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SECTORAL STUDY

Organic products in Greece

Coordinator: Bilalis Dimitrios
Researchers: Drontza Chrisoula, Konstantas Aristidis, Stavropoulou Areti, Tabaxi Ioanna, Travlos Ilias

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Final Report

Sectoral Study 9 Organic products in Greece

Athens, December 2015

Sectoral Study 9 Organic products in Greece

Scientific Supervisor: *Bilalis Dimitrios (Associate Professor – Agricultural University of Athens)*

Scientific Team: *Drontza Chrisoula (MsC Agronomist – Agricultural University of Athens)*
Konstantas Aristidis (PhD Agronomist – Agricultural University of Athens)
Stavropoulou Areti (Agronomist)
Tabaxi Ioanna (MsC Agronomist / PhD student – Agricultural University of Athens) Travlos Ilias (Lecturer Agricultural University of Athens)

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INTRODUCTION

Globally, the growing food needs and the expanded volume of food consumption lead in some cases to "thoughtless" intensification of production methods. At the same time, the great use of fertilizers and chemical components worsened the quality of food and contributed to environmental damage. The increasing industrialization of the global food market, coupled with the occasional "food scandals" have resulted in serving consumers shift to a more natural diet.

Organic Agriculture (OA) entrepreneurship expands in many areas of agriculture, but not all of them seem to have a viable future. According to the answers of the OA stakeholders, who were interviewed during the writing of this study, the areas of OA that young entrepreneurs should focus are the following (extended presentation is presented at the following chapters of this study):

1) *Organic crops*

2) *Hydroponic Float systems*

3) *Biodynamic Organic Agriculture*

4) *Bio-cosmetics*

5) *Agro-eco Organic Agriculture tourism*

6) *e-commerce*

7) *e-Learning*

Organic Agriculture Introduction

Organic Agriculture (OA) is a widely recognized agriculture production method, expressed legally by the EU and used by numerous manufacturers as a marketing tool more than as an ideology itself. Net ideologues producers logically will not cultivate any conventional and would react to existing marketing mechanisms, aiming at a decentralized distribution system and a closer relationship between producer and consumer.

High rates of increase in sales of organic products and the entrance of the prevailing business, government and consumers in OA, are the driving force behind the creation of improved protocols to support the social values of the local production, family farming and external collaborators of OA (Browne *et al.*, 2000; DeLind, 2000; Anon, 2001; Lotter, 2003)

The recent use of EU policies in order to develop more environmentally sensitive agriculture methods and the importance of reducing the surplus, has led to a fairly widespread interest in OA in both international and national level (Van Diepeningen et al., 2006). Moreover, the recent focus on expanding organic industry and world trade of organic products has been questioned about the risk to which lays down the basic values, but also the possibility of promoting sustainability

and social justice (Duesing, 1995; Le Noallec, 1999; DeLind, 2000; Klonsky, 2000; Norberg-Hodge, 2000; Lotter, 2003).

Background

Table 1 presents a brief summary of OA history and description of the most important OA facts.

Table 1: Brief presentation of OA history and description of the most important OA facts.

Year	Description of the most important OA facts
1924	Lectures of Rudolf Steiner for OA. Establishment of «*demeter biodynamic label*».
1940	Sir Albert Howard publishes the book «*An Agricultural Testament*».
1942	Development of OA ideology and rules. J.I. Rodale publishes the first issue of «*Organic Farming and Gardening*» magazine.
1943	Lady Eve Balfour publishes the «*The Living Soil*».
1946	The Soil Association is created in England.
1967	The Soil Association issues its first organic standard.
1972	Establishment of IFOAM and development of the standards.
1974	Development of private certifications.
1979	Enactment of the first law on organic products in California.
1980	Publication of basic standards of IFOAM, while the market increases rapidly.
1985	France adopts legislation.
1990	Enactment of the law on organic production in America.
1991	Adoption of the European legislation 2092/91. Professionalisation certification
1992	Establishment of Certification Program of IFOAM. Development of international trade.
1999	Adoption of the Codex Alimentarius guidelines. Adoption of EU Regulation concerning organic livestock production.
2000	Publication of Japanese Version of the organic Regulation. Publication of American national standard for organic products.
2007	Creation of a new OA standard (834/2007).

2009	Application of the standard 834/2007.

Definitions

Worldwide definitions of OA are similar and focus on ecological principles as a basis for the production of crops and animals. According to the National Board of organic standards, the OA is "*an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony*" (ATTRA, 1995). Accordingly, the definition given by the IFOAM (2004) for the OA is the following: "*Organic agriculture is a holistic production management system that promotes and enhances health agro-ecosystems, including biodiversity, biological cycles, and soil biological activity*".

In Greece, as in Switzerland and Austria, the OA term was established. This term refers to areas where agricultural production is ensured through the utilization and increase of the biological properties and processes, as well as abiotic energy, while manipulations with chemical-synthetic pesticides, regulators development and interventions in soil and plants soluble chemicals and nitrogen fertilizers are prohibited. So, OA is the gentle and environmentally friendly agriculture, implemented without the use of chemical pesticides and fertilizers, GMOs, hormones, antibiotics and preservatives in plants, animals and processed products (http://www.qways.gr).

According to international organizations and bodies, the term *organic* is also a certification form indicating the products that have been produced in accordance with the organic standards throughout production, management, processing and marketing (FAO, 2000). The terms "*Organic Agriculture*" and "*Nature Growing*" (*nature farming*) are equivalent to the OA in Europe and Japan. The OA definitions increasingly include social and ethical issues, such as good agricultural practice, family farms and the ethics of animal sustainability (animal ethics) (IFOAM, 2001).
The increasing attention given to moral-ethical animal production (Fölsch & Hörning, 1996; Kiley-Worthington, 1996; Hovi & Trujillo, 2000) has affected the development of livestock standards in OA (Lotter, 2003).

Accordingly, Keller (1997) and Köpke (1994) point out that the term OA refers to the organizational system and organization of agricultural objectives, operating as an organization. Therefore, OA is mostly identical with the mixed type of organic farm, where the crop plant is in a balanced relationship with the number of animals held (Köpke, 1995). These are precisely the farms which provide potential for a high degree of intensification and consists the farms that consumers are willing to find at OA.

General principles

Today the progress and development of OA is based on certain key principles which define the vision, positions and rules of the organic movement worldwide. These are the principles of health, ecology, fairness and precautionary.

Principle of Health: OA has to maintain and improve the health of soil, plants, animals, people and the planet, considering them as an indivisible whole.

Principle of Ecology: OA must be based on natural cycles and living ecological systems, agree with them, to mimic and help to maintain.
Principle of Equality: OA should be structured on relations which guarantee equality before the common environment and life opportunities. Precautionary principle: OA should be exercised with prudence and responsibility to protect the environment and ensure the health and welfare of current and future generations.

More specifically, the basic principles of OA are (http://www.bioagro.gr):

- Protection of the environment.
- Maintenance of soil fertility.
- Respect of consumers. health.
- Conservation of ecosystem's biodiversity.
- Recycling of materials, as far as possible.
- Addressing agricultural units as systems in balance.
- Maintenance of organically produced plant and animal products at all stages, from production to the market, in harmony with the laws of nature.
- Quality over quantity.
- The use of new technologies in OA for livestock production, in accordance with the requirements of each kind.

Characteristics

OA is a holistic mode of production, which in addition to producing high quality products, aims at the maintenance of soil fertility, natural resources, purity of water and biodiversity. The art of organic farming aims at better use of ecological principles and processes (IFOAM, 2004).

OA may also provide solutions to other environmental problems, by promoting the reduction of erosion and runoff and reduce soil salinity and water (Conacher & Conacher, 1998; Hansen *et al.*, 2001).

Objectives

The main objectives of OA, as proposed and developed by the various organizations, are:

- Organization of courtyard and room standards of a living organism.
- An operational cycle with the least possible consumption of non-renewable energy reserves and raw materials.
- Responsible utilization and coordinated promotion of fundamental natural lifestyles and conscious avoidance of environmental pollution.

- Implementation of a multidimensional production faceted operational structure that includes different species of plants and animals without excessive specialization in the exploitation phase.
- Over time, increased physical ability of soil fertility.
- Promotion of already acclaimed varieties, aiming resistance to pathogenic diseases. " Food Production for a complete diet in sufficient quantities and reasonable prices.
- Creating stability conditions on the basis of adequate living standards and income for the producer.
- No chemical-synthetic fertilizers, pesticides, protective and post-harvest preparations, hormones and growth promoters are allowed.
- Organizing of local markets for organic products consumers.

SWOT analysis

At the following table (Table 2) we can see a brief SWOT analysis of OA.

Table 2: OA SWOT analysis.

Strengths	Weaknesses
• The pesticide residues problem is minimized. • There is improved soil structure. • Less residues and waste use. • Minimize the pollution of groundwater with nitrates.	• Organic fertilizers should be incorporated into the soil. • The decomposition of organic matter is gradual, which is not the best solution for plant growth. • The labor input is much higher.

• Large range of available crops for organic cultivation. • Easy acceptance of innovation. • It targets mainly young people (farmers, entrepreneurs etc.) • Well developed control and certification system • Very good soil and climatic conditions of the country, promote development of organic farming. • The high nutritional value of organic foods. • The placing on the market of organic products certified under international standards. • The consumption of organic products from "conscious" consumers, aware of their value, which remain stable in their preferences. • The important role of agro-food sector in the economy and the existence of considerable capacity in manufacturing, which can be used for organic production.	• Manure can contaminate water. • Reduced productivity per unit of land. • Lack of education. • Lack of innovation transfer system. • Low processing levels. • The lack of protein feed limits the growth of the livestock sector. • Lack of a national plan and constant changes of the tax system and of the National legislation. • Lack of organized trade network. • Lack of recording of the industry by an national export agencies etc. (statistics). • Insufficient awareness of consumers about the methods of production of organic products. • The high cost of production and thus the higher selling price of organic products compared to conventional counterparts. • The high dependence on subsidies and "opportunistic" motivation of many producers. • Lack of know-how for more and more "difficult" organic farming. Insufficient training of most organic farmers. • The weakness of the distribution networks and the inadequate presence of organic products in many retail locations. • The low size of organic production at

	local level, which does not allow the transfer of several products in large urban centers.

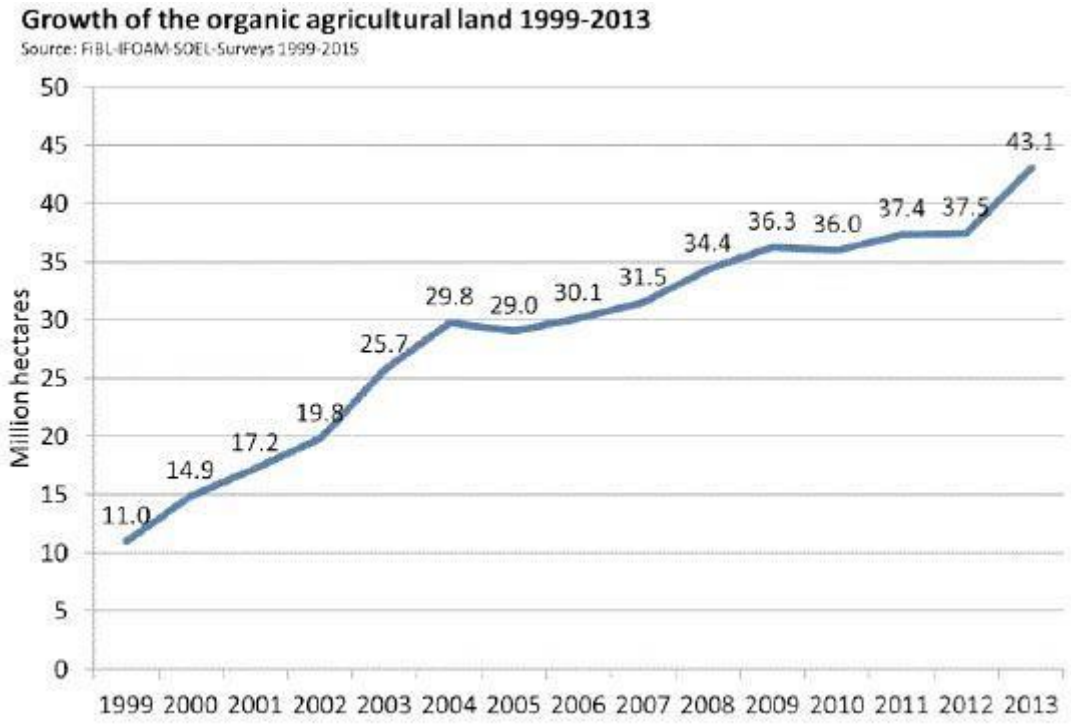
Opportunities	Threats
• OA can increase the income of farmers. • The demand for OA products is constantly increasing. • The avocation with OA open new markets and opportunities such as Biocosmetics, organic agro-eco tourism etc. • New institutional framework (greening, maintenance grants etc) • Greece is considered to be a country for investments because of the cost. • Young organic farmers with high educational level and environmentally friendly behavior. • Increased export demand the last 2 years, especially from countries outside the EU. • The "*systematic*" informing consumers about organic products (advertising, exhibitions etc.) and changing their eating habits. • Increased exports and penetrate new markets. • New types of crops (herbs, pomegranates, herbs	• The higher price of the organic products, in periods of economic pressure of the consumers, can be an inhibited factor for young people and young farmers to involve with OA. • Instability of the political system. • Lack of financing from the banking system. • The prolonged economic recession in the country and the further decrease in consumer income. • Delays in payment of subsidies for organic production. • The liquidity problems in the market due to the economic situation and rising bad debts. • Increased competition for Greek organic food term, from products from low cost third countries.

etc.). • The organization of producers. associations - cooperatives and their cooperation with large manufacturing companies - standardization with extensive distribution networks. • The systematic and "*targeted*" view of "*Greek*" organic products both domestically and abroad. • The business activities of persons from urban areas sensitized to environmental maintenance and protection.	

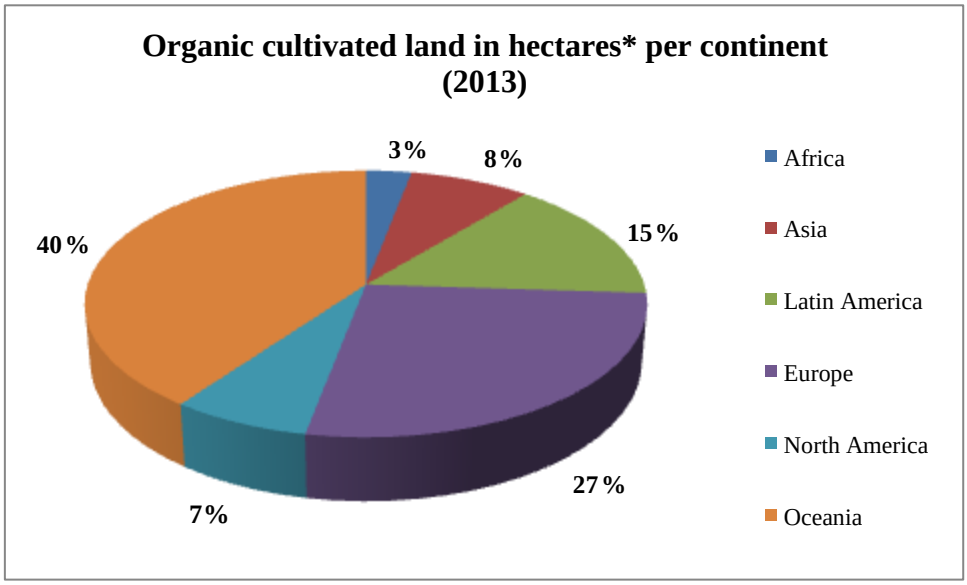
Statistics

International

Interest in OA has significantly increased in the recent years. Based on a survey conducted by FiBL-IFOAM between 1999-2015, the organic cultivated land shows rapid growth worldwide (Graph 1). The continents with the larger percentage of OA cultivated land are Oceania (*40%* of cropland), Europe (*27%* of cropland) and Latin America (*15%* of cropland) (Chart 1), and as for the OA producers Asian is the leader with *36%*, followed by North America (*29%*), Europe (*17%*) and Latin America (*16%*) (Chart 2). Schematic representation of OA land worldwide for 2013 is presented in Figure 1.



Graph 1: Growth of the organic agricultural land (1999-2013).
(*source: FiBL & IFOAM, 2015*)



Including land in transition

Chart 1: Organic cultivated land in hectares per continent (2013).
(*source: FiBL & IFOAM, 2015*)

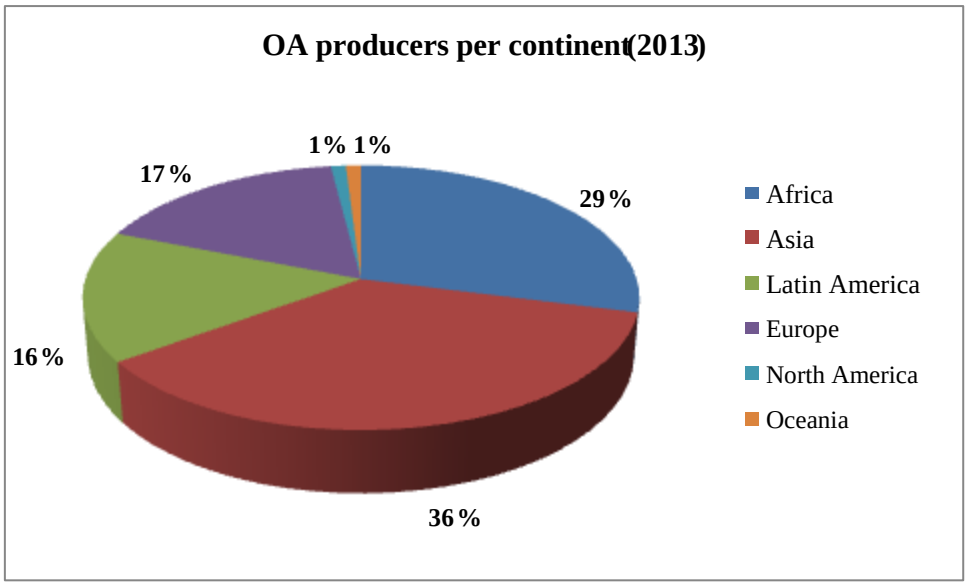


Chart 2: OA producers per continent (2013).
(*source: FiBL & IFOAM, 2015*)

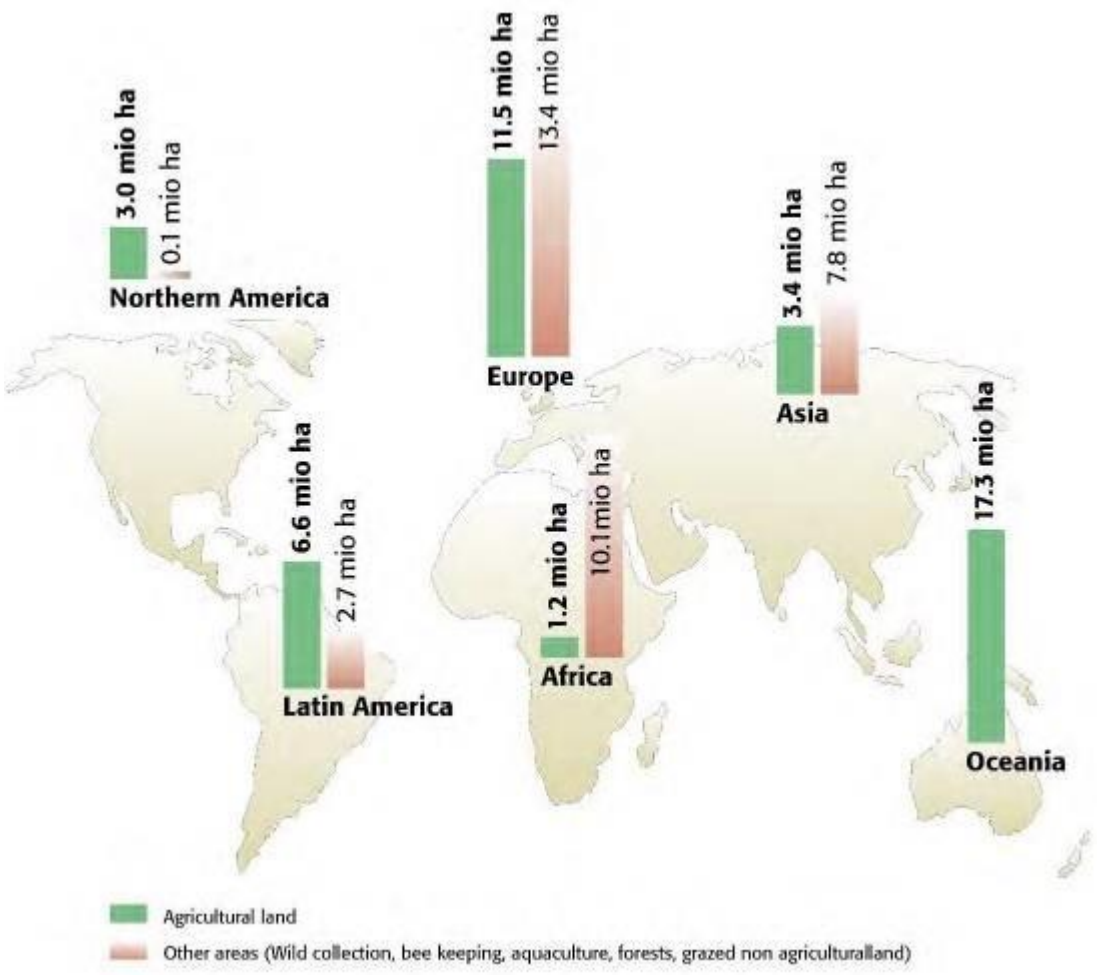


Figure 1: Display of cultivated and organic cultivated land worldwide (2013).
(*source: FiBL & IFOAM, 2015*)

Additionally, at the following table (Table 3) we can see a depiction of the most important indicators of the global OA market.

Table 3: OA Display of the most important indicators of OA global market (2013) (*source: FiBL & IFOAM, 2015*).

