

GREEK FARMING IN NATIONAL AND EUROPEAN CONTEXT: THE ROLE OF DIGITAL IN AGRICULTURE TRANSFORMATION

Chrysoula Betsou, Alexandra Tsiaousi, Chairi Kiourt, Nikolaos A. Kazakis*, Nestor C. Tsirliganis

ATHENA - Research and Innovation Centre in Information, Communication and Knowledge
Technologies - Xanthi's Division, University Campus South Entrance, Kimmeria, P.O Box 159,
Xanthi, GR-67100, Greece

Abstract

This work reviews the present status of the agriculture in Greece both in national and European framework. Greece is a mountainous country with the agricultural land covering almost half of the total area of the country (arable, permanent crop and pastureland). The greater part of the agricultural land belongs to Northern Greece, with the Region of Eastern Macedonia and Thrace being one of the most fertile areas.

Most of the arable land is used for the cultivation of crops mainly for human and animal consumption, followed by the area covered by permanent grasslands and crops (olives, grapes, fruit and berry trees). Based on the database of the Statistical Office of the European Union, the cereal, fodder and industrial crops are the most abundant crops that are cultivated in Greece. Additionally, grapes, raisins, fresh vegetables, aromatic, and medical plants possess an important role in the agricultural production list of the country. However, the Greek agricultural output is much lower than in other European countries.

Over the last two decades the agricultural land and the production of various products is declining in Greece. Even though the whole EU confronts a similar declining trend, Greece must deal with a more serious situation. Greek farmers daily face up to economic challenges such as high taxes and the rising costs of energy, fertilizers, and other raw materials, as well as to other environmental challenges like climate fluctuations (e.g., aridity) and soil erosion. Precision farming is the solution for innovative crop cultivation, production, and management with respect to the environment. By applying high-tech techniques and climate smart practices during the agriculture procedure, the efficiency of the agricultural production would be increased, while the consumed amount of money, energy, water and fertilizers would follow the opposite direction.

Keywords: Greek farming, Optimal Agriculture, Artificial Intelligence, AGRO 4+

1. INTRODUCTION

Humans, since their existence on Earth have been modifying the global landscape, biodiversity and ecosystem processes. More than three quarters of the Earth's ice-free land have been influenced by human residence and their activities, such as the exploitation of different natural resources and the land use for agricultural purposes. Only less than one quarter of the Earth's land has not been utilized and can be characterized as wildland [1-5]. Different changes in land use have occurred since the Industrial Revolution, from primary deforestation of undistributed ecosystems to other forms of land use (arable land, cropland, grazing land) [6]. Agriculture is one of the main contributors to land changes (e.g. conversion of forest, savanna and steppe lands to cultivated areas all around the world), indicating the importance of land as a resource for the increasing human needs and the development of civilization [5, 7-8].

The agricultural land (including areas used for crops as well as for pasture) differs from country to country, depending on the size and the population of each country, its morphological characteristics, water resources, soil properties, disturbance regimes (e.g. fires) and climate factors (such as temperature and precipitation) [1, 9-14]. Except for the different biophysical drivers, socio-economic factors, such as the country's population movement and the economic activities, affect the agricultural ecosystems and crop production [15].

In Europe, agriculture accounts for almost half of the total territory [16]. Since 2001, a lot of changes have occurred in the European agricultural system. The enlargement of the EU, after the incorporation of twelve Eastern and Southern European countries, in combination with new production challenges and climate change adaptation and mitigation, have influenced the land use and generally the agricultural practices [17]. Several countries located especially in the South and Eastern Europe (from Latvia to Slovakia and Romania to Greece) face a lot of changes in land use which lead either to intensification of agricultural activities [16-17] or to agricultural abandonment [18]. The abandonment of the agricultural land (especially in remote and mountain areas) is present in most of the countries, setting an alert for the enhancement of rural development and the cultivation of crops [19-23]. The decline in agricultural domain (e.g. land use, number of farms, crop production), occur mainly due to the lack of economical sustainability and to difficulties in adapting to changes in farming practices, consisting consequently a key driving force for social and economic transformation [24]. European agricultural statistics presents a general reduction of agricultural areas during the past decades, especially for small-scale agricultural systems [16, 23-25].

