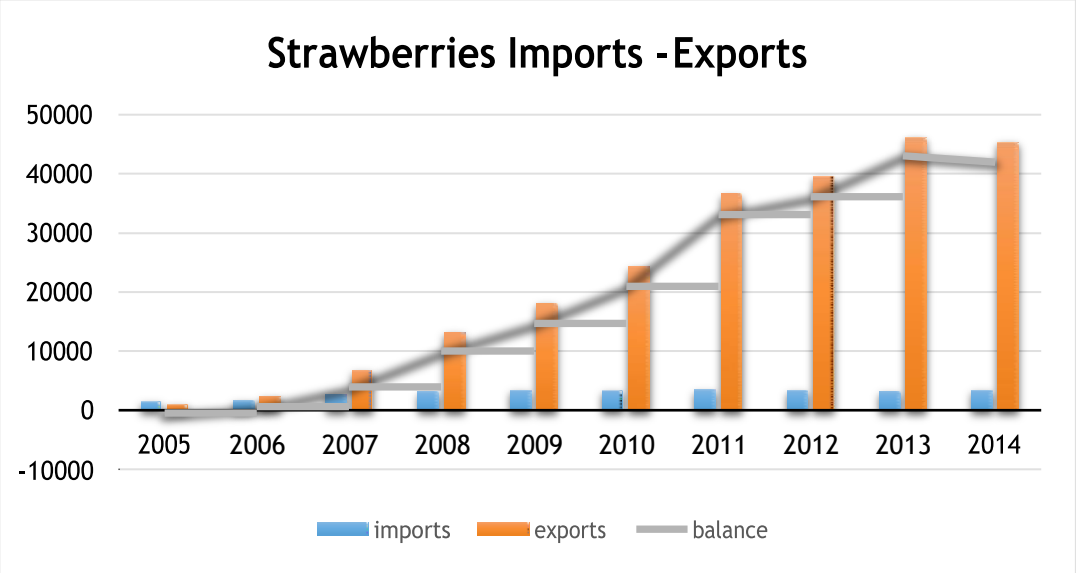

Figure 17 Imports-Exports balance of strawberries in Greece

Figure 17 presents the imports, exports and the balance for strawberries on the last decade in Greece. Data shows a significant increase of Greek export of strawberries from 2008 while the imports are stable. The main destination countries for Greek strawberries are shown in Figure 18 where we find that Russian Federation is the major client.

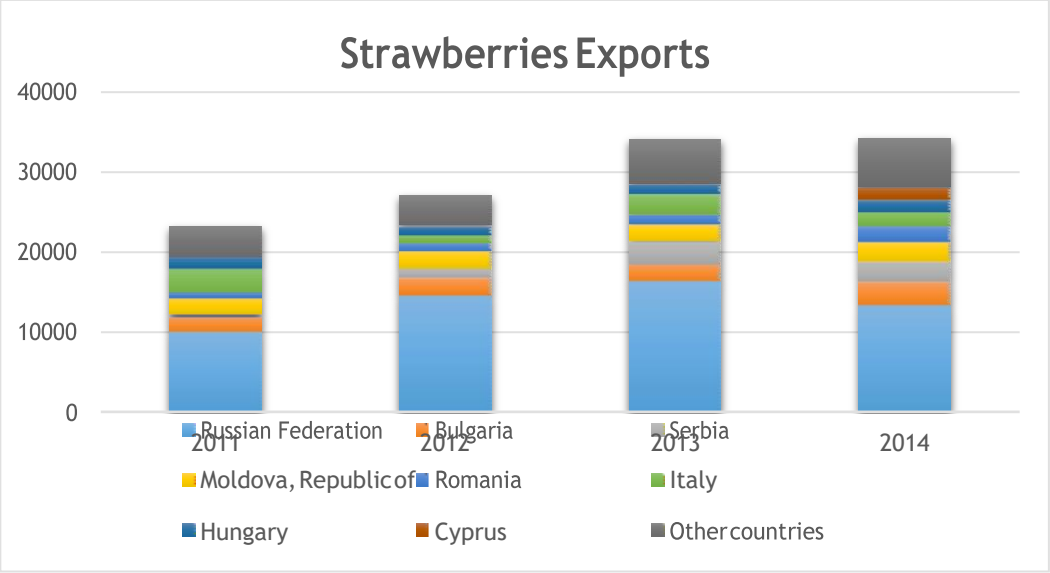

Figure 18 Exports of Greek strawberries in tons. ITC Trademap

Until 2013 the main country for Greek imports of strawberries was the Netherlands (Fig. 19), but in 2014 import from Spain are almost as equal to the ones from the Netherlands.

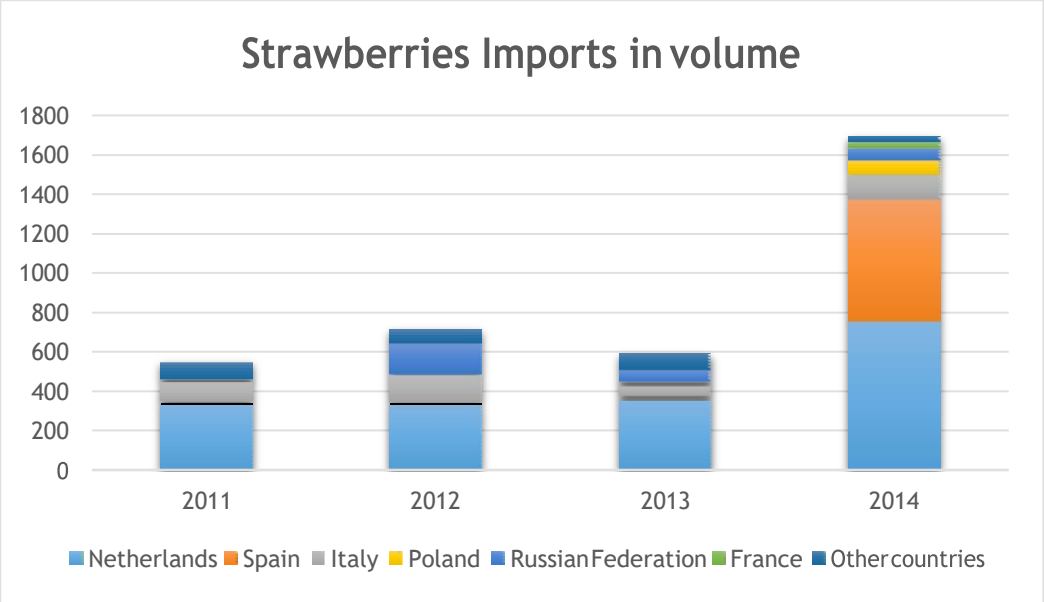

Figure 19 Greek Imports of strawberries in tons. ITC Trademap

Looking at the AFs sector in generally the leader on global berries production is the U.S.A. producing around half a million tons (Fig. 20)

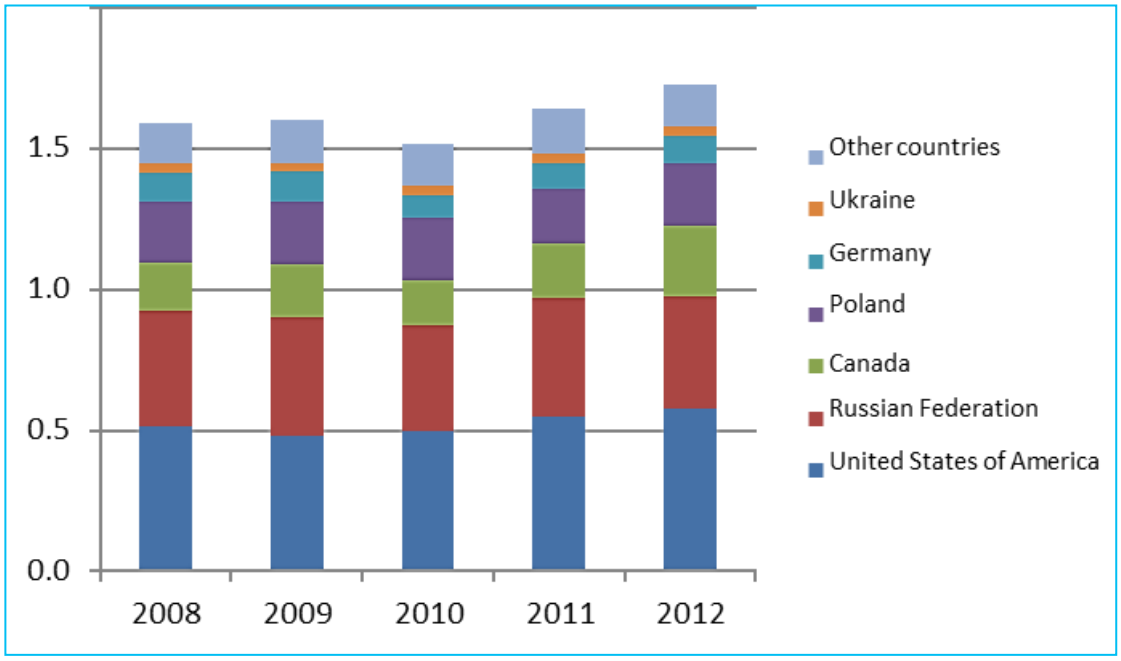

Figure 20 Global production of berries, 2005-2012, in million tones

In addition the U.S.A. is also the leader in global blueberries production (Fig. 21) and at the same time is the main exporter (Fig. 22) and importer (Fig.23) of blueberries.

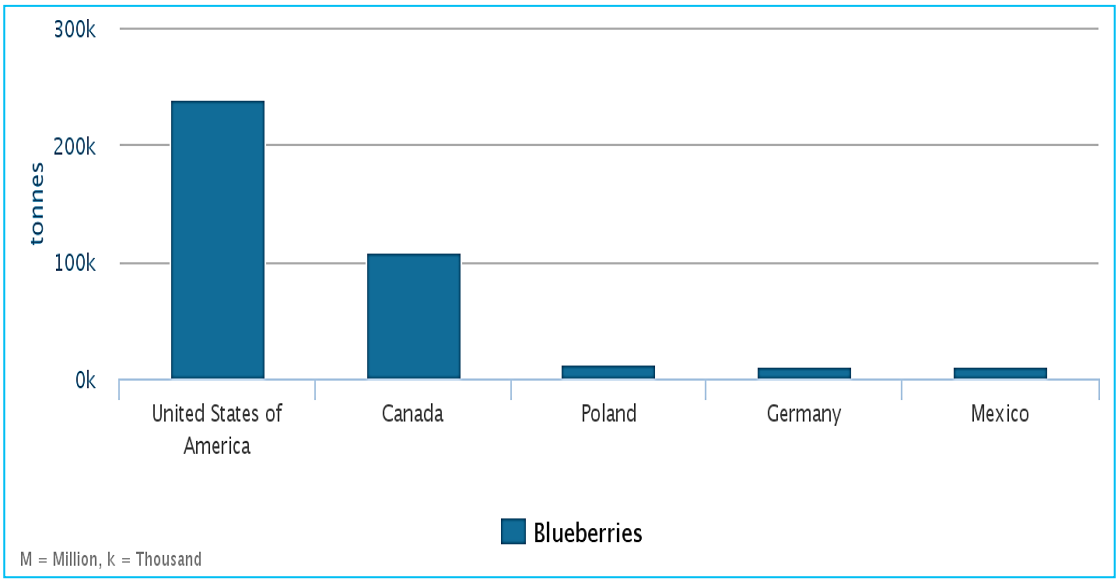

Figure 21 Production of top 5 producer countries of blueberries in 2013. FAOSTAT

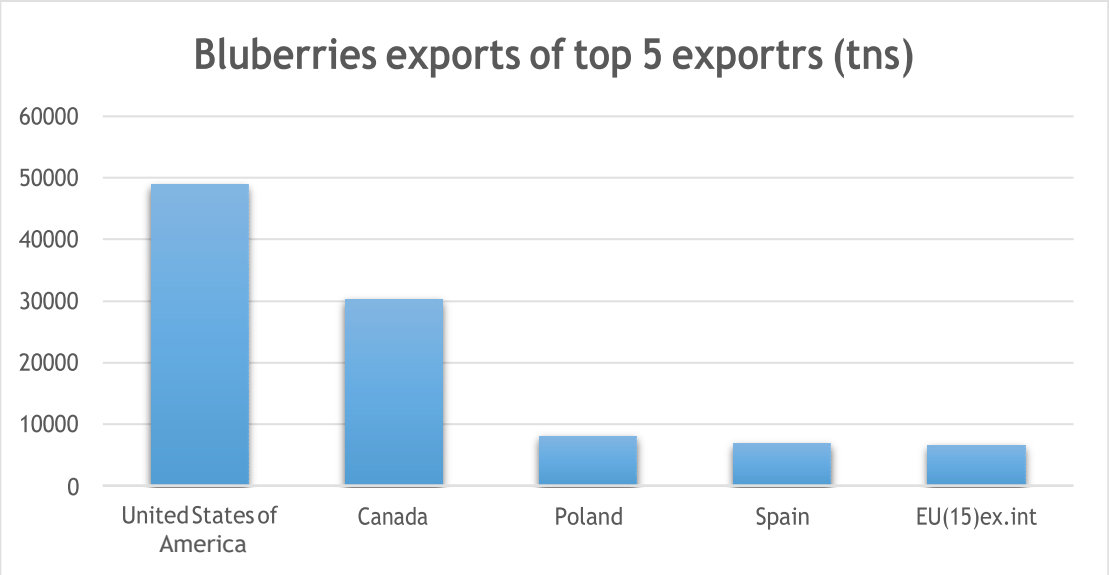

Figure 22 World top 5 exporter countries for blueberries

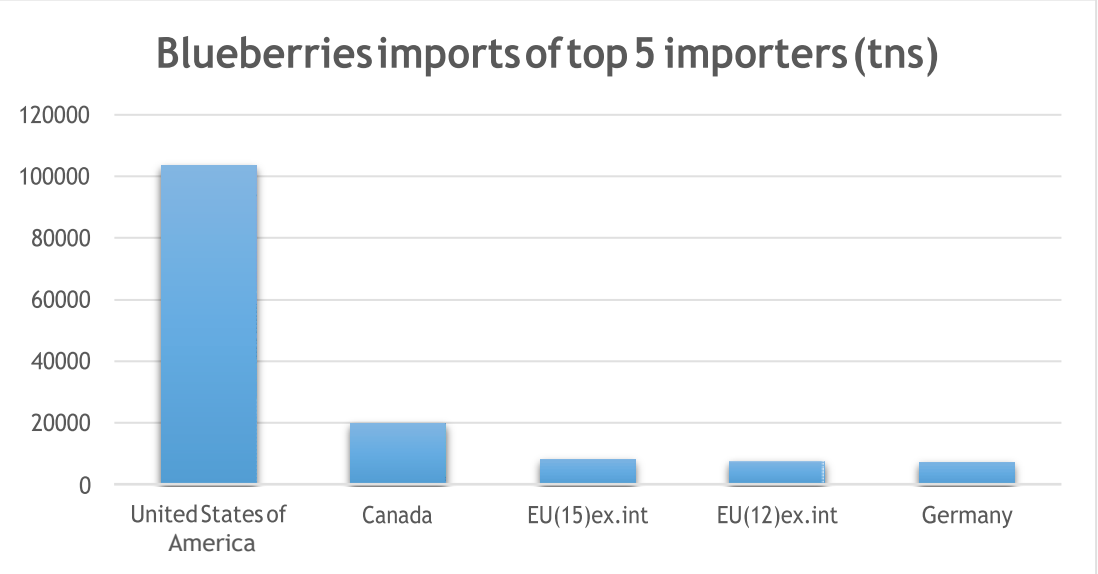

Figure 23 World top 5 importer countries for blueberries

The Russian Federation and Poland leads the global production of raspberries (Fig. 24)

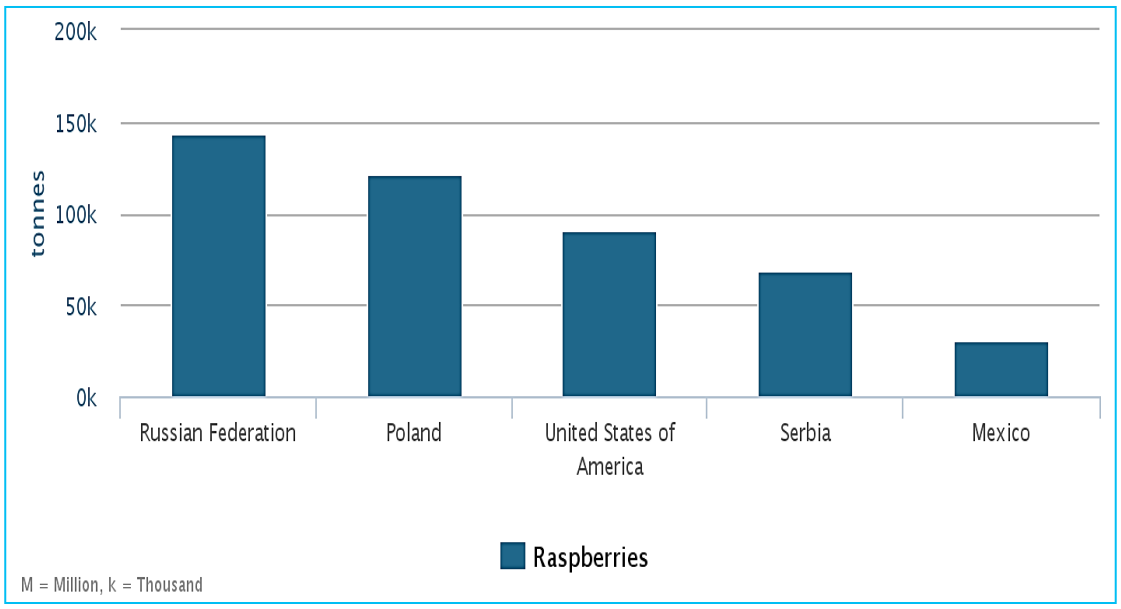

Figure 24 Production of top 5 producer countries of raspberries. FAOSTAT 2013

The world leader of strawberries production is China followed by the U.S.A. and Spain (Fig. 25).

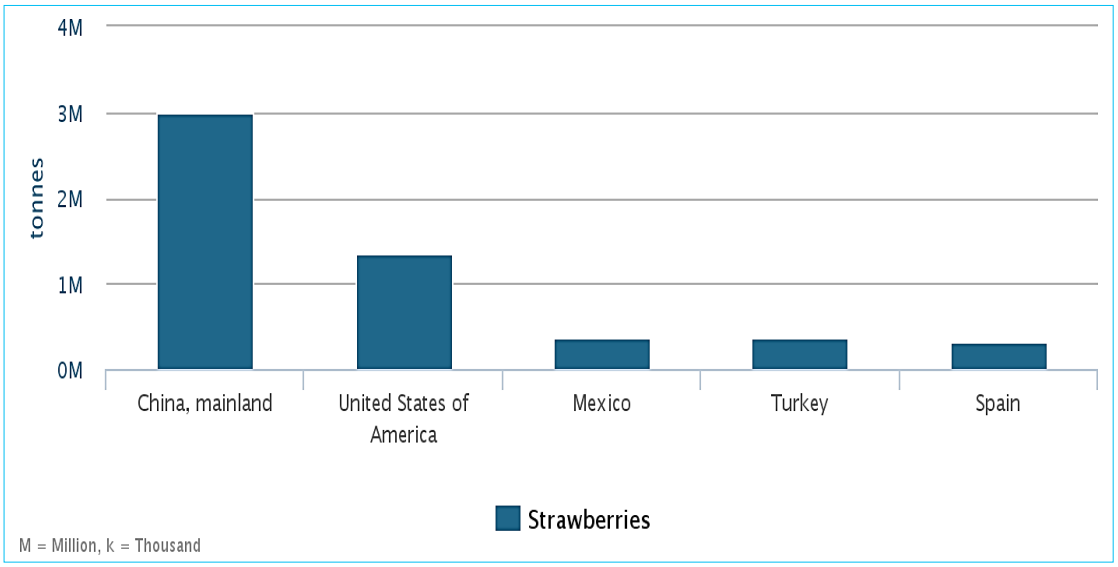

Figure 25 Production of top 5 producer countries of strawberries, FAOSTAT 2013

Spain is the world leader country of strawberries exports (Fig. 26), while the number one importer of strawberries is the U.S.A. (Fig.27).

