

The Importance of Agricultural Land Used in the Production of Agricultural Products in Greece

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Abstract

In Greece, agriculture plays a key role in supporting the socio-economic sustainability of rural areas, as this sector is the main user of agricultural land. In Greece, agriculture covers a large part of its territory. It accounts for about 30% of the total area. The total cultivated agricultural land (arable crops, horticultural land, permanent crops) amounts to 3,221,680 hectares compared to the 171,603,000 hectares of the EU-27. In 2018 the main crop groups per year were distributed as follows: 53.4% of cultivated area (1,719,600 hectares) was used for arable crops, 1.9% (61,890 hectares) for horticultural, 33.7% (1,085,100 hectares) for permanent crops and 11.0% (354,760 hectares) of arable land was under set-aside. 56% of arable land is located in lowland areas, while the rest is in mountainous or semi-mountainous areas. An important parameter for crop efficiency is the irrigated agricultural area. One-third of the arable land is irrigated. The highest irrigation rates (97%) are occupied by horticultural crops, 43% by arable land, 38% by tree crops and 36% by viticulture. The average size of agricultural holdings is less than 5.0 hectares and the number of large farms has increased. Thus, 76.0% of rural households have a size of less than 5 hectares, while less than 1% have a size of more than 50 hectares. It is worth noting that agriculture must take care of soil protection, water quality, natural resources because these are vital factors in ensuring the sustainability of humanity.

Keywords: Soil resources, Sustainable agriculture, Agricultural production.

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1. Introduction

The contribution of the agricultural sector in Greece has always been of considerable importance. Its role is multidimensional, covering many and sensitive sectors, both socio-economical and environmental. In the past it was a means of reviving the post-war economy of Greece, while in the current era of global economic crisis and pandemic COVID19 is also a stable means of growth. It participates in many indicators of the economy and affects it to a great extent. Agriculture's contribution to the economy is attained through the products produced and through the foreign exchange markets involved. In addition, it is a feeder of a range of products and services, determining both food self-sufficiency and food safety, producing better and safer food, regulating other sectors of the economy, such as processing and the country's trade balance. Sustainability of agricultural production is vital for humans because agriculture is the main food resource for the growing population. Soil is the quintessence of life and health for humanity. Soil fertility management and quality-health is the key to the development of sustainable agriculture (Simonis and Setatou, 2008). At the same time, agriculture has been implementing regulations in recent years, constantly regulating the preservation and protection of the environment. The participation of agriculture in the development of a country's economy depends on many factors, such as the country's national wealth, territory, its international relationships and the level of economic development. The larger the agricultural sector, the greater its participation in the economy. It is also a fact that as an economy develops, the participation of the agricultural sector decreases and this is due to the inelastic demand for agricultural income and the increase in agricultural inputs from non-agricultural sectors, as well as the increase in the share of expenditure of its products intended for processing, packaging and presentation.

2. Materials and Methods

In this paper, the statistical data used have come from the databases of the Hellenic Statistical Authority (HEL. STAT.), of the Ministry of Rural Development and Food and are supplemented with additional information from Eurostat and Feostat.

3. Results and Discussion

The importance of the primary sector is determined, based on its percentage participation in GDP. According to a survey by the General Confederation of Greek Workers, the percentage participation of the agricultural sector in the formation of GDP historically declines. The total contribution of agricultural production for 1951 was of the order of 29% of total GDP. However, agricultural production may have been on the rise, but over time its share in the country's GDP has been declining. During the last five decades, the contribution of the Greek agricultural sector to the Gross Domestic Product (GDP) has decreased from 15% to less than 5%. GDP decreased from 9.9% in 1995 to 7.3% in 2000 and then to 5.2% in 2006. The

contribution of the sector to the Greek economy is, however, more important than that of the European Union (EU) average. In addition, in Greece, agriculture plays a key role in supporting the socio-economic sustainability of rural areas, as this sector is the main user of agricultural land and employs about one third of the rural population. (Figure 1, 2).