Taking into account the above changes in agriculture, the growing demand for agricultural products, the population's increase as well as the vital role of agriculture in economy, food security, employment in agrarian areas and biodiversity insurance [26-34], European Union (EU) has adopted different policies (Common Agricultural Policies-CAP) for strengthening the livability in rural areas of all Member States, as well as the production of internationally competitive products via innovative, eco-friendly practices [26,35-38].

Since 1960, different strategies and development programs have been applied by state authorities and Research Institutions [26, 39] for the regulation and support of European agriculture [40-48]. The last European support measures, that have been legislated and applied for more than twenty years, can be classified into three categories (pillars). The first one is about supporting the annual agricultural production and the prices of agricultural products, the second one deals with the general support of rural development, while the third one focuses on public health and food safety [16]. All Pillars (from the first to third category) have been equitably distributed to all Member States, offering equal opportunities for economic growth while taking into account the wide diversity of the agricultural sector across Europe [16]. The last CAP, reformed in 2013, has been integrated into Europe 2020 Strategy, and concerns the modernization and simplification of agricultural practices in a more smart, resilient and sustainable way, under the framework of a more direct and faire distribution of money across Member States [16, 28, 46-48].

Based on the wide diversity of agriculture across Europe and the differences that are present between the Member States, it is interesting to study the European agricultural sector from various aspects such as the agricultural production, land use, organic farming, economic performance, and training level of farmers. A cross-country overview is presented, emphasizing on Greek agriculture and its dynamics in the EU.

2. AGRICULTURE IN EUROPEAN UNION

Agriculture is an important economic sector and the main land user of EU with the total utilized agricultural area accounting up to 173 million hectares [16, 26]. As long as EU has been enlarging its area of influence with the incorporation of new Member States, a lot of structural changes have been observed in the agricultural sector, revealing also the existence of an agricultural heterogeneity among European countries [16, 36, 49]. A lot of challenges have been appeared concerning the agricultural activities as well as the living conditions, employment opportunities and services in rural areas [50]. However, EU through different strategies (CAP) has managed to ensure a fair standard of living for the agricultural communities, by supporting the agricultural productivity, farmer's agricultural activities and income [36, 42-46].

Based on Eurostat publications and database [51-53], the agricultural area comprises almost half of the total European land area, including different types of land cover (e.g. arable land, meadows, grasslands, permanent crops, vegetables). Arable land covers more than half of the European

agricultural land, grasslands cover one third of it, while permanent crops land covers the rest part. All of them are heterogeneously distributed across Europe. For example, most of the arable land belongs to France, Germany, Spain, and Poland, while the biggest areas of permanent grassland and meadows are reported in United Kingdom, France, and Spain. The largest areas occupied by permanent crops are observed in Spain, Italy, France, and Greece, whereas the majority of vegetables is cultivated in Romania, Poland, Italy, and Portugal [53].

Since 2005, the agricultural area of all main types of land cover has declined, except for the permanent grassland and meadows which present an increase of 4.5 % over this period. The arable land is 2.4 % less than one decade ago (2.5 million hectares less), while the decline of the area covered by permanent crops is up to 4 % [53]. Figure 1 shows the changes that have been observed in arable land in different European countries since 2005. Bulgaria is the country with the maximum increase of arable land in EU, while Ireland is in the opposite direction, with a decline reaching up to 60% [53]. A decrease in the number of farms has also been observed during the period 1990-2016 [26, 54]. Farms of older Member States (EU-15) present a decline of 40 % (especially in countries like Denmark, Spain, Netherlands, and Italy), while after the incorporation of Romania, Bulgaria and Croatia in EU, the number of farms has been significantly increased [26].