INDICATORS	WORLDWIDE (2013)	LEADING COUNTRIES (2013)
OA land	43.1 million ha (2012: 37.5; 2008: 35.2)	Australia (17.2 million ha) Argentina (3.2 million ha) USA (2.2 million ha)
Countries with OA land *>5%* of the total arable land	26 (2012: 27 / 2009: 24)	Falkland islands (*36.3%*) Liechtenstein (*31%*) Austria (*19.5%*)
OA producers	2.0 million (2012:1.9; 2009: 1.8)	India (650.000) Uganda (189.610) Mexico (169.703)
OA market size	72 billion $ (2009: 54.9; 1999: 15.2)	USA (24.3 billion $) Germany (7.6 billion $) France (4.4 billion $)
Per capita consumption	2013: 10.05 $	Switzerland (210 €) Denmark (163 €) Luxembourg (157 €)
Countries under OA rules	82 (2012: 84; 2008: 74)	-
OA certification bodies	523 (2008: 489)	Japan (59) USA (57) South Korea (33)

National

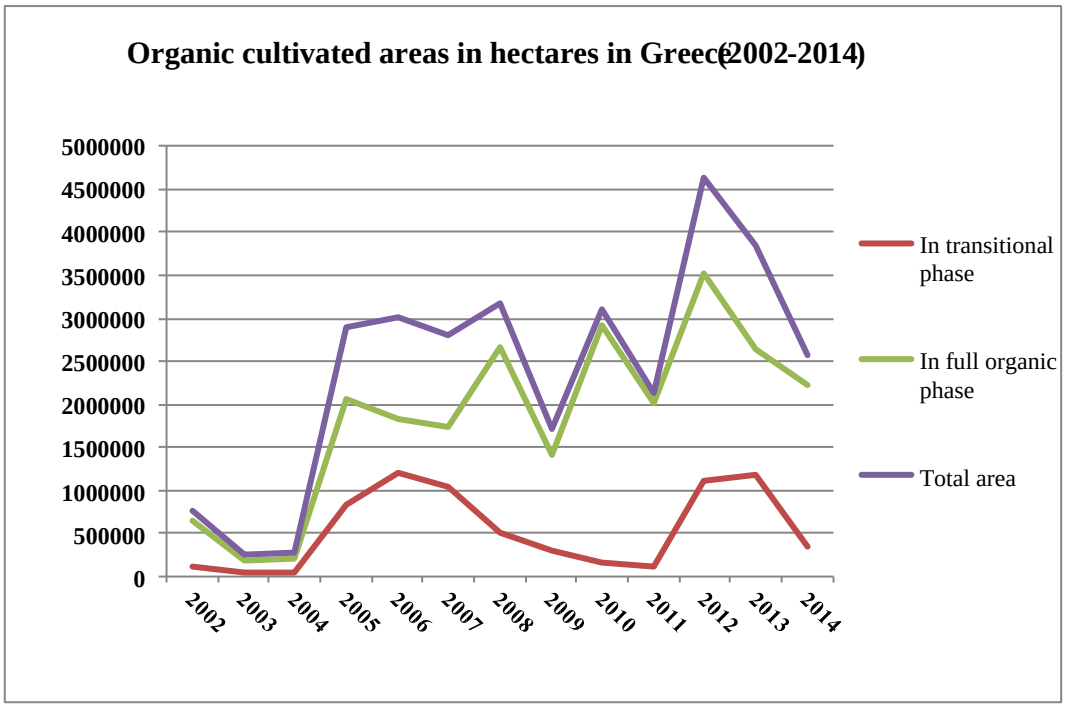
The increasing Organic land in our country is due to many factors. The most important factors are:

- Strengthen organic farmers according to Reg. 2078/92.
- Increase of the domestic demand for organic products.
- Improve of the relation between organic farmers and government services.
- Encourage of organic farming by the Ministry of Agriculture.
- Increasing fears of consumers of food contaminated with pesticides.
- Increasing consumer interest in the environment and linking organic agriculture with the environment.

- Application by the ministry and the EU programs for extensive farming in order to reduce overproduction.

In worldwide scale Greece is at the 23rd place concerning the total OA land and at the 26th place concerning the shares of OA land. (FiBL&IFOAM, 2015)

Based on the info from Graph 2, we can see a constant increase of the organic cultivated land until 2013 and 2014 when, due to economic crisis, we had a decrease. The total OA area of Greece (arable and pastures) amounts to 256.131 ha. The 221.916 ha (*86.64%*) are on organic stage and 34.216 (*13.36%*) in transition. The year 2014 compared to 2013 we had a total reduction of organic land by 127.475 ha (*33.23%*) and more specifically from 383.607 to 256.132 ha.

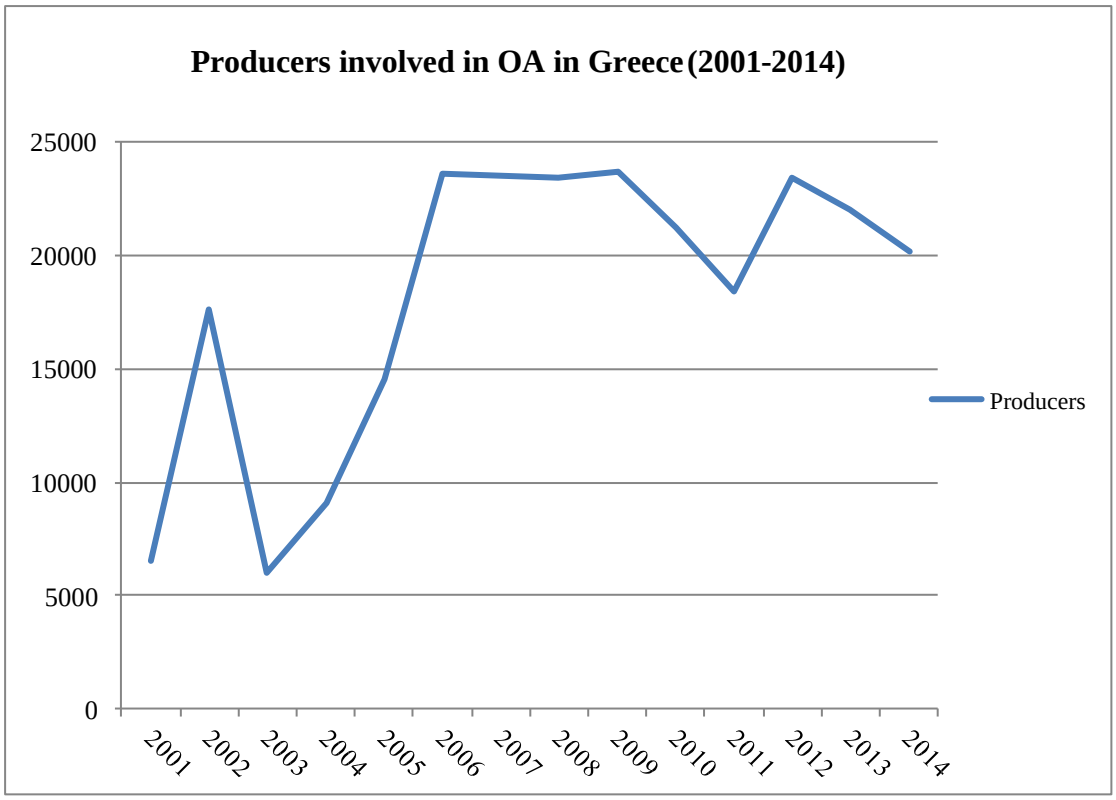


Graph 2: Organic cultivated areas in hectares in Greece (2002-2014). (*source*: *http://www.minagric.gr*)

Based on the data from the Ministry of Agriculture (http://www.minagric.gr) in OA:

- All registered business operators are 21.828, distributed as follows: 20.186 producers, 1.635 processors and 7 importers.
- Producers amounted to *92.48%*, to all operators active in OA.
- In 2014, in comparison with 2013, we have a total reduction of entrepreneurs of *7.29%*.

According to Graph 3 we can see a large increase from 2001 to 2014 of the number of OA producers, with a decline at the start of the period when the Greek financial crisis begun (2009-2011). Meanwhile, the OA processors during the same period presented a constant increase (Graph 4).



Graph 3: Producers involved in OA in Greece (2001-2014). (*source:* http://www.minagric.gr)

Graph 4: Processors involved in OA in Greece (2001-2014). (*source:* http://www.minagric.gr)

In OA 21.828 productive and commercial enterprises are active, while the organic surfaces (croplands, pastures, fallow land) are about 256.132 ha. Compared to 2013, we have a small decrease in the number of entrepreneurs by 1.715 (*7.28%*), as opposed to the organic land, where there is a sizable reduction of 127.475 ha (*33.23%*).

Very interesting are also the percentages of OA Greek cultivations per plant species, as presented inChart 3, which marks the market niches, where young people (farmers, unemployed etc.) can target in order to produce innovating organic products based on plants or crops which most farmers are not familiar with.

More specifically, the allocation of OA arable land, the crop group consisting cereals, fodder production, industrial plants, oil fruits, fiber, aromatic plants and herbs etc., covers an area of 82.317 ha (*57.50%*). Following are permanent crops, such as fruit, citrus, vines, olives, which cover 59.301 ha (*41.43%*), while vegetables cover 1.535 ha (*1.07%*).

OA cultivations, for the year 2014, and their respective percentage on the total of organic farming in Greece, in descending order are the following (Chart 3):

- Oilve trees cover 47.058 ha and with a percentage of *32.87%*.
- Cereals (wheat, barley, oats, maize etc.) together with rice cover 45.100 ha and with a percentage of *31.5%*.
- Fodder plants (annual, perennials, pastures) cover 32.593 ha and with a percentage of *22.77%*.
- Industrial plants cover 4.290 ha and with a percentage of *3%*.
- Vine cultivation cover 4.387 ha and with a percentage of *3.06%*.
- The rest of the crop plants cover 4.688 ha and with a percentage of *3.27%*.
- Fresh vegetables, melons, strawberries etc. cover 1.392 ha and with a percentage of *0.97%*.
- Citrus fruits cover 1.241 ha and with a percentage of *0.87%*.
- Subtropical plants cover 675 ha and with a percentage of *0.47%.*
- Stone and fleshy crops cover 633 ha and with a percentage of *0.44%*.
- Nuts cover 387 ha and with a percentage of *0.27%*.
- Other arable land crops cover 334 ha and with a percentage of *0.23%*.
- Root crops cover 232 ha and with a percentage of *0.16%*.
- Berry crops cover 123 ha and with a percentage of *0.09%*.
- Other permanent crops cover 20 ha and with a percentage of *0.01%*.

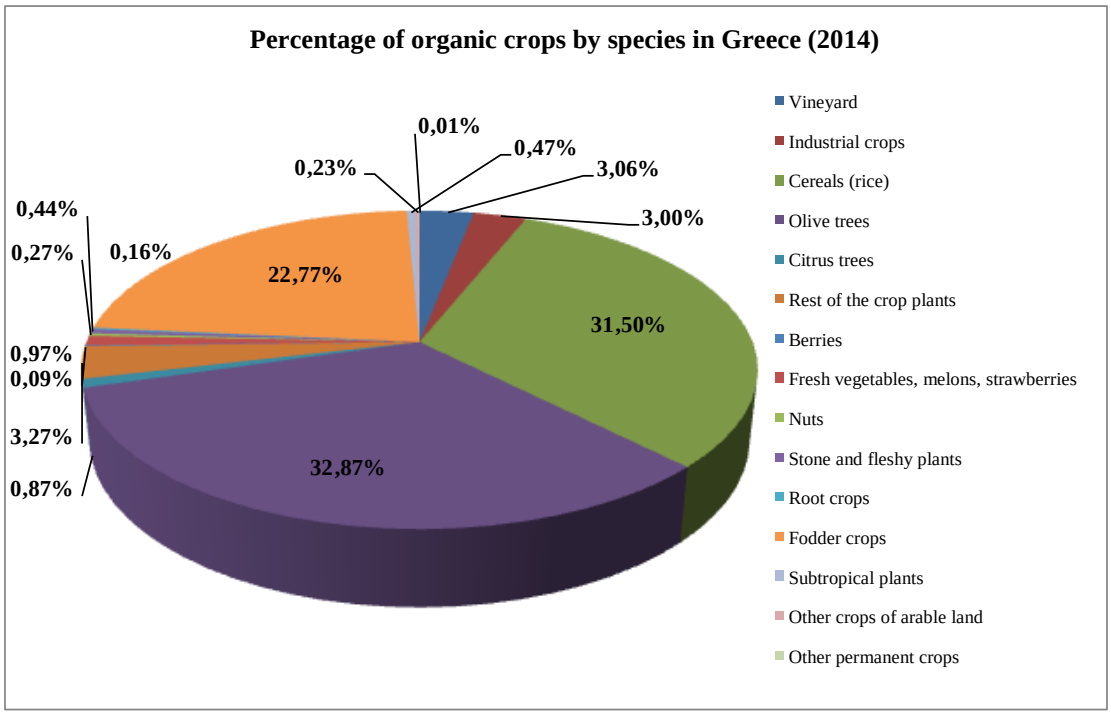


Chart 3: Percentage of organic crops by species in Greece (2014).
(*source*: *http://www.minagric.gr*)

Legal Framework

In detail the legal framework of OA (Table 4) in Europe is based on the following regulations, which are listed in chronological order (Bilalis, 2009):

Table 4: OA legal framework.

Reg. (EC) No. 354	*Reg. (EC) No. 590/2011(corrective)*	*Reg. (EC) No. 889/2008*
Circular No. 1973/138399/12.11.13	*Reg. (EC) No. 426/2011*	*Reg. (EC) No. 834/2007*
Reg. (EC) No. 519/2013	*Reg. (EC) No. 590/2011*	*Reg. (EC) No. 394/2007*
Reg. (EC) No. 392/2013	*Reg. (EC) No. 344/2011*	*CMD No. 245090/2006 (FEK 157/B./2006).*
Reg. (EC) No. 203/2012	*Reg. (EC) No. 426/2011*	*Reg. (EC) No. 852/2004*
Reg. (EC) No. 751/2012	*Reg. (EC) No. 471/2010*	*Reg. (EC) No. 853/2004*
Reg. (EC) No. 508/2012	*Reg. (EC) No. 271/2010 (corrective)*	*Reg. (EC) No. 854/2004*
Reg. (EC) No. 505/2012	*Reg. (EC) No. 271/2010*	*Reg. (EC) No. 1452/03*
Reg. (EC) No. 203/2012	*Reg. (EC) No. 537/2009*	*Reg. (EC) No. 223/2003*
Reg. (EC) No. 126/2012	*Reg. (EC) No. 710/2009.*	*Reg. (EEC) No. 2092/91*

Reg. (EC) No. 1084/2011	*Reg. (EC) No. 1235/2008*	
Reg. (EC) No. 1267/2011	*Reg. (EC) No. 967/2008*	

Standards

The standards which apply to OA, are divided into the following categories, depending on the country there are valid.

- *International standards*
  - IFOAM standards
- *National standards*
  - Regulation EU 834/2007 (replacing 2092/91): applies to OA products which are produced or imported to EU.
  - USDA (National Organic Program): applies to OA products which are produced or imported to USA.
  - JAS: applies to OA products which are produced or imported to Japan.
  - COQ (Canadian Organic Growers): applies to OA products which are produced or imported to Canada.
- *Private standards*
  - Biosuisse (Switzerland)
  - Naturland (Germany)
  - Soil Association (UK)
  - KRAV (Sweden) " Bio Austria (Austria)

Certification Bodies

International

At the major European countries, the following OA certification bodies are active:

- AIAB (Italy)
- ICEA (Italy)
- SOIL ASSOCIATION (UK)
- ECOCERT (France)
- BDIH (Germany)
- Demeter International (Biodynamic Sector)

National

In Greece, the following OA certification bodies (Table 5) are active

(http://www.esyd.gr):

Table 5: National OA certification bodies.

BioHellas	DIO	QMSCERT
TÜV HELLAS	A-CERT	Fysiologiki
Geotechnical Laboratory	IRIS	ALBINSPEKT CENTER
COSMOCERT	EUROCERT	Q-CHECK
TÜV AUSTRIA HELLAS	Thomas Misailidis OE.	Parianos Polydoros – Sougioultzis Charilaos OE

OA market

The OA is still a small part of the global agricultural market, but as the demand for organic products is increasing, so does the OA market grows. This niche market is the opportunity for young people, without excluding the older ones, with their enthusiasm and fresh ideas to get involved to an area which constantly grows and has many different pathways.

The sector of organic products in Greece consists mainly of small companies (production, manufacturing and import), and especially family ones. Over the years they entered the industry large companies as well, most of which are mainly engaged in conventional products. The production and distribution of organic products, by these companies still covers a small percentage of their total sales.

As mentioned, the bulk of Greek organic products and especially fresh fruits, vegetables and olive oil, are absorbed by foreign markets. Consequently, the Greek companies face fierce competition from other European countries that have strong brands, possessing considerable market shares. Particularly intense is the competition from the Mediterranean countries, which produce similar quality products with Greek and marketed in several competitive prices.

Stakeholder analysis

In OA we have a variety of stakeholders involved, who can be summarized at the following:

Supply chain (National, Regional and Local Levels)

- Primary producers (individuals – collective)
- Processors
- Input providers
- Equipment providers
- Wholesalers
- Retailers
- Banking

- Consultants
- Advisory
- Public services
- Ministries

Demand (National, Regional and Local Levels)

- Consumers/Users
- Hotels
- Restaurants
- NGOs

Regulation (National, Regional and Local Levels)

- Agricultural authorities
- Food Safety Authorities
- Environmental Authorities
- Labour, social security etc.
- Certification bodies

The importance and the influence of its stakeholder is presented at the following Stakeholder Matrix (Table 6).

Table 6: Stakeholder Matrix.

		Importance of stakeholder			
		Unknown	Little / No importance	Some importance	Significant importance
Influence of Stakeholder	Significant influence	-	-	• Processors • Wholesalers • Retailers	• Primary producers • Banking • Consumers/Users • Food Safety Authorities • Certification bodies • Environmental Authorities • Labour, social security etc.
	Some influence	-	" Ministries	• Advisory • Agricultural authorities	" Consultants

	Little / No influence	-	• Hotels • Restaurants	• Input providers • Equipment • Public services • Providers	-
	Unknown	" NGOs	-	-	-

OA market statistics

International

The countries with the largest market for organic food are the United States (24.3 billion €), followed by Germany (7.6 billion €), France (4.4 billion €) and China (2.4 billion €). The largest single market is the United States followed by the European Union (22.2 billion €) and China. By region, North America has the lead (26.7 million €), followed by Europe (24.3 million €) and Asia (Figure 2). Market growth was noted in all countries and in some cases double digit; e.g. in the United States, the market grew by *11%* or in Switzerland, by *12%*. (FiBL&IFOAM, 2015).

Figure 2: Global OA market: Distribution of retail sales value by country and by single markets (2013). (*source: FiBL & IFOAM, 2015*)

The higher per capita consumption appears in Europe: In 2013, Switzerland had the highest per capita consumption (210 €) worldwide, followed by Denmark (163 €), and Luxembourg (157 €) (Figure 3).

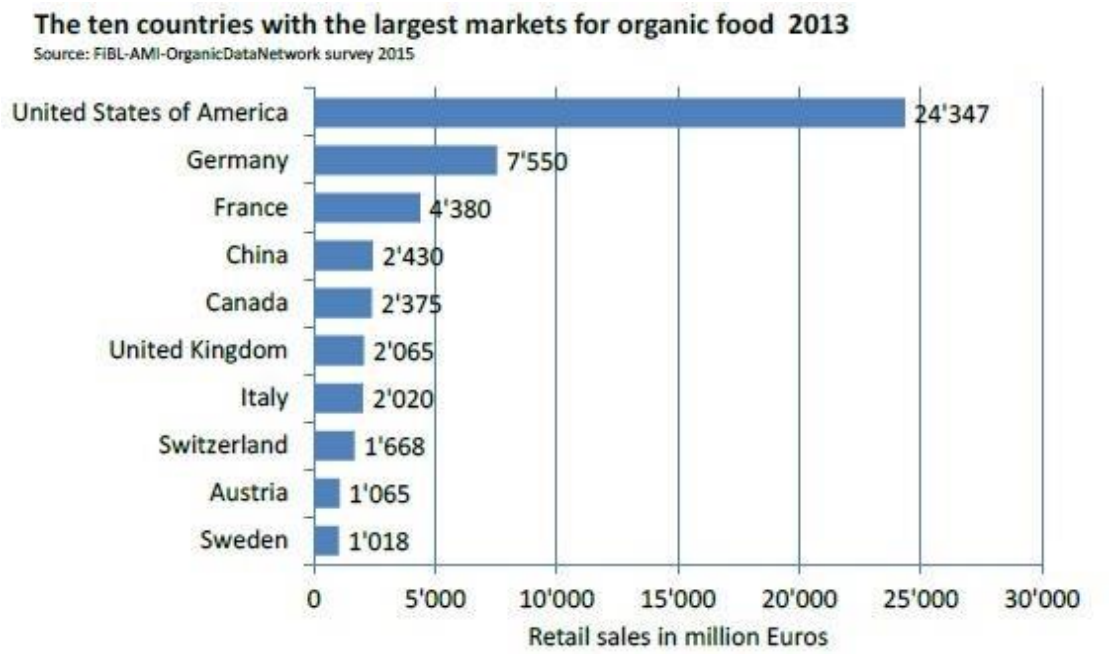


Figure 3: The ten countries with the largest markets for organic food (2013).
(*source: FiBL & IFOAM, 2015*)

All the aforementioned statistics present a constant increase to both total OA market sales value and per capita consumption of OA products, especially in Europe. This phenomenon can easily attract the interest of young unemployed people, young farmers and other vulnerable social groups and get involved with OA.

National

General (demand)

Demand for organic products is directly related to the concern of consumers about their health, together with food safety, an element which is affected by the different "*food scandals*" that occasionally are made public. (ICAP, 2014)

The price of products together with the available consumers' income, affects the demand for organic products. In general, the demand for organic food shows greater elasticity than that of conventional food. The fact that organic products are sold weighted average from *20%* to *50%* more expensive than their conventional counterparts (depending on product), is an inhibiting factor for the purchase by the general public, given the economic recession affecting the country. (ICAP, 2014)

Important factors for the development of demand are the information of the public about the benefits of eating organic food, and the greater presence of the latter in the various retail locations. (ICAP, 2014)

Also, there are subjective factors (emotional or ideological) that influence the demand. The need of some of the consumers for consumption of organic products comes from their conviction that they are beneficial for their health and more secure than conventional. The environmental concerns are also an important factor, since the organic mode of production is considered environmentally friendly and respects all life. The available income, the educational level, the age,

the marital status etc., also affect the demand for organic products, but as shown by various researches their role does not seem to be decisive. In our country, it is estimated that due to the reduced disposable income and substantially higher prices for organic products, there is greater demand elasticity in relation to price, not only to conventional, but also in organic compared to other European countries. (ICAP, 2014)

General (offer)

From research conducted in Greece and abroad, the decision of producers for engaging with OA affected by their educational and informational level, their environmental awareness and the level of subsidies. In economic terms the main motivations seem to be the highest profitability and the opportunity to easily sell their production. Also, important role seems to have their concern about their health (due to the use of pesticides and other chemicals) or their dissatisfaction by the poor performance of inputs (fertilizers, pesticides, etc.) compared to their costs. (ICAP, 2014)

Although the sector of organic products in Greece is developed in recent years, at present the overall picture that emerges is that of a relatively small sector in terms of number and size of the companies operating, with a low concentration and high dispersion units. (ICAP, 2014)

Specifically, the sector consists mainly of small size and family character companies (production, manufacturing and import). Most of these units have the legal form of personal enterprise or limited / general partnership, and the annual turnover of each formed at relatively low levels. (ICAP, 2014)

The majority of OA businesses are export oriented, although in recent years, the proportion occupied by exports in the total sales is reduced in favor of the domestic market.
Despite the relatively easy entry of a company in the field of organic farming, the sector of processing of organic products is capital intensive thus requires investment in facilities and sales networks. In particular, the distribution network configuration costs and acquisition of machinery and equipment required for the standardization of products, limits the possibilities of strategic moves of most small businesses. (ICAP, 2014)

The following chart (Chart 4) presents the distribution channels of organic products in Greece for 2013 the supermarket chains as distribution channel, estimated that collectively account *for 55%* of sales in the sector and is projected to strengthen further as more chains each year extend to trade in organic foods in their stores making "organic corners". Organic farmers' markets and other outlets (eg. cellars) cover about *32,5%* and specialized organic food shops the remaining *12,5%*. Apart from these a small percentage is covered by organic e-shops, which is rising from year to year. (ICAP, 2014)

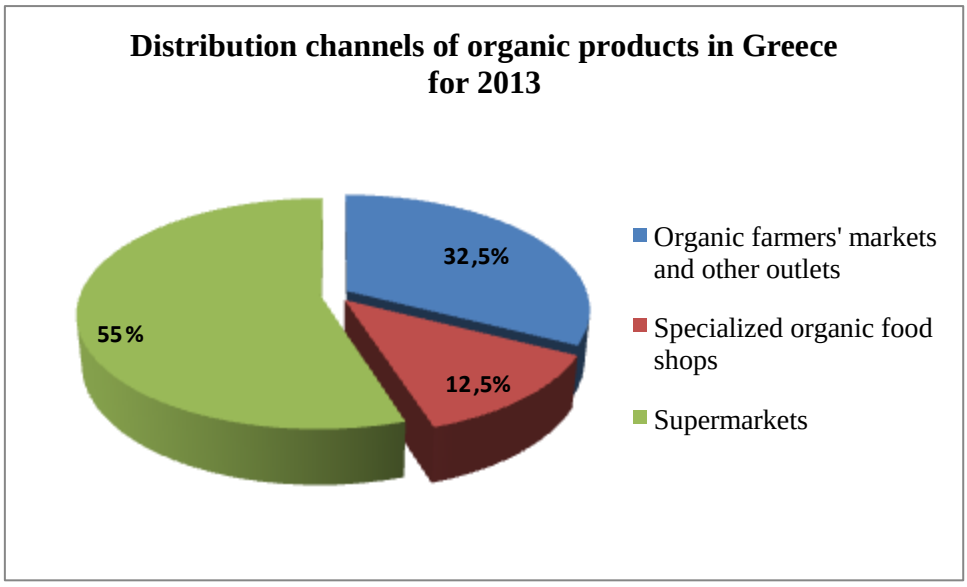


Chart 4: Distribution channels of organic products in Greece for 2013. (*source: ICAP, 2014*)

The profit margins of organic processors differ depending on the product, with the organic wine profit to be larger in relation to other species. Generally, their profit margins are higher than those of conventional processors, which consist of one of the main motivations of a producer to turn to organic cultivation.