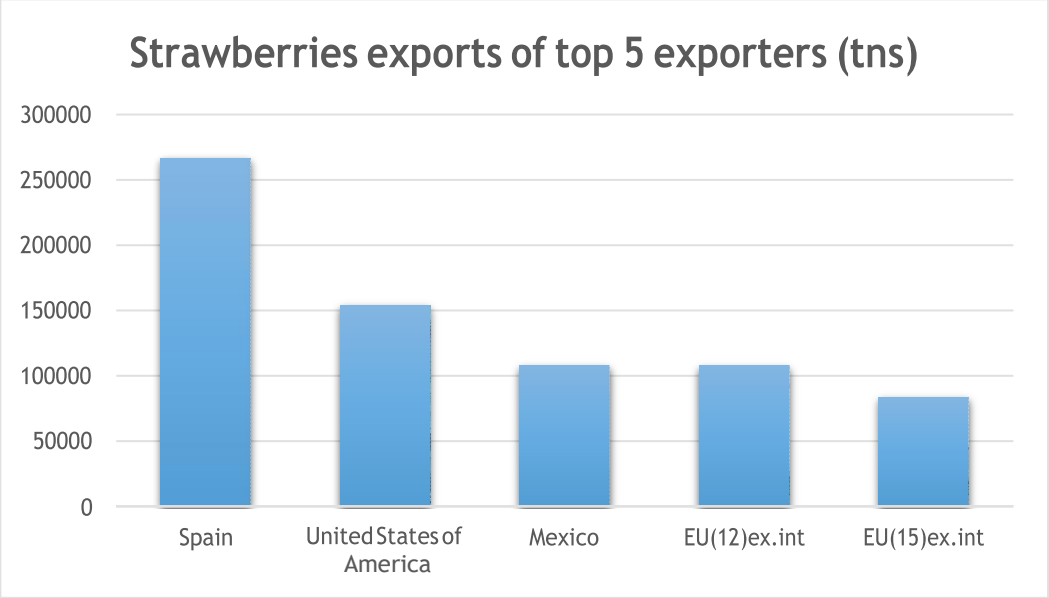

Figure 26 World top 5 exporter countries for strawberries

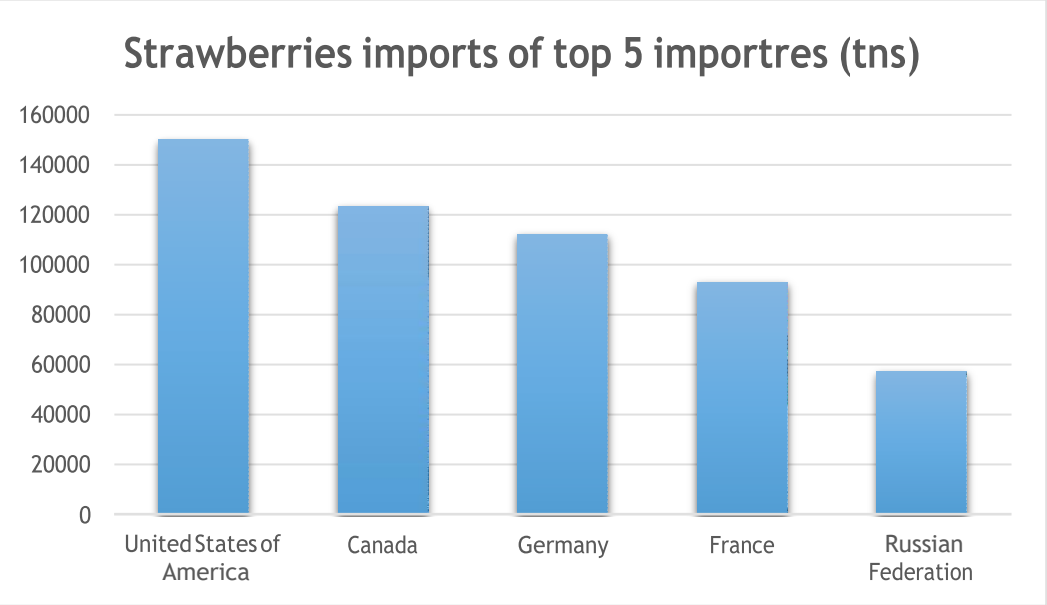

Figure 27 World top 5imported countries for strawberries

In pomegranates the leading country on production is India followed by Iran and the U.S.A. (Fig. 28)

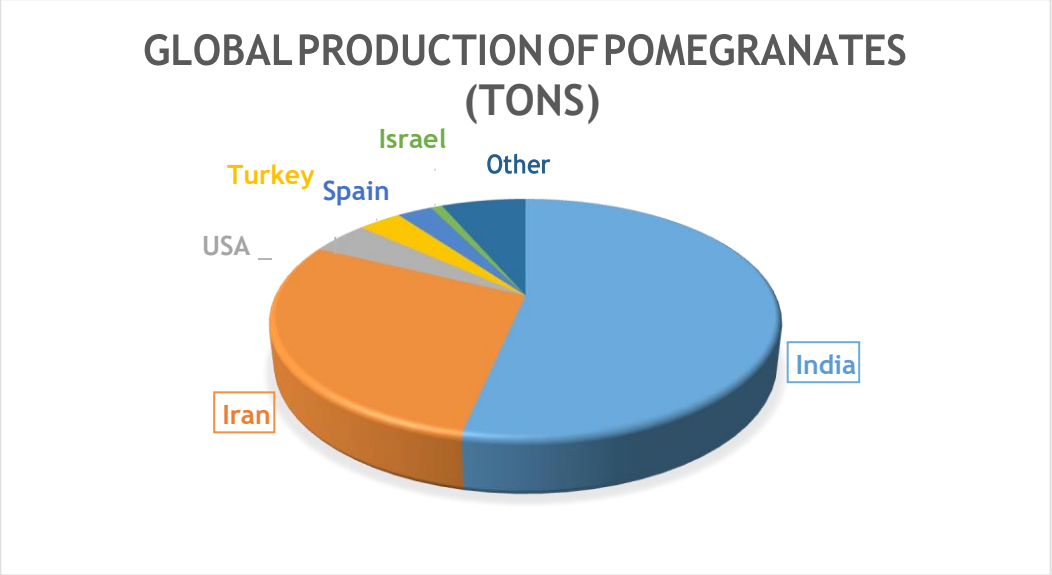

Figure 28 Global production of pomegranates

OVERVIEW OF THE EUROPEAN UNION

Fresh Berries

The total imports of fresh berries into EU grew from 2009 by 42% (Fig.27). The main importer country in EU for fresh berries is Germany followed by United Kingdom and the Netherlands (Fig. 29).

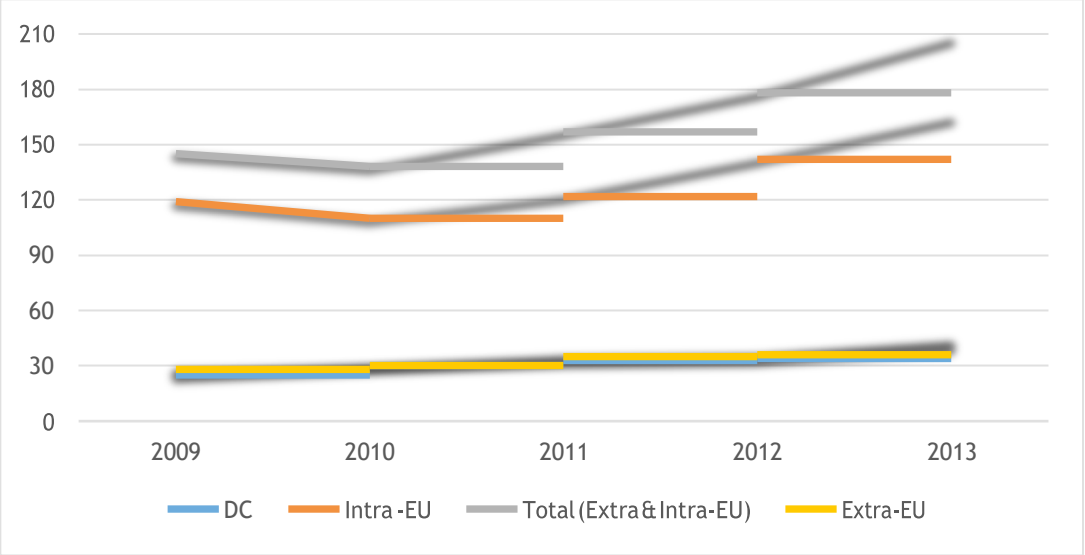

Figure 29 Imports of fresh berries into the EU, 2009-2013, in 1,000 tones, EUROSTAT

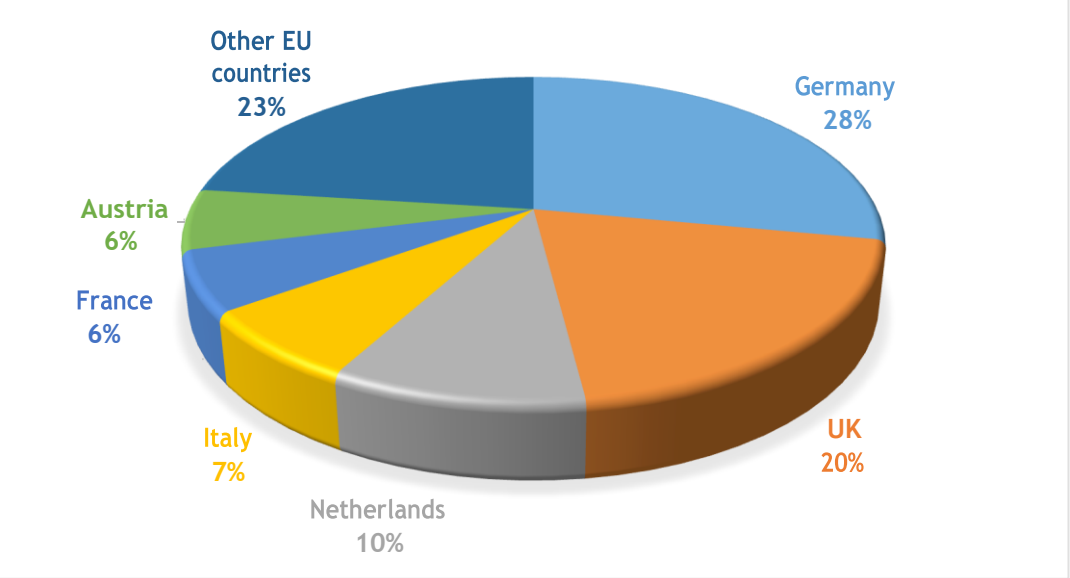

Figure 30 Division of import volume of fresh berries into the EU, in 2013

Exports from EU countries between 2009 and 2013 increased by 44% (Fig. 31). Key export countries are Poland, Spain and the Netherlands (Fig. 32). Poland is also one of the largest producer worldwide of raspberries (Fig. 19.) as well as the largest consumer of berries in general (Fig. 33). The trade of Spain and Poland with other EU countries is based mainly on inland production. Importers in the European market prefer larger producers because of supply certainty. Europe produces berries for a large part of the year, but imports are needed to meet market demand for fresh berries all year round.

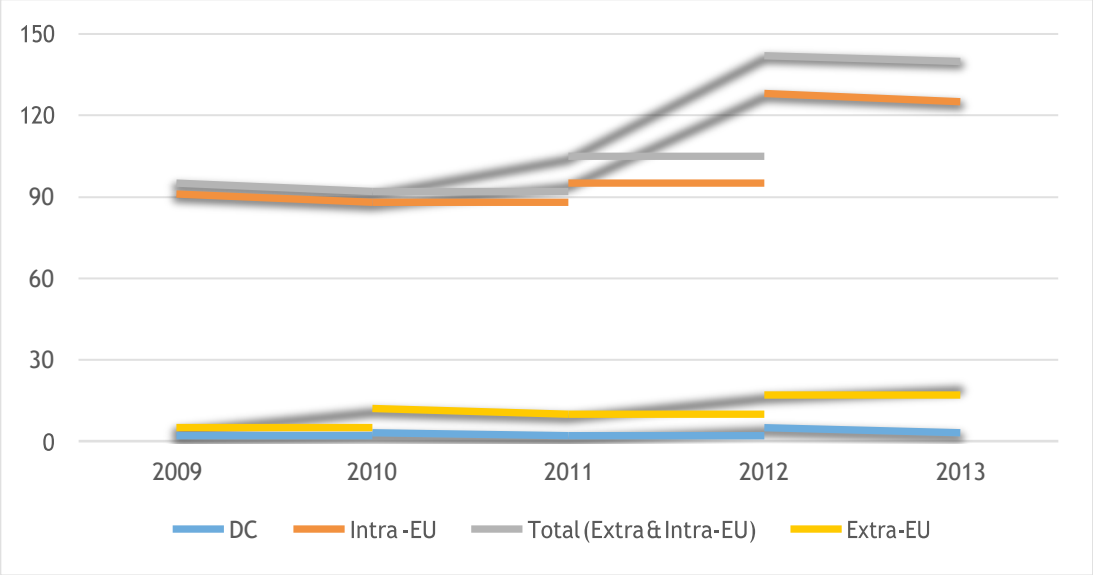

Figure 31 Export of fresh berries from EU countries, 2009-2013, in 1,000 tones, EUROSTAT

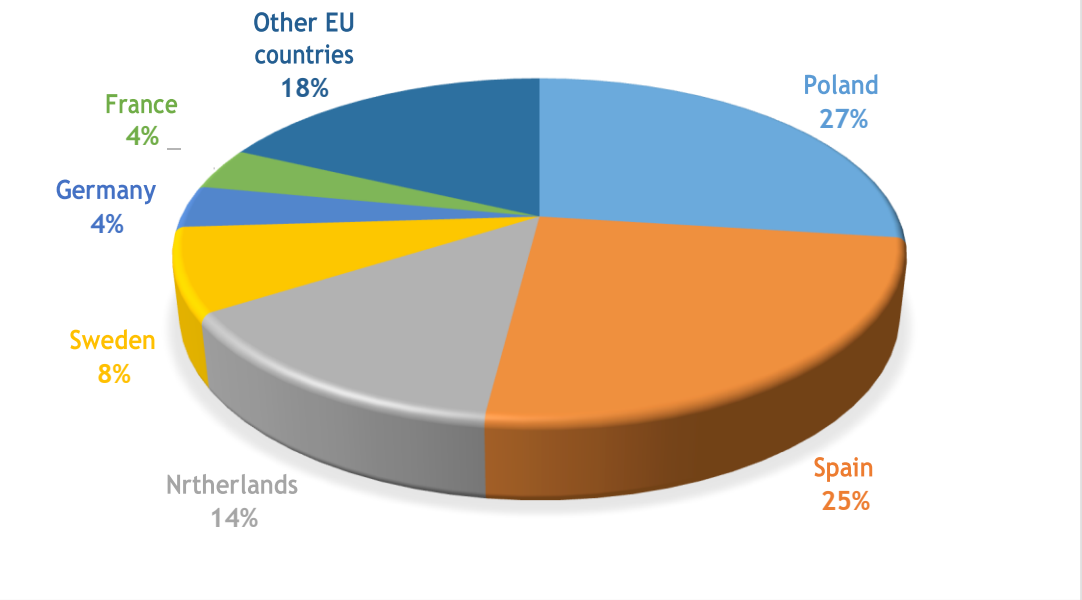

Figure 32 Division of export volume of fresh berries from EU countries, in 2013

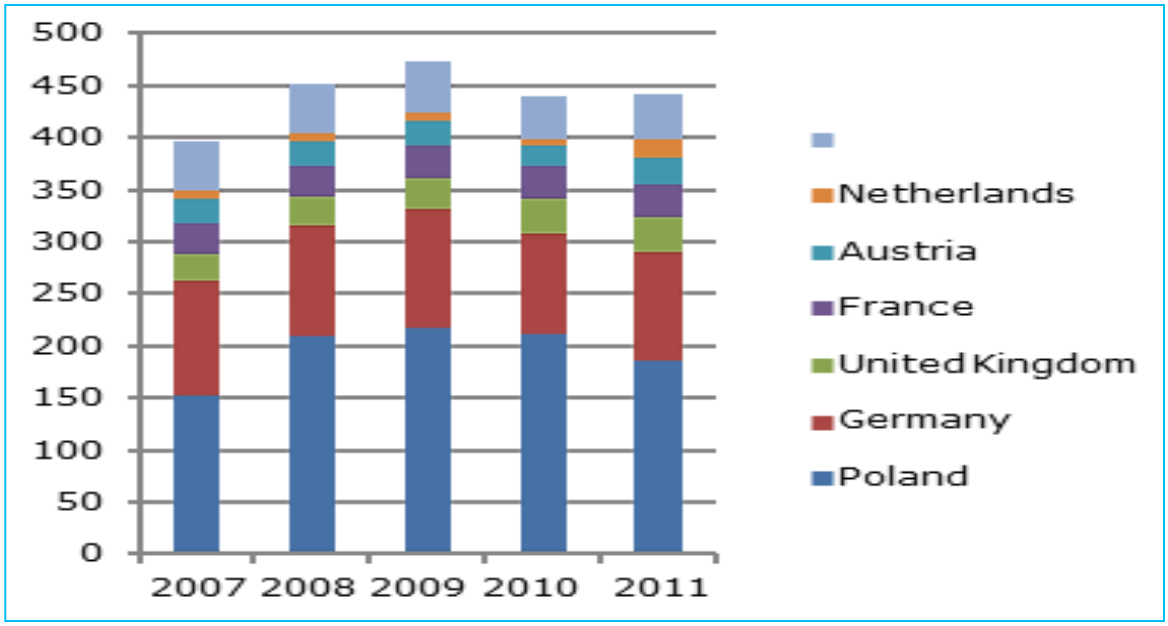

Figure 33 Apparent consumption of blueberries, cranberries, gooseberries and currants in the EU, 2007-2011, in thousands tones, FAOSTAT

Structure of the EU market related to fruit and vegetables (Fig. 34) in general, thus for AFS also is relatively simple (CBI, 2015).

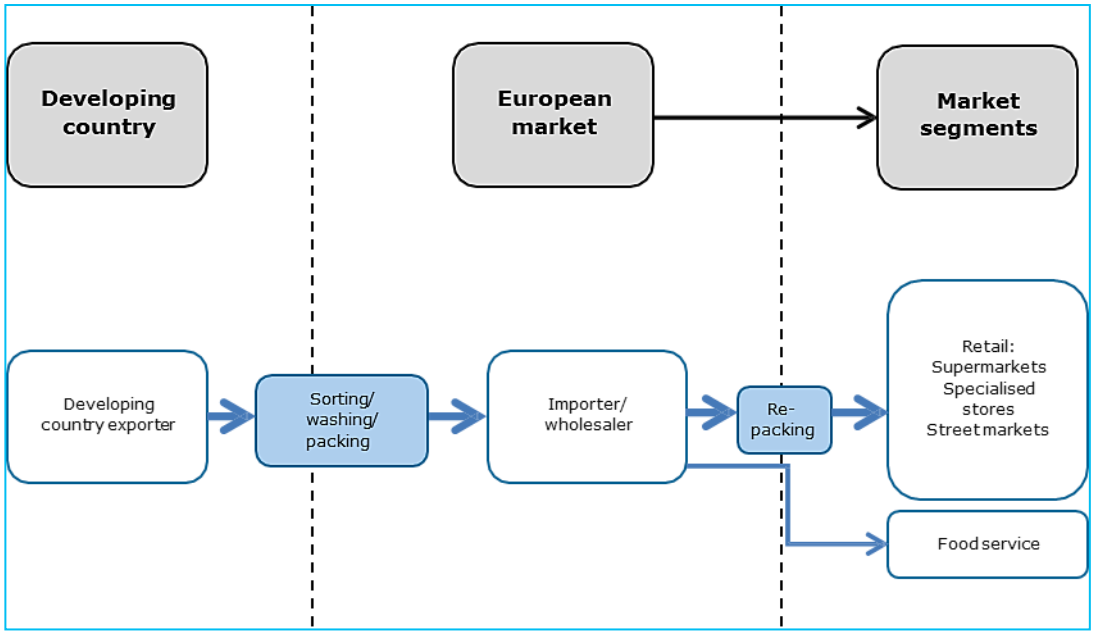

Figure 34 Market channels for fresh fruit and vegetables in the European market

Juice

Regarding the market of the juice of AFs in the European Union the main importer country (Fig 35). is the Netherlands followed by Germany, France and the UK.