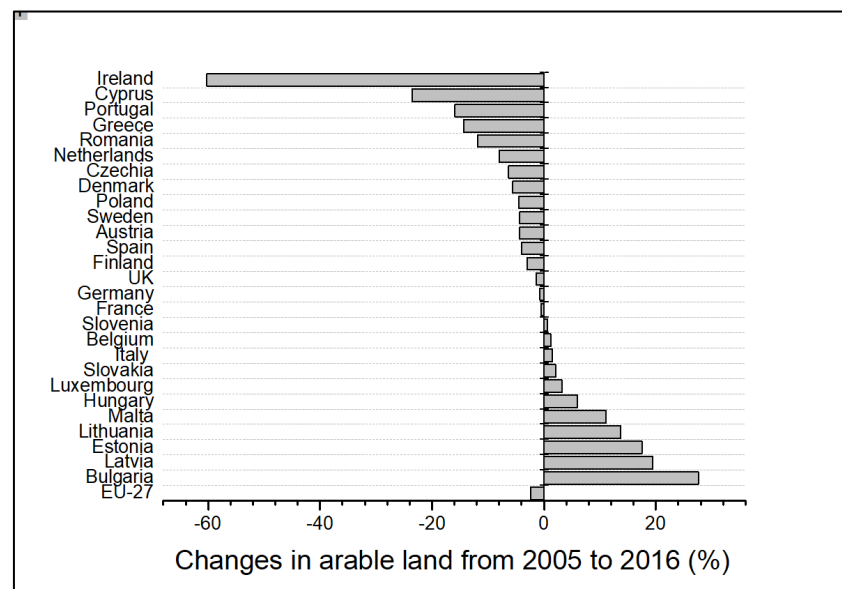


Fig. 1. Changes in arable land observed across Europe since 2005 [53].

The same declining trend during the last decade is observed in most of the agricultural production in several European countries [55]. The harvest production of some crops such as grain maize, wheat, and rice, as well as of some permanent crops (apple, pears, peaches, and plum trees) has been reduced by at least 10 %. There is a decline of less than 3 % in the production rate of barley and some species of fresh vegetables, while the cultivation of medical plants and tobacco were decreased by more than 20 %. On the other part of the scale, during the same period there is an increasing pattern in the cultivation of rye (+14 %), root crops (+12 %), figs and kiwis (+15 %). In the case of soya and sorghum production this rise is up to one order of magnitude higher than in 2012 [51].

Countries in Southern Europe, especially in the Mediterranean, present higher declines in agricultural production as they are more vulnerable to climate changes and their economies have been affected to a greater extent by the economic crisis. During the last decade, a lot of rural areas, had to deal with the consequences of economic crisis at regional and national level [16, 36]. Rural communities had to overcome the problems of financial liquidity in the market, high costs of borrowing and the increasing production costs [50]. Greece is one of these countries, with financial crisis and climate changes affecting a lot the rural life and the local economy and environment.

3. AGRICULTURE IN GREECE

3.1 An overview of Greek agricultural production

Greece is a typical Mediterranean country, located in the Southeast Europe. It is a mountainous country, with a varying geomorphology as the Pindus Mountain chain crosses the mainland from north to south, affecting the country's climate. The East part of the country along with the Aegean Islands are characterized by a typical Mediterranean climate, the West part by Alpine climate and the North part by a temperate climate [56]. Except of the climate, the morphological characteristics influence the land cover of the Greek land.

The majority of the country's area is covered by various types of cultivation (arable land, permanent crop land, permanent pastureland) [52, 55-56], while almost 20 % of Greece is occupied by forest areas including the areas that belong to the Natura2000 network [56-58]. Due to the morphological structure of Greece, the greater part of the agricultural land belongs to Northern Greece, with the Region of Central Macedonia and Thessaly occupying the majority of the cultivations [59].