Enterprises/Companies

In terms of institutional framework, "barrier" at the entrance of new companies, both in the field of OA and in the processing of organic food is the certification, which should be executed by organic certification bodies, after examining the relevant standards. (ICAP, 2014)

On the other hand, the establishment and consolidation of the reputation and name of companies involved in the processing of organic food is currently limited, as the market is fragmented, thereby is not difficult for new companies to enter the industry. Certainly, the penetration of products in a large number of sailing points and the development of an appropriate distribution network, is an important competitive advantage, which, due to cost, restricts the abilities of small companies. (ICAP, 2014)

Compared to the agrifood sector, which includes the production and marketing of organic products, the situation is better as the performance indicators move to higher levels and observed smaller sales decline in 2011 (Table 7).

Table 7: Performance indicators of production of organic products vs agro food sector. (*source: ICAP, 2014*)

	Sales variation	Return on equity	Gross profit margin (before income tax)	Gross profit margin (before income tax and interest)

	2010	2011	2010	2011	2010	2011	2010	2011
Production of organic products	3,9%	-3,1%	1,6%	0,8%	24,2%	22,5%	3,8%	2,0%
Agro food sector	2,1%	-8,3%	-4,0%	-3,4%	25,4%	23,2%	0,4%	0,8%

	Cover of financing needs		Relation foreign capital to equity		Overall liquidity		Direct liquidity	
	2010	2011	2010	2011	2010	2011	2010	2011
Production of organic products	1,19	0,47	1,73	1,78	1,40	1,38	0,92	0,92
Agro food sector	0,16	0,35	1,91	1,93	1,05	1,01	0,82	0,80

Prospects

The conditions for the development of OA in Greece is positive, since in addition to favorable climatic and soil conditions in several regions of the country and the growing international demand, there is a strong interest in entrepreneurial activity in the industry, not only by farmers but also by residents of urban areas sensitized on environmental issues. (ICAP, 2014)

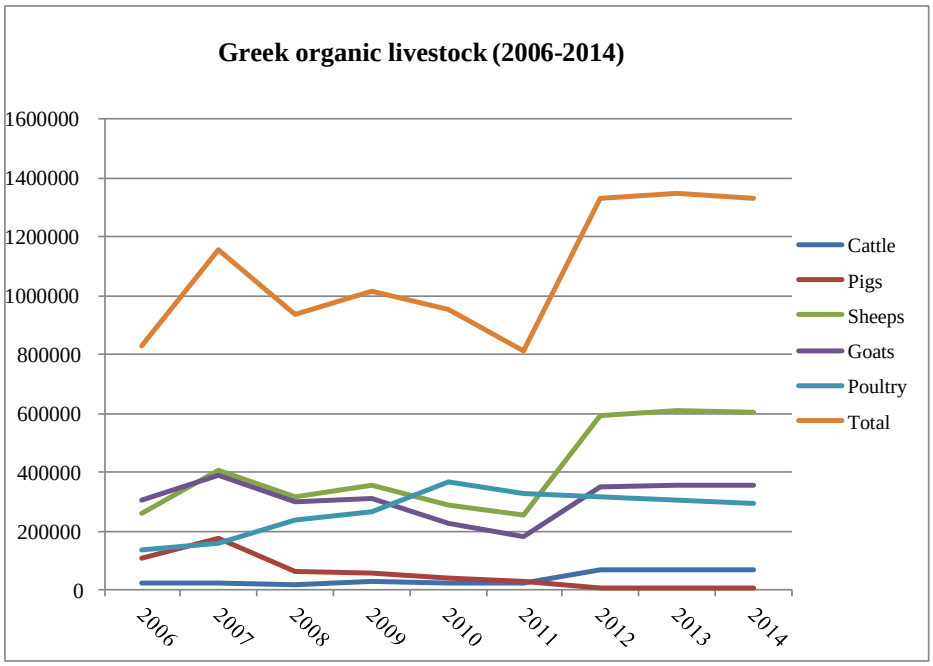
The prospects of the Greek market, despite the ongoing economic crisis remain positive while the development of the international market continues at a high pace indeed. Other positive elements for the development of the industry are the increasing attractiveness of organic products due to food scandals and sensitivity shown by consumers in health issues. In addition, there is an increasing demand from Greek consumers for OA products, especially in 2015 despite the economic crisis and decrease in 2013 and 2014, and also from international consumers and particularly from countries outside EU, where the Greek OA products receive better acceptance, because of their high quality, low prices, their consideration as tourist products and their combination with the overall tourism promotion. (ICAP, 2014)

Synergies with other sectors

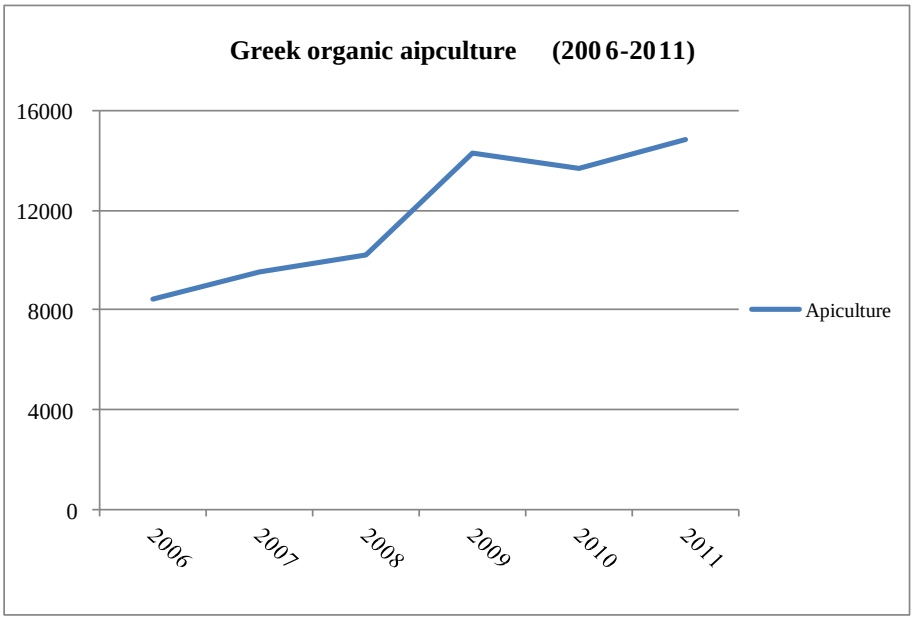
OA, based on the consumers' (Greek and foreign) demands which mainly concentrate on olive and table olives, wines and fresh vegetables and fruits, extents to the majority of agricultural sectors and can easily cooperate with any of the other agricultural areas mentioned in the project "*The Recharging the Youth Initiative*" of the Stavros Niarchos Foundation (SNF). Organic livestock, organic apiculture, organic vegetables, organic olive oils and table olives, organic vines and organic aquaculture mentioned at the project, already consists some of the most important and

popular areas of OA farmers and entrepreneurs and the synergy with them is built on solid foundations. So we are not talking just for a synergy between OA and the other areas of the project, but a mutual path to the Greek and international markets.

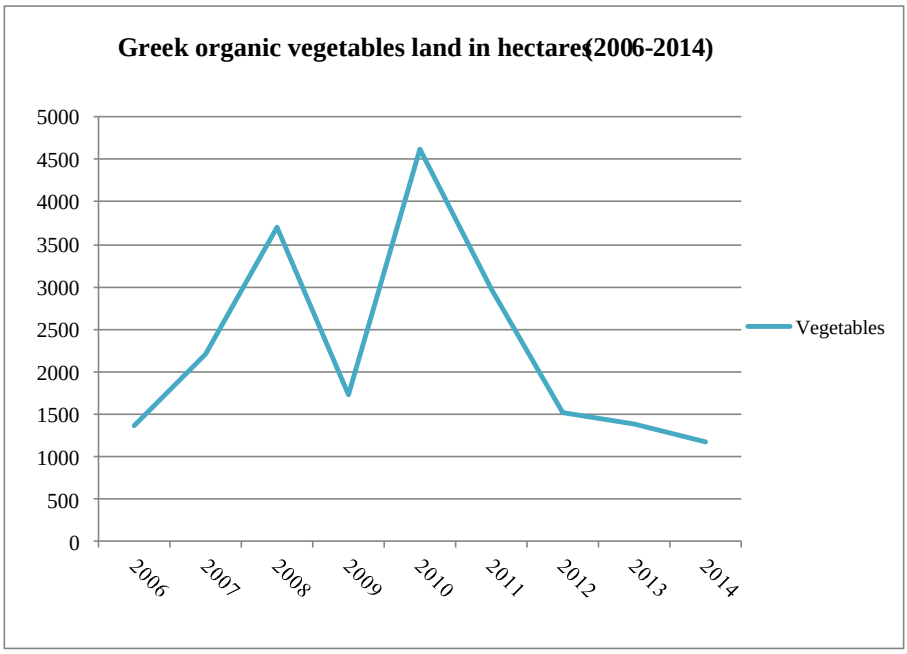
In this context Greek statistics of organic livestock, organic apiculture and organic vegetables are presented at Graph 5, Graph 6 and Graph 7, respectively.



Graph 5: Greek organic livestock (2006-2014). (*source*: *http://www.minagric.gr*)

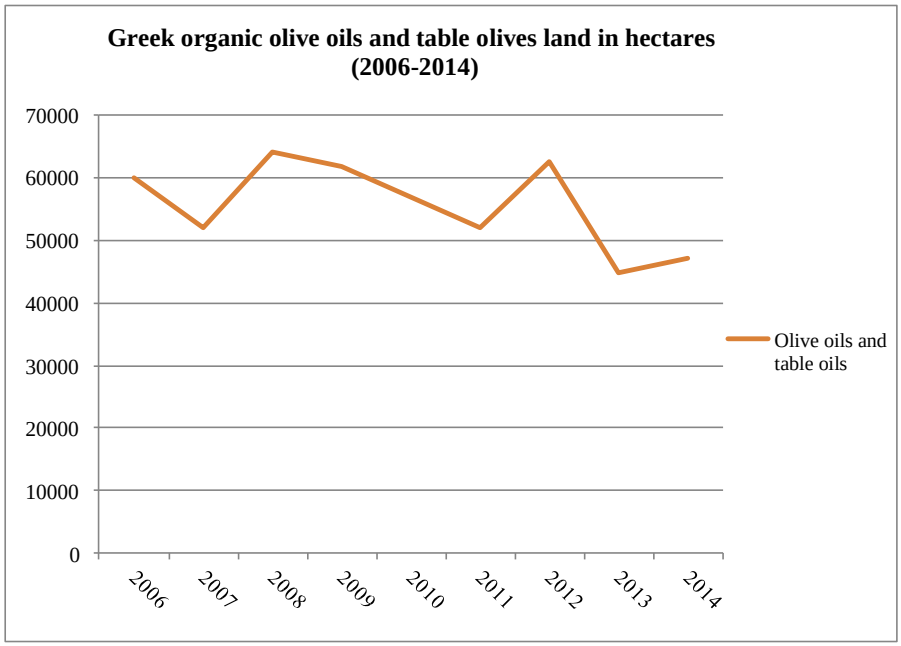


Graph 6: Greek organic apiculture (2006-2011). (*source*: *http://www.minagric.gr*)



Graph 7: Greek organic vegetables land in hectares (2006-2014). (*source*: *http://www.minagric.gr*)

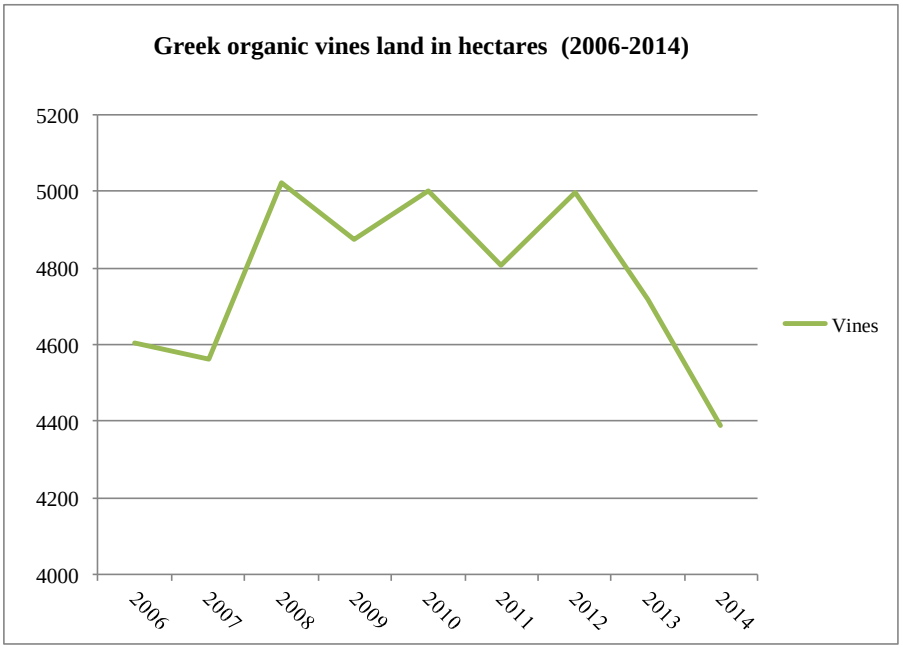
Due to the fact that organic olive oils - table olives and organic vines market share is larger than other organic crops and the demand for such products increases every year, we will have a more detailed presentation of their stats (land, market size and value). (Graph 8 and Graph 9, Table 8 and Table 9)



Graph 8: Greek organic olive oils and table olives land in hectares (2006-2014). (*source*: *http://www.minagric.gr*)

Table 8: Domestic market size and value of organic olive oil and table olives. (ICAP, 2014)

Year	Production (tons)	Exports (tons)	Consumption (tons)	Value (€)
2000	1.350	970	380	-
2001	1.400	1.000	400	-
2002	1.580	1.130	450	-
2003	1.950	1.400	550	-
2004	2.600	1.900	700	-
2005	3.200	2.300	900	-
2006	3.500	2.400	1.100	-
2007	3.800	2.500	1.300	-
2008	4.100	2.600	1.500	-
2009	4.300	2.700	1.600	-
2010	4.450	2.800	1.650	-
2011	4.600	3.000	1.600	4.480.000
2012	4.750	3.250	1.500	4.350.000
2013	4.700	3.250	1.450	4.300.000



Graph 9: Greek organic vines land in hectares (2006-2014). (source: *http://www.minagric.gr*)

Table 9: Domestic market size and value of organic vines. (ICAP, 2014)

Year	Production (tons)	Exports (tons)	Consumption (tons)	Value (€)
2000	690	145	545	-
2001	1.150	250	900	-
2002	1.850	360	1.490	-
2003	2.100	370	1.730	-
2004	3.500	550	2.950	-
2005	3.700	630	3.070	-
2006	4.000	800	3.200	-
2007	4.300	900	3.400	-
2008	4.500	950	3.550	-
2009	4.600	1.000	3.600	-
2010	4.650	1.000	3.650	-
2011	4.550	980	3.570	17.850.000
2012	4.350	950	3.400	15.300.000
2013	4.200	900	3.300	13.200.000

Modern-Innovative Organic Cultivations and Production Systems

OA was always inextricably linked with the innovation. The whole idea of OA was an innovation in its time, when everyone was looking for quantity and not quality and were all using different chemicals without meter or control, in the name of increased productivity.

Based on the above, in this chapter we introduce some modern and innovating cultivations with increased domestic and worldwide demand and high profit margins, which under OA principles can give high quality products. Also, we present some innovating production systems which come in result of OA, as well as innovating areas of OA.

Modern-Innovative Organic Cultivations

Perhaps the greatest challenge of the 21st century is to affordably meet the food nutrient demands of a global population, which is expected to surpass 9.6 billion people at mid-century, and also to sustain quantity and quality of planetary natural resources and biodiversity.

This reality points out the need for urgent attention to technological innovation in the food production sector, in order to improve agricultural and food systems leading to "*greater protein and energy production per unit of resource input*". On this respect, it is worth to try for new crops with promising potential, following the rules of OA, in order to significantly increase the efficiency of food and feed production.

Innovating plants cultivated under OA regulations, rich in protein and nutrients, destined for the enrichment of animal feed with good adaptability to soil and climatic conditions of the country are important and need to be studied and evaluated in a commercial scale, especially because of their unique attributes as well as their increasing demand.

New feed and forage crops

Soybean (Glycine max)

Soybean (*Glycine max*) is one of the most valued oilseed crops in the world. According to the latest data, soybean accounts for 55,25 million tons of oil, placing it ahead of all other field crops raised for oil extraction. Although its cultivation is known for about 5.000 years (first cultivated in China), it came to prominence only during the last 200 years (Picture 1). It has been cultivated for various purposes, during different periods of history and in different parts of the world. Its earlier uses have varied from a green manure crop to a forage crop and a nitrogen-fixing crop due to its ability to fix substantial quantities of atmospheric nitrogen in association with nodule-forming bacteria (Bradyrhizobium).

Picture 1: Immature and mature soybean plants.

Besides its stated purpose as oilseed crop, soybean has several significant beneficial features. Its role in improving soil properties through its deep and proliferated tap-root system, residue incorporation by way of shedding leaves as well as green manuring crop, soil and moisture conservation due to its thick and dense foliage, contribution to soil nitrogen enrichment through biological nitrogen fixation (BNF) and improvement in the soil biological health, have been recognized from the beginning. Actually, it is one of the leading crops grown under rainfed conditions, exploiting the limited moisture available for agriculture depending on the rainfall pattern in a given locality. Its moisture stress tolerance, contribution to soil fertility, lesser pest and disease incidence and leguminous nature have made soybean suitable for many mixed and sequential cropping systems (Behera *et al.*, 2007). Hence, soybean is relatively easy to produce using organic methods. However, it is important to recognize that organic farms rarely focus on a single crop. Organic soybeans are best grown in rotation with several other crops that (ideally)

complement or compensate for one another. Organic production is further enhanced when livestock enterprises that involve grazing and generate manure are also part of the system.

Soybean is mainly cultivated in regions experiencing warm summer months, with dominant producers being the U.S. and Brazil, jointly accounting for about two thirds of the world's total produce. Argentina and China follow next in production capacity.

Nowadays, the world's annual production is approaching a good 300 million tons, thus rendering soy as the dominant oilseed, globally. In Greece an area of 2.000 ha is harvested every year producing approximately 4.000 tons (FAO, 2013).

Soybean has many uses. It is mainly pressed to extract soybean oil, after which a soybean meal remains and consists of a rich source of protein. Soybean oil can be used for the production of edible oils such as kitchen oil, salad oil and others through refining and deep processing and can also be used for the production of printing ink and biodiesel. Soybean meal is mainly used for the production of compound feed. It is the main protein source in feed for livestock farming. The native soybean meal produced under low temperature conditions is mainly used for the production of isolated soy protein, concentrated protein and structural protein (Picture 2).

Picture 2: Soybean meal.

Soybean's oil content is approximately *20%*, while its major by-product is soybean meal. Soybean meal is a rich source of calcium, iron, zinc, phosphorus and magnesium. It is also rich in protein (ingredients that exceed *44%* of its total composition) and amino acids, rendering it as the primary and indispensable source of feed for all farmed animals (Table 10).

Table 10: Representative proximate composition of soybean.

Seed part	% of whole seed weight	% (moisture-free basis)			
		Protein Nx6.25	Lipid	Carbohydrate (incl.fibre)	Ash
Cotyledon	90	43	23	43	5.0
Hull	8	9	1	86	4.3
Hypocotyl	2	41	11	43	4.4

Whole seed	100	40	20	35	4.9

Source: *Cheftel et al. (1985)*

Furthermore, it has to be stressed that soybean meal is extremely rich in lysine, an essential amino acid, critical in the development of the animals (Table 11).

Table 11: Amino acid composition of soybeans and wheat.

AMINO ACID	SOYBEANS		WHEAT	
	A	B	A	B
Isoleucine	4.54	114	3.26	82
Leucine	7.78	110	6.67	94
Lysine	6.38	118	2.86	53
Methionine	1.26	-	1.50	-
Cystine	1.33	-	2.54	-
Meth.+Cyst.	2.59	74	4.05	116
Phenylalanine	4.94	-	4.51	-
Tyrosine	3.14	-	2.99	-
Ph.ala+Tyr.	8.08	133	7.50	124
Threonine	3.86	96	2.93	73
Tryptophan	1.28	133	1.09	113
Valine	4.80	97	4.42	89
A: g/16 g Nitrogen *B: Percentage of Provisional Amino Acid Scoring Pattern*				

Source: *FAO*

Soybean is considered an important crop for both individuals and industries, as the high protein oil beans are used as food for human consumption, animal rations and edible oils as well as industrial products. Being a leguminous crop, soybean, improves soil fertility by adding nitrogen from the atmosphere that is a major benefit in current situation when lands are losing fertility with the need to produce more food for increasing population. The steady market demands and the above mentioned characteristics create the appropriate conditions for soybean crop to occupy a great amount of farmers.

Quinoa (Chenopodium quinoa)

Quinoa (Chenopodium quinoa Willd.) is a pseudocereal that has been cultivated in Andean region for thousands of years (Bhargava *et al.*, 2006). It is native to all the countries crossed by the

Andean mountain range from Colombia to northern Argentina and the main producing countries in the Andean region and the world are Bolivia and Peru (Picture 3).

Picture 3: Quinoa plant.

It has been called a pseudo-cereal for botanical reasons but also, because of its unusual composition and exceptional balance between oil, protein and fat.