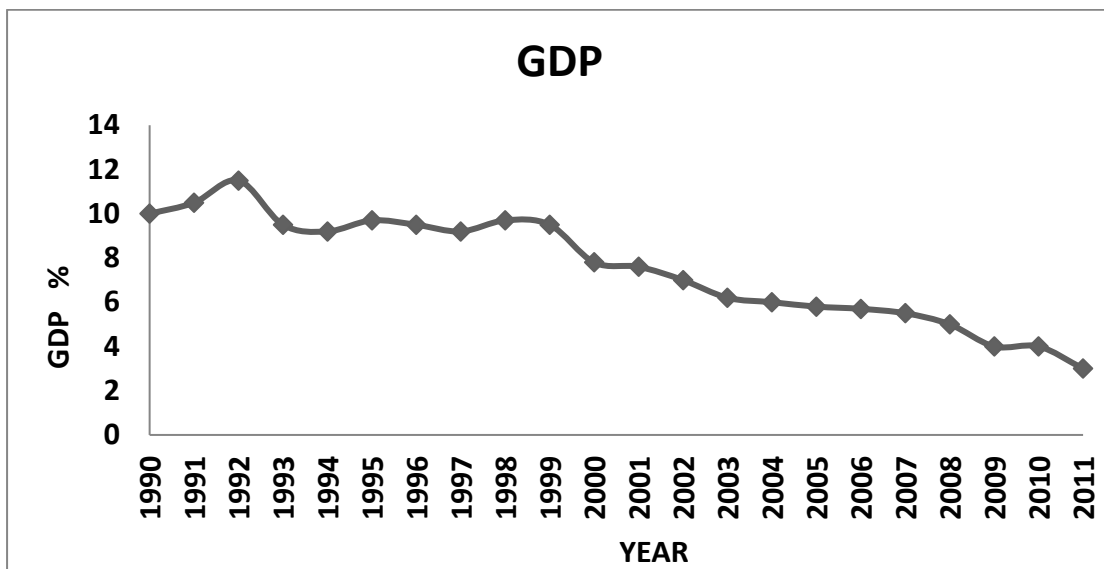


Figure 1: Percentage of the agricultural sector which participates in the GDP of the country

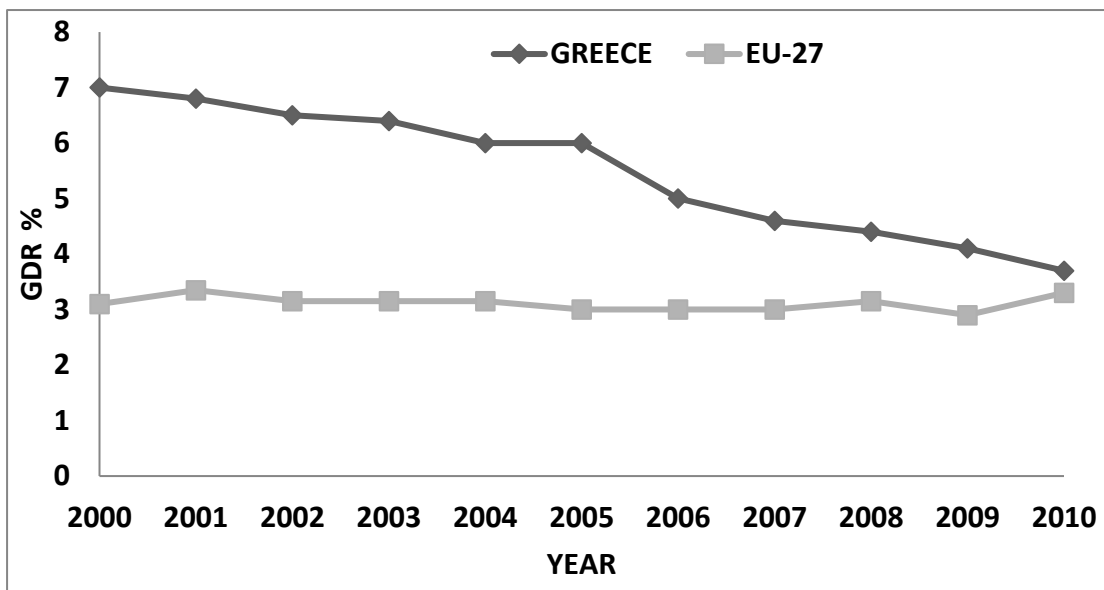


Figure 2: GDP in relation to all European countries

This is proved by the above Figure 2, which shows the great contribution of G.D.P. in relation to all European countries. Greece's entry into the European Union (EU) has greatly affected its entire economy and its effects are evident in agriculture. The participation of agriculture in Greece is decreasing every year. The share of the agricultural sector in the national economy varies in larger percentages than those of Europe. The arable land in Greece covers a large part of its territory. In 2018, the total cultivated agricultural land of the country (arable crops, horticultural land, permanent crops) amounts to 3,221,680 hectares, in approximately 31% of the total area, compared to 171,603,000 of EU-27, while forestry 50%, meadows 12%, wetlands 2%, cities, villages and infrastructure 4% and other remaining land uses (quarries, mines, etc) 2%. The total area of rural areas of the country is 82% compared to 57.6% of EU-27, and their population is 43% compared to 23% respectively. (Paschalidis, C. et al. 2020).