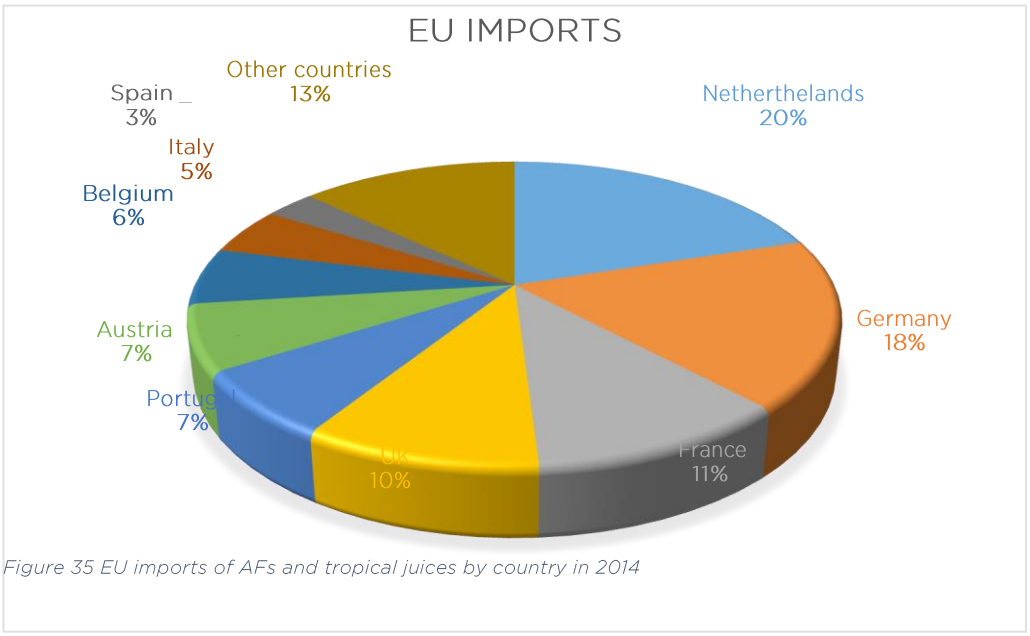

Figure 35 EU imports of AFs and tropical juices by country in 2014

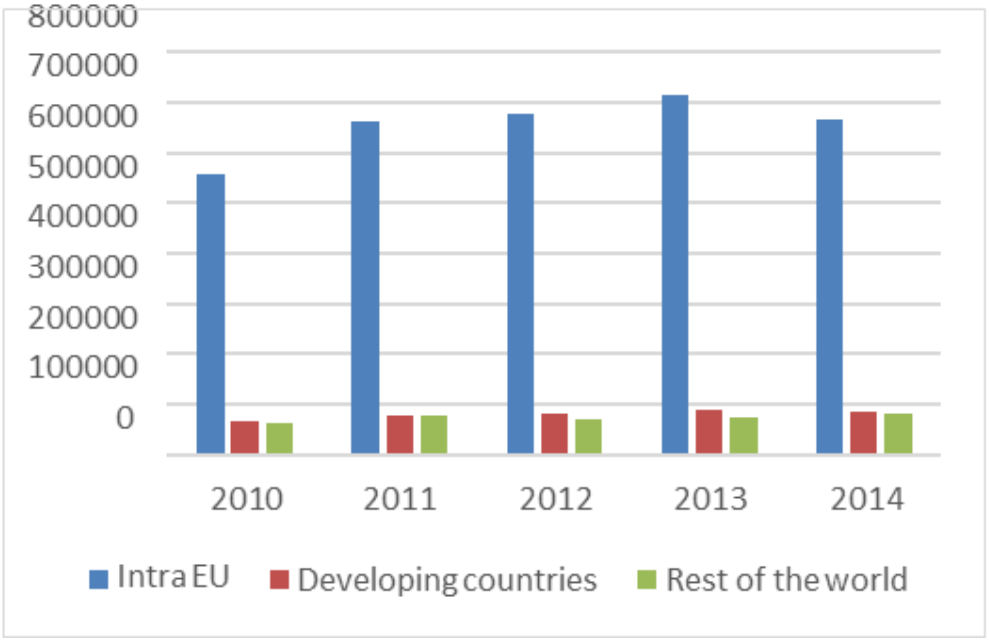

Figure 36 EU exports of AFs and tropical juices, in € thousands, Source: Eurostat

Exports of AFs and tropical juice of EU are mostly intra EU exports and have been increased since 2010 (Fig. 36). The Netherlands is the key exported country which

indicates, in relation to the imports data, that is major imported and re-exported player.

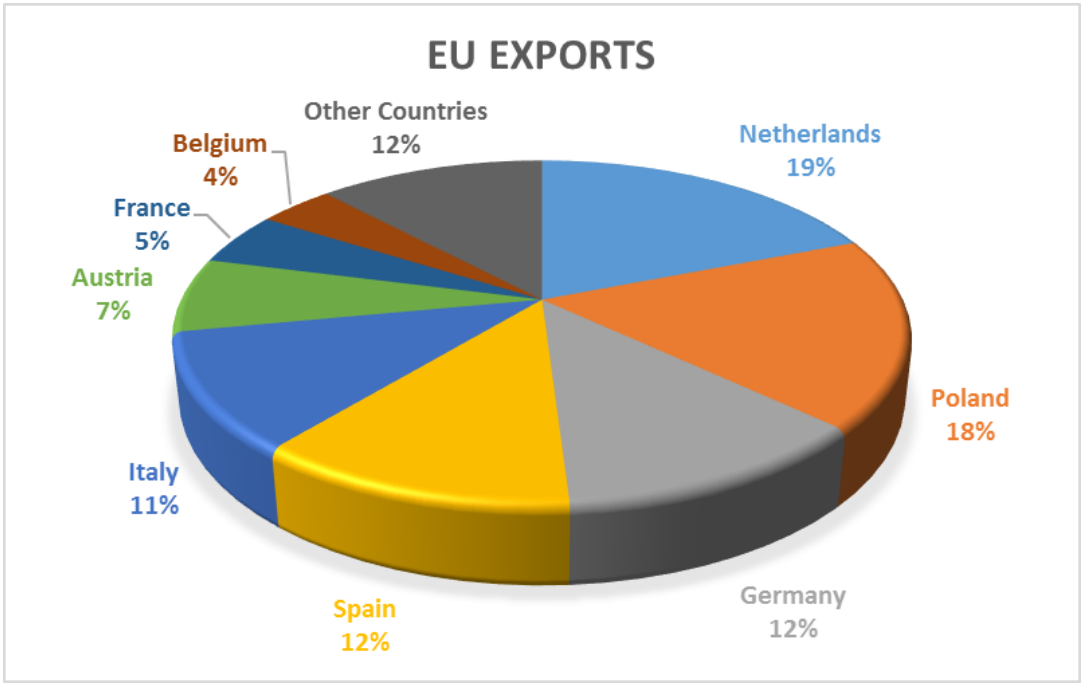

Figure 37 EU exports of AFs and tropical juices by country in 2014. Source ITC trademap

The structure of the market and the market channels in EU for juice is a bit more complex than the one for fresh fruits (Fig. 37)

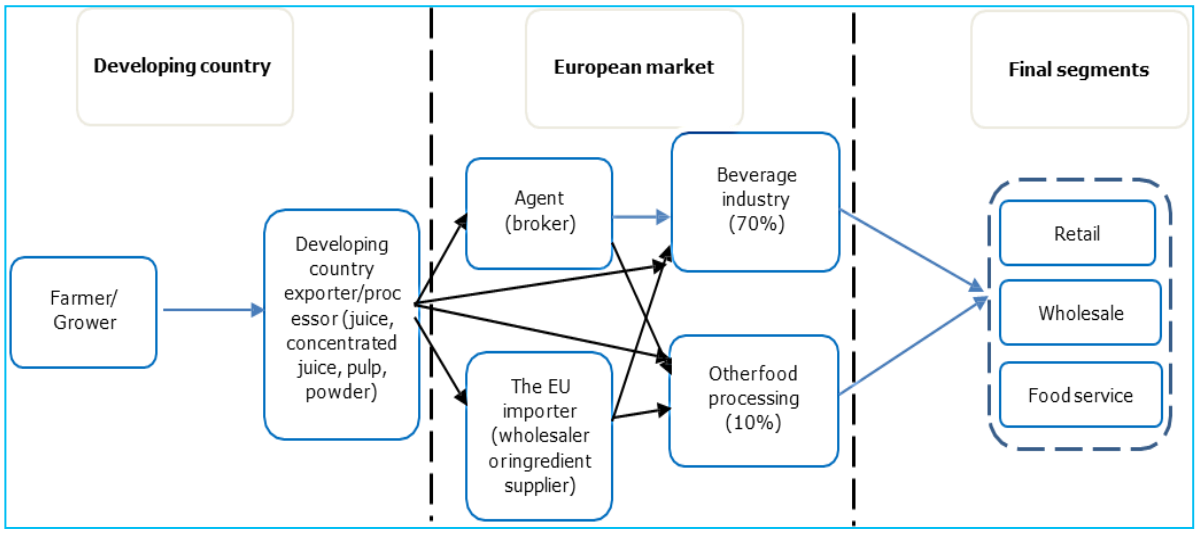

Figure 38 Common EU trade channels for AFs juices

THE FRENCH MARKET

The fresh AFs market in France has an increase since 2008 (Table 18) by 11.4%

Table 18 Historic Sales of Fruits by Category in France: Total Volume in 000' Tones and % Growth 2008-2013

Category	2008	2009	2010	2011	2012	2013	2008-13 % CAGR	2008/13 % Total
Apples	522.4	495.6	479.7	466.7	488.4	498.8	-0.9	-4.5
Banana	341.1	334.2	341.8	335.1	354.5	365.2	1.4	7.1
Cherries	23.9	24.5	24.3	24.6	24.1	23.7	-0.2	-1.1
Cranberries/Blueberrie	2.9	3.0	3.1	3.1	3.1	3.2	2.2	11.4
Grapefruit/Pomelo	95.7	94.1	92.4	88.1	80.6	70.9	-5.8	-26.0
Grapes	211.3	212.4	213.5	209.7	202.9	193.7	-1.7	-8.3
Lemon and Limes	42.6	51.1	51.6	52.6	53.0	52.8	4.4	24.1
Oranges, Tangerines and Mandarins	274.5	291.5	297.5	282.3	312.7	326.1	3.5	18.8
Peaches/Nectarines	194.7	193.6	200.7	185.2	177.5	179.2	-1.6	-8.0
Pears/Quinces	142.4	143.5	144.5	136.2	130.3	125.7	-2.5	-11.7
Pineapple	56.5	53.7	53.6	52.5	56.2	57.6	0.4	2.0
Plums/Sloes	32.2	32.5	32.7	32.0	32.1	32.5	0.2	1.0
Strawberries	66.5	69.9	70.6	71.3	72.6	74.7	2.4	12.4
Other Fruits	403.0	390.9	375.2	377.1	380.0	388.1	-0.7	-3.7
Fruits	**2,409.5**	**2,390.5**	**2,381.2**	**2,316.4**	**2,368.**	**2,392.0**	**-0.1**	**-0.7**

The estimation for the French market of AFs (Table 19) from 2014 to 2018 for strawberries to slightly grow by 5.2% and blueberries to be almost stable (growth 0.8%).

Table 19 Forecast Sales of Fruits by Category in France: Total Volume in '000 Tones and % Growth 2013-2018

Category	2013	2014 F	2015 F	2016 F	2017 F	2018 F	2013-18 % CAGR	2013-18 % Total
Apples	498.8	491.8	482.3	493.2	506.9	498.6	0.0	0.0
Banana	365.2	373.4	366.4	356.8	364.1	374.2	0.5	2.5
Cherries	23.7	24.0	24.5	25.1	24.8	24.5	0.7	3.6
Cranberries/Blueberries	3.2	3.2	3.1	3.1	3.2	3.2	0.2	0.8
Grapefruit/Pomelo	70.9	63.5	60.1	59.4	60.3	63.2	-2.3	-10.8
Grapes	193.7	189.1	220.6	223.4	227.8	233.6	3.8	20.6
Lemon and Limes	52.8	52.2	52.6	53.8	55.3	54.7	0.7	3.5
Oranges, Tangerines and Mandarins	326.1	331.8	324.0	307.1	313.2	322.6	-0.2	-1.1
Peaches/Nectarines	179.2	183.0	189.2	183.7	181.6	185.3	0.7	3.4
Pears/Quinces	125.7	127.2	130.4	135.0	136.3	139.5	2.1	11.0
Pineapple	57.6	59.1	59.1	57.8	59.9	61.0	1.2	6.0
Plums/Sloes	32.5	33.0	33.6	33.3	33.0	32.8	0.2	1.0
Strawberries	74.7	74.3	73.6	75.1	77.4	78.6	1.0	5.2
Other Fruits	388.1	399.2	412.1	407.6	402.1	409.1	1.1	5.4
Fruits	**2,392.0**	**2,404.8**	**2,431.7**	**2,414.2**	**2,445.9**	**2,481.0**	**0.7**	**3.7**

Other AFs products in France are the Naturally Healthy (NH) Beverages, whose current off-trade value sales grew by 2% in 2012 to reach €4.7 billion and frozen berries. France is the second largest importer of frozen berries in Europe with the majority of imports coming from Serbia (2011). These frozen berries are mainly intended for domestic consumption (Canadian ministry of Agriculture, 2014).

THE GERMAN MARKET

The market of fresh AFs in Germany has shown a small increase since 2006 (Table 20). While the forecast for the market trend up to 2016 is for strawberry to have double figured growth (15.2%) and blueberries to continue to grow by 5.9% (Table 21).

Table 20 Historic Sales of Fruits by Category in Germany: Total Volume in '000 Tones and % Growth 2006-2011

Category	2006	2007	2008	2009	2010	2011	2006-11 % CAGR	2006/11 % Total
Apples	1,450.9	1,411.7	1,397.7	1,338.3	1,398.1	1,426.1	-0.3	-1.7
Banana	880.4	889.0	912.6	828.3	775.6	791.1	-2.1	-10.1
Cherries	82.4	90.6	82.2	86.1	95.0	97.2	3.3	17.8
Cranberries/Blueberries	7.0	7.0	7.0	7.1	7.4	7.5	1.3	6.6
Grapefruit/Pomelo	49.5	49.4	46.9	46.7	48.0	49.0	-0.2	-0.9
Grapes	296.8	255.2	238.4	205.0	232.1	239.6	-4.2	-19.3
Lemon and Limes	123.6	123.5	115.1	114.8	121.3	125.3	0.3	1.3
Oranges, Tangerines and Mandarins	806.2	798.5	846.8	878.4	928.6	951.8	3.4	18.1
Peaches/Nectarines	271.2	235.5	247.0	283.3	311.3	320.6	3.4	18.2
Pears/Quinces	171.8	205.8	171.3	165.7	168.8	172.4	0.1	0.4
Pineapple	115.8	127.2	139.8	149.2	137.2	132.6	2.7	14.5
Plums/Sloes	84.4	82.3	74.0	65.6	68.6	70.0	-3.7	-17.1
Strawberries	206.1	197.6	189.1	224.4	216.3	221.3	1.4	7.4
Other Fruits	924.7	821.3	580.3	806.0	767.7	777.3	-3.4	-15.9
Fruits	**5,470.9**	**5,294.4**	**5,048.2**	**5,198.9**	**5,276.0**	**5,381.7**	**-0.3**	**-1.6**

Note: At the time of writing, historic data to 2011 represented the most recent available for fruit sales in Germany. (Canadian Ministry of Agriculture)

Table 21 Forecast Sales of Fruits by Category in Germany: Total Volume in '000 Tones and % Growth 2011-2016

Category	2011	2012 F	2013 F	2014 F	2015 F	2016 F	2011-16 % CAGR	2011/16 % Total
Apples	1,426.1	1,463.2	1,502.7	1,544.8	1,591.1	1,632.8	2.7	14.5
Banana	791.1	810.9	832.3	855.7	881.3	904.1	2.7	14.3
Cherries	97.2	99.6	102.2	105.1	108.3	111.2	2.7	14.4
Cranberries/Blueberries	7.5	7.6	7.6	7.7	7.8	7.9	1.2	5.9
Grapefruit/Pomelo	49.0	49.9	50.8	51.6	52.2	52.7	1.5	7.6
Grapes	239.6	244.4	248.1	250.6	253.6	254.7	1.2	6.3
Lemon and Limes	125.3	128.3	130.8	132.7	134.4	135.7	1.6	8.3
Oranges, Tangerines and Mandarins	951.8	976.5	1,003.9	1,026.0	1,044.4	1,069.3	2.4	12.3
Peaches/Nectarines	320.6	327.9	334.5	345.7	354.9	364.4	2.6	13.6
Pears/Quinces	172.4	176.3	181.6	185.2	189.5	192.5	2.2	11.7
Pineapple	132.6	134.3	138.0	139.6	141.1	141.9	1.4	7.0
Plums/Sloes	70.0	71.3	72.6	73.6	74.5	75.4	1.5	7.7
Strawberries	221.3	228.6	234.3	240.9	248.2	254.9	2.9	15.2
Other Fruits	777.3	789.4	805.3	824.1	846.8	872.2	2.3	12.2
Fruits	**5,381.7**	**5,508.2**	**5,644.7**	**5,783.2**	**5,928.1**	**6,069.8**	**2.4**	**12.8**

Juice

Per capita consumption of juice in Germany is by far the highest of the main European countries with moves towards greater product innovation. Smoothies have made their way into the chilled sections of supermarket chains, whereas in discount shops, the traditional focus has been on regular fruit juices. New flavours such as cranberry and pomegranate are also establishing a market share (Canadian Ministry of Agriculture, 2014).

THE BRITISH MARKET

Cranberries and blueberries are showing the fastest growth in the the AFs fresh fruit market in UK with a 9% total volume rise to 14 million tons in 2013 (Table 22). Cranberries and blueberries continued to show strong growth in 2013 as more consumers became aware of this product type. Also strawberries have an significant growth since 2008.

Table 22 Historic Sales of Fruits by Category in the United Kingdom: Total Volume in '000 Tonnes and % Growth 2008-2013

Category	2008	2009	2010	2011	2012	2013	2008-13 % CAGR	2008/13 % Total
Apples	614.4	589.9	581.0	574.6	570.6	568.3	-1.5	-7.5
Banana	863.2	828.7	816.2	807.3	800.0	794.4	-1.6	-8.0
Cherries	16.7	16.4	16.1	15.9	15.8	15.7	-1.3	-6.2
Cranberries/Blueberries	6.6	8.4	10.2	11.5	12.6	13.8	15.8	108.1
Grapefruit/Pomelo	30.8	30.3	29.8	29.4	29.1	28.9	-1.3	-6.4
Grapes	186.3	173.3	170.7	168.6	167.1	166.0	-2.3	-10.9
Lemon and Limes	67.7	67.0	66.0	65.3	64.7	64.4	-1.0	-4.9
Oranges, Tangerines and Mandarins	463.0	452.5	445.2	440.3	438.6	437.2	-1.1	-5.6
Peaches/Nectarines	68.0	65.0	63.7	62.7	62.0	61.4	-2.0	-9.7
Pears/Quinces	137.8	128.2	126.3	124.9	123.9	123.4	-2.2	-10.5
Pineapple	43.0	42.6	41.9	40.5	38.8	37.2	-2.9	-13.6
Plums/Sloes	54.8	54.3	53.5	52.8	52.2	51.7	-1.2	-5.7
Strawberries	65.9	71.2	74.4	76.0	77.0	78.4	3.5	19.0
Other Fruits	285.5	282.7	278.4	274.8	272.3	270.4	-1.1	-5.3
Fruits	**2,903.9**	**2,810.2**	**2,773.5**	**2,744.6**	**2,724.6**	**2,711.1**	**-1.4**	**-6.6**

The estimation for the AFs market in UK until 2018 (Table 23) is for berries to continue growing by 76.2% and strawberries by 6.7%.

Table 23 Forecast Sales of Fruits by Category in the United Kingdom: Total Volume in '000 Tonnes and % Growth 2013-2018

Category	2013	2014 F	2015 F	2016 F	2017 F	2018 F	2013-18 % CAGR	2013/18 % Total
Apples	568.3	567.2	568.9	571.7	575.2	579.8	0.4	2.0
Banana	794.4	792.8	796.0	802.3	810.4	819.3	0.6	3.1
Cherries	15.7	15.6	15.7	15.8	16.0	16.2	0.6	3.2
Cranberries/Blueberries	13.8	15.1	16.8	18.8	21.2	24.2	12.0	76.2
Grapefruit/Pomelo	28.9	28.7	28.6	28.7	29.0	29.3	0.3	1.4
Grapes	166.0	165.5	166.1	167.1	168.5	170.1	0.5	2.5
Lemon and Limes	64.4	64.1	64.2	64.5	64.9	65.5	0.4	1.8
Oranges, Tangerines and Mandarins	437.2	436.8	438.1	441.2	445.8	451.2	0.6	3.2
Peaches/Nectarines	61.4	61.2	61.4	61.9	62.7	63.5	0.7	3.4
Pears/Quinces	123.4	123.6	124.3	125.2	126.4	127.8	0.7	3.5
Pineapple	37.2	35.7	34.4	33.2	32.0	30.9	-3.6	-16.8
Plums/Sloes	51.7	51.5	51.7	52.0	52.4	53.0	0.5	2.5
Strawberries	78.4	79.6	80.7	81.8	82.7	83.6	1.3	6.7
Other Fruits	270.4	269.1	268.5	269.1	270.7	273.1	0.2	1.0
Fruits	**2,711.1**	**2,706.5**	**2,715.4**	**2,733.4**	**2,757.8**	**2,787.5**	**0.6**	**2.8**

Other AFs products in the United Kingdom includes the dried berries for which UK consumers have very positive perceptions of the healthfulness of dried fruit, rating it second to fresh fruit in terms of perceived naturalness, nutrition, ease of eating and taste. In addition baked Goods and Jams of cranberries are gaining popularity in

baked treats such as cakes and biscuits. Also frozen wild berries are very popular in UK.