Water shortage is a major constraint to plant production due to the combined effect of low rainfall, natively high evapotranspirationrate, and poor soils with a low waterretaining capacity. Quinoa is a crop that demonstrates a range of requirements for humidity and temperature, with different ecotypes adapted to different conditions. Some genotypes of quinoa are grown under conditions of severe drought, suggesting resistance to this adverse factor (Tapia, 1997). Furthermore, quinoa is an excellent example of *.functional food.* that aims at lowering the risk of various diseases (VegaGálvez *et al.*, 2010). The nutritional characteristics of quinoa, its rusticity, its wide adaptability and its multiple uses, explain the interest in the crop not only in South America but worldwide.

Quinoa's major use is still as a staple crop for subsistence farmers in rural regions of the Andes. However, a new international market for organically grown quinoa is increasing, creating a demand for export quinoa production in South America and some commercial production outside of South America.

According to FAOSTAT the period 1992-2010, the cultivation area in the main producing countries doubled, whereas the total production tripled. In 2002 quinoa in the Andean area was cultivated in 80.000 ha and the production was 55.000 tons, while in 2012 reached 108.000 ha and 91.000 tons respectively. In 2008, *92%* of quinoa production derived from Bolivia and Peru, followed by the US, Ecuador, Argentina and Canada, which together gave the remaining *8%* of quinoa world production.

While the main producers are Bolivia, Peru and the United States, quinoa production is expanding to other continents and it is currently being cultivated in several countries in Europe and Asia with high yields.

Organic quinoa is the only plant that contains all the essential amino acids, trace elements and vitamins and contains no gluten. Essential amino acids are found in the nucleus of the grain, unlike other cereals, like rice or wheat, in which they are located in their hull. Regarding the nutritional

value of biomass few data are available. However, it has been found that green stems and leaves of quinoa are rich in protein of high nutritional value, vitamins such as carotenoids, and ascorbic acid and minerals such as calcium, iron etc (Kakabouki *et al*., 2014). More specifically, leaves of quinoa contain ash *3.3%*, fiber *1.9%*, *0.4%* nitrates, vitamin E 2.9 mg/100g, sodium 289 mg/100g, carotenoids 82 - 670 mg/kg, vitamin C 1.2 – 2.3 mg/kg, protein 27 - 30 mg/kg, chlorophyll a 0.48 – 1.82 mg/g, chlorophyll b 0.25 – 0.07 mg/g. Therefore, in several regions of the world is used in animal nutrition. Quinoa's biomass is produced during the summer, which is very important for the nutrition of ruminants since at this period there is lack of natural vegetation. Hence, the production of valuable forages from such crops and its supply to ruminants is of great importance.

Organic quinoa is considered a multipurpose agro-industrial crop. The seed may be utilized for human food, in flour products and in animal feed stocks, because of its high nutritive value. The specific advantageous properties of quinoa for industrial uses must be identified and exploited, and process technologies enabling exploitation of such properties must be developed (Galwey, 1993). Faced with the global need to identify crops with potential to produce quality food, quinoa has a high potential both for its nutritional benefits and its agricultural versatility to contribute to food security in various Regions of the planet, especially in countries which are limited in food production or where the population has no access to protein sources.
As mentioned before quinoa is recognized and accepted worldwide as a natural food resource of Andean origin with high nutritional value, constituting a quality food for the health and food security of present and future generations. Due to its unique traits combined with the rapid increase on demand, quinoa meets the requirements for use as an innovative product that young unemployed people and young farmers can benefit from and create a successful business engagement with the particular crop.

New small grain and oil crops

Sesame (Sesamum indicum)

Sesame (*Sesamum indicum*), member of Pedaliaceae family, is an annual shrub with white bell-shaped flowers with a hint of blue, red or yellow with or without branches (Martin and Leonard, 1967), https://en.wikipedia.org/wiki/Flowering_plantwith numerous wild relatives to occur in Africa and a smaller number in India (Picture 4). It comes in a variety of colors, creamy-white to charcoal-black. In general, the paler varieties of sesame seem to be more valued in West and Middle East, while the black varieties are prized in the Far East.

Picture 4: Sesame plant.

Sesame is one of the world's most important oil seed crops. Not only is it a source of edible oil, but the seed itself provides a nutritious food for humans. One excellent characteristic of sesame oil is its resistance to oxidative deterioration. Its remarkable stability may be due to the presence of the endogenous antioxidants, sesamol and sesaminol, together with tocopherols (Hiromi and Sachiko, 1997). Sesame oil is rich in unsaturated fatty acids where the fatty acids composition is *14%* saturated, *39%* mono-unsaturated and *46%* poly-unsaturated fatty acids (Toma and Tabekhia, 1979). Carbohydrates in sesame seed are composed of *3.2%* glucose, *2.6%* fructose and *0.2%* sucrose, while the remaining quantity is dietary fibers. Also, sesame seeds have desirable physiological effects including antioxidant activity, blood pressure and serum lipid lowering potential as proven in experimental animals and humans (SiratoYasumoto *et al.*, 2001).

It is widely naturalized in tropical regions around the world and is cultivated for its edible seeds, which grow in pods. Bedigian *et al.* (1985) have shown that sesame originated on the Indian subcontinent and spread to other parts of Asia and Africa thousands of years ago. From India, sesame seeds were introduced throughout the Middle East, Africa and Asia. Sesame seeds were one of the first crops processed for oil as well as one of the earliest condiments (de Carvalho *et al.*, 2001). Currently, the largest commercial producers of sesame seeds include India, China and Mexico. It has utmost economical importance and is primarily grown by small farmers in developing countries. Its primary marketable products are the whole seeds, seed oil and meal. Sesame oil, other than its use as cooking medium, has certain industrial applications as it is used to make hair oil, hydrogenated oil and certain medicines (Quasem *et al.*, 2009).

Furthermore, sesame is highly tolerant to drought-like conditions and grows where other crops may fail. Sesame plant being easy to grow is well suited for cultivation in crop rotation and under organic cultivation system mainly due to the limited imports it requires to grow.

Global production of sesame seed, as estimated by FAO (2012), is 3.15 million tons per year. The largest producers are China and India, each with an annual harvest around 750.000 tons followed by Myanmar (425.000 tons) and Sudan (300.000 tons). These figures are only rough estimates of the situation as sesame is a smallholder crop and much of the harvest is consumed locally, without record of the internal trade and domestic processing.

In 2013, the total amount of sesame seeds imported in Europe amounted to 158 thousand tons and around 260 million €. Greece is the largest importer of sesame seed market in Europe (*25%* share in volume), accounting for 39 thousand tons/ 54.4 million € in 2013. This is due to the popularity of sesame seeds as an ingredient of the traditional Greek cuisine. The oilseed is in particular used as an ingredient for spreads such as tahini and halva, as well as in bakery and confectionery products. Almost all of Greek imports of sesame seeds (*98%*) originate directly from developing countries. On the other hand, Greece is the second largest exporter of sesame seeds in Europe. In 2013, it (re-)exported around 7 thousand tons / 7.2 million € of sesame seeds.

Today, the market for fair trade and organic products remains small in Greece, which can indicate that these premium products are not the most interesting choice for exporters. According to the latest data, the organic market in Greece amounted to 58 million €, with a low per capita consumption of 5.00 €/year. However, as organiccertified sesame seeds are already used by Greek companies, it is a market which could provide specific opportunities to those who decide to get involved with.

Flaxseed (Linum usitatissimum L.)

Flaxseed (*Linum usitatissimum* L.) is an annual herbaceous plant and one of the oldest cultivated crops which continues to be widely grown for oil, fiber and food (Berglund, 2002). The fiber, obtained from the stocks of the plant, is used to make fine linen and paper. Refined linseed oil primarily lends itself to uses in the industrial production of paints, coatings and floor covering (linoleum) (Oomah, 2001). In combination with resins and pigments, linseed oil has long been employed as an ingredient in coatings and inks. Linseed oil is used to make synthetic resins, especially linseed alkydes for printing inks, stand oils and varnishes. Linseed oil is also used as a binder for pigment pastes. Linseed stand oil of varying viscosity and acidity is obtained by polymerization at high temperatures. It is used to produce coatings of many kinds, inks, corrosion-proof and aluminum paints and brake linings. Blown linseed oil, thickened with air at high temperatures, exhibits excellent wettability and is therefore used in the ink industry and as a major binder in foundries and paint production. Today, there is a demand for refined linseed oil of many different grades. These are obtained by a refining process involving the steps of degumming, deacidification and bleaching.

Whilst the oil has limitations in the animal feed market due to its amino acid make-up, the expeller meal is a valuable protein livestock feed (particularly for ruminants) and has a crude protein level of *38%*. Although this does not compare directly with the higher protein feeds such as soybean meal, it is comparable with more direct competitors such as rapeseed meal and therefore is added to animal feed to improve animal reproductive performance and health (Heimbach, 2009). The seed is also used in livestock production for its medicinal properties, in particular for its functions as a laxative and for improving skin and hair quality. Moreover, linseed oil is regaining importance as a renewable raw material.

The exact place of its origin is uncertain (Lay & Dybing, 1989) but the southwestern Asia and the Mediterranean, proposed as potential sites of origin (Picture 5).

Picture 5: Immature and mature plant of flaxseed.

In the last two decades, flaxseed has been the focus of increased interest in the field of diet and disease research due to the potential health benefits associated with some of its biologically active components.

Linseed has a long history of medicinal use, its main effects being as a laxative and expectorant that soothes irritated tissues, controls coughing and relieves pain (Flax Council of Canada, 1998). An infusion of the seed contains a good deal of mucilage and is a valuable domestic remedy for coughs, colds and inflammation of the urinary organs. The oil in the seed contains *4%* L-glutamic acid, which is used to treat mental deficiencies in adults. Also, it has been found to contain various anticancer agents. Flaxseed oil is an excellent source of the omega-3 fatty acid linolenic acid with typical levels of *55%* in the oil (Oomah, 2001) making it ideal for paints, varnishes, and inks due to its fast polymerization properties. Increasing demand for edible oil sources with significant percentages of omega-3 fatty acids is resulting in consumption of flaxseed as a *functional food* (Table 12). Furthermore, flaxseed contains alpha-linolenic acid, a fatty acid that is related to the healthy growth of children, prevent heart disease, thrombosis, hypertension, inflammation and autoimmune disorders (Flax Council of Canada, 1998a). Flaxseed is also added to animal feed to improve animal reproductive performance and health (Heimbach, 2009).

Table 12: Representative proximate composition of flaxseed.

Constituent (%)	Whole seed	Cotyledons and embryo	Seed coat
Moisture	7.13	4.31	7.89
Nitrogen	4.01	4.64	3.18
Oil	38.71	53.20	1.84
Fiber (soluble)	10.22	-	-
Fiber (insoluble)	30.41	-	-
Ash	-	3.38	2.99

% of total oil	-	96.70	3.30

Flaxseed oil has a very healthy fatty-acid profile, with low levels (approximately *9%*) of saturated fat, moderate levels (*18%*) of monounsaturated fat and high concentrations (*73%*) of polyunsaturated fatty acids (PUFAs). The PUFA content comprises about *16%* omega-6 fatty acids, primarily as linoleic acid (LA), and *57%* alpha-linolenic acid (ALA C18:3n-3), an omega-3 fatty acid. Both LA and ALA are essential fatty acids since they cannot be produced by the body and must come from the diet (Table 13).

Table 13: Fatty acid composition of flaxseed.

Fatty acid	Chemical Structure	% in oil
Palmitic acid	C16:0	5.2
Stearic acid	C18:0	3.4
Oleic acid (omega-9)	C18:1	18.1
Linoleic acid (omega-6)	C18:2N-6	15.0
Lilnolenic acid (omega3)	C18:3N-3	57.9

The average worldwide flaxseed production between 2007 and 2011 was 1.162.449 tons (FAO, 2011). Globally, Russia has the largest flaxseed production in world with
250.000 tons per year and more than ¼ of world production.
The main flaxseed producing countries are the countries of the former Soviet Union, Ireland, France, Belgium and Netherlands. Belarus, India and Lithuania cultivate flaxseed in a limited area. In Greece the cultivation is that of a small scale and limited in the region of Messinia. The climate is not conducive to good quality fiber production so it is mainly for the production of flaxseed oil. The seed yield range from 700 to 800 kg per hectare.

In 2013, flaxseed imports to Europe amounted to 751 thousand tons (€ 411 million). The last 5 years show a slight volume increase, recording an average annual growth of

1.6%. This was accompanied with a much higher annual increase of *9.5%* in value, which reflects the increase in higher-value flaxseeds for direct consumption and the decline in flaxseeds for crushing.

Flaxseed.s medicinal, industrial and culinary uses have placed it in a great market position that is rapidly increasing. Expansion of the flaxseed market is most likely to occur from increased demand for human consumption and environmentally friendly industrial uses. Besides the short life cycle of flaxseed, the favorable impact in soil and the ability to be used in a wide range of crop rotation system, gives the opportunity to farmers to benefit from this particular crop variously.

Innovative Production Systems of Organic Agriculture

Hydroponics - Float systems

Introduction

During the last 12 years, there has been an increasing interest in hydroponics or soilless techniques for producing greenhouse horticultural crops. The future growth of hydroponics depends greatly on the development of production systems that are cost competitive with open field agriculture.

Hydroponics is a technology for growing plants in nutrient solutions (water and fertilizers) with or without the use of an artificial medium (e.g., sand, gravel, vermiculite, rockwool, peat moss, coir, sawdust) to provide mechanical support. Liquid hydroponic systems have no other supporting medium for the plant roots. Hydroponic systems are further categorized as open (i.e., once the nutrient solution is delivered to the plant roots, it is not reused) or closed (i.e., surplus solution is recovered, replenished, and recycled).

Description

There are many types of hydroponic systems, as well as many designs for greenhouse structures and many methods of control of the environment. One of the most advanced low cost hydroponic culture systems is the "*float system*" which is a closedend hydroponic seedling production system suitable mainly for the production of vegetables under coverage, where the seedlings grown in trays of polystyrene (fenizol) separated in cells into which is placed a mixture of peat and perlite and sown the seed. The trays are placed into water basins with a nutrient solution in which they float. (Bilalis *et. al.*, 2009; Bilalis *et. al.*, 2010; Akoumianaki-Ioannidou *et. al.*, 2015)

Benefits

The benefits of "*float system*" can be summarised at the following (Bilalis *et. al.*, 2009; Bilalis *et. al.*, 2010; http://agrinioreport.com):

- It is an excellent system for producing seedlings of vegetable and flower species.
- Production of healthy, uniform and well-developed seedlings.
- Production of seedlings resistant to transplant disorders.
- Easy installation, low operating costs and rapid amortization.
- Low labor costs (sowing, planting, harvesting, standardization).
- Less working time and overseeing the seedbed.
- Small maintenance requirements and easy execution of the work
- Optimization of use of water.
- Production of vegetables free from soil residues.
- Early crop production.
- Possibility for optimal production planning.

- Possibility for automation of many tasks (eg. sowing, collection, etc.).
- Reduction of the appearance of phytopathological problems due to the absence of substrate.

Business opportunities

The fact that "*float system*", which is assessed and improved by research on the Agricultural University of Athens, can produce high quality seedlings at a cost ranging from 4-19 cents of € / seedling and that is a system for production of own organic seedlings and it is not yet used by producers of organic seedlings, is an opportunity for young people with small capital to get involved in OA area which is in an infant stage and has high potentials, following the guidance and advice of experts (see chapter 9).

Biodynamics

Introduction

Biodynamic agriculture is a method of organic farming originally developed by Rudolf Steiner that employs what proponents describe as "*a holistic understanding of agricultural processes*" (Florian, 2006) One of the first sustainable agriculture movements, (Paull , 2011; Lotter, 2003; Harwood, 1990) it treats soil fertility, plant growth, and livestock care as ecologically interrelated tasks (Kristiansen and Mansfield, 2006; Ikerd, 2010; Abbott *et. al.*, 2007) emphasizing spiritual and mystical perspectives. Proponents of biodynamic agriculture, including Steiner, have characterized it as "*spiritual science*" as part of the larger anthroposophy movement. (Florian, 2006; Paull, 2011; Paull, 2011)

Biodynamics has much in common with other organic approaches as it emphasizes the use of manures and composts and excludes the use of artificial chemicals on soil and plants. Methods unique to the biodynamic approach include its treatment of animals, crops, and soil as a single system; an emphasis from its beginnings on local production and distribution systems; its use of traditional and development of new local breeds and varieties; and the use of an astrological sowing and planting calendar.

Certification

To receive certification as a biodynamic farm, the farm must meet the following standards: agronomic guidelines, greenhouse management, structural components, livestock guidelines, post harvest handling and processing procedures. (Delmas *et. al.*, 2008)

The term Biodynamic is a trademark held by the Demeter association of biodynamic farmers for the purpose of maintaining production standards used both in farming and processing foodstuffs. The biodynamic certification Demeter, created in 1924, was the first certification and labeling system for organic production. The trademark is intended to protect both the consumer and the producers of biodynamic produce. Demeter International is an organization of member countries; each country has its own Demeter organization which is required to meet international production standards (but can also exceed them). In France, Biodivin certifies biodynamic wine (Gregutt, 2005). In Egypt, SEKEM has created the Egyptian Biodynamic Association (EBDA), an association that provides training for farmers to become certified.

Principles

There are six principles of biodynamic farming: plant diversity, crop rotation, animal life, composting, homeopathic solutions and life forces.

Plant diversity is a method of keeping soil healthy by allowing a variety of plants to grow on uncultivated land. It's enhanced by mixing crops so plants work in support of each other (if one plant depletes a certain nutrient in the soil, a companion plant releases that same nutrient into the soil). Conventional farming practices sometimes adhere to monocropping, such as a farm planting and harvesting soybeans on the same fields year after year. In contrast, crop rotation and an assortment of animal life are an important part of sustainable agriculture. The practice of rotating crops from field to field and raising varied animal species, along with cover crops and green manures, encourages healthy soil, reduces parasites and controls weeds and pests.

Composting is elemental in biodynamic agriculture. It is the source of healthy soil -- the recycled manures and organic waste in the compost pile create humus vital to the farm. When spread on fields, the humus stabilizes nitrogen in the soil, vital to crop productivity. There are nine homeopathic preparations based on extracts from animal, plant and mineral manure, each diluted into sprays and used sparingly to homeopathically treat compost, soil and plants in a process called dynamization. Each preparation is numbered, 500 through 508 -- six are key to composting, two are used to stimulate humus and one is used to suppress fungal disease on crops.

And last but not least, the life force. Life force separates biodynamic farming from other agriculture because it's the acknowledgement that in addition to earthly influences (biology, physics, chemistry), cosmic forces (moon phases, celestial and seasonal cycles) play a role in the life of the farm.

Statistics

New figures released by Demeter-International reveal the steady global growth of biodynamic agriculture. Certified biodynamic hectares are up *2%* (from 144.497 to 147.495 ha), biodynamic processors are up *5%* (from 456 to 478), and biodynamic distributors are up *3%* (from 185 to 190). The number of countries with DemeterInternational certified biodynamic activity increased from 48 to 52. Croatia and Peru enter the list with newly reported biodynamic farms, and Bulgaria and Ukraine enter the list with new biodynamic distributors. There is considerable volatility in the statistics, with most countries reporting changes in the statistics for 2012 compared to the previous years. The three leading countries, based on biodynamic hectares, are

Germany (with 66.991 ha, up *1%*), Italy (8.688 ha, up *6%*), and France (8.100 ha, up *8%*). Germany has the most biodynamic farms (1420), the most biodynamic processors (195), and the most biodynamic distributors (62). The largest percentage increases in biodynamic hectares were recorded by Spain (up *157%* to 2128 ha), Ecuador (up *115%* to 236 ha), and South Africa (up *96%* to 157 ha). The total number of biodynamic farms decreased *16%* (from 5615 to 4733) with the biggest declines reported by Tunisia (down *23%* to 1.560 farms) and India (down *19%* to 5.882 farms). (http://orgprints.org/26246/)

Business opportunities

Biodynamic agriculture is a new trend which finds response from farmers who search for new innovating production systems based on the basic principles of OA. This trend has spread worldwide, its numbers has risen at the last 5 years not only in other countries but in Greece as well (80 ha in 2013 has risen to 200 ha at the end of 2014 and over 500 ha today), and also a dynamic development in the next 5 years is recorded. The products produced under biodynamic agriculture, which are mostly apples, pears, grapes, olives and vegetables, are absorbed directly from the Greek, the British and the Russian market. Although the biodynamic farms yields are about 20% lower than the organic, the prices are about 60-300% higher than the conventional, compensating and overlapping the lower yields (Angelopoulou *et. al.*, 2013). All the above, together with the fact that most biodynamic farmers are young people and easy to cooperate, consist a very good opportunity for young people, always with the proper guidance from experts as described in chapter 9, to get involved to a rapidly developing innovating part of OA.

Bio-cosmetics (processing method) Introduction

In the recent decade, individuals have become more environmentally concerned, while companies realized that consumers. needs and desires are changing. This, in turn, has created new environmentally oriented practices. As a consequence of this growing environmental awareness, the product preference of consumers has changed to green products (Greendex, 2010). This is especially the case for durable products which have limited or no negative influence on the environment (Akehurst *et al.*, 2012).

Concerns about health and environment have grown and resulted in a higher preference for cosmetics that maintain or promote a healthy lifestyle by containing ingredients which are beneficial for the skin (Kim & Chung, 2011). The preference of consumers for cosmetics without pesticides or synthetic chemicals and which will not negatively influence the environment is a fact (Rawat & Garga, 2012).

One of the driving forces behind the dynamic cosmetic and toiletries market is the continuously growing demand for products of natural and organic origins. The large number of investment activities in the natural cosmetic sectors by the leading global players shows the transition of their attitude toward this formally strategic and currently potential segment. Cosmetics are a part of cultural history and they reflect the status of the society and its technical development. Not having the cosmetics science of today, the ancients used nothing but natural ingredients to groom and beautify themselves. Now, the ambiguous and diversified definitions of natural cosmetics and the non-unified regulation of organic certification allow manufacturers of cosmetic products and consumers to interpret "*natural*" in a variety of ways.

Description

Organic cosmetics are created from ingredients which have been certified organic by one of the numerous certifying institutions that operate worldwide. An organic ingredient (or natural ingredient) is formally an ingredient which has been harvested without the use of synthetic

chemical compounds. Organic cosmetics are produced from the best natural component of plants and flowers that do not result in skin irritation at all as compared to the chemical based cosmetics.

Certification and labeling

There are over 40 standards for natural and organic cosmetics worldwide, most of which are in Europe. Moreover, there are labeling guidelines presented by the USDA in order to provide a safety net to consumers and these are the following:

"100% Organic": The product must contain (excluding water and salt) only organically produced ingredients. Products may display the USDA Organic Seal and must display the certifying agent's name and address.

"Organic": The product must contain at least *95%* organically produced ingredients (excluding water and salt). The remaining product ingredients must consist of nonagricultural substances approved on the National List of non-organically produced agricultural products that are not commercially available in organic form. Products may display the USDA Organic Seal and must display the certifying agent's name and address.

"Made with organic ingredients": The product must contain at least *70%* organic ingredients and the label can list up to three of the organic ingredients or "food" groups on the principal display panel. For example, body lotion made with at least *70%* organic ingredients (excluding water and salt) and only organic herbs may be labeled either "*body lotion made with organic lavender, rosemary, and chamomile*" or "*body lotion made with organic herbs*". These products are not permitted to display the USDA Organic Seal, but they must display the certifying agent's name and address.