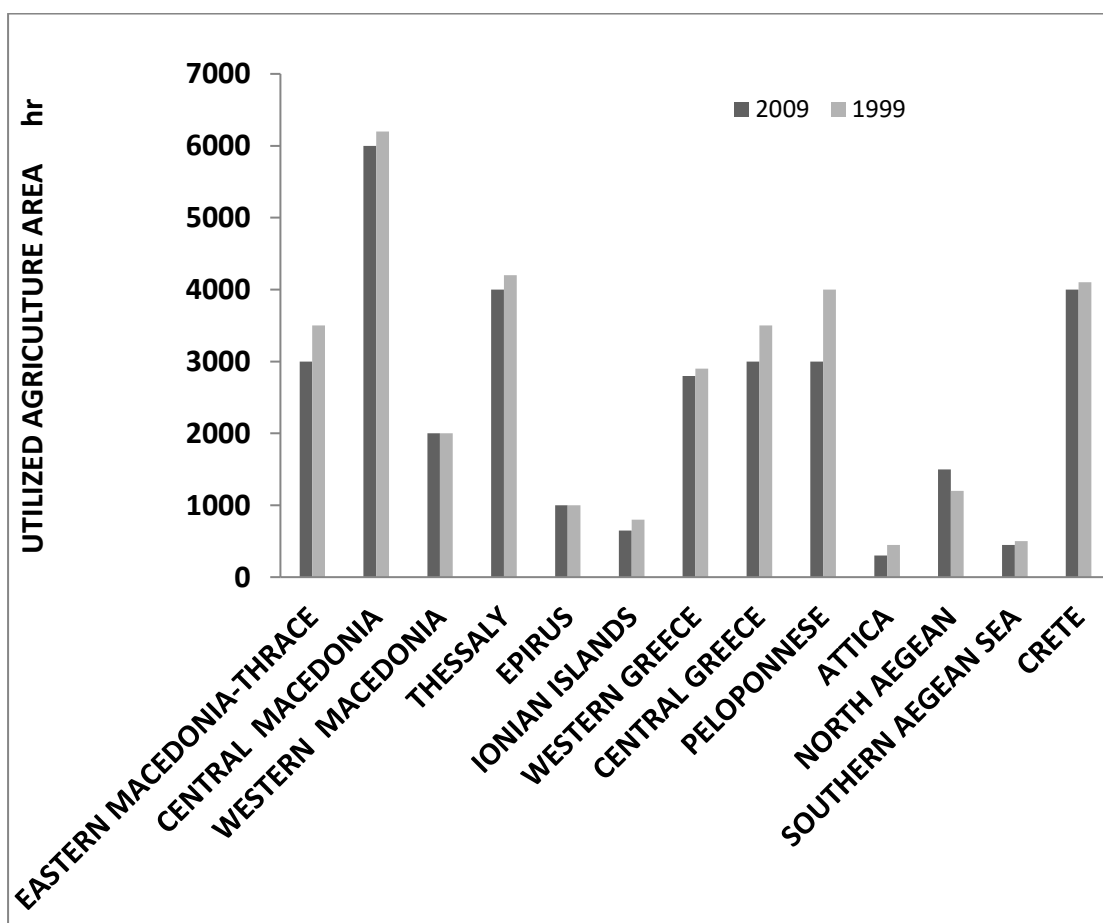


Figure 3: Utilized agricultural area by region

The above diagram shows the data for the used agricultural area by region. The largest agricultural areas are in Macedonia, Thessaly and Central Greece. It is worth noting that the cultivated land in Greece has decreased mainly due to the reductions in the production of cotton and tobacco, as well as cereals and oil crops. The cultivated areas of Greece show a significant decrease in the period 1990-2011. According to FAO data, land in 2011 decreased by about 22% compared to 1990. In addition, 56% of the arable land is located in lowland areas, while the rest is in mountainous or semi-mountainous areas. Finally, 82.7% of the used agricultural land is located in less-favored areas, of which 56.4% are in mountainous areas. The corresponding figures for the EU -25 is 55.4% and only 16.3% (Kaditi, E., Nitsi, E. 2010).