Potential substitution of imported fruits by Greek produced AFs

Greek imports of berries have been declining since 2007 as mentioned in the previous section. However, there are still missing data regarding commerce of each fruit in Greece and a realized assessment of the sector cannot be performed. Imported AFs compared to the Greek produced are, in most cases, cheaper as they are imported from countries with a lower cost of production . On the other hand, almost all Greek produced AFs are from farms that are certified as organic or sustainable management systems, both of which offer a great marketing advantage.

In order for Greek produced AFs to substitute imported fruits two major factors should be considered:

- Decrease the cost of production, which can be achieved by implementation of mechanized harvesting (where applicable) and reduction of agricultural inputs through the implementation of appropriate cultivation techniques.
- Establish Greek AFs as of high quality fruits, environmentally and user friendly (since they are organically produced) and of "Greek Origin". These could be achieved through the elaboration of research projects that will assess quality parameters of Greek produced AFs and an intense informative campaign for the advantages of Greek produced AFs.

All the above actions and measures need require careful planning, effective coordination and constant monitoring and evaluation of the actions.

4.3 The Greek Experience until now

4.3.1 Case studies from successful and unsuccessful farming businesses.

Part of our primary research consisted of visits to existing growers of AFs crop in order to collect all the necessary information. A short description of the interviewees is presented below. Analytic company profiles and interview findings are presented in Appendix II of the study.

ASOP Agios Athanasios (Cooperative)

The interview took place at our offices with Mr. Athanasiadis, Sales and Marketing director and Mr Argyriou, manager and founder of the cooperative. ASOP Ag. Athanasios in Drama region is a cooperative that established in 2005 and today has around 900 members all growers of pomegranate. The cooperative provides all the technical support and knowhow needed for the cultivation. The harvested yield is processed at the cooperative's processing unit producing fresh pomegranate's juice and fresh seeds. They produce the juice using modern methods (clear juice and deseeding) that facilitate the production of juice of higher quality and nutritional value.

Damianidis Rolandos (Aronia berry grower)

Mr. Damianidis established the farm on behalf of his daughter in 2012 in the region of Rodolivos in Serres. He manages the plantation and is responsible for all works performed. He planted aronia berries after a thorough research and he visited Boulgaria where he learnt about the plant and the processing techniques. Before establishing his plantation he elaborated a business plan based on the information he gathered himself and not based on the mass media. He started harvesting Aronia berries last year and he gives the yield mainly for juice production. He also experiments in processing and development of new products such as aronia raisins and wine.

Dimopoulos Dimitris (Pomegranates' grower)

Mr Dimopoulos established the 1 hectare pomegranate plantation in 2012 in Chalandritsa Achaias. He selected the Greek Variety "Ermioni" because it has better quality characteristic and is adapted to the local environmental conditions. In 2014 he harvested around 1000 kg that were distributed to the local retail market with great success. In 2015 the production was very little due to unfavorable weather conditions. Mr. Dimopoulos has already decided to expand his plantation by planting additional 1 hectare in 2016 because he have seen that there is great potential in this crop especially with the Greek variety whose fruits are sweeter than the one from "Wonderful" variety and the customers prefer his fruits even if they don't have the impressive red color of "Wonderful".

“Efkarpon” Hellenic Superfoods (Cooperative)

Interview took place at their facilities with Mr Kotsiopoulos is the new president of the “Efkarpon” Hellenic Superfoods cooperative which founded in 2011 in Karditsa. Today the cooperative has 128 members who cultivates around 60 hectares of alternative fruits like goji berry, aronia, blueberries and hippophaes and are scatered allover Greece but mainly in the region of Thessaly. The small quantities of the first production were distributed as fresh and frozen fruits to local retail stores and to wholesalers. The cooperative planned from the beginning to establish a processing unit to process the production of its members. The processing Facilities were funded by the EU investment program “Leader” and will be operative in 2016 in Mataraga a village nearby the city of Karditsa.

Gouliafas Aristotelis (Hippophaes’ grower)

Mr Gouliafas established 0.9 hectares of hippophaes in 2010 in the region of Aiani in Kozani. He decided to plant Hippophaes mainly because he is a big supporter of healthy diet and he used to consume hippophaes juice regularly. Mr Gouliafas is not very satisfy from his cultivation because during these years he faced a lot of problems. Apart from the lack of knowledge regarding cultivation techniques and processing his main obstacle was the very low productivity of his trees. After a thorough research he discovered that that has happened because he didn’t have the appropriate ratio of female to male trees. Mr. Gouliafas claims that he had done everything according to the instructions he had from the nursery and he blames them for this situation. Nevertheless he is determined to proceed with the cultivation of hippophaes despite the obstacles he faced.

Kaldakis Kostas (Pomegranates’ grower)

Mr Kaldakis Kostas is an alumni of American Farm School and an agronomist. He continues the family business in agriculture and since 2008 he cultivates pomegranates (5 hectares) and aromatic plants in the region Gallikos in Kilkis. He also makes juices and essential oils. Mr Kaldakis decided to cultivate pomegranates while he was working in an agrochemical company as technical consultant and after o trip to Israel where he discover the potential of pomegranate cultivation in Greece. He exploit his background and through the network he had acquired the necessary knowhow in the cultivation of pomegranates. He also established a network with

experts for the necessary technical support. Today he is very satisfied by the income from his plantation and plans to expand his activities to processing

Kalitsis Kostantinos (Strawberry grower in low greenhouses)

Mr. Kallitsis, an alumni of American Farm School, continues the family business and he collaborates with his uncle in rural primary production in the region of Katerini in Pieria. He cultivates kiwi, grapes, salad vegetables and strawberries. Even if he has reduced the cultivation area of strawberries (from 8 hectares in 2000 to 0.5 hectares today) he is satisfied from the income that he earns, as he sells his yield direct to retail markets and not to wholesalers. He doesn't plan to expand the cultivation because the expenses for cultivating strawberries in low greenhouses are high and there are competitors from Southern Greece with lower cost of production and longer period of cultivation.

Karkadakis Dimitris (Aronia berry grower)

Mr. Karkadakis is a retired policeman and he cultivates aronia berries (3.4 hectares) in the region of Mavrahades in Karditsa. He was cultivating traditional crops (cotton, wheat and maize), and after a thorough search and consulting (soil analyses and business plan) he decided to plant Aronia berries. The plantation is in the third year and he is satisfied by the initial yield. He sells his production to the cooperative "Aronia Hellas" who also provides him with the necessary technical support.

Karsikis Manolis (Pomegranates' grower)

Father of Mr. Karsikis established a pomegranate farm (5 hectares) in 2013 in the region of Nymfopetra in Thessaloniki as an investment in the rural section. They selected pomegranate mainly because of the promising high yield and high profits. In 2015 they harvested totally 3.5 tns of pomegranates but the price per kilo was already declined to 0.4€/kg (from 1.2€/kg) and they decided to distribute their product themselves. For this small production they didn't have difficulties in selling the fruits but they are questioning their capabilities on selling themselves thus they are planning to invest further on processing their product and distribute it to local markets. Since now they have invested a big amount of money and they still do but no guarantee is granded.

Kontovas Thomas (Aronia berries' grower)

Mr. Kontovas was cultivating traditional crops (cotton, wheat and maize), and after a thorough search and consulting he decided to plant Aronia berries. Today he cultivates 5.5 hectares of aronia in the region of Mavrahades in Karditsa. The plantation is in the second year and he harvested for the first time a small quantity which he sold to the cooperative "Aronia Hellas". Despite his satisfaction for the price and the production he achieved Mr. Kontovas expressed his agony about the future of the cultivation.

Molia – Arcadia (Company that cultivates blueberries)

Telephone interview with Mr. Petropoulos one of the three partners of Molia Arcadia, a company that produce fresh blueberries in the region of Tripoli in Arcadia. The company established in 2010. Today Molia Arcadia cultivates around 16 hectares of blueberries collaborates with 15 growers, has its own nursery and provide consulting services to potential blueberry growers. They distributing fresh blueberries at national level and they also export. For the next year they are planning to plant 7 more hectares of blueberries and they are investigating other promising crops for the region.

Mparmpas Phillipos (Hippophaes grower)

Mr. Mparmpas established the first plantation of Hippophaes in 2008 in a small area beside his house in order to evaluate and test the plants. He also established a network with experts in hippophaes from Germany. In 2010 he planted 0.8 hectares of Hippophaes (cv. Leikora) in the region of Konitsa in Ioannina. He bought that area for the specific reason, since he had no previous experience in the agricultural sector nor land to cultivate. Today after many test and experiments he harvest around 1.2 tons of hippophaes fruits that he processes his production at his owned facilities producing dried fruits (raisins) and juice. He distributes his products in the local market and direct to consumers locally and through internet (e-shop).

Papoutsis Nikos (Blueberries grower)

Mr. Papoutsis, president of the Agricultural Cooperative of Drama's bio-growers and bio-farmers (BIODRAMA), is the pioneer of blueberry cultivation in Greece. He

planted the first blueberries in 2005 in the region of Kalampaki in Drama, after a trip he made to Kiev, where he first tasted them. The years after he struggled a lot with the cultivation and the positioning of the blueberries in Greek fruit market. BIODRAMA is now cultivating around 4 hectares, processing and distributing blueberries. They have a great variety of products from frozen and dried fruits to jams, preserves even liquer from blueberries. Mr Papoutsis has ambitious future plans for blueberries and wants to establish blueberries as an alternative superfood with great benefits for human health.

Tsilemakis Christos (Extensive strawberries grower)

Mr Tsilemakis continues the family business of growing strawberries in open field (extensive cultivation). At his village Polypotamo in Florina, until 2005 almost all the villagers were cultivating strawberries, but now he is the last that still continues. Today he cultivates 0.7 hectares of strawberries which he personally distributes with great success at local retails stores and flea markets. Mr. Tsilemakis is very proud for the quality of his products and he strongly recommends extensive cultivation of strawberries as an alternative crop for mountainous regions.

4.3.3 Major Problems faced by growers

Systematic cultivation of AFs in Greece was started only recently and since the majority of AFs growers have not cultivated these crops before, they faced significant difficulties and obstacles. Interviewing existing growers of AFs resulted in defining a number of such problems, which have been categorized in 6 groups for better understanding of the situation.

Lack of accurate and scientific support in decision making in cultivating these crops

Cultivation AFs is a difficult decision which has to be made by the prospective grower. In order to make that decision he has to consider many aspects of the cultivation, such as the soil-climate requirements of these crops, the capital needed for the establishment and the production, the machinery needed and the requirements for crop protection. In addition he has to clarify what will be his final product (fresh,

dried, processed or any combination of them) and try to identify the potential buyers. Finally, a simple cost–benefit analysis or a business plan could provide very useful inputs in the process of decision-making.

Our interviews with existing growers of AFs have shown that all of them initially searched on the internet to find the information needed. Greek sources were limited and the majority had literature data or data from countries where these crops are already established. In addition conducting a local agronomist for advice involves the risk of receiving inaccurate or biased information since they didn't have enough experience on these crops, and in addition, some of them have financial ties to nurseries that sell propagation material of AFs. Moreover, a number of "specialists" have been arisen in Greece, presenting themselves as "gurus" of these crops, giving seminars for the cultivation of AFs in Greece. In reality they had only literature–based experience and nothing more. National Agricultural Research Institutes delayed significantly the implementation of guidelines on the cultivation of AFs, resulting in the misinformation of many growers.

Contacting and networking with experienced growers abroad, at countries where these crops are already successfully cultivated, was an option that only a very small number (4 out 15 in our interviews) have chosen and only two of them visited those countries to see and learn in person the knowhow of the cultivation of these crops.

Difficulties in establishing plantations

During the step of the establishment of AFs plantations, finding the appropriate propagation material was also an essential issue. Prospective growers didn't have reliable information on which varieties to choose, so they planted the ones that the nurseries had in stock. That was the main problem in hippophaes, goji berry and aronia. In pomegranate during the previous years there was an aggressive promotion of imported varieties (Acco and Wonderful) against the local varieties. In addition, since certified propagation material was only imported, had higher prices and thus a substantial amount of capital was required.

Another issue was the availability of suitable land to establish the plantation if someone wanted to plant a larger area than they possesed. In that case the solution

was to lease the land for a long period, but land owners were against such long–term leasing.

Poor knowledge transfer related to cultivation techniques and pest management.

As it has been mentioned earlier, in Greece there was a lack of knowledge for cultivating AFs. Little was known for proper cultivation techniques and practices and there was absolutely no experience regarding crop protection and pest management. In most cases literature mentioned that these crops don't have essential need for crop protection or they mentioned the common issues in other countries. The growers that we interviewed realized, shortly after the establishment, that the cultivation of these crops is challenging and requires constant monitoring and hard work.

The lack of accurate scientific support forced them to improvise in fertilization and irrigation of these crops, in pest management and in cultivation and harvesting practices. More specific growers of aronia, hippophaes, goji berry and blueberry realized that these crops don't tolerate high temperatures in summer and they require irrigation. To overcome this, many growers used mulching in order to preserve enough humidity and low temperature at the roots. Manually harvesting of goji berry, blueberry, aronia and hippophaes was, and still is, another important problem. In goji berry the major problems are the prolonged harvesting period due to the progressive ripening of the fruits and the small size of fruits. In aronia and blueberry the small size of fruits requires many workers to harvest the yield since they don't use special machineries for harvesting. Harvesting hippophaes appears to be the most challenging due to thorns on the branches. Manually harvesting of hippophaes is the most time and cost consuming cultivation practice. An alternative technique that is used by hippophaes growers is to prune the entire branch carrying the fruits, freeze it and then shake it to remove the fruits. This technique may reduce significantly the cost of harvesting but has serious negative impact on the productivity of the crop, because production jn following years is dramatically decreased. In order to reduce this impact and maintain each year fruit production, growers apply this technique to half of their plantation each year.

Pomegranate growers and particularly those who selected to cultivate imported varieties faced problems related to adaptation to the local environmental conditions.

Thus imported varieties appeared to be more sensitive to fruit splitting than local varieties.

Regarding crop protection it was clear from the first years that these crops would face problems. Goji berry growers found that it was very sensitive to pests and diseases similar to other Solanacea species. In aronia and blueberry, growers noticed mitigation of pest and diseases from other crops, such as cotton and apples.

It is very important to acquire the appropriate level of knowhow related to cultivation method and crop protection in these crops in order to cultivate them efficiently. Particular aspects related to crop protection by implementing organic management systems are very important to diversify domestic produced fruits to imported ones and gain the extra value added of a biologically certified product.

Processing

Alternative fruits have many uses either as fresh or processed. The price of processed products in many occasions exceed by far the one for fresh giving that way a very important added value to the products. In the case of AFs processing refers to various post harvest processing, from simply drying to production of juices, jams and preserves or even to producing entirely diversified products, such as aronia wine.

From the interviews we realized that even though there are processing facilities for other fruits, there is a major gap in specific knowhow for processing these fruits. More specific pomegranate's juice is mostly made by grinding the fruit instead of pressing, which produces juice of higher quality but requires specialized machinery. Similarly juice of aronia berries, hippophaes and blueberries is of higher quality and nutritional value if it is produced by pressing the fruits. In addition the remains of the pressure process could be used to extract valuable substances (colorants in aronia berries and blueberries) and oil extraction in hippophaes. Even for drying the berries most growers have experimented a lot in order to find the most appropriate technique to produce an acceptable and high quality product.

It is imperative to establish specialized processing units for the processing of AFs in order to exploit all potential uses of these crops. The first attempt to this point is the

processing unit of the "Efkarpon" Superfood's Cooperative which will be operational in 2016 and will process primarily the production of the members of the cooperative and additionally of others growers in the region of Thessaly.

Another successful example is the Agricultural Cooperative of Agios Athanasios in Drama, specialized in pomegranate cultivation and juice production using clear juice technology and deseeding method to produce natural juice of high quality and nutritional value.

For the moment the growers who process their production (or a portion of the production) use small-scale facilities, mostly home-based, and sometimes they use modified machines. The most common processing method is production of jams and preserves using simple recipes.

Obstacles in sales, distribution and exports

Finally the most significant obstacles that growers of AFs have faced so far, is the distribution of their products. Despite the high consumer demand for such products most Greek growers struggle to sell their production. There are many reasons that can justify this situation, such as insufficient selling and marketing skills, complicated distribution channels, inadequate level of collaborative attitude and untrustworthy wholesalers.

Greek agricultural products market is complicated and various mediators exist between the growers and the consumers, resulting in high retail prices and lower grower prices. There have been efforts to eliminate the intermediate stages by forming agricultural cooperatives and groups of farmers. However, the level of cooperation in AFs is still low. Thus, most growers attempt to sell their product individually, either to wholesalers and retail stores or directly to consumers. This demands more time and effort from the growers which is analogous to the level of production. An important element in this procedure is the reliability of the wholesaler or the buyer in general. Many growers, pomegranates growers in particularly, have complained for inappropriate methods by wholesalers to reduce the price of the fruits by intentionally decreasing their quality. In addition, pomegranate growers are very unsatisfied as prices have decreased significantly since the time that they decided to plant their trees.

4.3.4 Critical Success Factors

One of the objectives of interviewing existing farmers was to identify good practices from successful farmers and elaborate the critical success factors as guidelines to prospective farmers. It must be noticed, that simply following these guidelines does not guarantee the successful outcome of a potential grower, but enhance their possibilities. It was mentioned earlier, that cultivation of AFs is a challenging and demanding procedure, thus the most essential success factor is the determination and devotion of the prospective grower. That's why prior agricultural experience is not listed as a critical success factor. Our research showed that agricultural experience is important and experienced farmers have higher possibilities to succeed, however people with no prior agriculture experience or education have succeeded because of their determination and devotion to succeed.

Possession of knowhow in specific cultivation and processing

Growers that have made intensive research and acquired the required knowhow, prior to plantation establishment, were able to overcome better the encountered obstacles. Especially those who have visited other countries that traditionally cultivate these crops and managed to establish a network for knowledge transfer. In addition, knowledge of efficient processing methods is important to diversify their products and to maintain high quality and nutritional value.

Selection of well-adapted varieties to specific soil and climate conditions

The AFs are not native to Greece and most of them (besides pomegranates and strawberries) were not cultivated before, thus selection of suitable varieties for the Greek soil-climate conditions is essential. Thereby higher yield and better productivity can be accomplished. In addition well adapted varieties to specific soil and climate conditions are less subjected to disorders and diseases.

Intensive research on new crop adaptability and requirements

AFs have specific needs and requirements relating not only to soil-climate conditions but also to cultivation practices and techniques, crop protection, processing and of course distribution of the products. Thus intensive research is needed for the prospective grower to make the decision to cultivate them.

Ongoing technical support

Since the level of knowhow experience in Greece is very low growers need ongoing technical support in every step and aspect from the cultivation to processing and distribution of their products. Experienced agronomists, food scientists and marketers should closely collaborate with AFs growers to strengthen the sector.

Business plan & Market research

The elaboration of a business plan and market research before the prospective grower makes the decision to cultivate AFs is more than essential. Making a business plan he forced to identify all the needs and requirements of the crop and evaluate his capabilities to overcome potential obstacles. Identifying potential buyers as well as assessing the performance of his business according could protect him from an unsuccessful investment both in time and money.

Segmentation of production (development of new products)

Selling the product fresh or with little processing is one way to make a decent income, but diversifying production by processing and developing processed products is the recommended way to gain additional value.

Available capital to invest

Finally, the high cost of establishment and production of AFs, requires sufficient available capital. The available capital should also support the prospective grower for the period needed to reach the crop full production and ensure a constant.

5. Future Prospects

5.1 SWOT analysis

The Alternative Fruit sector in Greece is newly formed and mostly unorganized, since there was neither central planning nor guidelines for the establishment of new plantations. Therefore, the need for the evaluation and analysis of the sector is arisen in order to plan and implement actions, which will strengthen the sector and become more attractive to existing and prospective farmers.

In this section a sector-wise SWOT analysis has been made for identifying strengths, weakness, opportunities and threats of the Alternative Fruit crops cultivation sector. SWOT analysis has proved to be a very useful tool and provide inputs to identify, orchestrate and plan actions and activities for implementation in a specific sector.

	INTERNAL	EXTERNAL
POSITIVE	**STRENGTHS** ● Long tradition in fruit cultivation ● Micro-environments favorable for cultivating AFs ● Produced fruits of high quality and nutritional value. ● Many potential uses. ● High yields	**OPPORTUNITIES** ● Greater awareness by potential farmers ● New CAP favors forming of group of farmers ● EU investment programs. ● Increased demand for health related products and elevated consumer health consciousness. ● Increasing use of Alternative Fruits in food industry ● Encouragement of agro-tourism movement.
NEGATIVE	**WEAKNESSES** ● Small and fragmented agricultural holdings. ● High establishment and production cost. ● Perennial crops. ● Insufficient level of knowhow. ● Lack of motivation and inadequate resources for forming cooperatives ● Obstacles in accessing processing units ● Lack of knowledge regarding specific market needs	**THREATS** ● Geopolitical issues. ● Limited access to financing. ● Imports of cheaper competitive products. ● Misinformation of prospective farmers. Shifting patterns of consumer demand.