According to the Statistical Office of the European Union, one of the largest parts of the Greek land that is used for agricultural production is covered by arable land (38.7 %) and it is used to produce crops mainly for human and animal consumption. The permanent grassland corresponds to a slightly larger part of the agricultural land, which accounts for a percentage of 40.8 % and it is used to provide further fodder and forage for animals. In the remaining area (20.3 %) permanent crops (fruit and berry trees, olives, and vines) and vegetables (0.2 %) are cultivated [52-53].

The most abundant crops in Greek arable land are the cereal crops (51.4 %) followed by fodder crops (16.5 %), industrial crops (19.4 %) and other crops (12.7 %) [52]. Each region favors the cultivation of specific crop species. Maize for instance, is the most popular crop cultivated in Greece, especially in the Region of Central Macedonia. Durum wheat, barley, common wheat, rice, oats, rye, sorghum and other crops are also in the production list of the country, with the majority of them found in Central Macedonia [59]. The fodder plants (such as vetch, cultivated meadows, mangolds, barley and oats) which are grown for grazing purposes, are mostly found in the Region of Western Greece, an area with the highest levels of livestock in Greece. Finally, the industrial plants' production involves cotton, sunflower, sugar beets, tobacco, soya, rapeseed, sesame, groundnuts and pumpkin seeds as well as some aromatic plants and concerns mostly the regions of Thessaly and Central Macedonia. It should be noticed that each year a small percentage of the arable land (less than 10 %) becomes temporarily fallow land, in order to achieve higher productivity of crops [59].

The cultivation of trees is second in the line of the agricultural production, with olive trees being the most dominant in Greek territory, followed by stone fruit trees, citrus trees, pome fruit trees and nut bearing trees. More precisely, peach and nectarine trees, orange trees, apple trees, cherry trees, kiwi trees, almond trees, mandarin trees, apricot trees, pear trees, walnut trees, lemon trees, pomegranate trees, chestnut trees, fig trees and pistachio trees are some of the most frequently found trees in the country. Their existence, as well as their population over the country depends on the altitude, local microclimate of each area and soil properties [59]. The majority of the trees are cultivated in Peloponnesus and in Crete, where the meteorological conditions favor their development.

The production of vines, grapes and raisins is next on the agricultural production list. Peloponnesus and Crete are the regions that prevail over vine and grape production. Most of the grapes are used mostly for wine production (61 %) and for table consumption (26 %), while the remaining ones are aimed for raisins production [59].

Last but not least in the agricultural products list are the vegetables, the ornamental plants, seedbeds and the nurseries. The most popular vegetables are tomatoes, cucumbers, onions, strawberries, spinach, cabbages, peppers, pumpkins, lettuce, beans, carrots, cauliflowers, eggplants, broccoli, leeks, chicories and endives, peas, asparagus, artichokes, okras, and garlic. Most of them are cultivated in the Region of Central Macedonia [59].

3.2 Greek agricultural production over the years

Agriculture plays an important role in the development of Greece [56]. Since the first postwar decades, Greek agriculture has been significantly modernized, especially after the entry of Greece in EU in the 1980s. During these decades, the European Economic Policies have been a supportive mechanism for the socio-economic development of the country [50]. Although, due to the mismanagement of funding by the different Greek governments and the reduced levels of private investment in agriculture, especially after the debt crisis, a decline in the rural development, agricultural production (in most of the products) and in the economic weight of the primary sector has been observed [16, 50]. In the past, Greece was self-sufficient in basic agricultural products, but nowadays the country must import a lot of them, and in some cases even fresh products (vegetables and fruit) despite the fact that it possesses comparative productive advantages [50]. Unfortunately, Greek agriculture has not been in line with the productivist model [50, 60], it has been missing opportunities and the advantages that the Greek land offers.

Over the last two decades, in Greek territory, the agricultural land is declining (Figure 2) as well as the agricultural production of various products. Since 2012, most of the land area that is used for the cultivation of common cereals, wheat, durum wheat, rye, potatoes, corn, root crops, sugar beet, tobacco, fresh and root vegetables have been decreased at least 20% [55-64]. Figure 3 captures the reduction of the harvested production of different main cereals such as common wheat, spelt, durum wheat, grain maize and corn. A decline of at least 5 % has been observed in the production of main cereals, such as common cereals and wheat [55].