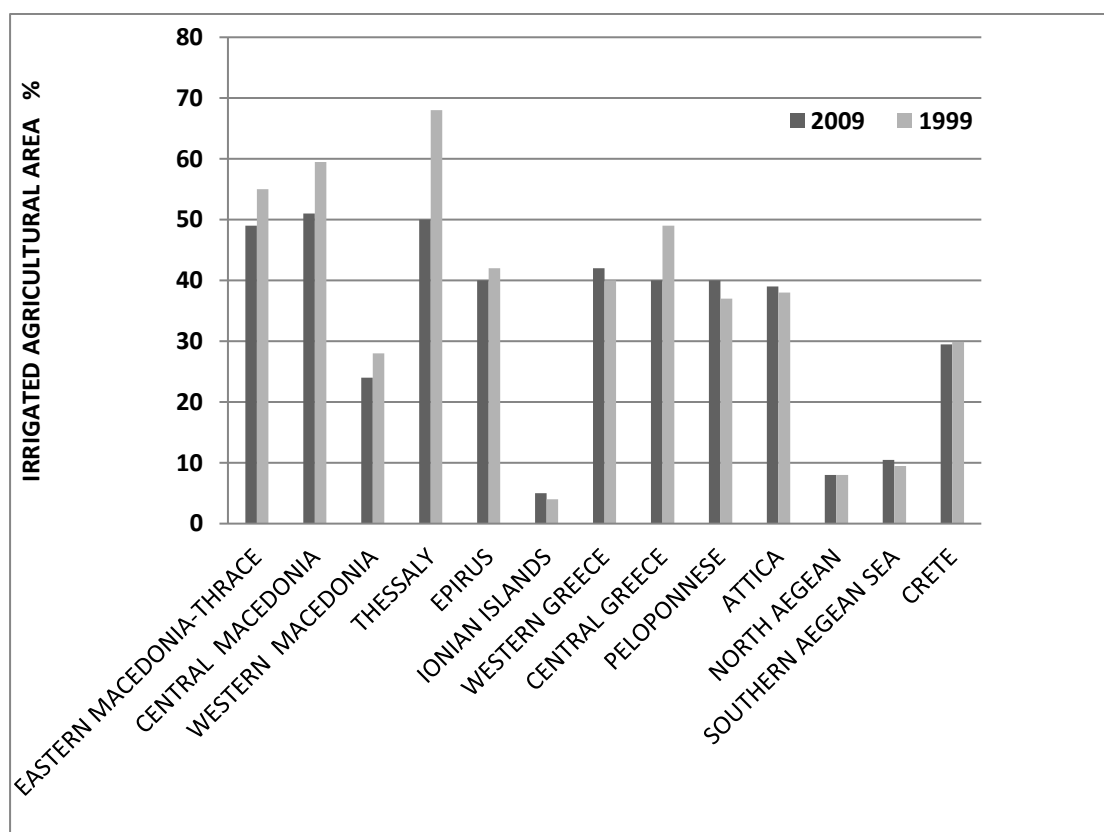


Figure 4: Irrigated agricultural land by region

Irrigated agricultural land is also an important parameter for crop efficiency. In Greece as a whole, in 1999, 44.6% of all crops were irrigated, while in 2009 a percentage of 40.6% (HEL.STAT, 2012). In total, the majority of Greek crops showed a decrease in irrigation except in Western Greece, the Ionian Islands, Attica, the Peloponnese and the South Aegean. The region, especially of Thessaly, has been

experiencing a particular water shortage problem in recent years. Irrigated areas based on geomorphological characteristics for mountainous areas occupy 21.9%, for lowland areas 48.3% (Dagkalidis A., 2008). For 92% of the irrigated areas of the country, irrigation is done by systems and techniques that do not ensure the rational and sustainable management of water resources, with large losses in transport and irrigation. Regarding the type of crops that occupy the highest percentages of irrigation, are the vegetables that are irrigated in 97%, in 43% the arable crops, in 38% the arboreal ones and in 36% the viticultural ones. The structural characteristics of Greek agriculture are what characterize it and create the specifications and conditions for further development. These mainly consist of the very large number of small and fragmented agricultural holdings, the low percentage of irrigated agricultural land, the high percentage of economically active people employed in agriculture and in their old age (about 60% are over 55 years old and in the busy employment of farmers (Petropoulos D., 2020).

Table 1: Size categories and land used of agricultural holdings in 1995, 2000, 2005 and 2013.