The basic USDA guidelines are helpful if "*organically grown*" is, but there are dozens of other unregulated "*Certified Organic*" agency seals, and all have varying standards and guidelines for what constitutes organic. Hence, there are many different certifiers in the market place such as:

A. COSMOS

COSMOS is an international standard for organic and natural cosmetics. Founded in 2010 as collaboration between five European organic certification bodies, it's now global. As a relatively new standard, the logo isn't widely seen at the moment – many companies still use the logo of the original certifier – but it's likely to become more visible in coming years.

"COSMOS Organic": Contains a minimum of *95%* certified organic ingredients of biological (plant or animal) origin. Water, salts and minerals can't be counted as organic, so this calculation is based on the other ingredients, which are mostly plantbased ingredients and animal products. However, at least *20%* of the total product (which includes the water and so on) must be organic, except for mineral makeup products and wash-off products (and others which reasonably have a very high water content) for which the minimum percentage is *10%*. Further requirements are that there are no genetically modified or irradiated ingredients, no nanoparticles and no animal testing. Animal products can be used (such as beeswax or honey), but not parts of dead animals. The packaging also has to meet certain requirements.

"COSMOS Natural": The standard for natural ingredients stipulates which ingredients are permitted and how they may be processed. The product doesn't have to be 100% natural – instead the percentage of "*natural*" ingredients is listed, and can include water, salts and minerals.

B. Natrue

Natrue is an international certifier for natural and organic cosmetics and skin care products, with locally based certifiers in various countries. Only water, natural ingredients, derived natural ingredients and nature-identical ingredients are permitted. There are three levels of certification: a) natural, b) natural with organic ingredients (*70%* or more organic ingredients) and c) organic (*95%* or more organic ingredients).

C. NSF

The NSF "*contains organic ingredients*" standard is a US national standard for personal care products making organic ingredient claims. Products must undergo a thorough review by an independent organic certification body to verify the product contains least *70%* organic content by weight.

D. Others

While the above are the main certifiers for the products we came across, other organic certifiers for ingredients and/or the total product include Soil Association (UK), BioGro (NZ), Ecocert (France), OFC, BDIH (Germany), Cosmebio (France), ICEA (Italy), Natural Products Association (US) and USDA Organic (US). You may see one or more of these logos on marketing material and packaging – a company may apply to different organisations for certification according to the markets in which they sell.

Regulations

Independently of the formulation of a natural cosmetic product, all products must comply first and foremost with the basic requirements of Cosmetics Regulation (EC) No 1223/2009, particularly with regard to their composition, safety, efficacy and labeling requirements. Furthermore, animal testing is fundamentally against NATRUE.s underlying values and ethics. It is for this reason that the NATRUE criteria extends the animal testing ban on finished cosmetic products as regulated by Regulation (EC) No 1223/2009 to third countries outside the EU.

Organic certified natural substances and derived natural substances must come from controlled organic farming and/or wild collection, certified by a duly recognized certification body or authority to an organic standard or regulation approved in the IFOAM Family of Standards, or to this Standard.

In natural cosmetics, natural fragrances (for example essential oils) which correspond to ISO standard 9235 may be used. This includes isolates of essential oils and essential oils reconstructed from them. Synthetic nature-identical fragrances may not be used in natural cosmetics. The natural fragrance material must also comply with all other requirements of the NATRUE-label criteria.

Detergent surfactants substances used must be completely biodegradable in accordance with the EC Regulation on Detergents (Regulation (EC) No 648/2004).

Market

Consumer demand for organic cosmetics has grown at double-digit rates in recent years. In a similar way certified organic cosmetics score higher than its synthetic counterpart. Organic Monitor[1] values the global natural & organic market at $10.4 billion and certified products account for just *1%* of the total, most of which are in Europe.

Although most sales are concentrated in Europe and North America, the highest growth rates are occurring in other regions. Healthy growth rates have attracted new entrants into the market. Large cosmetic brands are increasing market share by either the acquisition route or launching natural / organic lines. Many newcomers, including Henkel, Garnier and Amore Pacific, have developed certified lines of popular products. New brands designed for mainstream retailers are also developing a strong presence.

Aspects of sustainable development must also be taken into account along the entire value chain, under respect of biodiversity (submission of a sustainability report or an environmental impact assessment by the manufacturers).

Why to choose organic cosmetics?

Conventional beauty products utilize petroleum-based ingredients and usually rely on a host of other chemicals for their production process. These compounds are typically harsh substances, like petroleum, aluminum, and lead, all of which require extensive mining. Although they may be effective for improving appearance, albeit temporarily, the chemicals in conventional makeup are often very harsh on skin and may promote irritation or allergic reactions in sensitive individuals. More importantly, many of the chemicals used in non-organic makeup are downright poisonous to the endocrine system. Parabens and phthalates are two common examples of substances that are used extensively in cosmetics. Both of these compounds have been linked to cancer and type II diabetes (Trasande et al., 2013), and the Environmental Protection Agency warns against their exposure.

Man-made aromas expose the body to a number of toxic effects, and some research has linked them to cancer, nervous system disorders, allergies, and birth defects (EPA, 1992). Not only do humans inhale these chemicals into their lungs, they also expose their skin to these toxic compounds. Essential oils are perhaps one of the best natural perfumes in the world and the most concentrated in terms of aroma.

Opportunities for young entrepreneurs

In Greece apart from the large multinational cosmetic companies, there are many Greek companies, mostly family companies that activates in the field of cosmetics, and especially in green-cosmetics (including bio-cosmetics). Most of these companies have started based on the

[1] http://www.organicmonitor.com/natprod.htm

vision and fresh ideas of young entrepreneurs, who seized the opportunity to get involved to a rapid growth market. This market is not yet overcrowded and under the right training, as described in chapter 9, young unemployed people, young farmers or even older open minded farmers, can find a way out from the unemployment and uncertainty of today's economic crisis.

Organic agro-eco tourism

Introduction

Lately, we see a great development of organic agro-eco tourism, as the demand, worldwide but also in Greece, increases. Many tourists, prefer the agro-tourism instead of the classic tourism, and seek for countries which have the proper facilities and increased quality to provide them with the "*real*" experience of organic agro-eco tourism. According to the statistics the rural tourism in Europe in 2014 provides around 6 million bed spaces in 500.000 establishments, representing around *15%* of the total accommodation capacity of Europe. Together with related services, the sector generates more than €100 billion in direct spending – mostly in the local economy - and is a critical element for the survival and revitalization of many rural areas. Current statistics and research suggests a profitable future, fulfilling the changing trends and new horizons of demand and markets: authentic, individual holiday experiences together with a relaxing and healthy environment that respects high standards of sustainability. However, these positive signs come with new challenges. The shift in purchasing and decision-making power to the consumer due to internet requires new concepts and methods of marketing, product development, communication, and consumer feedback. The demographic curve will bring along changes in the structure of markets, while at the same time demand and competition within Europe and from outside will increase.

Description

The organic agro-eco tourism offers the visitor the opportunity to experience the rural areas, farming activities, local products, traditional cuisine and daily life, cultural heritage of each region with respect to the environment and tradition. It gives visitors the opportunity to come into contact with nature and with outdoor activities, which may be involved.

Benefits

Organic agro-eco tourism seeks to create positive social, cultural and environmental impact and meet the need for farmers to gain additional income employed by the service sector and the need for urban dwellers to return to nature.

According to Nae-Wen Kuo *et.al.* (2006) the direct economic revenues of organic agro-eco tourism are many times above the revenues of simple cultivations, and have also the following additional benefits:

- The linkage can create additional value of OA.

- OA can contribute to service economy and experience economy.
- People can increase their confidence in organic products through better understanding.
- A one-step relationship between organic producer and consumer can be established.
- Local food supply will be connected with demands in the tourism industry.

Also, organic agro-eco tourism is developing the local community, helps at the production of traditional products, maintains arts that would otherwise disappear, contributes to the revival of customs and traditional events, the preservation of architectural heritage, consists of a mean of communication of remote areas with major urban centers and provides new life perspectives to young people in these regions. Through organic agro-eco tourism the cultural heritage and the uniqueness of each region are displayed.

Opportunities for young entrepreneurs

The combination of OA and agro-tourism give birth to the "organic agro-eco tourism", which is a great opportunity for many unemployed young people to go back to their villages and take advantage of their unexploited family fields, by converting them in organic agro-eco tourist businesses.

So, with the proper guidance from experienced people, such as agronomists, economists etc. and the help of the "*Agro-info Desk*", as presented in chapter 9, young unemployed people and young farmers can create a modern, high quality profitable
"*organic agro-eco tourist*" business, using their own funds or funded by National programs such as the Leader[2].

Organic Agriculture and Technology

E-Commerce

As Internet has become the new "*best friend*", mainly of young people, its combination with young peoples. environmental awareness, creates the optimal conditions for young entrepreneurs to bring OA online. During the analysis of the OA market we found that there is a small percentage of consumers who buy their organic products via e-shops, which raises from year to year, and consists of a market niche which is not sufficient exploited.

Greek young entrepreneurs apart from the creation of simple e-shops where the consumers search, find and order organic products, mostly processed, some of them made their ideas a reality and created new and innovating ways to sell online even fresh organic products.

Such examples are the cases of Biobox[3], where consumers can order their personal box with Greek, certified organic fruit and vegetables in season and have it delivered in their home or office

[2] http://www.agrotikianaptyxi.gr
[3] http://www.biobox.gr

and gineagrotis[4], where visitors can choose their "personal" farmer who will grow the organic crops that they have selected and have them delivered straight from the field.

E-learning

Another important factor for young people to successfully get involved with OA area is their access to the right and verified knowledge. That is why the creation of a verified, up to date electronic repository with all the available knowledge concerning OA in general, is crucial.

Some of the tools and information that should be included in the electronically platform are:

- General information about OA.
- Information about all OA areas, from cultivations to processing.
- Information about OA products.
- Information about OA innovations.
- Information about OA entrepreneurship.
- Information about ways to acquire tundity.
- Information about OA e-commerce.
- E-lessons by experts (academics, agronomists, experienced organic farmers etc.).
- Articles and scientific papers about OA.
- Forum.

The platform will not be static but will be constantly developed, optimized and up to dated according to the user needs. Also, pages in social networks should be created (Facebbok, Tweeter, LinkedIn, Google+ etc.) as they have become the main communication tool of young people, and constitute the best way of approaching them. The e-learning process will be part of the Organic Agriculture Innovation Network as described in chapter 9.

Organic Agriculture Innovation Network

The importance of rural entrepreneurship is increasing gradually. Already in 1997, the International Food and Agriculture Organisation have studied rural entrepreneurship and later on several studies, funded by the European Union, took place.

The fact is that the management of an organic farm is different from rural entrepreneurship. The ability of a farmer to plan, manage and expand a long term profitable business (such as the family farm) successfully requires specialized management skills. Moreover, entrepreneurship is closely linked to innovation, creativity and a certain degree of risk-taking.

[4] http://www.gineagrotis.gr

The investment in the *.knowledge triangle*. of education, research and innovation, which reflects the close relationship between the three key elements of the development strategy in the modern era, is a challenge which can lead our country to the increase of agricultural productivity and sustainability and can contribute to the reversal of the negative economic climate.

The EU has put innovation at the heart of its policies and in particular as a priority for achieving the rural development objectives[5], which contribute to the strategy of "*Europe 2020*" for smart and sustainable growth.

This primary role of research and innovation is developed further in the EU 2020 flagship initiative "*Innovation Union*", which introduces the concept of European
Innovation Partnerships (EIP) as a new way of encouraging innovation. The scope of
EIP is to build bridges between science and application of innovative approaches in practice.Furthermore, concerning the "*agricultural productivity and sustainability*", EIP tries to promote competitive and sustainable agriculture which achieves better results with fewer resources and operates under conditions of genuine harmony with the environment[6].

Idea

The "*Organic Agriculture Innovation Network*" (OAIN) consists of two pillars, the "*Innovation Organic Fields*" or "*Lighthouse Fields*" (IOF or LF) and the "*Agro-info Desk*" (AID). The idea of the IOF (LF) is based on the idea of the "*Living Lab*"[7], which is a worldwide breakthrough in innovation and can be implemented in all scientific areas. The "*Living Lab*" constitutes an experiential environment, which could be compared to the concept of experiential learning, where users are immersed in a creative social space for designing and experiencing their own future. Living labs could also be used by policy makers and users/citizens for designing, exploring, experiencing and refining new policies and regulations in real-life scenarios for evaluating their potential impacts before their implementations. The IOF (LF) are not only the implementation of the "*Living Lab*" in the field of OA, but a step further as they provide a "*live*" help desk the AID (the second pillar), consisted by experienced agronomists, which continues to advice and help the participants and after the end of their involvement. The IOF (LF) are an innovation in OA in Greece, and maybe worldwide, as it is the first time that someone brings together the research, the implementation, the users and the experts in one "physical" single point.

Objectives

The creation of the OAIN aims at networking the beneficiaries (unemployed, young farmers etc.), the training and advice providers, the researchers, the supply chain operators and all those who believe at the development of innovation in Organic Agriculture. More specifically the OAIN objectives can be summarized at the following: a) Facilitate the exchange of expertise and best cultivation practices.

[5] EU regulation No 1305/2013
[6] COM(2012) 79
[7] https://en.wikipedia.org/wiki/Living_lab

b) Supporting the transfer of experience and practical knowledge of experienced traditional farmers to young farmers or unemployed that will work on Organic Agriculture.

c) Supporting the development of new and innovating ideas of young farmers to the benefit of older.

d) Facilitating the interconnection of reception centers to community-wide information about their actions.

e) Supporting participants to continue their rural entrepreneurship.

In detail, the purpose of the IOF (LF) is the "*Specific training and support*" of unemployed young people and young farmers on innovative organic crops, farming practices, farm management procedures and ways on increasing the added value and promotion of products they choose themselves, with the coordinated help and guidance of agronomists and other specialized scientists. Moreover, the IOF (LF) aims at the installation of innovative organic crops and farm management processes and also the development of an R & D test system. Following, the AID addresses to both young, mostly unemployed, people but also to existing young farmers who are either looking for advice to optimize their production or diversify production using new cultivation methods or require the provision of a general consultative framework where they can, under guidance, explore topics ranging from the stage of sowing to the stage of harvesting, processing, promotion and distribution of their organic products, trying to become entrepreneur organic farmers. Part of the AID will be the e-learning platform as described in chapter 8.2.

In both pillars, beneficiaries learn about new agricultural practices as well as the interactions that results from the commingling of rural activities and physical persons engaged in agriculture, in a center that gathers all this "energy" and distributes under local, national and / or international needs.

Benefits

The benefits of OAIN influence many groups of people, and can be summarized at the following:

- Significant contribution to the fight against unemployment, through retraining and absorption in the OA sector.
- Support of the innovative rural entrepreneurship and creation of new job opportunities in the rural sector.
- Support of large number of direct beneficiaries in the field of innovative rural entrepreneurship.
- Awareness and encouragement for participating in innovative actions.
- Develop of a methodology and mechanism in order to promote innovation in OA (innovation brokerage).
- Protection of beneficiaries who have innovative ideas from wrong choices.
- Emergence really successful innovation efforts and connecting all stakeholders.
- Support substantial number of innovative organic farming and production processes of organic agriculture, as mentioned in chapter 5.
- Penetration of innovative organic crops and innovative methods to optimize production through participation in "*traditional peasant program*" or by disseminating the results of the program.
- Improvement of existing production as well as the production of new organic products from the same crops (eg. Cultivation of *Humulus lupulus* not only for beer production but also for bio-cosmetics).
- Organization of production through the mechanism of producer organisations and other forms of cooperatives, and also the creation of clusters and networks.

- Organization of the certification of the production in cooperation with the certification bodies.
- Organization of a rural social network in order to host young farmers.
- Development of entrepreneurship in the primary sector and in sectors connected to it, such as agro-eco tourism, organic products web-sites, organic catering industry etc.
- Ability to contribute to boosting OA exports and reducing imports.
- Connecting the primary to the tertiary sector.

Target groups

Both pillars target people who try to find a way out of the unemployment through agriculture, and especially OA, and especially vulnerable groups and unemployed people who intent to resettlement from urban centers (mainly from the areas of large urban areas) in rural communities and suburban areas, in order to engage in agriculture, either as a main or complementary activity.

The project is also addressed to young farmers who need professional and specialized training, without excluding more experienced farmers, who in any case need counselling to new innovative crops and farming practices, as well as to management issues, in order to find a way to new markets.

CONCLUSION - EPILOGUE

The prolonged economic downturn affecting Greece in recent years, affects the course of the organic sector. The contraction in consumer disposable income, pushing them to seek cheaper products even foodstuffs.

Especially in regards of the organic products, the comparatively higher selling price than conventional, negatively affects their demand, although market analysts mention that several businesses reduce selling prices and the "*gap*" between products (organic and conventional) has been reduced considerably, especially in certain product categories.

On the other hand, organic products cater to specific buyers with high preference for them, but which, at present, are very limited. Therefore, the problem is more related to the enlargement of the portion of consumers who prefer organic products over conventional.
The industry believes that the long term prospects of the examined sector are positive, given the low penetration of organic food domestically. Moreover, demand for organic products in several foreign markets is an increasing trend, which favors the growth of Greek organic products exports, provided that our country will increase production (both in volume and varieties).

Given the current conditions, the axes which should support the sector's entrepreneurs for their development (critical success factors), or even to maintain their market position, are:

- Organized (through associations, institutions, etc.), systematic and targeted advertising and promotion of Greek organic products in domestic market but also in foreign countries, in order to increase exports.
- The involvement in new "*dynamic*" organic farming.

- Further development and expansion of the distribution networks and the penetration of organic products in most retail locations.
- Systematic consumer awareness of organic products with the purpose of influencing.

On the other hand, in Greece there are many barriers for, mostly new enterprises to enter, develop and expand in OA areas, which can be summarized at the following:

- High competition of foreign OA products.
- Freezing of bank loaning.
- Increased taxation.
- Bureaucracy.

As for young people, they have developed environmental conscience which is the driving force of their involvement with anything that promotes respect to nature, and thus OA. Apart from their own activation, young people will need a small "*push*" at the direction of OA through channels that are mainly used by them, such as the Internet and the social networks. Their involvement in OA is not easy, as they lack knowledge, resources and mentoring, factors which are going to be covered by the OAIN, as described at chapter 9. Young entrepreneurs will need the assistance not only by OAIN, but also from the universities, the certification bodies, the private companies and the municipalities, according to their expertise. *So, our scope should be to collaborate and synergise with all other sectors of the studies (apiculture, aquaculture, animal production, oil production, wine production, aromatics and medical plants etc.) in order to expand the innovative idea of* Organic Agriculture Innovation Network (OAIN)*, which was briefly presented and analysed during our study, and create a general Network, the* Agriculture Innovation Network (AIN)*, which will include all the Agriculture areas of Greece.*

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BUSINESS PLAN OF FLAXSEED CULTIVATION

GENERAL INFORMATION OF THE BUSINESS

Business name: Flaxseed Field

Sector: Agriculture

Business Scope: Flaxseed cultivation

Year of establishment: 2016

Legal Status Enterprise: Farmer (Freelancer)

SUMMARY DATA OF BUSINESS PLAN

Scope of our business plan is to cultivate organic flaxseed, used for its seed and oil for human consumption. As we aim mainly at young unemployed people we have created a business plan based on no initial capital available (except from a small bank loan of 14.000 €) and no owned land available. For out cultivation we will rent a flat, 10 hectares field with good soil and weather conditions. We have no initial capital available and we have to depend on a small bank loan. Our target group consists mainly of processors, merchants, bio-shops and consumers of domestic and foreign markets. The business will be a family business and apart from the small number of workers, we will use the help of most of the family members. The product produced is organic as we follow all the necessary rules and regulations of certification organizations. Many of the business plan parts, referring to a small to medium size business, do not respond to our case, as our business

is not a typical business but a primary production business without a standard business chart. Finally, our business plan is a ten year plan, taking account all the necessary information for the establishment of a successful business.

1 SCOPE AND SHORT DESCRIPTION OF BUSINESS

Our scope is to cultivate organic flaxseed for its oil, which is used for human consumption. Some important general information about the flaxseed cultivation can be summarized at the following:

Flaxseed (Linum usitatissimum), is a summer annual crop in temperate climates. It originated in India and has been used for thousands of years. Pilgrims brought it to Europe and then America. They used the seed for food and nutrition, and to make linseed oil. They also used the fibers of the long, thin stems to make clothing, linen and lace, rope, twine, and a variety of other items. Cultivated flaxseed plants grow to 1.2m tall, with slender stems. The leaves are glaucous green, slender lanceolate, 20–40mm long and 3 mm broad. The flowers are pure pale blue, 15–25mm diameter, with five petals. The fruit is a round, dry capsule 5–9mm diameter, containing several glossy brown seed shaped like an apple pip, 4–7mm long. The time from seeding to harvest varies between 90 and 150 days.

Flaxseed oil has a very healthy fatty-acid profile, with low levels (approximately *9%*) of saturated fat, moderate levels (*18%*) of monounsaturated fat and high concentrations (*73%*) of polyunsaturated fatty acids (PUFAs). The PUFA content comprises about *16%* omega-6 fatty acids, primarily as linoleic acid (LA), and *57%* alpha-linolenic acid (ALA C18:3n-3), an omega-3 fatty acid. Both LA and ALA are essential fatty acids since they cannot be produced by the body and must come from the diet.

At this time we are at the beginning of our cultivation plan, as we only have available the field (10 hectares rented) and a small initial capital (bank loan 14.000 €).

2 BUSINESS OBJECTIVES

Our main objectives can be summarized at the following:

- Produce quality product which will lead to the creation of a strong brand name.
- Establish good relationships with our clients (processors, breeders and merchants).
- Achieve certain economic targets, such as:

- The cultivation will start being profitable from the end of the first (1st) year. o The cultivation will start being profitable from the end of the first (1st) year. o Creation of oil extraction installation at the end of the 5th year. o Use of produced flaxseed for extracting our own oil from the start of the 6th year. o Selling flaxseed oil from the end 6th year. o Increase of our profit from the 6th year.
- Rent and cultivate another 10 hectares after the end of the 6th year, when the bank loan will be repaid.

3 FUNDING

At the following table (Table 14) we can see the available funding for our cultivation/business.

Table 14: Funding (10 year plan).

	YEAR				
FUNDING	1ο	2ο	3ο	4ο	5ο
Own funds	-	-	-	-	-
Bank loan (14.000€ loan - 7,5% Interest rate - 5 years)	14.000	-	-	-	-
Subsidy	6.000	6.000	6.000	6.000	6.000
TOTAL DEPRECIATION	20.000	6.000	6.000	6.000	6.000

4 ESTABLISHMENT PROCEDURES

For the organic cultivation of flaxseed we should follow the rules and regulations of organic certification organizations, and we will also need a license for GMO free products.

The required capital at incorporation for our business, including all the bureaucratic procedures and papers, is approximately 14.000 € (5 year bank loan with 7,5% interest rate and no grace period).

5 COMPETITIVE ADVANTAGE

The cultivation of flaxseed is consider to be innovative, and in combination with the organic way of cultivation, we are going to produce a "*strong*", innovative and with

high demand product, giving us a great advantage in comparison to other farmers, who either grow non-organic flaxseed or other similar plants. Also, the constant increase of the worldwide demand for flaxseed and oil, gives us the opportunity to sell all of our production, without having any of the problems that result from the failure to the whole production, such as the cost for the destruction or the storage of the remaining production.

6 MARKET

6.1 Market segmentation

Our target group consists mainly of processors, merchants, bio-shops and consumers of domestic and foreign markets, because of the nature of our product, which is used for its seed and oil extraction for human consumption.