Figure 39 Alternative Fruits sectoral SWOT analysis

Moreover, a cross examination of strength, weaknesses, opportunities and threats has been made to evaluate their interactions and find specific topics to focus and propose actions which will enforce the sector.

Strengths

- Long tradition in fruit cultivation (S1)

Greek farmers have been successfully cultivating fruit crops for a very long period, among them citrus fruits (oranges, lemons and mandarins), peaches and nectarines, apples, pears, kiwis and grapes. In some of fruits, Greece is among the top 3 production EU countries (Table 24). Therefore Greek farmers have gained valuable experience in fruit cultivation and can easily adapt the knowledge needed for new ones.

Table 24 Best 3 production countries per fruit

Fruit	1st Place	2nd Place	3rd Place
Apples	Poland	Italy	France
Pears	Italy	Spain	Belgium
Peaches	Italy	Spain	Greece
Apricots	Italy	France	Spain
Cherries	Poland	Italy	Spain
Plums	Romania	France	Italy
Strawberries	Spain	Poland	Germany
Raspberries	Poland	UK	Spain
Blackcurrants	Poland	UK	Germany
Lemons	Spain	Italy	Greece
Grapefruit	Spain	---	---
Oranges	Spain	Italy	Greece

Table grapes	Italy	Spain	Greece

- Micro-environments favorable for cultivating alternative crops (S2)

Greece geomorphological terrain has created a number of local micro-environments some of them with unique characteristics. In these locations suitable climate conditions can be found in order to cultivate alternative fruits.

- Produced fruits of high quality and nutritional value (S3)

Analyses conducted by the farmers have provided evidence that fruits produced in Greece have higher levels of antioxidants compared to those referred in literature.

- Many potential uses and utilization of almost every part of the plant (S4)

Alternative fruits have many applications and uses. They can be consumed fresh, dried, and processed as jams, preserves and juices. In the pharmaceutical industry extracts are used for production of syrups and dietary supplements. They are also important source of anthocyanins, which can be used as safe food colorants in food industry, confectionary and bakery. Moreover apart from the fruits the leaves can be used for extraction and the wood of some of them is utilized.

- High yields (S5)

Compared to the traditional crops that are cultivated in many Greek regions, such as wheat, maize and cotton, cultivation of alternative fruit crops have higher productivity and can ensure higher agricultural income to the farmers.

Weaknesses

- Small and fragmented agricultural holdings (W1)

Average size of agricultural holdings in Greece is around 5 hectares which is by far less than the average size in EU countries. Moreover it is usual fragmented to smaller land plots increasing that way transportation and production costs.

- High establishment and production cost (W2)

Data derived from our interviews indicates that the alternative fruit crops have high cost of establishment related to the high prices of rootstocks/seedling, implementation

of dripping irrigation system and labor cost. Cultivation practices and techniques used in alternative fruits such as pruning, fertilization, crop protection, soil cultivation and harvesting increase the cost of production. Lack of mechanized harvesting of alternative fruits is the major problem that growers face since they are obligated to hire workers to harvest the fruits by hand. Therefore the cost of foreign labor for harvesting is estimated (by the farmers we interviewed) to contribute by more than 50% on the total production cost.

- Perennial crops, prolonged period for reaching full production, long term investment commitment (W3)

Alternative fruits (except strawberries) are perennial crops which is on one hand an advantage, because you invest once and you harvest for many years, but it also has major disadvantages such as the long term investment commitment, the higher cost of establishment and the prolonged period for reaching full production.

Before someone decides to cultivate perennial crops he should consider that these crops enchain land plots and money for a long period. This can become a major problem if one wants to rent land in order to cultivate these crops. He also has to have supplementary income because the first 3 years the income from the crops will be very small (almost zero) and much lower than the expenses. After 3 years, the crops will gradually produce and in most cases they reach full production after 5 years.

- Insufficient level of knowhow experience regarding cultivation techniques and pest management (W4)

Cultivation of alternative fruits, with the exception of pomegranates and strawberries, was practically unknown in Greece, as most of them are native to other regions, such as Central and Eastern Europe, North America and Asia. Therefore, there is a major lack of knowhow and experience related to best practices, cultivation techniques and crop protection. Even for pomegranates their systematical cultivation has started recently by establishing imported varieties for which limited knowledge is available for their adaptability toy Greek soil-climate conditions and potential issues related to their cultivation and crop protection.

- Lack of motivation and inadequate resources for forming cooperatives (W5)

It is widely acceptable that growers unions, such as cooperatives and farmer groups, provide benefits to both growers and consumers. As they can enforce their negotiating powers, growers can benefit from economies of scale regarding cost of supplies, cost of machineries and labor which will have a significant impact on cost of production. In addition, they could negotiate and achieve higher prices and penetration of new markets and exports. Thus an increase on their income will be achievable. On the other hand, consumers could get the products directly from growers at lower prices overriding wholesalers.

- Obstacles in accessing processing units (W6)

Alternative fruit holdings are scattered in a big area and since there aren't enough processing units specialized in processing these fruits, distant farmers have increased transportation costs in order reach processing facilities.

- Lack of knowledge regarding specific market needs (W7)

Understanding the specific needs and requirements of a market is a crucial factor for successful distribution of a product. The alternative fruit market appears to be multi segmented as there are many potential buyers of the products. In addition it is a developing market in an infant stage and consumers needs are still unformatted.

Opportunities

- Greater awareness by potential farmers (O1)

Greek farmers have seen their agricultural income decreasing significantly during the past 5 years. Prices of traditional crops have also decreased or at least remained flat. Therefore, alternative fruits have risen as potential substitute of traditional and non- profitable crops for existing farmers. Moreover unemployed youth who consider

agricultural sector as an opportunity for an income, are attracted by the idea of cultivating these fruits.

- New CAP favors formation of group of farmers (O2)

Benefits derived from formation of agricultural cooperatives and group of farmers has been previously stated. The new Common Agriculture Policy (CAP 2014 – 2020) encourages and supports the formation of collectives' schemes in order to strengthen the agricultural sector.

- EU and national investment programs (O3)

National Rural Development Program 2014 – 2020 and EU's investment programs include topics that could provide support for the expansion of alternative fruits cultivation. Moreover, establishment of new processing units could be facilitated by the above programs

- Increased demand for heath related products and elevated consumer health consciousness (O4)

During the last decade an increased trend for consuming products that contributes to a better health has been noticed. Foods with high levels of substances that contribute to good health, (like antioxidants, vitamins, Ω3 and Ω6 fatty acids) are becoming more and more attractive to consumers.

- Increasing use of Alternative Fruits in the Food Industry (O5)

The Food industry has developed a series of new products using Alternative fruits as main or supplementary ingredients such as mixed juices, bars, yogurts and salads. Thus demand of alternative fruits has been significantly increased.

- Encouragement of the agro-tourism movement (O6)

Agro-tourism is a specialized type of tourism gaining lately great interest by Greek and Europeans. A constantly increasing number of farms are forming as agro-touristic facilities and seek for collaboration with other farmers in order to enrich the diversity of their product. Thus there is an opportunity for AF growers to either create an agro- touristic enterprise or collaborate with an existing.

Threats

- Geopolitical issues (T1)

Geopolitical issues have always been a problem in our region and recently the Russian embargo to EU agricultural products has created many problems in Greek agricultural exports. Russia is one of the largest importers of Greek agricultural products, among them AFs.

- Limited access to financing (T2)

A noticeable amount of capital is needed for someone to enter the sector of AFs because as it was mentioned before they have high establishment and production cost. The economic crisis in Greece has made access to financing very difficult as a large number of people have lost their income and the bank financing is mostly inaccessible as they have applied very strict conditions to grant loans.

- Imports of cheaper competitive products (T3)

Most of the AFs are also cultivated in countries where cost of labor and application of cultivation practices are cheaper, lowering the cost of production. In addition they have not developed organic production of these fruits and they can sell their products in lower prices. Imported fruits from such countries is a major competitor to Greek produced fruits.

- Misinformation of prospective farmers. (T4)

Promotion of alternative crops as a very lucrative business which has been largely made by the media and press in Greece may be the biggest danger that can hurt the expansion of these crops. There was a large number of desperate people, in previous years, who have seen these crops as a solution for an income, but they have been misinformed about their requirements and needs and lost their investment. Thus now prospective farmers are very skeptical about these crops.

- Shifting patterns of consumer demands (T5)

It is not uncommon for consumers to change habits in short periods and stop demanding products as they used to. Sometimes this can occur in short time period

and a product that was high desirable by the customers rapidly lose their interest. Alternative fruits, as perennial crops, are very vulnerable to shifting patterns of consumer demands and thus there is a risk of loss of investment.

SWOT analysis with rating of each factor

The SWOT analysis was constructed as a matrix and was populated with a correlation analysis of each internal factor (strength or weakness) with the external factors (opportunities and threats). This was determined with the following method. When examining the correlation of a strength with an opportunity, if the strength enhanced the ability to take advantage of the opportunity, a (+) score was assigned, while if it had a negligible correlation with the opportunity a (0) score was assigned. In examining the correlation of a strength with a threat, if the strength protected against the threat, a (+) score was assigned, while if it had a negligible correlation with the threat a (0) score was assigned. Similarly, when examining the correlation of a weakness with an opportunity, if the weakness compromised the ability to take advantage of the opportunity, a (-) score was assigned, while if it had a negligible correlation with the opportunity a (0) score was assigned. In examining the correlation of a weakness with a threat, if the weakness made the sector more susceptible to the threat, a (-) score was assigned, while if it had a negligible correlation with the threat a (0) score was assigned.

After populating the cells of the matrix with the scores (0, - or +), the sum of each factor is obtained (horizontally for the internal factors and vertically for the external factors) by adding all (+)'s and subtracting all (–)'s. The total obtained horizontally gives an indication of the relative importance of each strength or weakness for a given sector.

The total obtained vertically for each opportunity, gave an indication on how well the sector was poised to take advantage of available opportunities, and for each threat, how susceptible was the sector to existing threats.

The analysis of the scores was used as a tool for deciding which of the internal factors (weaknesses) were good candidates for developing actions that would minimize these weaknesses. In addition, the effect of each action on increasing the score of the opportunities and reducing the threats was determined. Similarly, significant strengths were identified for utilization.

The strengths with the highest score are the "Produced fruits of high quality and nutritional value" and "Many potential uses". This implies that according to our assessment these are the features in this sector, which are most attractive. However, there are five weaknesses which need to be addressed in order to find actions that would eliminate the weaknesses. Since there is little that we can do to overcome the obstacle of AFs being perennial crops we would propose actions that can influence the size and fragmentation of agricultural holdings, the insufficient level of knowhow in these crops, the formation of cooperatives and the lack of knowledge regarding marketing of the products.

For the sector of AFs there is no opportunity strong enough for which we could propose action in order to exploit them. On the other hand there is significant threat that could have a serious negative impact on the sector. This is the "Misinformation of prospective farmers". It appears that there is an imperative need for accurate and unbiased training of prospective farmers on the needs and requirements of these crops, as well as on the potential benefits and risks if they decide to enter the sector.

	Total opportunities						Total threats							
	1	1	1	1	1	1	1	-2	-2	-4	1		Actions	
Long tradition in fruit cultivation	+	0	+	+	0	+	+	0	+	+	+	8		Total strength
Micro-environments favorable for cultivating alternative crops	+	+	+	0	0	+	0	0	+	0	0	5		
Producedfruitsofhighquality and nutritionalvalue	+	+	+	+	+	+	+	+	+	0	+	10		
Many potential uses	+	+	+	+	+	+	+	+	+	0	+	10		
High yields	+	+	0	0	+	0	+	+	+	0	0	6		
Small and fragmented Agricultural holdings	-	0	-	0	0	0	-	-	-	-	0	-6		Total weakness
High establishment and production cost	-	0	0	0	0	-	0	-	-	-	0	-5		
Perennial crops	-	-	0	0	0	0	0	-	-	-	-	-6	1	
Insufficientlevelofknowhow	-	-	-	0	0	-	0	0	-	-	0	-6		
Lack of motivation and inadequate resources for forming cooperatives	0	-	-	0	0	0	-	-	-	-	0	-6	2	
Obstacles in accessing processing units.	0	0	0	-	-	0	0	-	-	0	0	-4		
Lackofknowledgeregarding specificmarketneeds	0	0	0	-	-	-	-	0	-	0	-	-6	3	
	reater awareness y otential rmers	ew CAP favors rmation of group farmers	U and nationa vestment ograms.	creased demand r heath related oducts and evated consumer ealth consiousness	seof "alternative" uits in bakery, airy nd fresh t	Encourageme gro-tourism ovement.	eopolitical issues .g. Russian mbargo)	mited access to nancing	ports of cheaper mpetitive oducts.	isinformation of ospectivefarmers	hifting patter nsumerdemands			

5.2 Stakeholder Analysis

Stakeholder analysis was based on the influence a stakeholder has on the sector in correlation to its importance for the sector. Thus a matrix of major stakeholders has derived which is shown in Figure 17.

		Importance of stakeholder			
		Unknown	Little / No importance	Some importance	Significant importance
Influence of Stakeholder	Significant influence	-	-	• Food Safety Authorities • Processing units • Retailers	• Banking • Consumers • Wholesalers • Certification bodies • Labour, social security etc.
	Some influence	-	• Environmental Authorities • Ministries	• Advisory • Agricultural authorities	• Nurseries • Consultants
	Little / No influence	-	• Hotels • Restaurants	• Supply providers • Equipment suppliers • Public services	-
	Unknown	• NGOs	-	-	-

Figure 41 Stakeholder analysis matrix

The most significant stakeholders are the customers whose demand the sector has to satisfy, the banks where the grower is address in order to find the capital to run his business. In addition the certification bodies are major stakeholder since most of the crops are organically cultivated. The certification bodies are the ones who control the

implementation of the organic management techniques and in case of violations of the organic regulations they can withdraw the certification. Thus the Greek produced AFs will lose a great advantage. Wholesalers are also major stakeholders with great influence on the sector as they are the ones who set the prices for most products. Labor and Social Security agencies are very important as the sector of AFs demands many hours of hired labor for implementing agricultural practices.

Other stakeholders with high influence especially for processed products are the processing units who, as it has already been mentioned, could attempt to lower the price they offer to grower in order to maximize their profit and some times that happens deliberately. In cases when the grower also processes the fruits on his own he has to comply with the health safety regulations. As we have seen small growers of AFs distribute their production to retail stores directly, thus these are the ones who have the bargaining power to set the price for the products.

Finally, growers of AFs seek consultation and many times address local agronomists, thus consultants are of high importance for the sector. Nurseries are also an important stakeholder because they sell the propagation material and sometimes they are the ones who lead the grower towards a certain variety or even a crop.

5.3 Agro tourism opportunities

Agro tourism is a part of special interest tourism which continuous to grow, mostly because of the rapid expansion of the mass media into niche markets, the easy way to inform through internet, new transport facilities and mass interest of people to have new and unique experiences. Agro tourism is by comparison widespread across Europe, and is a very much larger activity in terms of turnover and employment. It is composed of a very large number of micro-businesses.

Agro-touristic businesses can combine touristic and agricultural activities or collaborate with agricultural businesses in order to enrich their touristic product. Thus AFs growers have a unique chance to expand their professional activities to agro tourism either by transform their business to an agro-touristic business, or by collaborate with one. Our study has shown that AFs have a wide distribution in Greece and some are very close to touristic areas.

Agro-tourists could observe the activities related to cultivation of AFs, learn about them or even participate to some of them particularly the processing activities and taste their one products.
Therefore with agro-tourism new horizons open to Greek farmers who can and must exploit this opportunity to increase their income. AFs growers should follow this trend and seek opportunities to collaborate with agro touristic enterprises.

5.4 E-commerce opportunities

E-commerce options can be exploited in a multitude of ways, ranging from b2c and b2b capabilities on a corporal web site to using an online sales platform or mobile applications.

Our first finding is that almost forty two percent don't own a web site and the ones who do, use it for informative and customer feedback support (Table 25). Only few offer options for online sales and support multilanguage options and while one out of three use a smartphone we found that very few are responsive. Regarding digital marketing we found that while one out of three sites are orientated around customer support only two methods are being and that only one of the survees has been pursuing them.

If we combine these findings with the answers we received for future usage intentions, where half of them answered they would use a web based platform for b2c and b2b sales and purchases, we conclude that need for such tools is well developed and that awareness of the usefulness of these tools has risen despite the fact that they are not common practice. This in turn points to an opportunity for extending the

operations model to other dimensions of revenues which are not used yet, but professionals would utilize they were available.

Table 25 Processed date from field research regarding e-commerce

E-commerce and e-shop questionnaire	
1. Regarding company web site	
a. We don't have a company web site	41,67%
b. We have a website and we use it for (you can select more than one) :	
1. Information regarding products and services	33,33%
2. Customer feedback	33,33%
3. Online sales options	8,33%
c. It is optimized for mobile browsing	8,33%
d. It is multilingual (more than three languages)	0,00%
e. It offers options for online sales	8,33%
2. Do you use a Smartphone or tablet?	33,33%
3. Select the e-marketing tools you use if any (you can use more than one) :	
a. Email marketing (Newsletters)	0,00%
b. Video marketing (YouTube promotion)	8,33%
c. SMS marketing	0,00%
d. Social media marketing	8,33%
e. PPC advertising (Search engine advertising)	0,00%
f. None of the above	0,00%
4. Would you use a web based platform to sell products directly to the customers?	
a. Yes	50,00%
b. No	8,33%
c. Already use	8,33%
5. Would you use a web based platform to sell products directly to your business partners?	
a. Yes	50,00%
b. No	8,33%
c. Already use	8,33%
6. Would you use a web based platform for purchasing production related goods?	
a. Yes	50,00%
b. No	8,33%
c. Already use	8,33%

5.5 Guidelines and Indicative Business Plan

Economic and technical data collected from on-site interviews using a structured questionnaire have been processed in order to elaborate an indicative business plan for blueberry production.

			Blueberry
COST	1 2 3 4 5	Variable costs per ha	
		Fertilization cost per ha	€ 820.00
		Pestiside cost per ha	€ 110.00
		Labour cost per ha	€ 2,400.00
		Reproductive material cost per ha	€ 675.00
		Other cost per ha (Certification)	€ 500.00
	1 2 3 4	Depreciation	
		Maintenance equipment cost	€ 750.00
		Equipment insurance	€ -
		Building depreciation	€ 860.00
		Equipment depreciation	€ 1,450.00
	1	Irrigation	
		Total irrigation cost per ha year	€ -
	1	TOTAL COSTS	€ 7,565

INCOME		Gross annuity (F)	
		Crop yield (kg/ha)	€ 13,100.00
		Average crop price (€/kg)	€ 4.42
		Production value	€ 57,902

NET INCOME		NET INCOME	
		NET INCOME per ha (before taxes)	€ 50,337

In conclusion, an indicative net income of a blueberries grower in Greece (€50,337 per hectare), is satisfactory and higher than traditional crops. Thus, blueberries seem to be a very attractive alternative for Greek farmers, provided they will find suitable areas to cultivate them. Moreover, the recorded yields of blueberries are similar with those in the US (Safley, 2013). On the other hand, prospective farmers should always keep in mind that prices may be still relatively high (4-5 euro/kg for the grower), but there is a risk of a price drop as more growers plant them, as was observed with

pomegranates recently. Data from on-field interviews with existing growers pointed out that decreased prices of pomegranates have negatively influenced some of the growers, who expressed their dissatisfaction for the potential reduction of their income. It should be also noticed that as AFs are perennial crops, a grower's response to future reductions of prices is rather difficult.

6. Conclusions and Recommendations

Conclusions

AFs sector is a newly formed sector of Greek agriculture and is basically in infant stages. Although pomegranates and strawberries are familiar to Greek consumers' only strawberries were previous cultivated. Most of the AFs (like blueberries, hippophaes goji berry and aronia) are native to other countries who lead global production and are major consumers and exporters. The dynamic of the sector appears to be very high due to the increasing consumer demand of these fruits and the many and different potential uses. AFs are characterized by high concentration of antioxidants which are valuable substances for the human organization. Health claims of AFs are steadily study from the medicinal community and constantly new studies appear in respective scientific journals.

Cultivated areas of AFs are still limited and predominated by pomegranates. However the study showed an impressive increase and growth both in cultivated area and the number of agricultural holdings cultivating AFs in the last five years. Inevitable this sudden increase has a negative side which has been seen in the form of lack of knowhow and knowledge in cultivation techniques and practices, crop protection, processing and of course marketing of AFs. Insufficient knowledge in cultivation techniques leads the growers to improvise in irrigation, fertilization even in planting methods. In addition, as it was shown in the case of hippophaes, high harvesting costs forced and lack of mechanization of the crops forced the growers to apply inappropriate methods that strongly affect the productivity of the crop. Moreover AFs needs special methods for processing and if it is outsourced it has high cost. At the time most processing is made at amateur level and is home-based. The major obstacle for further expansion of the sector is the inability for efficient promotion of the products. In support of this is the fact that AFs have not reached yet the critical mass in production that would allow the growers to gain added value from large exports to countries where they traditionally consume these fruits and the trend is to increase the demand.