Size of cultivated agricultural Land (ha)	1995		2000		2005		2013	
	Number of Holdings	Percentage of the Total %	Number of Holdings	Percentage of the Total %	Number of Holdings	Percentage of the Total %	Number of Holdings	Percentage of the Total %
0 -2	353,000	44.0	394,951	48.68	412,000	49.4	364,880	45.0
2-5	249,000	31.0	226,496	27.9	223,000	26.7	179,470	22.1
5-10	148,000	18.4	109,004	13.4	140,300	16.8	86,520	12.2
10-20	26,000	3.2	52,669	6.49	22,000	2.64	45,560	5.6
20-50	22,000	2.7	23,922	2.94	28,000	3.36	26,200	3.2
>50	4,000	0.49	4,276	0.52	7,000	0.84	6,880	0.8
>100	1,000	0.12	1,000	0.12	1,000	0.12	1,000	0.12
Total	802,000	100	811,318	100	833,000	100	810,530	100

Examining the distribution of the total number of agricultural holdings in size classes according to their area, there is an increase in the number and percentage of the total, of very small holdings up to 2 hectares and at the same time there is a slight increase in the number-percentage of holdings with an area of over 20 hectares. The conclusion on the nature of the maintenance of very small properties is confirmed. At the same time, however, the gradual concentration of land in larger farms is evident. While holdings of up to 20 hectares in 1995 accounted for 44.01% of the total and owned 76.30% of the total land area, 213 accounted for 51.4% of the total and owned 64.35% of the total land area. Despite the survival of the very small agricultural holding, examining the structure of the agricultural holdings that occupy the used agricultural land, based on their area, the tendency of concentrating the land in larger properties emerges slowly but steadily. The tendency of

concentration is stronger for the categories of holdings with an area from 300 acres to 1000 acres. Thus the percentage of these holdings that hold more than 1,830 acres from 0.08% has reached 1.0% in 2013. This trend will continue in the coming years and is fueled by the implemented tax policy, but also by the continuous squeezing of family income - mainly small and medium-sized farms - by increasing production costs and setting low selling prices. It is noted that the average area of agricultural exploitation in Greece is 4.8 hectares, one of the smallest among the EU countries. The average agricultural holding at EU level is four times that of Greece. The total number of holdings with fluctuations has remained at the same level since the early 1990s, after the sharp decline that occurred between 1987 and 1990, when it shrank by about 100,000 holdings (Paschalidis, C. et al. 2018). (Karanikolas, P. 2017) The interpretation of non-mobility of agricultural holdings is associated with social, economic and psychological factors. The economic factors are related to the unsatisfactory growth of all sectors of the National Economy during this period, as a result of which the conditions for stable and satisfactory incomes are not created. In addition, agricultural holdings act as a shield to protect and enhance family income, to people who are additionally engaged in the agricultural profession. The social and psychological factors are connected with the strong institutions of the average Greek with the province, the agricultural family and the agricultural activities. Thus he practices the agricultural profession as a complement, but also as a continuation of the family tradition. The largest number of holdings is located in the region of Central Macedonia (96,482 in 2016), followed by Crete and the Peloponnese and the smallest number (20,283 in 2016) is located in the South Aegean, followed by the North Aegean, the Ionian Islands and Attica. From 2009 to 2016 the number of holdings shows a decrease of 38,105 holdings or 5.3%. The main crops in Greece based on the cultivated area are cereals, olives, cotton, maize, grapes, tobacco, oats, potatoes, peaches and nectarines. In 2018 the main crop groups per year were distributed as follows: 53.4% of cultivated area (1 million 719 thousand 600 hectares) was used for arable crops, 1.9% (61 thousand 890 hectares) for vegetables, 33.7 % (1 million 085 thousand 100 hectares) for permanent crops and 11.0% (354 thousand 760 hectares) of arable land was under fallow regime (Larissi, 2014).