6.2 Analysis of installation site

The field where we are going to plant our plants is a flat, 10 hectares field with soil and weather conditions appropriate for cultivating flaxseed and also access to water.

6.3 Competition

In Greece the cultivation of flaxseed is still in infant stage and only few farmers cultivate flaxseed and even fewer organic. Moreover, about 80% of the flaxseed is imported, so our domestic competition is limited and this is a situation that we should exploit to our advantage, as our clients prefer domestic products. Our clients have strong negotiation power, as they can turn to foreign competitive products, which can be cheaper as they are produced in larger scale and resulting the reduction of the production costs. On the other hand, our suppliers have weak negotiation power as we have a variety of suppliers that we can turn to.

6.4 Main features

The average worldwide flaxseed production between 2007 and 2011 was 1.162.449 tons. Globally, Russia has the largest flaxseed production in world with 250.000tons per year and more than ¼ of world production.

The main flaxseed producing countries are the countries of the former Soviet Union, Ireland, France, Belgium and Netherlands. Belarus, India and Lithuania cultivate flaxseed in a limited area. In Greece the cultivation is that of a small scale and limited in the region of Messinia. The climate is not conducive to good quality fiber production so it is mainly for the production of flaxseed oil. The seed yield range from 700 to 800 kg per hectare.

In 2013, flaxseed imports to Europe amounted to 751 thousand tons (€ 411 million). The last 5 years show a slight volume increase, recording an average

annual growth of *1.6%*. This was accompanied with a much higher annual increase of *9.5%* in value, which reflects the increase in higher-value flaxseeds for direct consumption and the decline in flaxseeds for crushing.

6.5 SWOT Analysis

The following Table (Table 15) presents the SWOT analysis of our cultivation/business.

Table 15: SWOT analysis.

Strengths	Weaknesses
• Great demand for organic flaxseed and oil (bio-health foods) • Large production capabilities • Limited competition • Higher prices	• Lack of Greek seed production • Free import of seeds from EU • Lack of expertise • Increased labour costs
Opportunities	**Threats**
• Development opportunities • Higher profit	" It needs large fields in order to be profitable

7 PRODUCTS AND SERVICES

7.1 Products and services description

Our product for the first two years will be flaxseed and after the third year our final product would be flaxseed oil. Flaxseed has a long history of medicinal use, its main effects being as a laxative and expectorant that soothes irritated tissues, controls coughing and relieves pain. An infusion of the seed contains a good deal of mucilage and is a valuable domestic remedy for coughs, colds and inflammation of the urinary organs. The oil in the seed contains *4%* Lglutamic acid, which is used to treat mental deficiencies in adults. Also, it has been found to contain various anticancer agents. Flaxseed oil is an excellent source of the omega-3 fatty acid linolenic acid with typical levels of *55%* in the oil making it ideal for paints, varnishes, and inks due to its fast polymerization properties. Increasing demand for edible oil sources with significant percentages of omega-3 fatty acids is resulting in consumption of flaxseed as a *functional food*. Furthermore, flaxseed contains alpha-linolenic acid, a fatty acid that is related to the healthy growth of children, prevent heart disease, thrombosis, hypertension, inflammation and autoimmune disorders.

At the end of the 5th year we are going to use part of our profits for establishing our own oil extraction and bottling installation in order to produce the oil by ourselves and increase our profits as the price of flaxseed oil is at least twice the price of the flaxseed.

8 PRODUCTION PROCESS

8.1 Production process description

Our product for the first two years is flaxseed seed for oil extraction, and from the 3rd year until the end of the 5th year we will produce flaxseed oil by using others oil extraction installations (10% fee). At the end of the 5th year we will purchase our own flaxseed oil extraction and bottling installation and we will produce, bottle and sell our own flaxseed oil without paying any fee. For all the above we will follow the following procedure steps:

1 Soil preparation

2 Sowing

3 Basic organic fertilization

4 Weeding

5 Harvesting

6 Oil extraction (after the end of the 5th year)

7 Bottling (after the end of the 5th year)

7.1 Raw materials supply

After conducting market research we found that Agrogen S.A. (http://www.agrogen.gr) would be our major supplier and various bio-shops and merchants our major client.

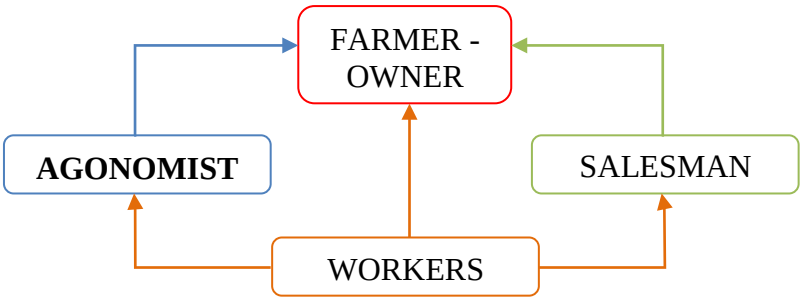
7.2 Production staff

The staff that we are going to need is the following:

- One agronomist (family member)
- One salesman (family member)
- 3-5 workers (mainly family members, and basic salary for the others)

7.3 Business Chart

The following Graph presents the simple Business Chart of our cultivation/business (Graph 1).



Graph 10: Business Chart.

7.4 Analysis of production equipment / Procurement cost / Payments settlement / Government aid for the purchase

For our cultivation we will need the following equipment:

- One (1) Tractor - 80 HP: new: 20.170 € / used: 7.904 € / rent: 1.000 €/per year.
- One (1) Disk harrow - 24 disks: new: 2.540 € / used: 1.250 € / rent: 272 €/ per year.
- One (1) Seeder – 14 lines: new: 4.850 €new / used: 1127 € / rent: 558 €/ per year
- One (1) Plow: new: 1.740 € / used: 890 € / rent: 170 €/ per year.
- Other equipment (hoe, backup sprayers etc.): 350 €.

Apart from our own funds and bank loan, we can make our papers for government aid through ESPA programs for young farmers or entrepreneurs.

8 STRATEGY IN ACCORDANCE WITH THE MARKET MIX

8.1 Determination of sales prices

Not applicable

8.2 Sales and distribution strategy

Not applicable

9 FINANCIAL ANALYSIS

Our financial analysis (Tables 3, 4, 5, 6, 7, 8 and 9) is based on the following conditions and objectives:

- No land (field) is owned by the person.
- No own funds are available (equity is 0 € including working capital).
- Required initial capital is 14.000 €.

- Loan needed is 14.000 € (7.5% interest rate / 5 years loan / no grace period).

Table 16: Information of flaxseed's cultivation.

INFORMATION OF FLAXSEED'S CUTLIVATION	
Own land (hectares)	0
Rented land (hectares)	10
Total land	**10**
Land rent (€/hectare/per year)[8]	437,50
Total rent (€/per year)	**4375**
Land value (€/hectare)	10.690
Total land value (€)	**106.900**
Seeds sales price (€/Kgr)	1,5 (conventional 1st year) 2 (transitional organic 2nd year) 2,5 (full organic 3rd year)
Seed production (Kgr/hectare)	2.200
Total seed production (Kgr)	**22.000**
Oil sales price (€/Kgr)	5,85 (full organic 3rd year with others oil extraction installation) 6,5 (full organic 3rd year with own oil extraction installation)
Oil production (Kgr/hectare)	900
Total oil production (Kgr)	**9.000**
Subsidy (€/hectares)	600
Total subsidy (€)	**6000**
Hourly wage (€)[9]	2,92

[8] Based on Greek average land rental cost. [9] Based on basic salary

Table 17: Number of working hours and working hour's costs of flaxseed's cultivation (1st to 5th year).

				DURATION OF USE			CURRENT VALUE	
Machinery	Replacement Value (€)	Residual value (€)	Total productive life (years)	Age of machinery (years)	Years left	Annual depreciation	Year start	End year
Tractor - 80 HP (used)	5.904,00	295,20	15	10	5	1.121,76	5.904,00	4.782,24
Disk harrow - 24 disks (used)	1.476,00	73,80	15	10	5	280,44	1.476,00	1.195,56
Seeder – 14 lines (used)	702,00	35,10	15	10	5	133,38	702,00	568,62
Plow (used)	4.736,00	236,80	15	10	5	899,84	4.736,00	3.836,16
Irrigation System (elastics, nozzles, filters, valves etc.)	2.800,00	0,00	5	1	4	700,00	2.800,00	2.100,00
TOTAL	*15.618*	*641*	-	-	-	*3.135,42*	*15.618,00*	*12.482,58*
Average invested capital in agricultural machinery				*14.050,29*				
Average invested farming capital				*120.950,29*				
Average invested capital of owned farming				*14.050,29*				

	NUMBER OF WORKING HOURS[9]			WORKING HOURS COST (€)		
LABOUR CATEGORY	Family (own)	Paid	Total	Family (own)	Paid	Total
Field preparation	70	0	70	205,00	0	205,00
Sowing cost	30	10	40	88,00	29,00	117,00
Basic fertilisation	30	0	30	88,00	0	88,00
Weeding cost	400	585	985	1168,00	1708,00	2.876,00
Collection cost	30	30	60	88,00	88,00	176,00
Plant protection	50	50	100	146,00	146,00	292,00
Irrigation	100	80	180	292,00	234,00	526,00
Other Costs	1.000	0	1.000	2.920,00	0	2.920,00
TOTAL	1.710	755	2.465	4.995,00	2.205,00	7.200,00

Table 18: Table calculation of Annual Depreciation (1st to 5th year).

Table 19: Table calculation of Annual Expenditure (1st year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	4.993,20	0,00	4.993,20	0,00	4.993,20
b) Foreign labor remuneration	2.204,60	2.204,60	0,00	2.204,60	0,00

[9] FEK 1181/09.06.2011.

c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	269,92	0,00	269,92	0,00	269,92
TOTAL	*7.917,72*	*2.204,60*	*5.713,12*	*2.654,60*	*5.263,12*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	2.850,00	2.850,00	0,00	2.850,00	0,00
2) E.L.G.A	990,00	990,00	0,00	990,00	0,00
3) Third-party services	3.450,00	3.450,00	0,00	3.450,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	385.88	385.88	0,00	0,00	385,88
TOTAL	*10.675,88*	*10.675,88*	*0,00*	*10.290,00*	*385,88*
TOTAL PRODUCTION CREDITS	27.716,09	12.880,48	14.835,62	22.043,15	5.672,94

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 20: Table calculation of Annual Expenditure (2nd year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*

2) Labour					
a) Family labor remuneration	4.993,20	0,00	4.993,20	0,00	4.993,20
b) Foreign labor remuneration	2.204,60	2.204,60	0,00	2.204,60	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	269,92	0,00	269,92	0,00	269,92
TOTAL	*7.917,72*	*2.204,60*	*5.713,12*	*2.654,60*	*5.263,12*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	2.850,00	2.850,00	0,00	2.850,00	0,00
2) E.L.G.A	1.320,00	1.320,00	0,00	1.320,00	0,00
3) Third-party services	3.450,00	3.450,00	0,00	3.450,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	398,25	398,25	0,00	0,00	398,25
TOTAL	*11.018,25*	*11.018,25*	*0,00*	*10.620,00*	*398,25*
TOTAL PRODUCTION CREDITS	28.058,47	13.222,85	14.835,62	22.373,15	5.685,32

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 21: Table calculation of Annual Expenditure (3nd to 5th year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00

b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	4.993,20	0,00	4.993,20	0,00	4.993,20
b) Foreign labor remuneration	2.204,60	2.204,60	0,00	2.204,60	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	269,92	0,00	269,92	0,00	269,92
TOTAL	*7.917,72*	*2.204,60*	*5.713,12*	*2.654,60*	*5.263,12*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	2.850,00	2.850,00	0,00	2.850,00	0,00
2) E.L.G.A	1.579,50	1.579,50	0,00	1.579,50	0,00
3) Third-party services	3.450,00	3.450,00	0,00	3.450,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	407,98	407,98	0,00	0,00	407,98
TOTAL	*11.287,48*	*11.287,48*	*0,00*	*10.879,50*	*407,98*
TOTAL PRODUCTION CREDITS	28.327,70	13.492,08	14.835,62	22.632,65	5.695,05

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 22: Table calculation of Financial Results.

FINANCIAL RESULTS	AMOUNT

	1st year	2nd year	3rd year	4th year	5th year
Gross Revenue	39.000,00 €	50.000,00 €	58.650,00 €	58.650,00 €	58.650,00 €
Net Profit	11.283,91 €	21.941,53 €	30.322,30 €	30.322,30 €	30.322,30 €
Gross Profit	26.119,53 €	36.777,15 €	45.157,92 €	45.157,92 €	45.157,92 €
Agricultural Producer Income	16.956,85 €	27.626,85 €	36.017,35 €	36.017,35 €	36.017,35 €
Net Revenue or Capital Revenue	17.388,65 €	28.058,65 €	36.449,15 €	36.449,15 €	36.449,15 €
Capital Efficiency	0,14	0,23	0,30	0,30	0,30
Net assets Revenue	13.013,65 €	23.683,65 €	32.074,15 €	32.074,15 €	32.074,15 €
Return on capital	0,93	1,69	2,28	2,28	2,28
Land Revenue	15.658,91 €	26.316,53 €	34.697,30 €	34.697,30 €	34.697,30 €
Labour Revenue	19.201,63 €	29.859,23 €	38.240,02 €	38.240,02 €	38.240,02 €
Product Production Cost	1,26 €/Kgr	1,28 €/Kgr	3,15 €/Kgr	3,15 €/Kgr	3,15 €/Kgr

10 Business plan conclusions

According to the financial analysis we come to the following conclusions:

- The cultivation will start being profitable from the end of the first (1st) year.
- Creation of oil extraction installation at the end of the 5th year.
- Use of produced flaxseed for extracting our own oil from the start of the 6th year.
- Selling flaxseed oil from the end 6th year.
- Increase of our profit from the 6th year.
- Rent and cultivate another 10 hectares after the end of the 6th year, when the bank loan will be repaid.

The results of the financial analysis, shows that the cultivation of organic flaxseed, is a an optimal opportunity for young people (farmers, unemployed etc.) to get involved to an area with few risks, as it needs small or no initial capital and no freehold land, and great profits. The Greek market as well as the Greek consumers is now mature enough to absorb all the production, as they are fully informed about the positive effects of the flaxseed and oil at human diet. Based on the above, we come to the conclusion that the cultivation of organic flaxseed is a «business» (engagement) with optimal prospects for a viable future.

BUSINESS PLAN OF SESAME CULTIVATION

GENERAL INFORMATION OF THE BUSINESS

Business name: Sesame Field

Sector: Agriculture

Business Scope: Sesame cultivation

Year of establishment: 2016

Legal Status Enterprise: Farmer (Freelancer)

SUMMARY DATA OF BUSINESS PLAN

Scope of our business plan is to cultivate organic sesame, used for its seed and oil for human consumption. As we aim mainly at young unemployed people we have created a business plan based on no initial capital available (except from a small bank loan of 14.000 €) and no owned land available. For out cultivation we will rent a flat, 10 hectares field with good soil and weather conditions. We have no initial capital available and we have to depend on a small bank loan. Our target group consists mainly of processors, merchants, bio-shops and consumers of domestic and foreign markets. The business will be a family business and apart from the small number of workers, we will use the help of most of the family members. The product produced is organic as we follow all the necessary rules and regulations of certification organizations. Many of the business plan parts, referring to a small to medium size business, do not respond to our case, as our business is not a typical business but a primary production business without a standard business chart. Finally, our business plan is a ten year plan, taking account all the necessary information for the establishment of a successful business.

9 SCOPE AND SHORT DESCRIPTION OF BUSINESS

Our scope is to cultivate organic sesame for both its seed and oil, which are used for human consumption. Some important general information about the sesame cultivation can be summarized at the following:

- Plan characteristics: Sesame (*Sesamum indicum*) is a broadleaf summer crop that belongs to the Pedaliaceae plant family which has bell-shaped flowers and opposite leaves. When planted early and under high moisture and fertility conditions, sesame can reach 4-6 feet in height. In dryland conditions, it is generally 3-5feet, depending on rainfall. Some varieties are single stemmed and others have branches. The fruiting form of sesame is a capsule, often called pods. They have divided sections much like a cotton boll. Some varieties have a single capsule per leaf axil and others have triple capsules per leaf axil. Flowering starts about 35-45 days after planting and stops 7585 days after planting. The seed is produced in these capsules with about 70 seeds per capsule. The first capsule is 1-2ft from ground. Physiological maturity (PM) normally occurs 95-110 days after planting. The plant is very leafy but will self-defoliate at maturity.

- Climate conditions: Because sesame is of tropical origin, it performs best in areas where temperatures remain high throughout the growing season of 110 to 150 frostfree days. Seed do not germinate well when soil temperatures are below 21°C, and plant growth is retarded by cool temperatures even after the stand is established. Growth and fruiting are favored with average daily temperatures in the range of 30 to 33°C. Sub-optimum temperatures during planting and germination are a common issue when trying to plant as early as possible. Early literature indicated that capsule set is usually poor during periods of extremely hot weather when maximum temperatures exceed 41°C. The plant will shed blooms if it is stressed for moisture. If it has been stressed for moisture and is irrigated late, some varieties will shed blooms for several days. Sesame leaves are killed by temperatures slightly above the freezing point. A hard freeze may impact green plants with high moisture content.

  Initiation of flowering is sensitive to photoperiod and varies among varieties. The oil content of the seed tends to increase with increased photoperiod. Because protein content and oil content

are inversely proportional, seed with increased oil content has decreased protein content.

Sesame is very drought-tolerant, due in part to an extensive root system. However, it requires adequate moisture for germination and early growth and a minimum rainfall of 500 to 660 mm per season is necessary for reasonable yields. Moisture levels before planting and flowering have the greatest impact on yield. Sesame is intolerant of water-logging. Rainfall late in the season prolongs growth and increases shattering losses. Wind can cause shattering at harvest and is cited as one reason for the failure of commercial sesame production in many countries.

- Tillage: Good land preparation is essential for a good stand since the sesame seed is small. Conventional tillage has its advantages as well as cautions to be aware of. Sesame is a deep-rooted crop, and hardpans will reduce yields. Deep tillage breaks hardpans in the root zone but, deep tillage, just before planting, is highly discouraged. Deep tillage should be done with sufficient time for rainfall or other seedbed firming equipment to prepare the seedbed for proper planting conditions. Clean tilling increases soil temperatures, insures a weed free environment to start the crop, and removes residue that may tie up herbicides. Planting into soft tilled soils may result in seed drift. Sesame is small enough to move considerably in large fractures in the soil when not using much down pressure on planting units or covering systems. In conventional tilled ground, a shallow mulching is recommended to get rid of weeds from the seedbed and seal in moisture. The mulch should be as shallow as possible to keep the moisture near the surface and prevent soil from blowing. A light irrigation or shower after the shallow mulching is beneficial to firm the seedbed as well. Understanding the depth of the moisture is critical.

- Planting Date: In general, Sesame is planted 2 to 3 weeks later than cotton or grain sorghum. In areas with long growing seasons and adequate summer rainfall or irrigation water, sesame planted in June or July. A good rule of thumb is not to plant until at least a month after the last killing frost in the spring. However, soil temperature is a better indicator of when to plant. Sesame is small seeded and can be drilled or row planted. Planters adapted for vegetable seeds may work best while small grain planters must be adapted for low planting rates. Stand establishment is sensitive and a good firm moist seedbed is best.

No matter what equipment is used, the overall goal is to place the seed in moisture (the seed needs to have moisture around it for 3 days - late planting, to 5 days - early planting), minimize seed depth to reduce the amount of time for emergence, and yet place the seed deep enough to ensure the seed will not dry out before emergence. In most cases, this can be described by placing the seed 1.5 to 3.5cm below the surface. The sesame seed is small and has less push than cotton, peanuts, wheat, sorghum or soybeans. It needs less cover and compaction than most other field crops.

Populations of 620.000 to 750.00 plants per hectare in 45 to 75cm rows have produced the highest recorded yields. This is about 8 to 10kgr per hectare for 55cm rows. The cheapest insurance for sesame is to plant enough seed the first time. Overseeding is much better than under-seeding. Sesame can adjust to the population. If the population is too high, it will self-thin itself in most situations. In low populations, it will branch more to fill the spaces.

Sesame varieties grown commercially require 90 to 110 days from planting to reach physiological maturity. The upper limit is for areas where there are lower heat units accumulated during the growing season. Another 20 to 40 days are needed to allow the plant to dry down for harvest. Approximately five frost-free months are needed for sesame production. Once the plant reaches physiological maturity, a frost will not hurt it, and it will actually help it to drydown quicker.

- Fertilization: Sesame is not a poor-land crop. Applying a balanced commercial fertilizer at planting time is required for satisfactory production on soils of low to moderate fertility. Fertilizer rates and ratios are similar to those recommended for cotton on the same soil. Side dressing with a nitrogen-bearing fertilizer may be necessary when growing plants are unthrifty and light green in color.

  Sesame will require approximately 50 to 90kgr of nitrogen per hectare on irrigated production and 37 to 80kgr of nitrogen per hectare on dryland production. A large amount of nitrogen is taken up by the plant during flowering and the crop responds well to foliar feeding. Apply phosphorus and potash according to soil test. High phosphorus levels in saline soils may decrease sesame yields.

- Irrigation: Sesame is one of the most drought tolerant crops in the world and should do well in areas of 400 to 45 mm of annual

precipitation. It will respond to irrigation if applied properly. It prefers fast, light irrigations (i.e., short runs or some slope). Excessive moisture is not beneficial and extended periods of rainfall and/or high humidity may cause leaf diseases. Plants standing in water for more than a few hours may be killed. Watering should be discontinued when flowering stops (70 – 80 days depending on variety). If a dry period occurs prior to planting plan on heavy preirrigation. Then follow with the next irrigation 4 to 5 weeks later. Three additional irrigation may be needed and application should be made every 7 to 12 days unless there is rain.

- Weed Control: There are no herbicides or pesticides labeled for sesame. In the absence of herbicides or clean fields, cultivation is the best option. Cultivation should be done at 3-4 weeks after planting before it gets too tall. Sesame tolerates throwing dirt up on the stalks - helps control small weeds coming in seed line and deepens irrigation furrow. If plants look yellow from cold or too much rain, cultivation will help green up sesame. The sesame roots follow moisture. If there is rain or a pivot is used in first few weeks after planting, the roots will grow laterally. Cultivating too close to the plant will cut the roots. Sesame can be cultivated when it is a little taller than tractor axle, but it should be done in afternoon when the plants are less turgid. The flowers will fall, but this is natural, and the whole fruit or young capsule is rarely knocked off by the tractor. Keep fields as clean as possible of wild cucumber, sunflower, and ground cherry. These seed are difficult to clean out of sesame. Sesame delivered with these seed is subject to price discounts.

- Pest Control: Diseases and insects do not cause much commercial damage on sesame, but they may increase when acreage increases. Bacterial leaf spot is most likely to cause trouble. Fusarium wilt can be a serious problem on fields previously planted in sesame. The current sesame varieties have tolerance to Fusarium. A fungicidal seed treatment is especially important for non-shattering varieties, because the planted seeds are slower to emerge than the shattering varieties. Since the seeds for these varieties spend more time in the soil before germination, they need more protection from fungal pathogens. Green peach aphid (cotton aphid does not affect sesame), thrips, grasshoppers, cutworms, and white fly are the most common insects attacking sesame. When the population of these insects is extended, plants may not set sufficient capsules.