The SWOT analysis of the sector revealed significant issues for its future which have to be addressed in order to increase the attractiveness to prospective farmers. Lack of

knowledge and knowhow, inadequate level of collaboration attitude and lack of knowledge regarding specific needs of the AFs market are the main weaknesses of the sector that compromise the ability to take advantage of the opportunities for the sector. Moreover a major threat, misinformation and mislead of prospective farmers showed to be the most significant problem of the AFs sector. In previous years there was an impressive and continuous "push" of the AFs crop by articles on the public press and media, special edition on technical press and generally an intense and sometimes on purpose discussion which lead to a great interest in AFs crops. There were many people who were convinced by the promising yields and income and started cultivating them immediately. Very few were more skeptical and searched more on the internet for information and tried to reach experts abroad and others who were completely opposite to the "new" crops. As a result, a significant number of people made misguided investments and lost their money.

Nevertheless AFs sector is a dynamic sector, very promising and there are many regions in Greece where alternative fruits could be cultivated and produce high quality products. Domestically produced alternative fruits could substitute imported ones or even be exported to EU countries creating a positive trade balance, adding value to the GDP and reducing unemployment creating additional jobs. The sector is attractive to young people providing the transition or entrance would be carefully planned and after thorough consideration. AFs can have a high yield and provide a descent income. The sector can be a way out of unemployment (especially for youth) either by starting their own farming operation or by becoming employed in processing units as there is high need for operating such companies in order to better promote the products and gain added value from them. Moreover jobs would be created for young scientists to support farmers on cultivation, investigate potential new varieties or species through research initiatives, or developing new product for the processing industry.

The sector needs to be carefully planned and appropriate supporting programs (3-5 years) need to be implemented in order to organize the sector and realize its potentials. All stakeholders need to be engaged and devoted to participate in good faith, in order to exploit all the capabilities of the sector and improve agricultural production and national economy.

Recommendation for consideration in the implementation Phase

ALTERNATIVE FRUIT CROPS SECTOR PROPOSALS

A) Opportunities for easy victories:

1. Greater awareness by potential farmers

Strengths to rely on, in order to take advantage of these opportunities

- Long tradition in fruit cultivation
- Micro-environments favorable for cultivating AFs
- Produced fruits of high quality and nutritional value.
- Many potential uses.
- High yields

B) Opportunities that can be taken advantage of only after redressing the balance of strengths/weaknesses

1. Increased demand for health related products and elevated consumer health consciousness.
2. Increasing use of Alternative Fruits in food industry
3. Encouragement of agro-tourism movement.

Weaknesses to alleviate in order to take advantage of such opportunities

1. Insufficient level of knowhow.
2. Lack of knowledge regarding specific market needs
3. Obstacles in accessing processing units

Proposals for Part B of the Project:

Relevant to A) Opportunities for easy victories:

1. Create a roadmap/guideline on the accessibility, procedures, requirements and distribution channels for potential exporters.
2. Create a lexicon of alternative crops including information on suitable varieties for Greek soil-climate conditions, cultivation techniques, possible problems and solutions.
3. Selection of blueberry varieties that can be adopted to Greek soil-climate conditions
4. Create an e-tool providing accurate and realistic business plans for prospective farmers.

Relevant to B) Opportunities that can be taken advantage of only after redressing balance of strengths/weaknesses:

1. A center for education and promotion of new cultivations providing accurate scientific information and guidelines to potential farmers
2. Create a network of satellite prototype farms (Lighthouse farms) that would provide practical training

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Appendix I

Economic analysis of the Alternative Fruit Crops for Greece sector

A structured questionnaire was used for the collection of technical and economic data of the production costs of the aromatic plant sector. To ensure the reliability of the data, the interviewers were trained in order to have the ability to control the quality of the data.

A1. Fertilization cost per acre

Regarding alternative fruit crops taking into consideration that one of the important variable costs are fertilizers in the analysis of the category it is clearly presented that nitrogen (35,21%, urea (14,28%) and compound fertilized (10,08%) are mostly used.

Fertilizer	Participation (%)
Triple superphosphate	0,45
Basic fertilizer	2,01
Foliar fertilizer	0,10
Ammonium sulphate	0,31
Potassium sulphate	0,62
Sulphate	0,10
Potassium	6,48
Fresh manure	1,27
Ammonium nitrate	1,50
Potassium nitrate	0,37
Organic	0,36
Urea	14,82
Compound	10,05
Water Soluble	0,63

Nitrogen	35,21
Anhydrous lime	0,51
Effective microorganisms	16,66
Sulphyric iron	0,15
Potassium thiosulfate	0,44
Granular fertilizer	0,32
Digested manure	0,90
Micronutrients fertilizer	1,80
Chelating calcium	3,23

A2. Pesticide cost per acre

Regarding pesticides in the vineyard holdings fungicide in used in an extremely high percent (81,33%) showing that fungus problems are a serious threat for alternative fruit crops in the country.

Pesticide	Participation (%)
Insecticide	12,20
Herbicide	5,94
Fungicide	81,33
Plant hormones	0,54

A3. Reproductive material cost per acre

Concerning alternative fruit crops the reproductive material that are mostly used rooted cuttings and saplings with 33,99% and 32,88% respectively while seedling and seed are used in a lower extend.

Reproductive material	Participation
(%) Rooted cutting	33,99
Seedling	25,82

Saplings	32,88
Seed	7,31

A4. Supplies cost per acre

In the majority of the alternative fruit crops holdings the supply that is mostly used is binding material (88,68%) while packaging material and shavings are used in a smaller scale.

Supplies cost	Participation (%)
Binding material	88,68
Packaging material	4,22
Shavings	7,09

A5. Other costs

Regarding other expenses in the majority of the cases the farmers had recorded the money spended however, they could not verify where they did those expenses.

Other costs	Participation (%)
Certification cost	19,17
Other	80,83

A6. Labor cost per time unit per acre

Regarding labor cost, harvesting and tilthing are the two main costs in an alternative fruit crop holding covering the 39,88% and 25,35% of the total costs respectively.

Labor	Participation (%)
Fruit thinning	3
Fertilization	0,87
Weeding	0,33
General cultivation	1,63
Cultivator application	0,56
Destroyer application	6,39

Pesticide fertilization	0,09
Pruning	2,32
Summer pruning	1,42
Offshoots cleaning	2,24
Tillage	39,88
Cultivating	7,51
Harvesting	25,35
Milling	5,63
Plantation	1,34
Grass cutting	1,44

A7. Family labor per time unit per acre

Taking into consideration that family labor is an important asset in an alternative fruit crop holding the labor that family members are mostly dealing with are fruit pruning and carving covering 45,50% and 25,20% respectively.

Labor	Participation (%)
Fruit thinning	0,35
Fertilization	0,74
Weeding	0,88
General cultivation	5,07
Net application	0,90
Ground cover	3,64
Cultivator application	0,24
Destroyer application	0,26
Pesticide fertilization	2,92
Pruning	0,75
Fruit pruning	45,50
Branches cleaning	1,14
Offshoots cleaning	0,23
Summer pruning	0,68

Tillage	0,12
Cultivating	25,20
Harvesting	3,12
Milling	2,12
Transplantation	0,74
Fertigation	0,10
Plantation	0,73
Grass cutting	4,55

A8. Equipment cost per year

The use of the equipment that are mostly used in an alternative fruit crop holding are cars (50%), soil working machine (10,56%) and milling machine (11,00%).

Equipment cost	Participation (%)
Car	26,76
Soil working machine	10,56
Gasoline car	15,95
Diesel tractor	10,54
Diesel car	25,19
Milling machine	11,00

A9. Insurance interest and maintenance cost per year

Insurance interest and maintenance cost	Participation (%)
Car	11,63
Soil working machine	9,21
Milling machine	18,25
Gasoline car	14,96
Diesel tractor	11,73
Diesel car	34,21

Procedure of data collection

A questionnaire was used for the collection of technical and economic data from agricultural holdings throughout the country.
The questionnaire was divided in nine sections.

Section 1

Collection of data related to the profile of the owner of the holding and all the people working on it. Moreover this section includes data regarding age, education, income derived from agriculture. Those data are not related to the economic results of the agricultural holding but are considering as necessary for the provision of effective advisory services to the holdings.

Section 2

General data regarding the agricultural holding profile divided in two parts. The first part include information related to plant production and aspects such as cultivation, acres, ownership and type of the holding.

Section 3

In this section information regarding fertilizers, pesticides, reproductive material are recorded. Moreover all the labour, the time spent for the use of the machinery for every cultivation during the year are also registered. Labour is also divided in family or foreign and all the fuel expenditure are also mentioned. Following that, records related to the irrigation are also noted.

Section 4

Data related to the fixed capital of the holding. Machinery used for crop production, purchase year, value, percent and hours of use in the sector, buildings, land reclamation and permanent plantation are recorded.

Section 5

This section referred to the general cost of an agricultural holding (power, fuel, other costs)

Section 6

Data related to the income by the holding. Specifically this part of the questionnaire is related to the collection of information regarding the product output for every agricultural sector and the sale prices. Moreover, the compensation for each sector is also recorded.

Section 8

Data related to the products and sub products and information related to subsidies, insurance claims and products distribution.

Section 9

Data related to subsidies of the holding, Single Payment Scheme in the context of Common Agricultural Policy or any other parameter that influence the farmer's income.

Appendix II

Profiles of interviewed farms and companies

RUTGERS
New Jersey Agricultural Experiment Station

Perrotis College
Agriculture · Environment · Life Sciences

Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 22/10/2015
Company Title: ASOP Agios Athanasios		Company Type: Cooperative
Address: Agios Athanasios, Drama		Web site: www.e-rodi.gr
Contactperson&Company manager: Athanasiadis Panagiotis	Mobile: 6971 985355 e-mail: sales@e-rodi.gr	GPSlocation N- 41.074 E- 24.245
Main activity sector: Production ☑ Processing ☑ Packaging & Distribution ☑		Other activities:
Year of establishment: 2005	Management & ownership: ☑	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 – 200.000 ● 201.000 and over		
Level of activity: local/regional ☑ national ☑ exporter ☑ importer ☐		
If exporter, main markets: Germany, Cyprus, Bulgaria, USA, Belgium and others		
If importer, national origin of main imports:		
In Greece, main geographical Markets: Nation wide		
Short company history/researcher notes: The interview took place at our offices with Mr. Athanasiadis, Sales and Marketing director and Mr. Argyriou manager and founder of the cooperative. ASOP Ag. Athanasios is a cooperative that established in 2005 and today has around 900 members all growers of pomegranate. The cooperative provides all the technical support and know how needed for the cultivation. The harvested yield is processed at the cooperative's processing unit producing fresh pomegranate's juice and fresh grains. They produce the juice using modern methods (clear juice and deseeding) that facilitate the production of juice o higher quality and nutritional value.		
Insert photos		

Mini Report - Key outcomes and important notes

ASOP Agios Athanasios is a cooperative of pomegranate's growers that is registered in EU's registry and was established in 2005. One year later they started to build the processing facilities to produce pomegranate's juice. Today the cooperative has around 1000 members allover Greece cultivating around 1000 hectares of Wonderful variety.

Production and Technological improvements

- All the members apply organic or sustainable management systems certified by Euro Cert.
- For juice production they use modern methods like clear juice and deseeding therefor the juice is natural, of high quality and nutritional value.
- The cooperative provides to its members all the necessary technical support and also has a number of infrastructure (tractors, spraying equipment) for common use.
- The cooperative also provide the knowhow on the cultivation of pomegranates and a reimbursement for the organic certification expenses.

Commercial potential

Main products of the ASOP Agios Athanasios are pomegranate seeds and juice (250 ml and 2 lt). Using modern technologies in processing the fruits they make products of high quality and nutritional value. Demand of these products is constantly raising and lately the cooperative started exporting in Balkan countries and in U.S.A. Future target markets are the Scandinavian countries, where there is an increasing demand on pomegranate's juice. There is also a company web site with online selling option.

Nevertheless, Mr. Athanasiadis (sales director of the cooperative), believes that there are many improvements to be made starting from the marketing campaign to the development of new innovation products based on pomegranate.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Mr. Argyriou (manager and founder of the cooperative) believes that pomegranate is a very promising and dynamic crop for Greece. He also believes that Greek produced pomegranates are of higher quality due to the soil-climate conditions. Despite the high cost of establishment a descent income is achievable for the growers and thus he recommends this crop to prospective growers.

Regarding training needs according to Mr. Argyriou there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products.

Problems faced

- Inadequate consumer information regarding the benefits of consuming pomegranates. There are still many thing to be done on promoting consumption of pomegranates.
- Insufficient technical support on selecting suitable varieties for Greek soil-climate conditions.

General Comments/outcomes

ASOP Agios Athanasios is an excellent example of the benefits of cooperation. Despite the common prejudice and lack of collaborative attitude that characterize Greek farmers unions of growers such as cooperatives and group of farmers according to Mr. Argyriou is the only way for strengthen Greek agricultural sector.

RUTGERS
New Jersey Agricultural Experiment Station

Perrotis College
Agriculture · Environment · Life Sciences

Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 9/10/2015
Company owner: Damianidou Aliki		Company Type: Family
Address: Rodolivos, Serres		Web site: www.aroniaproducers.gr
Contactperson&Company manager: Damianidis Rolandos	Mobile: 6972416232 e-mail: info@aroniaproducers.gr	GPS location N- 40.937143 E- 23.942035
Main activity sector: Production ☑ Processing ☑ Packaging &Distribution ☐		Other activities:
Year of establishment: 2012	Management & ownership:	
Annual turnover: o Up to 10.000 o 11.000–100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity: local/regional ☑ national ☐ exporter ☐ importer ☐		
If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: North Greece		
Short company history/ researcher notes: Mr. Damianidis established the farm on behalf of his daughter in 2012. He manages the farm and is responsible for all works performed in the farm. He started harvesting Aronia berries last year and he gives the yield mainly for juice production. He also experiments in processing and development of new products such as aronia raisins and wine.		
Insert photos  		

Mini Report - Key outcomes and important notes

Mr. Damianidis is a retired employee of the Greek Telecommunication Organization and a farmer for over 30 years. Previously he cultivated traditional crops such as wheat, cotton, nuts, olives and grapes mainly because of the direct payments from EU. At the end of the last decade he started exploring alternatives crops to increase his income and also to leave a promising enterprise as a heritage to his children. After a thorough research and evaluation of potential alternative crops he decided to cultivate Aronia berries and he planted 4 hectares.

Production and Technological improvements

- The plantation is organically managed
- It is monitored by a researcher at the National Agricultural Organization "DEMETRA" who provided consulting services when needed
- There is a dripping irrigation system which is also used for fertilization.
- He is an experience farmer, he is devoted on his cultivation and spend a lot of time on his farm; he learnt about the cultivation techniques from Bulgarian farmers as he has established a network with them.
- Quality characteristics analysis showed a superiority of Greek produced aronia to the one cultivated in Balkans and Central and East Europe.

Commercial potential

Aronia berry belongs to the so-called "superfoods" mainly because of the high concertation of antioxidants. In Greece the market of "superfoods" is still in primary stages. However the last 5 years there is a growing demand by the consumers who buy health products and follow a healthy living. For that reason a continuous interest for growing aronia has been developed from existing or potential farmers. Many problems have been raised due to the lack of knowhow on the cultivation of this crop.

Fundamental steps prior aronia establishment

- Acquire the knowhow needed to cultivate this crop
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the introduction of their products to the wholesalers and the retailers and convince them to buy them. Entering in the markets is a successive procedure; you introduce your product in the local markets, then nationally and then internationally.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Aronia berry is a newly introduced crop in Greece and most plantations are aged 3-5 years. Greek soil and climate conditions and particularly the existence of many local microenvironments seem to favor the cultivation of aronia and the production of high

quality fruits. High yield and income per hectare, which are reported in bibliography, are the main attractive factors to potential growers. Although there aren't special official limitations establishing the cultivation, initial cost for plantation (approximately 7,000 €/ha), lack of knowhow, elevated harvest cost, and market conditions seems to be the major drawbacks.

Regarding training needs according to Mr. Damianidis there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Lack of knowhow and shortage of specialized consultants and personnel
- Certified propagation material
- Hand harvesting elevates production cost
- Continuous monitoring of the plants to identify new pests and diseases
- Inadequate consumer information

General Comments/outcomes

- Mr. Damianidis practices agriculture for over 30 years and possess valuable experience in cultivating crops. Thus, before establishing his plantation he made an extend research on the potential crops comparing pros and cons and investigating prospective buyers of his products.
- Mr Damianidis decided to plant aronia berries based on his research on the prices and market conditions rather than trust the rumors and the figures that were broadly spread in Greece through the media presenting aronia as golden choice.
- Mr Damianidis is very passionate with his plantation spending many days on monitoring the plants for any disorders.
- He mainly produces frozen fruits which he sells for juice, but he exploring on development of new product such as dried aronia, aronia jum and win (aronia and merlot).
- Therefore Mr. Damianidis is an excellent example of a successful farmer who decided to plant a new crop only after a thorough research and creating his own business plan.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 29/10/2015
Company title: Dimopoulos Dimitris		Company Type: Family
Address: Chalandritsa, Ahaias		Web site:
Contact person: Dimopoulos Dimitris	Mobile: 6977 622318 e-mail: dimdimop@hotmail.com	GPSlocation N-40.867938 E-22.862198
Main activity sector: Production ■ Processing ☐ Packaging & Distribution ☐ Year of establishment: 2008	Management & ownership:	Other activities:
Annual turnover: o Up to 10.000 ● o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity: local/regional ■ national ☐ exporter ☐ importer ☐ If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: Peloponnisos, Athens		
Short company history/ researcher notes: Mr Dimopoulos established the 1 hectare pomegranate plantation in 2012. He selected the Greek Variety "Ermioni" because it has better quality characteristic and is adapted to the local environmental conditions. In 2014 he harvested around 1000 kg that were distributed to the local retail market with great success. In 2015 the production was very little due to unfavorable weather conditions. Mr. Dimopoulos has already decided to expand his plantation by planting additional 1 hectare in 2016.		
Insert photos Interview took place at Thessaloniki		

Mini Report - Key outcomes and important notes

Mr. Dimopoulos Dimitris is a person who decided to leave his city way of living and enter the agricultural sector. Initially he started as a truffle collector and as his business was growing he decided to become professional farmer and established 1 hectare of pomegranates.

Production and Technological improvements

- The plantation is organically managed and he will certify his production.
- He selected to cultivate the Greek variety "Ermioni" because is adopted to local soil-climate conditions and has more desirable quality characteristics.
- Before making the decision to cultivate pomegranates he visited many growers to acquire knowledge and knowhow

Commercial potential

Greek Cultivation "Ermioni" according to Mr Dimopoulos except from being well adopted to Greek soil-climate conditions has also better quality characteristics thus it is more desirable by the consumers, despite any coloration defects. He also believes that Greek growers should support the Greek varieties.

According to Mr. Dimopoulos the fundamental steps prior pomegranate establishment are:

- Acquire the knowhow needed to cultivate this crop
- Select wisely the most suitable variety
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion and the price of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem he faced in entering into the markets was the initial introduction of his products to the wholesalers and the retailers and convince them to buy. Once they tasted the fruit they were excited and reordered more quantities.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Mr. Dimopoulos supports that pomegranate is a very promising and dynamic crop for his region provided he select wisely the variety.

Regarding training needs according to Mr. Dimopoulos there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products.

Problems faced by grower

- Inadequate consumer information regarding the benefits of consuming pomegranates and Greek varieties in particular.
- Insufficient technical support on selecting suitable varieties for Greek soil-climate conditions.

General Comments/outcomes

- Mr Dimopoulos didn't have prior Agricultural experience nor land to cultivate. He rented the land from his relatives to cultivate pomegranates.
- He also plans to expand his business by installing additional 1 ha and make facilities for processing and packaging.
- He also explore new products
- Therefore Mr. Dimopoulos is an example of a newcomer in the agricultural sector with no prior experience, who has succeeded to cultivate a novel crop.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 23/10/2015
Company Title: "Efkarpon" Hellenic Superfoods		Company Type: Cooperative
Address: Mataraga, Karditsa		Web site: www.efkarpon.com
Contact person & Company manager: Kotsiopoulos Kostas	Mobile: 6971 985355 e-mail: Kotsiopoulos.k@efkarpon.com	GPS location N- 39.4004 E- 22.0715
Main activity sector: Production ☐ Processing ☐ Packaging & Distribution ☐		Other activities:
Year of establishment: 2011	Management & ownership: ☐	

Annual turnover:

- o Up to 10.000
- ● 11.000 – 100.000
- o 101.000 – 200.000
- o 201.000 and over

Level of activity: local/regional ☐ national ☐ exporter ☐ importer ☐

If exporter, main markets:

If importer, national origin of main imports:

In Greece, main geographical Markets: Nation wide

Short company history/researcher notes: Mr Kotsiopoulos is the new president of the "Efkarpon" Hellenic Superfoods cooperative which founded in 2011. Today the cooperative has 128 members who cultivates around 60 hectares of alternative fruits like goji berry, aronia, blueberries and hippophaes and are located all over Greece but mainly in the region of Thessaly. The cooperative planned from the beginning to establish a processing unit to process the production of its members. The processing Facilities were funded by the EU investment program "Leader" and will be operative in 2016.