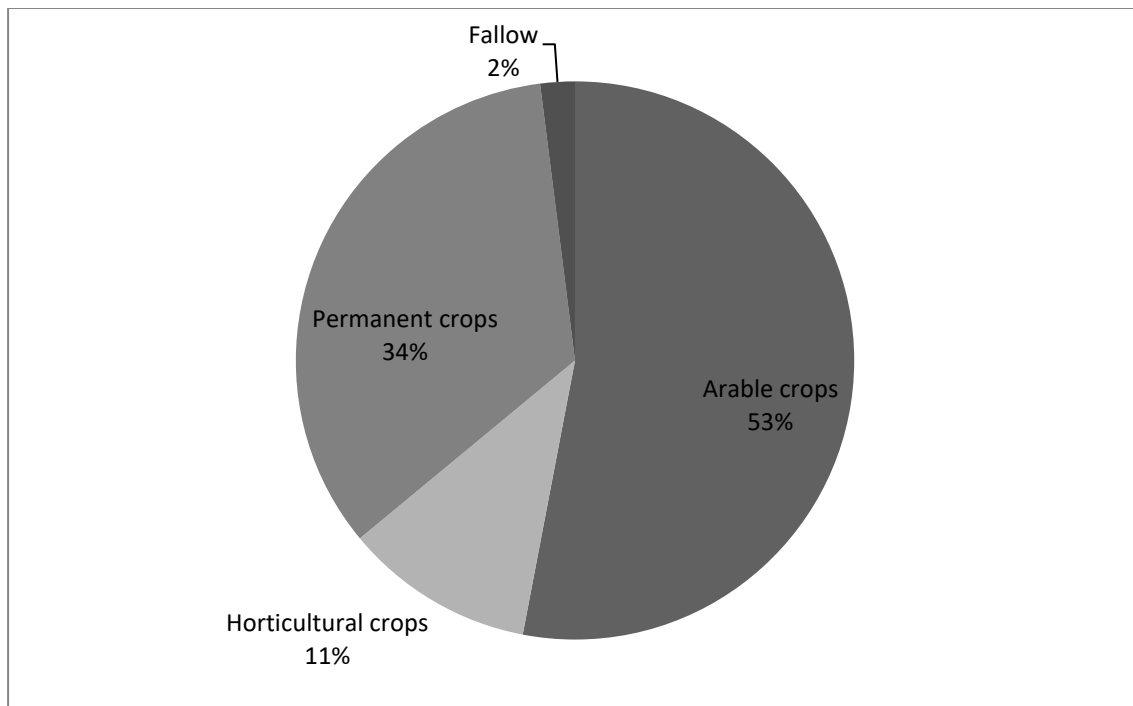


Figure 5: Percentage (%) distribution of cultivated agricultural land by categories (Total, 2018).

This diagram above shows the percentage distribution of cultivated agricultural land by category. The main cultivated species of Greece are of Mediterranean type with small differences in their production over the years, while in recent years it is observed that new products have start to be cultivated. Large crop plants (LCP) occupy a total of about 55% of the total cultivated area in Greece, not counting the set-aside, which is basically applied to LCP. It is therefore understood that 65% of the Greek Agricultural Land concerns LCP which include cereals, industrial plants, legumes, fodder plants, biomass plants and aromatics.

Table 2: The main crops based on the cultivated area.

	1990 ha	1995 ha	2000 ha	2005 ha	2010 ha	2011 ha	Total %
Wheat	1,003,000	878,800	857,800	843,900	510,000	544,000	27
Olives	691,000	708,716	781,000	784,500	834,200	850,000	25
Cotton	259,000	420,000	412,000	364,500	250,000	300,000	11.5
Maize	207,600	182,487	216,000	246,900	151,550	181,630	7.1
Barley	179,00	156,300	119,300	94,300	112,000	101,630	4.3
Grapes	145,919	126,712	124,790	125,400	99,300	103,200	4.0
Tobacco	78,796	69,000	61,000	54,369	15,600	16,122	1.8
Oats	43,000	44,288	43,200	40,400	56,200	88,220	1.6
Potatoes	50,300	52,000	48,800	44,440	31,350	28,450	1.5
Peaches & nectarines	44,1,000	53,500	44,300	43,266	43,600	42,200	1.5

According to the above table, the main species are cereals, olives, cotton, tobacco or potatoes, peaches. Cereals are products of primary importance for Greek agriculture and in 2013 4.55 million tons of cereals were produced. Regarding the value of the products produced, cereal crops in Greece produce about 8% of the total value of agricultural production (Eurostat News Release 33/2015), in about 770 million euros. The second main product is olives of which the largest area, production and economic value are held by the oil-producing countries. Globally, Greece is ranked in the third position of olive oil production given the fact that olive oil is an important food product and has the highest nutritional consumption in the world. The cultivated area of the olive orchards is steadily increasing over the years. One of the most important factors of this phenomenon is the fact that olive is a plant that can be grown in many areas whether it is lowland, semi-mountainous and mountainous. Also, Greece, in addition to holding the 3rd place in the world in the production of olive oil, holds the 5th place in the production of edible olive globally.

Table 3: Main crops based on production

	1990 tons	1995 tons	2000 tons	2005 tons	2010 tons	2011 tons	Total %
Maize	2,013,000	1,838,779	2,094,000	2,534,077	1,718,460	2,166,790	10,80
Sugar beets	2,760,000	2,537,054	3,033,244	2,573,393	761,500	324,400	10,77
Olives	1,003,724	2,199,300	2,502,000	2,583,185	1,809,800	2,000,000	10,59
Wheat	1,939,000	2,314,838	2,326,000	2,044,149	1,663,070	1,702,020	10.20
Tomatoes	1,844,000	2,064,160	2,085,000	1,713,580	1,406,200	1,169,900	9.01
Grapes	1,122,436	1,128,000	1,251,463	1,130,000	1,002,900	856,600	5,65
Cotton	670,000	1,326,000	1,297,000	1,231,597	700,000	890,000	5.25
Potatoes	953,035	1,050,827	1,012,000	818,727	791,500	757,820	4.26
Oranges	878,185	938,235	945,765	936,094	770,000	740,000	4.5
Peaches & nectarines	786,939	1,034,421	949,943	864,406	738,400	690,200	4.14