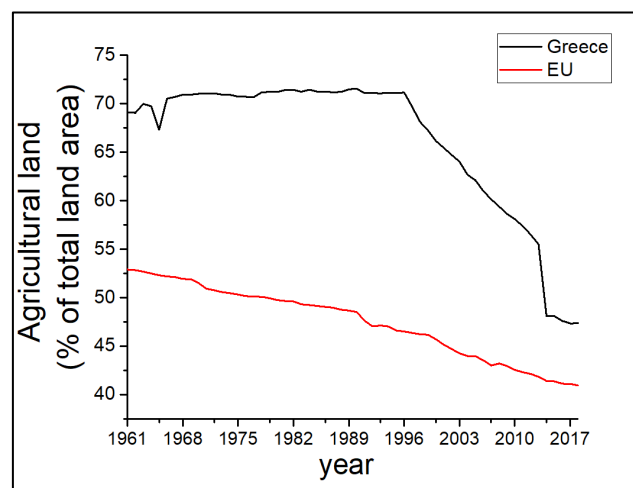


Fig. 2. The agricultural land presents a decline during the last decades [55].

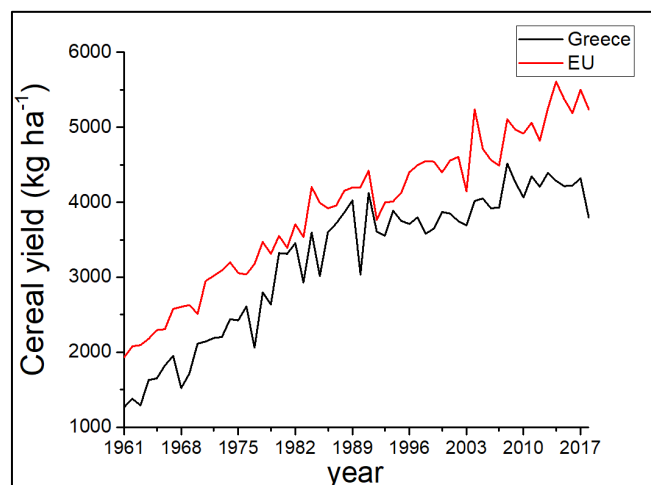


Fig. 3. Since 2012, the harvest of different cereals (wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grain) has been decreased, especially in Greece. [55].

Additionally, among the decline in cereal production and based on the database of the Statistical Office of the European Union, a downward trend has been observed in the harvest production of citrus fruits (-7.9 %), grapes (-13.5 %), fresh vegetables (-17.5 %) and plants harvested green (-15.1 %) [52]. The Food production index follows a similar pattern during the last decade, despite its increase during the second half of the 21st century [55]. This leads to the search for innovative technological solutions that could be applied in the agricultural field and in combination with general support of the agriculture domain, agricultural production would be promoted.

On the other hand, during the same period, the land that is used for cultivation and harvest of leafy vegetables, spinach, beans, dry pulses, field peas, barley, rice, sweet lupins, sorghum, triticale, soya, sunflowers, oilseeds, aromatic and medicinal plants, fiber, and industrial crops in Greece has been increased more than 28 %. In some cases (such as the cultivation of soya, aromatic plants, sorghum, sweet lupins), this augmentation reaches up to two or three orders of magnitude higher than the previous years, pointing out a new trend in agricultural productivity in Greece [61]. This rise in cultivating specific crops is promising and should be combined with technological innovations for more efficient and qualitative products in the future, considering all the factors that may influence the agricultural production.