- Harvest: Harvest date varies from September 15 to December 15, dependent on planting date, variety, and climate. Sesame is ready for harvest when the stalk dries down where it will be cut. For best yields, sesame must be harvested as soon as the crop is ready. The present shatter resistance varieties of sesame will hold the seed through 6 weeks of rain. The current problem is not with the shattering but rather with the deterioration of the plant which may result in lodging. Clean all harvest machinery and trucks for food crop. The settings of the combine are the most important and should allow for minimum seed damage. Since sesame seed is 50% oil, high broken seed reduces the grade. A slow cylinder speed with loose concaves is necessary for quality harvest. Check the combine bin often to determine the number of broken seed, a maximum of two broken seed per 100 is acceptable. Do not clean the seed completely with a combine, but run the seed through a processing machine for cleaning. It is easy to clean sesame seed and remove the trash with standard seedcleaning equipment. Protect seed from rain and dew in combine and trucks. Wet seed can heat up faster than most seed.

- Sorting - Grading: After harvesting, the seeds must be cleaned and hulled. The seeds pass through an air separation stage to remove any foreign particles. About 10% of this "cleaned natural seed" moves directly into food use as whole seed to be blended into flour for baked goods. Next, a combination of water and friction work together as the seeds are passed against the chamber of the hulling machine to separate the hull from the seeds. This dust-free de-hulled seed makes up 30% of domestic production and has 99.97% purity for the baked goods market. Once the seeds have been hulled, they are passed through an electronic color-sorting machine that rejects any discolored seeds to ensure perfectly colored sesame seeds. Immature or off-sized seed is removed but saved for oil production.

  Sesame oil is extracted by pressure in a mechanical expeller and is tolerant of only minimal heating by the extraction process. This pure, mechanically expressed oil is called “virgin” oil and is preferred by many food handlers. The oil is often blended with other vegetable oils for salads and other food uses. Sesame oil should be kept refrigerated. Sesame seeds can become rancid if exposed to prolonged heat. If properly stored, the packed seeds have a 2-year shelf life with little reduction in quality.

At this time we are at the beginning of our cultivation plan, as we only have available the field (10 hectares rented) and a small initial capital (bank loan 14.000 €).

10 BUSINESS OBJECTIVES

Our main objectives can be summarized at the following:

- Produce quality product which will lead to the creation of a strong brand name.
- Establish good relationships with our clients (processors, breeders and merchants).
- Achieve certain economic targets, such as:
  - The cultivation will start being profitable from the end of the second (2^{nd}) year. o Creation of oil extraction installation at the end of the 5^{th} year.
  - Use of produced sesame bean for extracting our own oil from the start of the 6^{h} year.
  - Selling sesame bean oil from the end 6^{th} year.
  - Increase of our profit from the 6^{th} year.
  - Rent and cultivate another 10 hectares after the end of the 6^{th} year, when the bank loan will be repaid.

11 FUNDING

At the following table (Table 14) we can see the available funding for our cultivation/business.

Table 23: Funding (5 year plan).

	YEAR				
FUNDING	1ο	2ο	3ο	4ο	5ο
Own funds	-	-	-	-	-
Bank loan (14.000€ loan - 7,5% Interest rate - 5 years)	14.000	-	-	-	-
Subsidy	6.000	6.000	6.000	6.000	6.000
TOTAL DEPRECIATION	20.000	6.000	6.000	6.000	6.000

12 ESTABLISHMENT PROCEDURES

For the organic cultivation of sesame seed we should follow the rules and regulations of organic certification organizations, and we will also need a license for GMO free products.

The required capital at incorporation for our business, including all the bureaucratic procedures and papers, is approximately 14.000 €, which can be found be a 5 year bank loan with 7,5% interest rate and no grace period.

13 COMPETITIVE ADVANTAGE

The cultivation of sesame is consider to be innovative, and in combination with the organic way of cultivation, we are going produce a "strong", innovative and with high demand product, giving us a great advantage in comparison to other farmers, who either grow non-organic sesame or other similar plants. Also, the constant increase of the worldwide demand for sesame oil, gives us the opportunity to sell all of our production, without having any of the problems that result from the failure to the whole production, such as the cost for the destruction or the storage of the remaining production.

14 MARKET

14.1 Market segmentation

Our target group consists mainly of processors, merchants, bio-shops and consumers of domestic and foreign markets, because of the nature of our product, which is used for its seed and oil extraction for human consumption.

14.2 Analysis of installation site

The field where we are going to plant our plants is a flat, 10 hectares field with soil and weather conditions appropriate for cultivating sesame and also access to water.

14.3 Competition

In Greece the cultivation of sesame is still in infant stage and only few farmers cultivate sesame and even fewer organic. Moreover, about 80% of sesame seed is imported, so our domestic competition is limited and this is a situation that we should exploit to our advantage, as our clients prefer domestic products. Our clients have

strong negotiation power, as they can turn to foreign competitive products, which can be cheaper as they are produced in larger scale and resulting the reduction of the production costs. On the other hand, our suppliers have weak negotiation power as we have a variety of suppliers that we can turn to.

14.4 Main features

Global production of sesame seed is 3.15 million tons per year. The largest producers are China and India, each with an annual harvest around 750.000tons followed by Myanmar (425.000tons) and Sudan (300.000tons). These figures are only rough estimates of the situation as sesame is a smallholder crop and much of the harvest is consumed locally, without record of the internal trade and domestic processing. In 2013, the total amount of sesame seeds imported in Europe amounted to 158 thousand tons and around 260 million €. Greece is the largest importer of sesame seed market in Europe (*25%* share in volume), accounting for 39 thousand tons/ 54.4 million € in 2013. This is due to the popularity of sesame seeds as an ingredient of the traditional Greek cuisine. The oilseed is in particular used as an ingredient for spreads such as tahini and halva, as well as in bakery and confectionery products. Almost all of Greek imports of sesame seeds (*98%*) originate directly from developing countries. On the other hand, Greece is the second largest exporter of sesame seeds in Europe. In 2013, it (re-)exported around 7 thousand tons / 7.2 million € of sesame seeds.

14.5 SWOT Analysis

The following Table (Table 15) presents the SWOT analysis of our cultivation/business.

Table 24: SWOT analysis.

Strengths	Weaknesses
• Great demand for organic sesame seed and oil (bio-health foods) • Large production capabilities • Limited competition • Higher prices	• Lack of Greek seed production • Free import of seeds from EU • Lack of expertise • Increased labour costs
Opportunities	**Threats**
• Development opportunities • Higher profit	" It needs large fields in order to be profitable

15 PRODUCTS AND SERVICES

15.1 Products and services description

Our product for the first two years will be sesame seed and after the third year our final product would be sesame oil Sesame is one of the world's most important oil seed crops. Not only is it a source of edible oil, but the seed itself provides a nutritious food for humans. One excellent characteristic of sesame oil is its resistance to oxidative deterioration. Its remarkable stability may be due to the presence of the endogenous antioxidants, sesamol and sesaminol, together with tocopherols. Sesame oil is rich in unsaturated fatty acids where the fatty acids composition is *14%* saturated, *39%* monounsaturated and *46%* poly-unsaturated fatty acids. Carbohydrates in sesame seed are composed of *3.2%* glucose, *2.6%* fructose and *0.2%* sucrose, while the remaining quantity is dietary fibers. Also, sesame seeds have desirable physiological effects including antioxidant activity, blood pressure and serum lipid lowering potential as proven in experimental animals and humans.

After the end of the second year we would use the sesame seed for extracting sesame oil, by using the oil extraction and bottling installation of others. At the end of the 5th year we are going to use part of our profits for establishing our own oil extraction and bottling installation in order to produce the oil by ourselves and increase our profits as the price of sesame oil is at least twice the price of the sesame seed.

16 PRODUCTION PROCESS

16.1 Production process description

Our product for the first two years is sesame seed for oil extraction, and from the 3rd year until the end of the 5th year we will produce sesame oil by using others oil extraction installations (10% fee). At the end of the 5th year we will purchase our own sesame oil extraction and bottling installation and we will produce, bottle and sell our own sesame oil without paying any fee. For all the above we will follow the following procedure steps: " Soil preparation

- Sowing
- Basic organic fertilization
- Weeding

- Harvesting
- Oil extraction (after the end of the 5th year)
- Bottling (after the end of the 5th year)

16.2 Raw materials supply

After conducting market research we found that **Agrogen S.A.** (http://www.agrogen.gr) would be our major supplier and **Pastelia Xaitoglou** (http://www.*haitogloubros.com*) our major client.

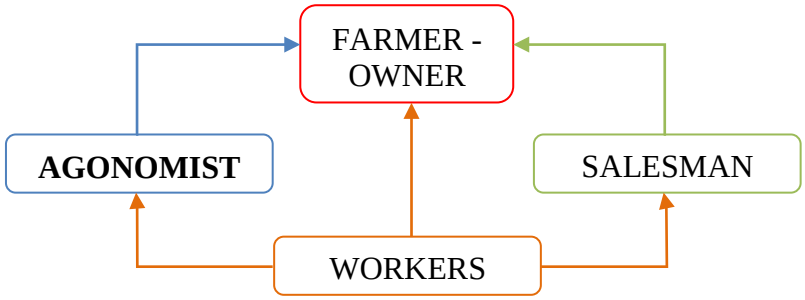
16.3 Production staff

The staff that we are going to need is the following:

- One agronomist (family member)
- One salesman (family member)
- 3-5 workers (mainly family members, and basic salary for the others)

16.4 Business Chart

The following Graph presents the simple Business Chart of our cultivation/business (Graph 1).



Graph 11: Business Chart.

16.5 Analysis of production equipment / Procurement cost / Payments settlement / Government aid for the purchase

For our cultivation we will need the following equipment:

- **One (1) Tractor - 80 HP:** new: 20.170 € / used: 7.904 € / rent: 1.000 €/per year.
- **One (1) Disk harrow - 24 disks:** new: 2.540 € / used: 1.250 € / rent: 272 €/ per year.
- **One (1) Seeder – 14 lines:** new: 4.850 €new / used: 1127 € / rent: 558 €/ per year
- **One (1) Plow: new:** 1.740 € / used: 890 € / rent: 170 €/ per year.
- **Other equipment (hoe, backup sprayers etc.):** 350 €.

Apart from our own funds and bank loan, we can make our papers for government aid through ESPA programs for young farmers or entrepreneurs.

17 STRATEGY IN ACCORDANCE WITH THE MARKET MIX

17.1 Determination of sales prices

Not applicable

17.2 Sales and distribution strategy

Not applicable

18 FINANCIAL ANALYSIS

Our financial analysis (Tables 3, 4, 5, 6, 7, 8 and 9) is based on the following conditions and objectives:

- No land (field) is owned by the person.
- No own funds are available. (equity is 0 € including working capital).
- Required initial capital is 14.000 €.
- Loan needed is 14.000 € (7.5% interest rate / 5 years loan / no grace period).

Table 25: Information of Sesame's cultivation.

INFORMATION OF SESAME'S CUTLIVATION	
Own land (hectares)	0
Rented land (hectares)	10
Total land	10
Land rent (€/hectare/per year)[10]	437,50
Total rent (€/per year)	4375
Land value (€/hectare)	10.690
Total land value (€)	106.900

[10] Based on Greek average land rental cost. [12] Based on basic salary

Seeds sales price (€/Kgr)	1,3 (conventional 1st year) 1,4 (transitional organic 2nd year) 1,55 (full organic 3rd year)
Seed production (Kgr/hectare)	1.700
Total seed production (Kgr)	17.000
Oil sales price (€/Kgr)	3,24 (full organic 3rd year with others oil extraction installation) 3,96 (full organic 3rd year with own oil extraction installation)
Oil production (Kgr/hectare)	750
Total oil production (Kgr)	7.500
Subsidy (€/hectares)	600
Total subsidy (€)	6000
Hourly wage (€)[12]	2,92

				DURATION OF USE			CURRENT VALUE	
Machinery	Replacement Value (€)	Residual value (€)	Total productive life (years)	Age of machinery (years)	Years left	Annual depreciation	Year start	End year
Tractor - 80 HP (used)	5.904,00	295,20	15	10	5	1.121,76	5.904,00	4.782,24
Disk harrow - 24 disks (used)	1.476,00	73,80	15	10	5	280,44	1.476,00	1.195,56
Seeder – 14 lines (used)	702,00	35,10	15	10	5	133,38	702,00	568,62
Plow (used)	4.736,00	236,80	15	10	5	899,84	4.736,00	3.836,16
Irrigation System (elastics, nozzles, filters, valves etc.)	2.800,00	0,00	5	1	4	700,00	2.800,00	2.100,00
TOTAL	*15.618*	*641*	-	-	-	*3.135,42*	*15.618,00*	*12.482,58*
Average invested capital in agricultural machinery (euros)				*14.050,29*				
Average invested farming capital (euros)				*120.950,29*				

Table 26: Number of working hours and working hour's costs of Sesame's cultivation (1st to 5th year).

	NUMBER OF WORKING HOURS[11]			WORKING HOURS COST (€)		
LABOUR CATEGORY	Family (own)	Paid	Total	Family (own)	Paid	Total
Field preparation	70	0	70	205,00	0	205,00
Sowing cost	30	10	40	88,00	29,00	117,00
Basic fertilisation	30	0	30	88,00	0	88,00
Weeding cost	600	920	1520	1.752,00	2686,00	4.438,00
Collection cost	30	0	30	88,00	88,00	176,00
Plant protection	30	30	60	146,00	146,00	292,00
Irrigation	100	80	180	292,00	234,00	526,00
Other Costs	1.000	0	1.000	2.920,00	0	2.920,00
TOTAL	1.910	1.090	2.900	5.579,00	3.183,00	8.557,00

Table 27: Table calculation of Annual Depreciation (1st to 5th year).

Average invested capital of owned farming(euros)	*14.050,29*

[11] FEK 1181/09.06.2011.

Table 28: Table calculation of Annual Expenditure (1st year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	5.577,20	0,00	5.577,20	0,00	5.577,20
b) Foreign labor remuneration	3.182,80	3.182,80	0,00	3.182,80	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	328,50	0,00	328,50	0,00	328,50
TOTAL	*9.538,50*	*3.182,80*	*6.355,70*	*3.632,80*	*5.905,70*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	3.000,00	3.000,00	0,00	3.000,00	0,00
2) E.L.G.A	663,00	663,00	0,00	663,00	0,00
3) Third-party services	3.450,00	3.450,00	0,00	3.450,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	379,24	379,24	0,00	0,00	379,24
TOTAL	*10.492,24*	*10.492,24*	*0,00*	*10.113,00*	*379,24*

TOTAL PRODUCTION CREDITS	29.153,24	13.367,08	15.478,20	22.844,35	6.308,89

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 29: Table calculation of Annual Expenditure (2nd year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	5.577,20	0,00	5.577,20	0,00	5.577,20
b) Foreign labor remuneration	3.182,80	3.182,80	0,00	3.182,80	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	328,50	0,00	328,50	0,00	328,50
TOTAL	*9.538,50*	*3.182,80*	*6.355,70*	*3.632,80*	*5.905,70*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	3.000,00	3.000,00	0,00	3.000,00	0,00
2) E.L.G.A	719,10	719,10	0,00	719,10	0,00
3) Third-party services	3.450,00	3.450,00	0,00	3.450,00	0,00

4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	381,34	381,34	0,00	0,00	381,34
TOTAL	*10.550,44*	*10.550,44*	*0,00*	*10.169,10*	*381,34*
TOTAL PRODUCTION CREDITS	29.211,44	13.733,24	15.478,20	22.900,45	6.310,99

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 30: Table calculation of Annual Expenditure (3nd to 5th year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	5.577,20	0,00	5.577,20	0,00	5.577,20
b) Foreign labor remuneration	3.182,80	3.182,80	0,00	3.182,80	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	328,50	0,00	328,50	0,00	328,50
TOTAL	*9.538,50*	*3.182,80*	*6.355,70*	*3.632,80*	*5.905,70*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					

1) Consumables	3.000,00	3.000,00	0,00	3.000,00	0,00
2) E.L.G.A	729,00	729,00	0,00	729,00	0,00
3) Third-party services	3.450,00	3.450,00	0,00	3.450,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	381,71	381,71	0,00	0,00	381,71
TOTAL	*10.560,71*	*10.560,71*	*0,00*	*10.179,00*	*381,71*
TOTAL PRODUCTION CREDITS	29.221,71	13.743,51	15.478,20	22.910,35	6.311,36

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 31: Table calculation of Financial Results.

FINANCIAL RESULTS	AMOUNT				
	1st year	2nd year	3rd year	4th year	5th year
Gross Revenue	28.100,00 €	29.970,00 €	30.300,00 €	30.300,00 €	30.300,00 €
Net Profit	- 1.053,24 €	758,56 €	1.078,29 €	1.078,29 €	1.078,29 €
Gross Profit	14.424,96 €	16.236,76 €	16.556,49 €	16.556,49 €	16.556,49 €
Agricultural Producer Income	5.255,65 €	7.069,55 €	7.389,65 €	7.389,65 €	7.389,65 €
Net Revenue or Capital Revenue	5.103,45 €	6.917,35 €	7.237,45 €	7.237,45 €	7.237,45 €
Capital Efficiency	0,04	0,06	0,06	0,06	0,06
Net assets Revenue	728,45 €	2.452,35 €	2.862,45 €	2.862,45 €	2.862,45 €
Return on capital	0,05	0,18	0,20	0,20	0,20
Land Revenue	3.321,76 €	5.133,56 €	5.453,29 €	5.453,29 €	5.453,29 €
Labour Revenue	8.485,26 €	10.297,06 €	10.616,79 €	10.616,79 €	10.616,79 €
Product Production Cost	1,71 €/Kgr	1,72 €/Kgr	3,90 €/Kgr	3,90 €/Kgr	3,90 €/Kgr

19 Business plan conclusions

According to the financial analysis we come to the following conclusions:

- The cultivation will start being profitable from the end of the second (2nd) year.
- Creation of oil extraction installation at the end of the 5th year.
- Use of produced sesame bean for extracting our own oil from the start of the 6th year.
- Selling sesame bean oil from the end 6th year.
- Increase of our profit from the 6th year.
- Rent and cultivate another 10 hectares after the end of the 6th year, when the bank loan will be repaid.

The results of the financial analysis show that the cultivation of organic sesame, is a very good opportunity for young people (farmers, unemployed etc.) to get involved to a area with few risks, as it needs small or no initial capital and no freehold land, and very good profits. The Greek market as well as the Greek consumers is now mature enough to absorb all the production, as they are fully informed about the positive effects of the sesame seed and oil at human diet. Based on the above, we come to the conclusion that the cultivation of organic sesame is a «business» (engagement) with very good prospects for a viable future.

GENERAL INFORMATION OF THE BUSINESS

Business name: Soybean Field

Sector: Agriculture

Business Scope: Soybean cultivation

Year of establishment: 2016

Legal Status Enterprise: Farmer (Freelancer)

SUMMARY DATA OF BUSINESS PLAN

Scope of our business plan is to cultivate organic soybeans, used for their oil and flour for animal fodder. As we aim mainly at young unemployed people we have created a business plan based on no initial capital available (except from a small bank loan of 14.000 €) and no owned land available. For out cultivation we will rent a flat, 10 hectares field with good soil and weather conditions. We have no initial capital available and we have to depend on a small bank loan. Our target group consists mainly of processors, breeders and merchants of domestic and foreign markets. The business will be a family business and apart from the small number of workers, we will use the help of most of the family members. The product produced is organic as we follow all the necessary rules and regulations of certification organizations. Many of the business plan parts, referring to a small to medium size business, do not respond to our case, as our business is not a typical business but a primary production business without a standard business chart. Finally, our business plan is a ten year plan, taking account all the necessary information for the establishment of a successful business.

20 SCOPE AND SHORT DESCRIPTION OF BUSINESS

Our scope is to cultivate organic soybean mainly for its oil and secondary for its flour for use at fodder. Some important general information about the soybean cultivation can be summarized at the following:

- Plan characteristics: Soybean grown for seed production is an annual, leguminous, warm temperature, short-day plant, normally bushy and erects (upright growth habit). Usually plant height varies from 40 to 100cm, plants are much branched with welldeveloped roots, and each plant produces a number of small pods containing one to four rounds, usually yellow to black seeds. It has a round hairy stem with branches, and it varies in color according to the cultivar. The plants are categorized into determinate and indeterminate types. The determinate types are of short and terminate growth with the onset of flowering and the growth tips end in a pod-bearing raceme. The harvesting can be done in one round because all pods usually ripen at the same time. The indeterminate types can grow to a height of about 70cm. They continue to grow vegetatively, they flower and they form pods resulting in seeds or pods of different sizes that require manual harvesting at different times.

- Climate conditions: Temperature plays an important role in determining the rate at which soybean grow. Both high and below-optimum temperatures delay growth.

  Yields are adversely affected as temperatures rise above 30°C, while temperatures below 13°C for long periods during flowering stage inhibit flower and seed formation. Although 25°C can be considered the overall optimum temperature for all growth stages, the response of the soybean differs at various growth stages. At planting time, soil temperatures must preferably be in the region of 15°C in order to stimulate germination. Young seedlings are easily damaged by excessively hot weather conditions. Very cold and very warm temperatures delay flowering or lead to flower abortion.

  Day length influences soybean growth (photo-period sensitivity), and different cultivars have specific daylight length requirements, meaning that a certain cultivar could be more or less restricted to a specific area.

  Rainfall of 500 to 900mm is required for better yields and better seed quality, depending on growth conditions. Because of its long root system, the soybean can tolerate dry conditions prior to flowering but adequate moisture becomes essential

once the buds are formed and until the pods have filled. Soybeans are susceptible to drought during the flowering and pod formation stages. They can also do well in warm, dry areas under irrigation. Excessive rainfall prior to and during flowering can result in luxuriant growth and increased lodging. Waterlogged conditions have a negative effect on the crop yield. Maximum seed yield is possible where water in the root zone is kept above 50% plant-available.

- Tillage: Soil preparation for soybeans must be done thoroughly to ensure a deep, loose seedbed. However, unnecessary tillage should be avoided because, besides being costly in terms of labor and money, every time soil is loosened, there will be a loss of moisture and soil structure. Soil must also be protected against loss through wind and water erosion—a concern that dictates the kind of tillage system and the time at which it is utilized. Tillage for soybeans can be divided into two basic approaches, namely conventional tillage and conservation tillage. Conventional tillage normally involves inversion of the tilled surface layer, which leaves the soil surface virtually free of crop residues. Conservation tillage, on the other hand, uses tillage implements that leave most of the soil surface covered by crop residues following planting. Crop residues on the soil surface provide protection against wind and water erosion and also conserve soil moisture. Large clods, furrows or ridges must be avoided in order to ease planting operation and ensure a good plant stand. Herbicides are more effective in a fine, well-prepared seedbed. The field should be free from water-logging, stone, excessive sand and weeds. The fields that were planted with leguminous crop in the same year should be avoided. If the field has a steep slope, contours or ridges and waterways channels should be constructed.

- Planting Date: Soybean must preferably not be planted before mean daily temperatures of 15°C to 18°C have been reached. Planting date is an important management tool to maximize yield potential. The highest yields of soybeans are obtained from early plantings. Planting date from early to mid - May is the most appropriate for optimum seed production in Greece. Later plantings are likely to incur significant reductions in yield. Row width plays an important role in weed control, plant health and yield. Seed should be planted at a soil depth of 3 to 5cm and should emerge within five to seven days after planting. Planting depth should be 2cm in clay soil and 5cm in sandy soil. Good seed-to-soil contact must be ensured for good emergence and the formation of a soil crust should be prevented. The spacing between the rows can range from 40 to 90cm and from 5 to 15cm between the plants in the rows. The spacing can also be determined by the method of irrigation or water availability. A population of 270.000 to 300.000 plants per hectare is generally recommended, depending on the yield potential of the area. The higher the yield potential of the area, the

higher is the plant population. Planting on ridges can also increase yield. A population of fewer than 300.000 plants per hectare on average is recommended under dry climatic conditions, but a denser population than this is recommended under conditions of relatively high rainfall.