Insert photos



Mini Report - Key outcomes and important notes

"Efkarpon" Hellenic Superfoods is a cooperative of alternative fruits' growers and was established in 2011. One year later they started to build the processing facilities to process the production of its members. Today the cooperative has around 128 members allover Greece cultivating around 60 hectares of goji berry, aronia, blueberries and hippophaes.

Production and Technological improvements

- All the members apply organic or sustainable management systems certified by TUV Austria and A-Cert.
- Members exchange experience and good practices to help each other as there was no previous experience.
- Members visits other countries who possess knowhow on these cultivation through their participation on the "LEONARDO" program.
- All the members of the cooperative assigned to certain position, administrative or technical, depending on their professional experience.
- Experimental tests on processing method have been made by a food technologist member of the cooperative. But still there is lack of knowledge in certain techniques.
- Most member didn't have previous agriculture experience but they are all devoted to their crops and highly desire to know about their cultivation.

Commercial potential

For the moment they only supply fresh and frozen fruits to wholesalers and supermarkets regionally and in big cities (Athens and Thessaloniki). Future plans including production of jams, preserves, biscuits and digestive bars. They used a part of their production for experimental purposes on the processing procedures.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Mr. Kotsiopoulos (president of the cooperative) believes that alternative fruits are very promising and dynamic crops for Greece. He is convinced that Greece can produce fruits of high quality and nutritional value and compete successfully with imported ones. Also they could be a valuable asset of exports. Their future plans including exports of mostly fresh fruits to European countries.

Mr. Kotsiopoulos believes that there is an imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products.

Problems faced

- Inadequate consumer information regarding the benefits of consuming alternative fruits

- Insufficient technical support on selecting suitable varieties for Greek soil-climate conditions.
- Regarding goji berry there are many problems such as diseases and problems related to prolonged harvesting period.
- They experience marketing and managerial problems thus they think of hiring a professional manager and someone to organize sales department.

General Comments/outcomes

"Efkarpon" Hellenic Superfoods is an excellent example of successful cooperation. Despite the clear benefits of collaboration Greek farmers are still very skepticism in participating to such unions, mostly because of prejudice and negative past experience. The way this cooperative operates is an excellent case study and should be an example for everyone.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 10/10/2015
Company owner: Gouliafas Aristotelis		Company Type: Family
Address: Aiani, Kozani		Web site: https://www.facebook.com/gouliafas
Contactperson&Company manager: Gouliafas Aristotelis	Mobile: 6989588717 e-mail: gouliafasaris@hotmail.com	GPS location N- 40.160380 E- 21.811356
Main activity sector: Production Processing Packaging &Distribution		Other activities:
Year of establishment: 2010	Management & ownership: ☐	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 –200.000 o 201.000 andover		
Level of activity:local/regional ☐ national ☐ exporter ☐ importer ☐		
If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: North Greece		
Short company history/ researcher notes: Mr Gouliafas established his farm in 2010. He decided to plant Hippofaes mainly because he is a big supporter of healthy diet and he has consumed hippofaes juice regularly. During these years he faced a lot of problems but he continues and try to find solutions.		
Insert photos		

Mini Report - Key outcomes and important notes

Mr. Gouliafas Aristotelis is the owner of the agricultural holding and he runs it as family business although he is not a fully professional farmer. He as a person follows a healthy way of living practicing exercise and consuming natural and healthy products. Thus in 2010 he decided to establish a farm of 0.9 hectares of hippophaes planting various varieties. His main products are frozen fruits and hippophaes juice.

Production and Technological improvements

- The plantation is organically managed and certified by BIOHELLAS.
- He uses honey as sweetener for the juice.
- There is a dripping irrigation system.
- Although he is not an experienced farmer, he is devoted on his cultivation and spends a lot of time on his farm.
- Today he cultivates varieties from Germany, Russia and Rumania in order to assess their productivity and adaptation to Greek soil-climate conditions.

Commercial potential

Hippophaes is a fruit that has high concentration of antioxidants, thus it is commonly used in healthy diets. In Greece there has been a significant increase on the consumer demand of Hippophaes during the last five years.

Mr Gouliafas sells frozen fruits, juices (250ml) to wholesalers, retail stores (organic stores) and direct to consumers. He outsource the production of juice thus he has increased cost of processing.

According to Mr. Gouliafas the fundamental steps prior hippophaes establishment are:

- Acquire the knowhow needed to cultivate this crop
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion and the price of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the introduction of their products to the wholesalers and the retailers and convince them to buy. Also attention need to be given on elevating consumers demand on the product. Entering in the markets is a successive procedure; you introduce your product in the local markets, then nationally and then internationally.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Intensive cultivation of hippophaes has just been recently started in Greece, thus there is a lack of knowledge and know-how on cultivation and techniques and practices and pest management.

Regarding training needs according to Mr. Gouliafas there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Lack of knowhow and shortage of specialized consultants and personnel.
- Certified propagation material.
- Continuous monitoring of the plants to identify new pests and diseases.
- Inadequate consumer information regarding the benefits of consuming hippophaes.
- Insufficient technical support on selecting suitable varieties for Greek soil-climate conditions.
- Inaccurate information on cultivation practices such as ratio of male to female plants and harvesting methods.
- Most varieties of hippophaes have needle-sharp thorns which make harvesting very difficult. A method that Mr. Gouliafas is practicing, is to cut the whole branch, freeze it and then shake it to take off the fruits. This method may be effective for harvesting more easily and reducing the cost but have a serious impact on the productivity of the tree because it reduces dramatically the yield of the following year.

General Comments/outcomes

- Although Mr. Gouliafas is not an experienced farmer he is determined to succeed on the cultivation of hippophaes and overcome the problems that he is facing.
- Mr Gouliafas decided to plant hippophaes based on his experience as a consumer and the trends of consumers.
- Mr Gouliafas faces a constant struggle in finding new markets for selling his products. He plans to organize facilities to process his production in house.
- Therefore Mr. Gouliafas is an example of a newcomer in the agricultural sector who decided to plant a new crop following the trends of consumers but facing many problems that derive from the lack of know-how on the certain crop.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 8/10/2015
Company title: Kaldakis Ioannis		Company Type: Family
Address: Gallikos, Kilkis		Web site:
Contactperson&Company manager: Kaldakis Kostas	Mobile: 6947779687 e-mail: kaldakis@gmail.com	GPSlocation N-40.867938 E-22.862198
Main activity sector: Production ☐ Processing ☐ Packaging&Distribution ☐		Other activities:
Year of establishment: 2008	Management & ownership: ☐	

Annual turnover:

- o Up to 10.000
- o 11.000 – 100.000
- o 101.000 – 200.000
- o 201.000 and over

Level of activity: local/regional ☐ national ☐ exporter ☐ importer ☐

If exporter, main markets: Germany, Serbia

If importer, national origin of main imports:

In Greece, main geographical Markets: North Greece, Athens

Shortcompanyhistory/researchernotes: MrKaldakisKostascontinuesthefamilybusiness in agricultureandsince2008hecultivatespomegranatesandaromaticplants.Healso makes juices and essential oils.

Insert photos

Due to unfavorable weather conditions (heavy rain) it was impossible to take photos.

Mini Report - Key outcomes and important notes

Mr. Kaldakis Kostas is the executive manager of the farm which is a family business. He is an alumni of the American Farm School and an Agronomist who worked as a technical consultant at Bayer Cropscience. His father, a professional farmer, was cultivating traditional crops in the region of Kilkis (Galikos village). Mr Kaldakis took the opportunity and exploit his background and his position at Bayer to acquire the necessary knowhow on the cultivation of pomegranate and established a network with Israeli experts. Today he cultivates 5 hectares of pomegranates (variety "Acco") and his major product is pomegranate's juice.

Production and Technological improvements

- The plantation is conventionally managed as he has experienced many problems fighting phytophthora and other root diseases.
- He has applied a numerous of cultivation techniques to prevent the trees from root rotting such as mulching.
- There is a dripping irrigation system which is also used for fertilization.
- He is an experienced farmer, he is devoted on his cultivation and spends a lot of time on his farm; he learnt about the cultivation techniques from Israeli growers.
- He selected the variety Acco mainly to take advantage of the early harvest season and the higher prices.

Commercial potential

Pomegranates have attended great interest as an alternative fruit crop the last 5 years in Greece. An increase on the consumer demand has been noticed in Greece both for fresh fruit and of pomegranate's juice.

Mr Kaladakis sells fresh fruits, juices (250 and 500ml) and seeds (200gr) to wholesalers, retail stores and direct to consumers. He produces the juice at his own facilities, which he wants to expand and modernize in order to reduce the cost of processing (outsourcing processing increases the cost).

According to Mr. Kaldakis the fundamental steps prior pomegranate establishment are:

- Acquire the knowhow needed to cultivate this crop
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion and the price of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the introduction of their products to the wholesalers and the retailers and convince them to buy. In many cases he had experienced a rather aggressive price policy from the wholesalers during the selection process who try to reduce the price finding quality problems.

Entering in the markets is a successive procedure; you introduce your product in the local markets, then nationally and then internationally.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Although pomegranates is not a new fruit for Greeks its systematically cultivation started just recently. Greek soil and climate conditions and particularly the existence of many local microenvironments seem to favor the cultivation of pomegranate and the production of high quality fruits. In Peloponnese there is a native variety called "Ermion" (and a numerous of its clones) but lately almost all of the new establishments used foreign varieties such as "Wonderful", "Acco" and others.High yield and income per hectare, which are reported in bibliography, are the main attractive factors to potential growers.

Regarding training needs according to Mr. Kaldakis there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Lack of knowhow and shortage of specialized consultants and personnel.
- Certified propagation material.
- Continuous monitoring of the plants to identify new pests and diseases.
- Inadequate consumer information regarding to other uses of pomegranate.
- Decrease on prices following the establishment of his plantation
- Excessive bureaucracy related to exports procedures.

General Comments/outcomes

- Mr. Kaldakis and his family practice agriculture for over 30 years and possess valuable experience in cultivating crops. Thus, before establishing his plantation he made an extend research on the potential crops comparing pros and cons and investigating prospective buyers of his products.
- Mr Kaldakis decided to plant pomegranate based on his research on the prices and market conditions but since the establishment of his plantation there has been a significant decrease on prices. That forced him to find alternatives to distribute his production such as sell direct to consumers and processing. He is also planning to organize an e-shop for selling his products.
- Mr Kaldakis is very passionate with his plantation spending many days on monitoring the plants for any disorders and applying innovative cultivation techniques.
- Therefore Mr. Kaldakis is an excellent example of a successful farmer who decided to plant a new crop only after a thorough research and creating his own business plan.

Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 15/10/2015
Company owner: Kallitsis Konstantinos		Company Type: Family
Address: Svoronos, Katerini		Web site: www.aroniaproducers.gr
Contactperson&Company manager: Kallitsis Konstantinos	Mobile: 6987193605 e-mail: kkallitsis@hotmail.com	GPSlocation N- 40.267275 E- 22.465215
Main activity sector: Production ■ Processing □ Packaging & Distribution □		Other activities:
Year of establishment: 2008	Management & ownership:	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity: local/regional ■ national □ exporter □ importer □		
If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: Katerini, Thessaloniki		
Short company history/researcher notes: Mr. Kallitsis, a alumni of American Farm School, continues the family farm and he collaborates with his uncle in rural primary production. He cultivates kiwi, grapes, salad vegetables and strawberries. Even if he has reduce the area for strawberries (from 8 hectares in 2000 to 0.5 hectares today) he is satisfied from the income that he earns as he sells his yield to retail markets and not to wholesellers.		
Insert photos		

Mini Report - Key outcomes and important notes

Mr. Kalitsis Kostas is a young professional farmer, graduate of American Farm School who entered the family business because he loves the job. Today he and his uncle are cultivating grapes (1 ha), kiwis (7.5 ha) vegetables (2 ha) and strawberries (0.5 ha). They used to cultivate around 8 ha of strawberry in low greenhouses but low prices forced them to downsize the cultivated area. They still cultivated a small area mainly because they possess all the necessary equipment and this amount of production they can distribute to the local market.

Production and Technological improvements

- The plantation is conventionally managed but keep the use of chemical as low as possible.
- Until today he has experiments with many varieties in order to find the perfect combination of high quality and productivity.

Commercial potential

Mr. Kalitsis distributes his production immediately after harvesting to local retail stores with whom keeps long term collaboration. He is not very satisfy with the income from strawberries and he is not optimistic about the future of this crop in his region.

Problems faced by grower

- High production cost
- Root deseases.
- Insufficient technical support on selecting suitable varieties for Greek soil-climate conditions.
- Intense competition from growers of Southern Greece due to lower production cost and longer cultivation period.

General Comments/outcomes

- Mr Kalitsis said that if he didn't possess the necessary equipment he would not cultivate strawberries because it is not a profitable crop for the region.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 19/10/2015
Company owner: Karkadakis Evagelia		Company Type: Family
Address: Mavrahades, Karditsa		Web site:
Contactperson&Company manager: Karkadakis Dimitris	Mobile: 6975 753639 e-mail: litsa3101@hotmail.com	GPSlocation N- 39.269595 E- 22.091830
Main activity sector: Production ■ Processing □ Packaging & Distribution □		Other activities:
Year of establishment: 2012	Management & ownership:	

Annual turnover:

- o Up to 10.000
- o 11.000 – 100.000
- o 101.000 – 200.000
- o 201.000 and over

Level of activity: local/regional ■ national □ exporter □ importer □

If exporter, main markets:

If importer, national origin of main imports:

In Greece, main geographical Markets: He give his yield to Aronia Hellas Cooperative

Short company history/ researcher notes: Mr. Karkadakis is a retired policeman. He was cultivating traditional crops (cotton, wheat and maize), and after a thorough search and consulting he decided to plant Aronia berries. The plantation is in the third year and he is satisfied by the initial yield. He sells his production to the cooperative "Aronia Hellas" who also provides to him the necessary technical support.

Insert photos

Mini Report - Key outcomes and important notes

Mr. Karkadakis Dimitris is a retired policeman and he cultivated traditional crops such as wheat and cotton, because of the direct payments from EU. Because of the low prices of the traditional crops he decided to explore other crops suitable for the region of Karditsa. After a thorough research and evaluation of potential alternative crops he decided to cultivate Aronia berries and he planted initially 1.3 hectares. Today he cultivates 3.4 ha and last year he harvested for the first time.

Production and Technological improvements

- The plantation is organically managed.
- It is monitored by a private consulting firm who provided consulting services and technical support when needed.
- There is a dripping irrigation system which is also used for fertilization.

Commercial potential

Mr Karkadakis sells his production to the cooperative "Aronia Hellas" immediately after harvesting without further processing.

Fundamental steps prior aronia establishment

- Acquire the knowhow needed to cultivate this crop
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Aronia berry is a newly introduced crop in Greece and most plantations are aged 3-5 years. Greek soil and climate conditions and particularly the existence of many local microenvironments seem to favor the cultivation of aronia and the production of high quality fruits. High yield and income per hectare, which are reported in bibliography, are the main attractive factors to potential growers. Although there aren't special official limitations establishing the cultivation, initial cost for plantation (approximately 7,000 €/ha), lack of knowhow, elevated harvest cost, and market conditions seems to be the major drawbacks. Nevertheless Mr. Karkadakis believes that aronia is a promising crop for the region of Karditsa and Greece in general because there are favorable soil-climate conditions to produce fruits of high quality and nutritional value.

Regarding training needs according to Mr. Karkadakis there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Certified propagation material
- Hand harvesting elevates production cost
- Continuous monitoring of the plants to identify new pests and diseases
- Inadequate consumer information

General Comments/outcomes

- Mr. Karkadakis said that if there wasn't the consulting company, to support him on the decision making process, by making and evaluating all the necessary soil analyses and provide the needed technical support he wouldn't proceed in cultivating aronia.
- For the moment he doesn't think to expand his plantation but rather wait to evaluate further the productivity and profitability of the crop.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 9/11/2015
Company owner: Karsikis Manolis		Company Type: Family
Address: Nymphopetra, Thessalonikis		Web site:
Contactperson&Company manager: Karsikis Manolis	Mobile: 6946295368 e-mail: info@aroniaproducers.gr	GPSlocation N- 40.703 E-23.327
Main activity sector: Production ☑ Processing ☑ Packaging & Distribution ☐		Other activities:
Year of establishment: 2013	Management & ownership:	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity:local/regional ☑ national ☐ exporter ☐ importer ☐		
If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: Thessaloniki		
Short company history/researcher notes: Mr. Karsikis established its pomegranate farm (5 hectares) in 2013 as an investment in the rural section with his father. They selected pomegranate mainly because of the promising high yield and high profits. In 2015 they harvested totally 3.5 tns of pomegranates but the price per kilo was already declined to 0.4€/kg (from 1.2€/kg) and they decided to distribute their product themselves. They are planning to invest further on processing their product and distribute it to local markets.		
Insert photos Interview took place at Perrotis College		

Mini Report - Key outcomes and important notes

Mr Karsikis and his father in 2013 established 5 hectares of pomegranates in an area around 30 km outside of the city of Thessaloniki where they live. Since they didn't have prior experience in agriculture they had to purchase also all the necessary equipment for the cultivation, thus the total investment was very high. The main reason to enter the agricultural sector was to invest in a promising crop. At the time of the investment the prices of pomegranate that were given from wholesalers were satisfactory, but 3 years later they have decreased at Mr. Karsikis said that current prices are not satisfactory to sell to wholesalers and they prefer to distribute their production on their own or even sell direct to consumers. The tress haven't yet reached full production at the levels are manageable but later they surely face a lot of problems in distributing their production.

Production and Technological improvements

- The plantation is conventionally managed.
- The main variety he cultivates is Wonderful (2850 trees), he has planted also Acco (300 trees) and a small number of the Greek variety "Ermioni" (150 trees).

Commercial potential

The cultivation is on the third year and in 2015 he harvested only 3500 kg from 5 hectares. Since the prices were not satisfactory he decided to distribute the production himself direct to consumer or to small retails store. He sells fresh fruit and he makes juice on demand.

The most important problem he faced in entering into the markets was the initial introduction of his products to the wholesalers and the retailers and convince them to buy.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Mr. Karsikis believes that pomegranate is a very promising and dynamic crop for his region.

Regarding training needs according to Mr. Karsikis there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products.

Problems faced by grower

- Decreased prices make the cultivation non profitable.

- Inadequate consumer information regarding the benefits of consuming pomegranates.
- Small interest by consumers for Acco and Ermioni varieties.
- High initial investment

General Comments/outcomes

- Mr Karsikis didn't have prior Agricultural experience and infrastructure so he decided to purchase all the necessary equipment. Thus initial investment was very high.
- He plans to expand his business by installing processing and packaging facilities.
- The main reason for Mr Karsikis to cultivate pomegranates was the high promising yields and the high income for this cultivation. However, prices have been significantly decreased nowadays and the production seems to have many difficulties related to climate conditions (low temperatures) and crop protection (root diseases).

Therefore Mr. Karsikis is an example of a newcomer in the agricultural sector with no prior experience, who has many difficulties to cultivate a novel crop and made his decision based on biased information.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 19/10/2015
Company owner: Kontovas Thomas		Company Type: Family
Address: Mavrahades, Karditsa		Web site:
Contactperson&Company manager: Kontovas Thomas	Mobile: 6975 753639 e-mail: litsa3101@hotmail.com	GPSlocation N- 39.271286 E- 22.055657
Main activity sector: Production ■ Processing □ Packaging & Distribution □		Other activities:
Year of establishment: 2013	Management & ownership:	
Annual turnover: o Up to 10.000 ■ o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity: local/regional ■ national □ exporter □ importer □		
If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: He give his yield to Aronia Hellas Cooperative		
Shortcompanyhistory/researchernotes: Mr. Kontovaswascultivatingtraditionalcrops (cotton, wheatandmaize),andafterathoroughsearchandconsultinghedecidedtoplant Aroniaberries. Todayhecultivates5.5hectaresofaroniaintheregionofMavrahadesin Karditsa. Theplantationis inthesecondyearandheharvestedforthefirsttimeasmall quantitywhichhesoldtothe cooperative "AroniaHellas". Despitehissatisfactionforthe priceand the production he achieved Mr. Kontovas expressed his agony about the future of the cultivation.		
Insert photos		

Mini Report - Key outcomes and important notes

Mr. Kontovas Thomas established 2.9 ha of aronia in 2013 and a year after he planted additionally 2.6 ha. Previously he cultivated traditional crops such as wheat and cotton, because of the direct payments from EU. Forced by the low prices of the traditional crops he decided to explore other crops suitable for the region of Karditsa. He learned about aronia from a friend of his and decided to after thorough investigation to start cultivating.