Table 4: Products with the highest gross value

Species Crops	1990 Euro	1995 Euro	2000 Euro	2005 Euro	2010 Euro	2011 Euro	Total %
Olive	803,685	1,760,986	2,003,359	2,068,364	1,449,112	1,601,406	20.3
Tomato	681,476	762,839	770,541	633,277	519,681	432,353	8.0
Grapes	641,603	644,784	715,358	645,927	573,275	489,647	7.7
Cotton	319,141	618,845	617,845	586,831	257,257	400,177	5.8
Peaches- Nectarines	428,421	563,154	517,163	470,596	401,996	375,755	5.4
Wheat	305,939	365,240	367,001	322,530	262,403	368,548	3.8
Maize	285,172	260,491	296,647	358,990	243,446	306,817	3.7
Tobacco	216,114	236,594	217,560	198,062	35,041	32,312	2.1
Orange	169,716	181,321	182,777	180,908	148,809	143,011	2.1
Potatoes	160,854	177,360	170,806	138,186	133,590	127,906	1.9

Greece is covered by cotton in 11.5% of all arable crops and is the main producer of cotton in Europe. It is worth mentioning that the annual production of cotton in Greece is about 300,000 tons, of which 90% is exported as ginned. The cotton areas in Greece ranges per year (average 2004-2014) from 2.7 to 3.4 million acres with an average yield of 380 Kg / acre. The total value of the products produced in this value chain exceeds the amount of 1.5 billion euros. Then there is maize which occupies 7.1% of the total area and the largest percentage of crops is livestock. Barley is another grain with a large cultivated area, covering 4.3% of the total. The

cultivation of the vine is closely connected with the history and the tradition of Greece. According to the data of the Research of Viticultural Crops of the Hellenic Statistical Authority, in 2015 the viticulture covers approximately 1,030,821,000 acres. Of the total areas with vineyards, 633,262 acres are cultivated with vines and 397,559 acres with raisins. The cultivation of grapes has decreased by about 30% in 2011 compared to 1990. Most of the varieties grown in Greece are wine-making varieties, of which wine is produced, and which is the most important product of grapes. The production from Greek varieties is 89%, compared to 11% of the production from foreign varieties. Most areas with raisins (76% of the total area of raisins) are recorded in two regions, in the Peloponnese with 154,220 acres and in Crete with 148,045 acres. Tobacco covers 1.8% of the cultivated area. It is the product with the largest reduction of its areas that came after 2005 and amounts to 71%. The substantial countdown for the course of cultivation and its shrinkage to current levels began after the revision of the Common Tobacco Market Organization during the reform of the Common Agricultural Policy in 2004 and the implementation of the new regime from 1-1-2006. This abrupt huge change has had a huge impact on the social and economic sectors of the country. Tobacco growing has the advantage of high yield on a small cultivated area, high price and the fact that it does not need particularly fertile soils. Feed is one of the most important branches of the agri-food chain, as it is the basis for the production of meat, milk and eggs, that means, the main sources of protein for human consumption. According to recent data from HEL.STAT., the value of animal feed consumed in Greece amounts to 1.8 billion euros and corresponds to 70.1% of the production cost of livestock. One of the most important branches of FMC is legumes. The estimated area of legumes for animal feed is close to 1 million acres, with 800,000 acres occupied by alfalfa. Arboriculture is a fundamental part of the Greek economy that can contribute to the economic recovery and development of the country in the coming years. Fruit production and distribution is one of the most dynamic sectors of Greek agriculture, with a significant part of the produced arboricultural products being exported. According to data from the Hellenic Statistical Authority, arboricultural products are among the first exportable Greek products in the "Agro-food" sector. The expansion of arboriculture in recent years, as reflected in the ever-increasing rate of planting new orchards, is expected to increase production at a rate proportionally much faster than the increase in domestic consumption, further strengthening the export orientation of Greek arboriculture. Greece is the 4th largest producer of fruit in the European Union and the production volume of the country is more than 4.5 million tons. Indicatively, it is mentioned that Greece holds the 5th place in the world production of peaches, while it is the country with the largest production of industrial peaches and the first in their export. Greece is also in 4th place in world kiwi production with a continuous upward trend in domestic production. Most of the domestic fruit production is occupied by Citrus fruits (oranges 19.7%, tangerines 2.7%, lemons 2.5%) account for the largest share of domestic fruit production, followed by peaches (17.1%), apples (5.5%), kiwis (2.7%), apricots (1.8%), pears (1.6%), strawberries (1.0%) and cherries (0.9%).