- Rolling: Rolling helps conserve moisture and prepare the field for harvest. Besides, can help level the soil and push rocks into the ground, making it possible to do a better job combining. Some producers roll immediately after planting, while others wait until the soybeans have emerged. Rolling immediately after planting provides improved seed-to-soil contact and reduces the likelihood of plant injury. However, it also increases the chance of soil crusting, which hinders soybean emergence. Soybean fields that are not rolled after the drill often emerge more quickly and uniformly. If rainfall occurs after seeding, rolled fields are more prone to crusting. However, if conditions are very dry, rolling can improve emergence because moisture is conserved.

- Fertilization: The nutritional requirements of soybean are moderately high in comparison with other grains. Soybean consumes more phosphorus, potassium, magnesium and calcium than maize crops do. The soybean plant has a strong tap-root system and is able to use nutrients in the subsoil very effectively. Rotation with other highly fertilized crops and seed inoculation lower the ratio of the nutrients to be added to the soil. Fertilizer should be placed 10 to 15cm deep, below or to the side of the seed.

  The nitrogen requirement of soybean is met from the action of nitrogen fixation in the root nodules. Manure or commercial nitrogen fertilizer applied to soybean fields supplies a readily available supply of nitrogen, which soybeans will use prior to that provided by the rhizobia. Inoculants can be applied at planting time or as "preinoculants." Pre-inoculants are formulated to allow the bacteria to survive on the seed, making it possible to inoculate the seed well before planting. When soybeans are grown on land for the first time, inoculation with soybean rhizobia, Bradyrhizobium japonicum, is essential for high yields. The use of two different products or at least two different lots of the same product can improve the chances of good inoculation. This enables plants not only to fix nitrogen to meet their own requirements, but also to carry over 30 to 50kg of available nitrogen to the subsequent crop.

  Soybean responds very well to phosphorus and continues to absorb it right up to the stage when the beans reach their full size. The phosphate requirement of soybean is reduced and compound fertilizers are not recommended if the soybean is planted after well-fertilized crops, unless potassium is also required. Low yields are expected if available phosphorus is less than 30kg/ha. On the other hand, very high soil phosphate values may depress seed protein and oil contents, or induce zinc and iron deficiencies. In areas where no maize was

grown, 40kg/ha P_2O_5 is required in the early stage but less is required where fertilized maize was grown in the previous season.

Soybean requires a large amount of potassium during vegetative growth, with the highest concentration in the stems and leaves. A similar level occurs in the pods and the potassium content of the seeds is initially higher than at maturity. Potassium must therefore be more easily accessible to plants during rapid growth than in seed formation. The soil analysis will help in determining the amount of fertilizer required for obtaining better yield.

- Irrigation: Although soybean requires less water in the late reproductive growth stage, water is still essential for the translocation of nutrients from leaf and stem to the seeds. The method of irrigation will be determined by water availability, type of cultivar and the irrigation equipment available. The best methods are the sprinkler and drip irrigation. Irrigation systems are not 100% effective and more water must be applied to compensate for this deficit. Most soybeans are rainfed grown, the main factor limiting irrigation being profitability. In dry areas in underdeveloped countries, yield obtained under irrigation can be offset by drastically increased costs of production and aggravated where bulk and storage facilities are limited. Soybeans are sensitive to water shortage during the pod-set stage. Maximum seed yield is possible where water in the root zone is kept above 50% plant-available. A substantial preplanting irrigation which wets the soil from 60 to 100cm is recommended and moderately large amounts at longer intervals are preferred to frequent small applications. Irrigation at planting or three to four days later stimulates rapid germination and prevents possible crust formation. Adequate moisture during flowering stage will ensure that the maximum number of flowers will be fertilized and will produce pods. Shortage of water during late grain-filling stage can reduce yields by as much as 30%.

- Weed Control: Weeds can reduce yield, the degree of depression being related to the quantity of weeds and the growth stage of the crop. Young seedlings are unable to compete with many fast-growing weeds and their control at this stage is very important. Weeds usually have a fast growth rate and can easily deprive the soybean bean plant of moisture, minerals and light during the early growth stage. Every effort should be made to control weeds before planting. Mechanical cultivation is less damaging once the plants are 5 to 10cm high, although this should be done with judicious care to prevent soil from being thrown against the plant stems. After six to eight weeks, soybean can compete with all but the most persistent weeds, which may have to be removed by hand. Soybean depend more on the vertical root than on the lateral root, thus over-deep weeding is not damaging in terms of yield reduction. The closer the soybean spacing between the rows (30cm spacing), the lower will be the weed

depressions. The more sparsely the soybean rows, the higher the depression by weeds.

- Pest Control: Insect pests of soybean bean occur sporadically and can become economically important when large numbers build up. Regular inspections of the fields are necessary in order to facilitate the timeous identification of insect pests. Soybean beans are susceptible to various insect pests, which have a negative effect on yield and on the quality of the grains. Insect control is necessary when pods are damaged. Certain soybean bean cultivars are susceptible to root knot nematode; and the cultivation of these cultivars in soils with a high risk of nematode is not recommended. During the seedling stage, plants are attacked mainly by cutworms and large false wireworms.

  Soybean ισ susceptible to various viral and fungal diseases caused by different organisms. These diseases may result in low yield and poor quality of the grains and should be controlled from soil preparation until harvesting in order to obtain better yields. Integrated mechanisms such as chemical, mechanical, biological and other cultural practices can be used to control the diseases.

- Harvest: A delay in harvesting soybean can result in serious loss due to shattering. Harvesting should commence when most of the leaves have been shed and the moisture content of the seed falls below 15% but while the stems are still pliable. This can be done through moisture testing. Otherwise, experienced producers can detect maturity by the colour of the pods and the shattering ability. When soybean is ready for harvesting, pods will turn brown and shatter easily and the kernels will not yet be dry enough to break. Pods normally shatter when ripe, releasing the seeds, the rate and degree of shattering being varietal characteristics, and early or high shattering characteristics are detrimental in types harvested mechanically.

  Soybean beans are not suited to hand harvesting, stacking or wind rowing. The recommended harvesting method is to use a combine fitted with a soybean or wheat table. Self-propelled combines with a reasonable capacity should be able to harvest 14 hectares a day. When combining soybean beans, a slow drum speed (450-500 revolutions per minute) is required. The concaves must be set wider than for wheat and a slow ground speed (approximately 6km/h) must be used. The faster the drum speed, the more splits will occur. To further minimize losses, the combine must be adjusted as low as possible. The combine must cut the plants as close to the soil surface as possible in order to minimize the number of pods left behind. The maturity period is fairly short and the availability of the harvesting equipment is therefore crucial, especially when unfavorable weather conditions may be expected during the harvesting period.

- Sorting - Grading: After the soybean beans are harvested they must be sorted for the purpose of removing foreign materials and unwanted seeds. High quality soybean beans must be free from musty, sour, khaki-bush or other undesired odor, must be free from glass, metal, coal or dung, must contain no more noxious seeds, must be free from live insects irrespective of whether such insect occur in, on or among the soybean, must be free from a substance that renders it unfit for human or animal consumption or for processing into or utilization thereof as food or feed, must contain no chemical residues in excess of the prescribed maximum residue limit.

At this time we are at the beginning of our cultivation plan, as we only have available the field (10 hectares rented) and a small initial capital (bank loan 14.000 €).

21 BUSINESS OBJECTIVES

Our main objectives can be summarized at the following:

- Produce quality product which will lead to the creation of a strong brand name.
- Establish good relationships with our clients (processors, breeders and merchants).
- Achieve certain economic targets, such as:
  - The cultivation will start being profitable from the end of the first (1st) year.
  - After the end of the 6th year, when the bank loan will be repaid we could rent and cultivate another 10 hectares.

22 FUNDING

At the following table (Table 14) we can see the available funding for our cultivation/business.

Table 32: Funding (5 year plan).

	YEAR				
FUNDING	1ο	2ο	3ο	4ο	5ο
Own funds	-	-	-	-	-
Bank loan (14.000€ loan - 7,5% Interest rate - 5 years)	14.000	-	-	-	-
Subsidy	4.440	4.440	4.440	4.440	4.440
TOTAL DEPRECIATION	18.440	4.440	4.440	4.440	4.440

23 ESTABLISHMENT PROCEDURES

For the organic cultivation of soybean we should follow the rules and regulations of organic certification organizations, and we will also need a license for GMO free products.

The required capital at incorporation for our business, including all the bureaucratic procedures and papers, is approximately 14.000 €, which can be found be a 5 year bank loan with 7,5% interest rate and no grace period.

24 COMPETITIVE ADVANTAGE

The cultivation of soybean is consider to be innovative, and in combination with the organic way of cultivation, we are going produce a "strong", innovative and with high demand product, giving us a great advantage in comparison to other farmers, who either grow non-organic soybean or other similar plants. Also, the constant increase of the worldwide demand for soybean, gives us the opportunity to sell all of our production, without having any of the problems that result from the failure to the whole production, such as the cost for the destruction or the storage of the remaining production.

25 MARKET

25.1 Market segmentation

Our target group consists mainly of processors, breeders and merchants of domestic and foreign markets, because of the nature of our product, which is used for oil extraction and also as flour for use at fodder.

25.2 Analysis of installation site

The field where we are going to plant our plants is a flat, 10 hectares field with soil and weather conditions appropriate for cultivating soybean, especially high amounts of rainfall, and also access to water.

25.3 Competition

In Greece the cultivation of soybean is still in infant stage and only few farmers cultivate soybean and even fewer organic. Moreover, about 80% of the protein feedstuff is imported, so our domestic competition is limited and this is a situation that we should exploit to our advantage, as our clients prefer domestic products. Our clients have strong negotiation power, as they can turn to foreign competitive products, which can be cheaper as they are produced in larger scale and resulting the reduction of the production costs. On the other hand, our suppliers have weak negotiation power as we have a variety of suppliers that we can turn to. Finally, a great advantage of cultivating soybean is that the only substitute product is chickpea which in contrast to soybean has low yields.

25.4 Main features

Soybean is mainly cultivated in regions experiencing warm summer months, with dominant producers being the U.S. and Brazil, jointly accounting for about two thirds of the world's total produce. Argentina and China follow next in production capacity. Nowadays, the world's annual production is approaching a good 300 million tons, thus rendering soy as the dominant oilseed, globally. In Greece an area of 2.000 ha is harvested every year producing approximately 4.000 tons.

25.5 SWOT Analysis

The following Table (Table 15) presents the SWOT analysis of our cultivation/business.

Table 33: SWOT analysis.

Strengths • Great demand for organic soybean • Large production capabilities • Limited competition • Higher prices	Weaknesses • Lack of Greek seed production • Free import of seeds from EU • Lack of expertise
Opportunities • Development opportunities • Good profit	Threats " Mostly loss of production because of nature disasters

26 PRODUCTS AND SERVICES

26.1 Products and services description

Our product is Soybean, which has many uses. It is mainly pressed to extract soybean oil, after which a soybean meal remains and consists of a rich source of protein. Soybean oil can be used for the production of edible oils such as kitchen oil, salad oil and others through refining and deep processing and can also be used for the production of printing ink and biodiesel. Soybean meal is mainly used for the production of compound feed. It is the main protein source in feed for livestock farming. Soybean's oil content is approximately 20%, while its major by-product is soybean meal. Soybean meal is a rich source of calcium, iron, zinc, phosphorus and magnesium. It is also rich in protein (ingredients that exceed 44% of its total composition) and amino acids, rendering it as the primary and indispensable source of feed for all farmed animals.

27 PRODUCTION PROCESS

27.1 Production process description

Our product is soybean and for its production we follow a very simple and standard procedure, which can be summarized at the following steps:

- Soil preparation
- Sowing
- Basic organic fertilization
- Weeding
- Harvesting

27.2 Raw materials supply

After conducting market research we found that **Agrogen** S.A. (http://www.agrogen.gr) would be our major supplier and **Soybean Hellas** (http://www.soybeanhellas.gr/) our major client.

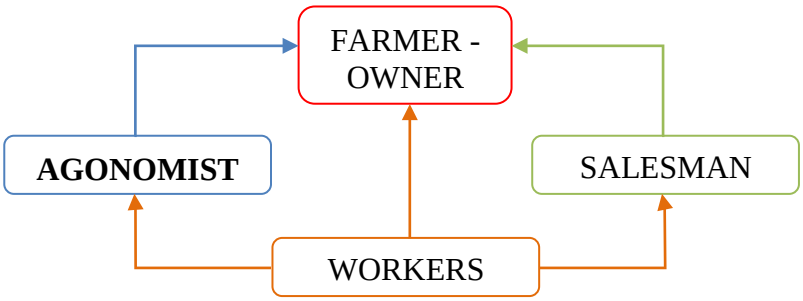
27.3 Production staff

The staff that we are going to need is the following:

- One agronomist (family member)
- One salesman (family member)
- 3-5 workers (mainly family members, and basic salary for the others)

27.4 Business Chart

The following Graph presents the simple Business Chart of our cultivation/business (Graph 1).



Graph 12: Business Chart.

27.5 Analysis of production equipment / Procurement cost / Payments settlement / Government aid for the purchase

For our cultivation we will need the following equipment:

- **One (1) Tractor - 80 HP:** new: 20.170 € / used: 7.904 € / rent: 1.000 €/per year.
- **One (1) Disk harrow - 24 disks:** new: 2.540 € / used: 1.250 € / rent: 272 €/ per year.
- **One (1) Seeder – 14 lines:** new: 4.850 €new / used: 1127 € / rent: 558 €/ per year
- **One (1) Plow: new:** 1.740 € / used: 890 € / rent: 170 €/ per year.

- Other equipment (hoe, backup sprayers etc.): 350 €.

Apart from our own funds and bank loan, we can make our papers for government aid through ESPA programs for young farmers or entrepreneurs.

28 STRATEGY IN ACCORDANCE WITH THE MARKET MIX

28.1 Determination of sales prices

Not applicable

28.2 Sales and distribution strategy

Not applicable

29 FINANCIAL ANALYSIS

Our financial analysis (Tables 3, 4, 5, 6, 7, 8 and 9) is based on the following conditions and objectives:

- No land (field) is owned by the person.
- No own funds are available. (equity is 0 € including working capital).
- Required initial capital is 14.000 €.
- Loan needed is 14.000 € (7.5% interest rate / 5 years loan / no grace period).

Table 34: Information of Soybean's cultivation.

INFORMATION OF SOYBEAN'S CUTLIVATION	
Own land (hectares)	0
Rented land (hectares)	10
Total land	10
Land rent (€/hectare/per year)[12]	437,50
Total rent (€/per year)	4375
Land value (€/hectare)	10.690
Total land value (€)	106.900

[12] Based on Greek average land rental cost. [15] Based on basic salary

Seeds sales price (€/Kgr)	0,48 (conventional 1st year) 0,58 (transitional organic 2nd year) 0,61 (full organic 3rd year)
Seed production (Kgr/hectare)	5.000
Total seed production (Kgr)	50.000
Subsidy (€/hectares)	444,00
Total subsidy (€)	4440
Hourly wage (€)[15]	2,92

Table 35: Number of working hours and working hour's costs of Soybean's cultivation (1st to 5th year).

				DURATION OF USE			CURRENT VALUE	
Machinery	Replacement Value (€)	Residual value (€)	Total productive life (years)	Age of machinery (years)	Years left	Annual depreciation	Year start	End year
Tractor - 80 HP (used)	5.904,00	295,20	15	10	5	1.121,76	5.904,00	4.782,24
Disk harrow - 24 disks (used)	1.476,00	73,80	15	10	5	280,44	1.476,00	1.195,56
Seeder – 14 lines (used)	702,00	35,10	15	10	5	133,38	702,00	568,62
Plow (used)	4.736,00	236,80	15	10	5	899,84	4.736,00	3.836,16
Irrigation System (elastics, nozzles, filters, valves etc.)	2.800,00	0,00	5	1	4	700,00	2.800,00	2.100,00
TOTAL	*15.618*	*641*	-	-	-	*3.135,42*	*15.618,00*	*12.482,58*
Average invested capital in agricultural machinery				*14.050,29*				
Average invested farming capital				*120.950,29*				
Average invested capital of owned farming				*14.050,29*				

	NUMBER OF WORKING HOURS[13]			WORKING HOURS COST (€)		
LABOUR CATEGORY	Family (own)	Paid	Total	Family (own)	Paid	Total
Field preparation	70	0	70	205,00	0	205,00
Sowing cost	30	10	40	88,00	29,00	117,00
Basic fertilisation	30	0	30	88,00	0	88,00
Weeding cost	250	220	470	730,00	642,00	1372,00
Collection cost	30	30	60	88,00	88,00	176,00
Plant protection	50	50	100	146,00	146,00	292,00
Irrigation	200	100	300	584,00	292,00	876,00
Other Costs	1.000	0	1.000	2.920,00	0	2.920,00
TOTAL	1.660	410	2.070	4.849,00	1.197,00	6.046,00

Table 36: Table calculation of Annual Depreciation (1st to 5th year).

Table 37: Table calculation of Annual Expenditure (1st year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	4.847,20	0,00	4.847,20	0,00	4.847,20
b) Foreign labor remuneration	1.197,20	1.197,20	0,00	1.197,20	0,00

[13] FEK 1181/09.06.2011.

c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	226,67	0,00	226,67	0,00	226,67
TOTAL	*6.721,07*	*1.197,20*	*5.523,87*	*1.647,20*	*5.073,87*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	4.100,00	4.100,00	0,00	4.100,00	0,00
2) E.L.G.A	630,00	630,00	0,00	630,00	0,00
3) Third-party services	4.000,00	4.000,00	0,00	4.000,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	439,88	439,88	0,00	0,00	439,88
TOTAL	*12.169,88*	*12.169,88*	*0,00*	*11.730,00*	*439,88*
TOTAL PRODUCTION CREDITS	28.013,44	13.367,08	14.646,36	22.475,75	5.537,69

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 38: Table calculation of Annual Expenditure (2nd year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00
b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*

2) Labour					
a) Family labor remuneration	4.847,20	0,00	4.847,20	0,00	4.847,20
b) Foreign labor remuneration	1.197,20	1.197,20	0,00	1.197,20	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	226,67	0,00	226,67	0,00	226,67
TOTAL	*6.721,07*	*1.197,20*	*5.523,87*	*1.647,20*	*5.073,87*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	4.100,00	4.100,00	0,00	4.100,00	0,00
2) E.L.G.A	870,00	870,00	0,00	870,00	0,00
3) Third-party services	4.000,00	4.000,00	0,00	4.000,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	448,88	448,88	0,00	0,00	448,88
TOTAL	*12.418,88*	*12.418,88*	*0,00*	*11.970,00*	*448,88*
TOTAL PRODUCTION CREDITS	28.262,44	13.616,08	14.646,36	22.715,75	5.546,69

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 39: Table calculation of Annual Expenditure (3nd to 5th year).

PRODUCTION CREDITS	Production Costs (€)	Variable Costs (€)	Fixed Costs (€)	Obvious Costs (€)	Hidden Costs (€)
1) Land					
a) Own land rent	0,00	0,00	0,00	0,00	0,00

b) Rent of foreign land	4.375,00	0,00	4.375,00	4.375,00	0,00
TOTAL	*4.375,00*	*0,00*	*4.375,00*	*4.375,00*	*0,00*
2) Labour					
a) Family labor remuneration	4.847,20	0,00	4.847,20	0,00	4.847,20
b) Foreign labor remuneration	1.197,20	1.197,20	0,00	1.197,20	0,00
c) Insurance of Agricultural Insurance Organisation (OGA)	450,00	0,00	450,00	450,00	0,00
d) Labour pay interest*	226,67	0,00	226,67	0,00	226,67
TOTAL	*6.721,07*	*1.197,20*	*5.523,87*	*1.647,20*	*5.073,87*
3) Capital					
a) Fixed capital					
1) Depreciation	3.135,42	0,00	3.135,42	3.135,42	0,00
2) Fixed Capital Interests	1.053,77	0,00	1.053,77	1.050,00	3,77
3) Maintenance	421,51	0,00	421,51	421,51	0,00
4) Insurance	116,62	0,00	116,62	116,62	0,00
5) Maintenance and Insurance Interest*	20,18	0,00	20,18	0,00	20,18
TOTAL	*4.747,50*	*0,00*	*4.747,50*	*4.723,55*	*23,95*
b) Circulatory capita					
1) Consumables	4.100,00	4.100,00	0,00	4.100,00	0,00
2) E.L.G.A	915,00	915,00	0,00	915,00	0,00
3) Third-party services	4.000,00	4.000,00	0,00	4.000,00	0,00
4) Overheads	3.000,00	3.000,00	0,00	3.000,00	0,00
5) Circulatory capital Interests*	450,56	450,56	0,00	0,00	450,56
TOTAL	*12.465,56*	*12.465,56*	*0,00*	*12.015,00*	*450,56*
TOTAL PRODUCTION CREDITS	28.456,56	13.662,76	14.646,36	22.760,75	5.548,38

***** Bank loan (14000€ loan - 7,5% Interest rate - 5 years)

Table 40: Table calculation of Financial Results.

FINANCIAL RESULTS	AMOUNT

	1st year	2nd year	3rd year	4th year	5th year
Gross Revenue	28.440,00 €	33.440,00 €	34.940,00 €	34.940,00 €	34.940,00 €
Net Profit	333,19 €	5.177,56 €	6.630,87 €	6.630,87 €	6.630,87 €
Gross Profit	14.979,55 €	19.823,93 €	21.277,24 €	21.277,24 €	21.277,24 €
Agricultural Producer Income	5.874,25 €	10.724,25 €	12.179,25 €	12.179,25 €	12.179,25 €
Net Revenue or Capital Revenue	6.452,05 €	11.302,05 €	12.757,05 €	12.757,05 €	12.757,05 €
Capital Efficiency	0,05	0,09	0,11	0,11	0,11
Net assets Revenue	2.077.05€	6.927,05 €	8.382,05 €	8.382,05 €	8.382,05 €
Return on capital	0,15	0,49	0,60	0,60	0,60
Land Revenue	4.708,19 €	9.552,56 €	11.005,87 €	11.005,87 €	11.005,87 €
Labour Revenue	7.054,25 €	11.898,63 €	13.351,94 €	13.351,94 €	13.351,94 €
Product Production Cost	0,56 €/Kgr	0,57 €/Kgr	0,57 €/Kgr	0,57 €/Kgr	0,57 €/Kgr

30 Business plan conclusions

According to the financial analysis we come to the following conclusions:

- The cultivation will start being profitable from the end of the first (1st) year.
- After the end of the 6th year, when the bank loan will be repaid we could rent and cultivate another 10 hectares.

The results of the financial analysis, shows that the cultivation of organic soybean, is a good opportunity for young people (farmers, unemployed etc.) to get involved to a area with few risks, as it needs small or no initial capital and no freehold land, and good profits. The Greek market is now mature enough to absorb all the soybean production, as it is informed about the positive effects of the soybean at animal feed. Based on the above, we come to the conclusion that the cultivation of organic soybean is a «business» (engagement) with good prospects for a viable future.