Production and Technological improvements

- The plantation is organically managed.
- It is monitored by a private consulting firm who provided consulting services and technical support when needed.
- There is a dripping irrigation system which is also used for fertilization.

Commercial potential

Mr Kontovas harvested this year a small amount of fruits which he sold to the cooperative "Aronia Hellas" as fresh fruits

Fundamental steps prior aronia establishment

- Acquire the knowhow needed to cultivate this crop
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Mr. Kontovas believes that aronia, despite of the problems like lack of knowhow, is a promising crop for the region of Karditsa and Greece in general because there are favorable soil-climate conditions to produce fruits of high quality and nutritional value.

Regarding training needs Mr. Kontovas supports that there is an imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Certified propagation material
- Hand harvesting elevates production cost
- Continuous monitoring of the plants to identify new pests and diseases
- Inadequate consumer information

General Comments/outcomes

- Mr. Kontovas said that the consulting services and technical support is a crucial factor for someone to decide to cultivate a new.
- Mr Kontovas expressed an anxiety of potential difficulties in distributing his production if the cooperative deny to absorb all the production or decrease the price.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 9/11/2015
Company owner: Molia - Arcadia		Company Type: Family
Address: 2nd km Tripoli - Megalopoli		Web site: www.molia.gr
Contact person & Company manager: Akis Petropoulos	Mobile: 694 2201613 e-mail: info@molia.gr	GPS location N- 37.502 E- 22.361
Main activity sector: Production ☑ Processing ☑ Packaging & Distribution ☑		Other activities:
Year of establishment: 2010	Management & ownership: ☑	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity: local/regional ☑ national ☑ exporter ☑ importer ☐		
If exporter, main markets: Germany, Dubai, Singapore, Sweden		
If importer, national origin of main imports:		
In Greece, main geographical Markets: National, through Super markets chains		
Short company history/researcher notes: Mr Petropoulos is one of the three partners of Molia Arcadia, a company that produce fresh blueberries. The company established in 2010. Today Molia Arcadia cultivates around 16 hectares of blueberries collaborates with 15 growers, has its own nursery and provide consulting services to potential blueberry growers. For the next year they are planning to plant 7 more hectares of blueberries and they are investigating other promising crops for the region.		
Insert photos Interview via telephone		

Mini Report - Key outcomes and important notes

Mr. Petropoulos Akis is one of the three partners of the private company Molia Arcadia that cultivate and produce fresh blueberries in the region of Tripolis. The company started in 2010 planting initially 1.5 hectares after two years of experiments to determine the adoptability of the crop to the Greek climate conditions and to find the most suitable variety for the region. For these test and experiments were designed and monitored in collaboration with experts from the Netherlands. Today Molia Arcadia and its partners cultivate around 16 hectares of blueberries.

Production and Technological improvements

- The plantation is sustainable managed and they have certified the products according to Global Gap prototype.
- Addition of acidic turf to the plantation hole in order to adjust soil pH.
- There is a dripping irrigation system which is also used for fertilization.
- Fertigation is also used to maintain low soil pH.
- Propagation material was imported from the Netherlands but now they run their own nursery.
- They have evaluated more than 5 different varieties to find the most suitable for Greek climate conditions.

Commercial potential

Molia Arcadia distributes its production 85% fresh (package of 125 gr) and only 15% is processed. The main market channels they supply are wholesalers and supermarkets. They also export to Germany, Dubai, Singapore and Sweden. The main advantage of Greek produced blueberries, according to Mr. Petropoulos, is the higher quality compared to the ones produced in Northern countries. They also participate to all major national and international fairs of the sector.

Fundamental steps prior blueberry establishment according to Mr. Petropoulos are

- Acquire the knowhow needed to cultivate blueberries
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the introduction of their products to the wholesalers and the retailers and convince them to buy them. Entering in the markets is a successive procedure; you introduce your product in the local markets, then nationally and then internationally.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Cultivation of blueberries requires low soil pH conditions, thus limited region in Greece are suitable for this crop. The application of acidic turf, a practice that they implement can boost blueberry cultivation despite the increase on establishment

cost. According to Mr Petropoulos blueberries is a promising and dynamic crop for his region but a new grower has to plant at least 1 hectare in order to make a decent profit.

According to Mr. Petropoulos there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, new growers need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Lack of knowhow and shortage of specialized consultants and personnel
- Hand harvesting elevates production cost
- Continuous monitoring of the plants to identify new pests and diseases
- Inadequate consumer information
- On their effort to expand, they have faced many difficulties in finding large suitable areas to cultivate. They have to buy or rent many land plots from different owners.

General Comments/outcomes

- Mr. Petropoulos has no prior agricultural experience but is a very efficient businessman, thus he collaborated with others experienced farmers in order to establish the company
- They have early identified the imperative need of acquire the appropriate knowhow so they found the experts to know from.
- The company invested a big amount of money on the cultivation because they are confident that Greek produced blueberries are of high quality.
- Therefore Molia Arcadia is an excellent example of a successful company in the sector of Alternative Fruits whose owners had carefully planned their moves and are moving forward with small but stable steps.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 27/10/2015
Company Title: Mparmpas Filippos		Company Type: Family
Address: Konitsa, Ioannina		Web site: www.ippofaes.gr
Contactperson&Company manager: Mparmpas Philippos	Mobile: 6937 971879 e-mail: info@ippofaes.gr	GPSlocation N- 40.046 E-20.717
Main activity sector: Production ☐ Processing ☐ Packaging & Distribution ☐		Otheractivities: Paintingand decorations
Year of establishment: 2008	Management & ownership: ☐	

Annual turnover:

- ● Up to 10.000
- ○ 11.000 – 100.000
- ○ 101.000 – 200.000
- ○ 201.000 and over

Level of activity: local/regional ☐ national ☐ exporter ☐ importer ☐

If exporter, main markets:

If importer, national origin of main imports:

In Greece, main geographical Markets: Nation wide

Short company history/ researcher notes: Mr. Mparmpas established the first plantation of Hippophaes in 2008 in a small area beside his house in order to evaluate and test the plants. He also established a network with experts in hippophaes from Germany. In 2010 he planted 0.8 hectares of Hippophaes (cv. Leikora) in the region of Konitsa in Ioannina. He bought that area for the specific reason, since he had no previous experience in the agricultural sector nor land to cultivate. Today after many test and experiments he harvest around 1.2 tons of hippophaes fruits that he processes his production at his owned facilities producing dried fruits (raisins) and juice. He distributes his products in the local market and direct to consumers locally and through internet (e-shop).

Insert photos

Mini Report - Key outcomes and important notes

Mr. Mparmpas Philippos is the owner of the agricultural holding and he runs it as family business. In 2008 he decided to test the adaptability of hippophaes to the Greek climate conditions. Thus he initially planted a small number of trees at his backyard. He provided the trees from a nursery in Germany and at the same time he contacted and network with specialist in the country to acquire the appropriate knowledge. Today he cultivates 1.1 ha of hippophaes (cv Leicora) which have been planted in 2010. His main products are frozen and dried fruits, hippophaes juice and dried hippophaes leaves.

Production and Technological improvements

- The plantation was organically managed but he discontinued the certification.
- He process his production at his own basic facilities.
- There is a dripping irrigation system also used for fertilization.
- He harvests by pruning the branches, then freeze them and take the fruits.
- He applies the above technique to half of the area each year.

Commercial potential

Mr Mparmpas has a variety of products which he has managed to produce at his own facilities. The main channels he uses to distribute his products are wholesalers, retail stores and direct to consumers. He also maintains a web site with online selling options. Thus he managed to sell all over Greece.

According to Mr. Mparmpas the fundamental steps prior hippophaes establishment are:

- Acquire the knowhow needed to cultivate this crop
- Select wisely the most suitable variety
- Network with experts on cultivation and potential buyers
- Knowing the market needs (ensure the promotion and the price of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the introduction of their products to the wholesalers and the retailers and convince them to buy. Also attention need to be given on elevating consumers demand on the product. Entering in the markets is a successive procedure.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Intensive cultivation of hippophaes has just been recently started in Greece, thus there is a lack of knowledge and know-how on cultivation and techniques and practices and pest management.

Regarding training needs according to Mr. Mparmpas there is imperative need of training and consulting on the cultivation techniques of the crop, pest management,

fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Lack of knowhow and shortage of specialized consultants and personnel in Greece.
- Certified propagation material.
- Continuous monitoring of the plants to identify new pests and diseases.
- Inadequate consumer information regarding the benefits of consuming hippophaes.
- Insufficient technical support on selecting suitable varieties for Greek soil-climate conditions.
- Most varieties of hippophaes have needle-sharp thorns which make harvesting very difficult. A method that Mr. Mparmpas is practicing, is to cut the whole branch, freeze it and then shake it to take off the fruits. This method may be effective for harvesting more easily and reducing the cost but have a serious impact on the productivity of the tree because it reduces dramatically the yield of the following year.

General Comments/outcomes

- Mr Mparmpas didn't have prior Agricultural experience nor land to cultivate. He bought the land just to cultivate hippophaes.
- Mr. Mparmpas is absolutely devoted to the cultivation of hippophaes and determined to succeed.
- He also plans to expand his business by installing specialized facilities for processing and packaging.
- His website provides all the necessary information about hippophaes and the benefits derived from its consumption. He also provides official data and analyses that support his products.
- Therefore Mr. Mparmpas is an example of a newcomer in the agricultural sector with no prior experience, who has succeeded to cultivate a novel crop.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 16/10/2015
Companyowner:BIODRAMA:AgriculturalCooperativeof Drama's bio-growers a bio-farmers		Company Type: Cooperative
Address: Kalampaki, Drama		Web site: www.blueberry.gr
Contactperson&Company manager: Papoutsis Nikos	Mobile: 696909168941 e-mail: info@blueberry.gr	GPSlocation N- 41.016340 E- 24.175583
Main activity sector: Production ☑ Processing ☑ Packaging & Distribution ☑		Other activities:
Year of establishment: 2005	Management & ownership: ☑	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity:local/regional ☑ national ☑ exporter ☑ importer ☐		
If exporter, main markets: Germany, Cyprus		
If importer, national origin of main imports:		
In Greece, main geographical Markets: Local regions and Nation wide, Thessaloniki		
Short company history/ researcher notes: Mr. Papoutsis, president of the Agricultural Cooperative of Drama's bio-growers and bio-farmers (BIODRAMA), is the pioneer of blueberrycultivationinGreece.Heplantedthefirstblueberriesin2005,afteratriphemade to Kiev, wherehefirsttastedthem.Theyearsafterhestruggledalotwiththecultivation andthe positioningoftheblueberriesinGreekfruitmarket.BIODRAMAisnowcultivating, processing and distributing blueberries and has ambitious plans for the Future.		
Insert photos   		

Mini Report - Key outcomes and important notes

Mr. Papoutsis Nikos is the president of the Agricultural Cooperative of bio-growers and bio-farmers of Drama (BIODRAMA). His main occupation is engineering but for the last 10 years he is devoted to the promotion of blueberries cultivation in Greece. He is the pioneer of blueberries in Greece as he says. His first contact with blueberries was during a trip to Kiev where he first taste it and learned about the benefits of blueberries consumption. Today the cooperative cultivates almost 4 ha of blueberries (cv. Bluecrop and Patriot) producing and distributing a variety of products from frozen fruits to jams, preserves and liqueur.

Production and Technological improvements

- The plantation is organically managed certified by A-Cert
- Addition of acidic turf to the plantation hole in order to adjust soil pH.
- There is a dripping irrigation system which is also used for fertilization.
- Fertigation is also used to maintain low soil pH.
- Propagation material is imported from Russia.
- He evaluated more than 5 different varieties to find the most suitable for Greek climate conditions.
- Has develop a large diversity of products.

Commercial potential

Blueberries consumption and demand is still in infant stages. Mr Papoutsis has struggled with many obstacles to promote his products. Although consumer demand for blueberries is rising and many studies and articles have been written for the benefits derived by blueberry consumption the fruit is still unknown to most people. Mr. Papoutsis and BIODRAMA Cooperative have develop a large diversity of products (blueberry's juice, mixed juices, jams, preserves, leaves for beverage, liquor etc.) and made remarkable effort to promote blueberries consumption in Greece. So far they have already manage to export to Germany and Cyprus.

Fundamental steps prior blueberry establishment according to Mr. Papoutsis are

- Acquire the knowhow needed to cultivate blueberries
- Network with experts on cultivation and potential buyers
- Plant also other crops which can facilitate application of organic management systems. They can also provide supplementary income especially for the first years.
- Knowing the market needs (ensure the promotion of your product)
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the introduction of their products to the wholesalers and the retailers and convince them to buy them. Entering in the markets is a successive procedure; you introduce your product in the local markets, then nationally and then internationally.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Cultivation of blueberries requires low soil pH conditions, thus limited region in Greece are suitable for this crop. The application of acidic turf, a practice that Mr. Papoutsis is implements can boost blueberry cultivation despite the increase on establishment cost. Mr Papoutsis believes that blueberries are a promising and dynamic crop for the region of Drama and other similar region in Greece as there are suitable climate conditions for high yield. He is also satisfy by the prices he achieves for his products. He also mentioned the need to differentiate blueberries from "Myrtilla" (bilberries) which are native to the region but of less nutritional value.

Regarding training needs according to Mr. Papoutsis there is imperative need of training and consulting on the cultivation techniques of the crop, pest management, fertilization, new product development and marketing of the products. Additionally, they need to be well trained and skilled in general agricultural techniques (cultural practices, farming systems etc) and they also need to be determined to work hard.

Problems faced by grower

- Lack of knowhow and shortage of specialized consultants and personnel
- Certified propagation material (he imports the propagation material)
- Hand harvesting elevates production cost
- Continuous monitoring of the plants to identify new pests and diseases
- Inadequate consumer information

General Comments/outcomes

- Although Mr. Papoutsis wasn't professional farmer he managed to successfully cultivate an unknown crop in Greece. This happened because of his devotion to the cultivation and the continuous training and mentoring by experts from Russia.
- Product diversity, according to Mr. Papoutsis is essential to successfully promote your production.
- Mr Papoutsis is very passionate with his plantation spending many hours a day on monitoring the plants for any disorders.
- Mr Papoutsis has ambitious future plans for blueberries and wants to establish blueberries as an alternative superfood with great benefits for human health
- Therefore Mr. Papoutsis is an excellent example of a successful farmer who decided to plant a new crop and devoted to it.

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Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 12/10/2015
Company owner: Tsilemakis Christos		Company Type: Family
Address: Polypotamo, Florina		Web site:
Contactperson&Company manager: Tsilemakis Christos	Mobile: 6976775254 e-mail: gouliafasaris@hotmail.com	GPSlocation N- 40.718282 E- 21.364265
Main activity sector: Production ■ Processing □ Packaging & Distribution □		Other activities:
Year of establishment: 1992	Management & ownership:	

Annual turnover:

- o Up to 10.000
- o 11.000 – 100.000
- o 101.000 – 200.000
- o 201.000 and over

Level of activity: local/regional ■ national □ exporter □ importer □

If exporter, main markets:

If importer, national origin of main imports:

In Greece, main geographical Markets: North Greece

Shortcompanyhistory/researchernotesMrTsilemakiscontinuesthefamilybusinessof growing strawberriesinopenfield(extensivecultivation).AtthisvillagePolypotamoin Florina,until 2005almostalltheVillagerswerecultivatingstrawberries,butnowheisthe lastthatstill continues.Today he cultivates 0.7 hectares of strawberries which he personally distributes with great success at local retails stores and flea markets. Mr. Tsilemakis is very proud for the quality of his products and he strongly recommends extensive cultivation of strawberries as an alternative crop for mountainous regions.

Insert photos
The field was inaccessible

Mini Report - Key outcomes and important notes

Mr. Tsilemakis Christos is a professional farmer who continuous the family business cultivating vegetables (tomatoes, potatoes, beans etc.) and strawberries (0.7 hectares). His region (mountainous area of Florina) has a long tradition on extensive cultivation strawberries but for the last 10 years there was a dramatically decreased on the number of farmers who cultivate strawberries.

Production and Technological improvements

- The plantation is conventionally managed but keep the use of chemical as low as possible.
- He tries to differentiate to his competitors by harvesting from late May to late June (when there is a gap) and producing strawberries of high quality and aroma.
- Until today he has experiments with many varieties in order to find the perfect combination of high quality and productivity.

Commercial potential

There is an impression to the consumers that strawberries of extensive cultivation excel on sensory characteristics to the ones cultivating in greenhouses. According to Mr Tsilemakis that is the main advantage of his products.

The biggest proportion of his production is distributed by himself in local street markets of Florina and surrounded regions (Kastoria and Kozani)

According to Mr. Tsilemakis the fundamental steps prior strawberry establishment are:

- Acquire the knowhow needed to cultivate this crop
- Select the appropriate variety according to the desirable characteristics (harvesting period, flavor and aroma)
- Knowing the market needs
- Quality is the key factor for establishing your product in the market and build a brand name.

The most important problem faced in entering into the markets was the competition from growers of Peloponnese due to lower prices. Also attention need to be given on elevating consumers demand on the product.

Training needs for new farmers

Alternative crop for youth – accessibility & attractiveness for youth

Strawberry is an established crop in Greece which was cultivating mainly extensively. Recently extensive cultivation has dramatically decrease and almost all strawberries are produced in low greenhouses. However, quality is not as good as naturally produced strawberries.

Regarding training needs according to Mr. Tsilemakis there is imperative need of training and consulting on the cultivation techniques of the crop and pest management

In addition develop of varieties suitable for extensive cultivation adopted to Greek climate conditions could raise the attractiveness of the sector.

Problems faced by grower

- Early spring's frosts.
- Root diseases.
- Insufficient technical support on selecting suitable varieties for Greek soil- climate conditions.
- Sometimes has difficulties in finding the desirable variety because he plants later than other regions and nurseries don't have enough stock to supply him.

General Comments/outcomes

- Mr. Tsilemakis is an experienced farmers and cultivates strawberries since the beginning. He insists on cultivating because he produces fruits of high quality and every year sells all his production.
- According to Mr. Tsilemakis his strawberries are of greater quality than the ones cultivated in greenhouses which is why customers prefer to buy his strawberries despite the price.
- Therefore Mr. Tsilemakis is an example of an experienced farmer who insists on the traditional way for cultivating strawberries and even if the productivity is lower his income is satisfactory.

Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 26/10/2015
Company Title: AGROPARAGO		Company Type: Private consulting company
Address: Zygomali 14, Ioannina		Web site: www.agroparago.com
Contactperson&Company manager: Mpalafa Natalia	Mobile: 6972 881985 e-mail: info@agroparago.com	GPSlocation N- 39.664 E- 20.851
Main activity sector: Production ☐ Processing ☐ Packaging &Distribution ☐		Other activities: Consulting company and web platform
Year of establishment: 2012	Management & ownership:	

Annual turnover:

- ● Up to 10.000
- ○ 11.000 – 100.000
- ○ 101.000 – 200.000
- ○ 201.000 and over

Level of activity: local/regional ☐ national ■ exporter ☐ importer ☐

If exporter, main markets:

If importer, national origin of main imports:

In Greece, main geographical Markets: Nation wide

Shortcompanyhistory/researchernotes: MrsMpalafaisaForestryandEnvironmental scientist whoforthelast3yearstriestopromotealternativecultivationintheregion(new fruitcropsand MedicinalandAromaticplants)throughtheformationofcooperativesand groupsofgrowers. Sheprovidesconsultingservices,technicalsupportandseeksforfunding programs to financially support the growers. She is also the administrator of the web platformAGROPARAGO,where growerscansubscribeanddemonstratetheircultivationand products in order to promote them.

Insert photos

Study No & title: #1 Alternative Fruit Crops for Greece	Researcher/s: Michail Genitsargiotis	Date: 26/10/2015
Company Title: Sym AGRO		Company Type: Private consulting company
Address: Educational & Technological Park of University of Ioannina		Web site: www.symagro.com
Contact person & Company manager: Kassandros Gatsios	Mobile: 26510 07653 e-mail: info@symagro.com	GPS location N- 39.622 E- 20.847
Main activity sector: Production ☐ Processing ☐ Packaging & Distribution ☐		Other activities: Consulting company and nursery
Year of establishment: 2010	Management & ownership:	
Annual turnover: o Up to 10.000 o 11.000 – 100.000 o 101.000 – 200.000 o 201.000 and over		
Level of activity: local/regional ☐ national ■ exporter ☐ importer ☐		
If exporter, main markets:		
If importer, national origin of main imports:		
In Greece, main geographical Markets: Nation wide		
Short company history/researcher notes: Sym AGRO is a private consulting company founded by two agronomist who plays an active role on the promotion of alternative (Hyppofaes, Godji berry, Blueberries etc.) and traditional (nuts, almond etc.) fruit crops. In addition they hold a nursery which provides the necessary propagation material. Mr. Kassandros Gatsios is the author of three educational materials for Hyppofaes, aronia and godji berry and has given a numerous lectures for alternative fruit crops in Greece. Lately they have started to promote contracted agriculture for these crops and tried to trade them.		
Insert photos		