The main exported fruits (by volume) are citrus fruits (34.4%), peaches (12.9%), kiwis (9.8%), apples (4.8%), bananas (2, 4%), strawberries (2.3%) and apricots (2.2%). The total production of vegetables in Greece in 2014 amounted to approximately 3 million tons (2,865). The most important vegetable crops in Greece based on the area they occupied in 2014 are potato with about 250,000 acres, fresh tomato with about 120,000 acres (excluding the areas with industrial tomatoes), watermelon with about 125,000 acres, onion with about 70,000 acres, raw bean with about 63,000 acres and cabbage with about 55,000 acres. Based on the amount of production, potato is slightly ahead with 586,000 tons, followed by tomato with 550,000 tons and watermelon with 538,000 tons (data of YAAT for 2014). The fruit and vegetable industry has strong export penetration and high competitiveness. The total value of agricultural production in Greece amounts to 9.7 billion. Of this total, 69% comes from crop production. Therefore, crop production has a dominant position in the agricultural economy of the country (Savvas, et al. 2014).

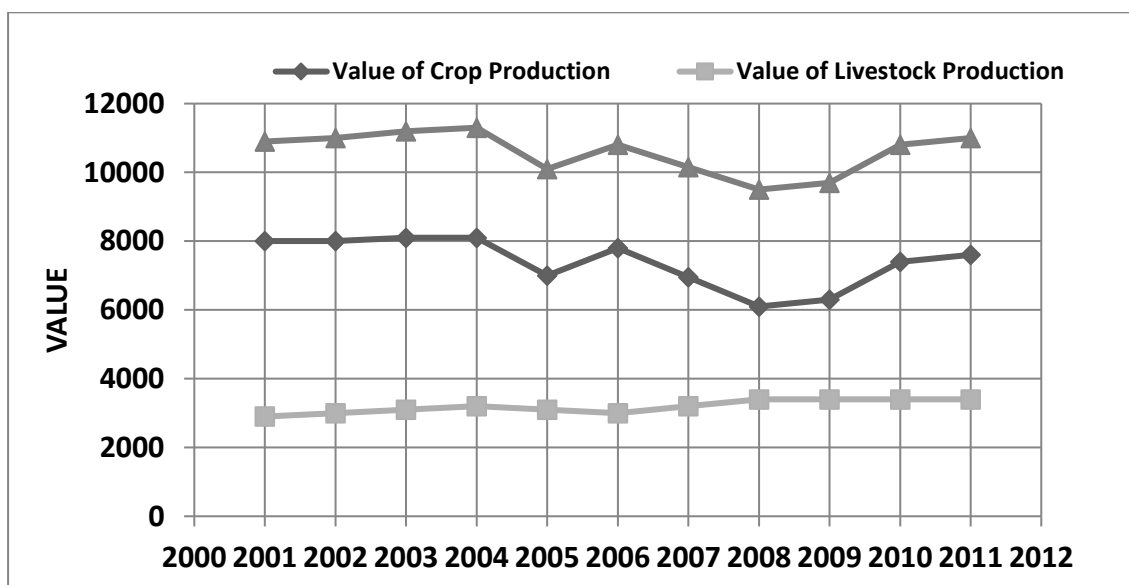


Figure 5: Value of Agricultural Production

Almost half of this share corresponds to vegetables. According to a relevant survey of "Gaia Business" (2015), the largest share in the total value of agricultural production in the years 2009-2013 corresponds to vegetables with 18%, followed by fruits with 16.6%. Greek agriculture has remained at about the same levels in terms of the value of agricultural production from 2010 to date. Gross value added at producer prices in crop production decreased from 5410 € / ha in 2010 to 4985 € / ha in 2014 (Savvas, et al. 2014).

4. Conclusions

While Greece has significant natural advantages for plant cultivation, crop production faces significant deficits in terms of know-how as well as in terms of organization and marketing. An important reason that makes it difficult to modernize farms for crop production is their small size. Increasing the average size of crop farms is expected to contribute to the improvement and better utilization of technological equipment and infrastructure. At the same time, it can help to show greater adaptability to changes taking place internationally, in order to increase their competitiveness and create better marketing conditions for products and exports.

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