4. FACTORS AFFECTING THE AGRICULTURAL PRODUCTION

4.1 The use of inorganic and organic techniques during the cultivation process

During the cultivation process different cropping methods can be applied depending on natural resources (soil, water, air, biodiversity), local climate conditions, and different economic factors (income and economic power of farmers) [52-53]. Due to the intensive use of land, the productive capacity of the soil is declining and as a result different strategies must be followed by farmers for reversing the phenomenon. All farmers aim to enhance their parcels with a sufficient supply of nutrients and trace elements, in order to help their crops grow up properly while their productivity efficiency is getting simultaneously increased. To achieve this goal, fertilizers (either organic or inorganic) as well as pesticides are employed.

Both organic and inorganic fertilizers provide the plants with all the nutrients (nitrogen, phosphorus, potassium, calcium, and other important secondary elements) they need, but there are some differences in their composition and the way they influence the plants. The inorganic fertilizers deliver to the plants a quick dose of nutrients, while the organic ones are acting slower, more naturally and they are friendlier to the environment. The organic fertilizers provide to plants, nutrients of natural origin (plant

or animal-based materials), which are byproducts or final products of natural processes (decaying leaves, manure and food combustion), whereas the inorganic fertilizers provide a mixture of minerals and synthetic chemicals [65]. All of them contribute to the proper growth of the plants and to a rise in their production.

Another ally of the farmers, beyond the fertilizers, is pesticides. They are applied during the agricultural procedure for the protection of plants against different diseases and harmful organisms, aiming to a more effective and qualitative yield. In Greece, during 2019 most of the pesticides were used in the cultivation of common wheat and spelt, durum wheat, grain maize and corn, potatoes, apples, oranges, and olives trees. Based on the cultivations and their needs, the local climate and the soil properties, several types of pesticides were consumed such as fungicides and bactericides, herbicides, haulm destructors and moss killers, insecticides and acaricides, plant growth regulators and molluscicides [51-55]. The use of pesticides, in combination with the use of fertilizers influences the production and improves their quality but also affects the environment and human health [54].

It should be noted that the use of mineral fertilizers started arising since the 60's for at least three decades [52], improving agricultural productivity and enhancing the income of farmers. However, during the last decades, the consumption of conventional fertilizers has been at lower levels than during the second half of the century. More specifically, during the last decade, the consumption of mineral fertilizers (nitrogen and phosphorous fertilizers) in Greece presents a 10 % decline, while in the rest part of Europe this decrease is around 1 % [54]. Additionally, the rate of sales of different pesticides has been reduced in Greece (22 %), while in the rest Europe the sales of pesticides remain at the same levels. However, the harmonized risk indicator for all European countries presents a fall during the last decade and reveals the impact that all the active substances of the pesticides have on human health and the environment based on their toxicity levels [55].

These declining trends during the last decade indicate that new strategies have been followed, promoting safer and more sustainable management of fertilizers and pesticides. New techniques (such as crop rotation and diversification, hygiene measures to prevent pest spread, protecting, and enhancing beneficial organisms and other non-chemical methods) have started to be applied, pointing out the key role of organic farming in the agriculture world [54].

Organic farming has been again involved in farmers' lives. Different organic systems have been promoted within the European Common Union Policies (CAP) for minimizing the negative environmental impacts of the conventional agricultural practices [63, 66-70]. Based on environmentally friendly methods, farmers have started cultivating their products with respect to the climate change action [52]. The production of safe and high-quality agricultural products is their main goal.

Organic farming mostly includes mixed farming systems concerning crop production in combination with livestock and forage legumes during the rotation crop production [66]. Holistic production management systems for crops cultivation are performed, emphasizing on practices with less synthetic chemical inputs (fungicides, pesticides, herbicides, insecticides, additives), while avoiding the production of genetically modified (GM) crops [62]. In order farming to be considered as organic, it must comply with the Regulation 834/2007 (28 June 2007) on organic production and labeling of organic products [62]. In Greece, since 2012 there has been an augmentation of 14 % of the agricultural land that was fully converted to an organic area, while in the EU this rise reaches up to 46 %. In 2019, the organic production of cereals has accounted for more than 5 % of the total Greek cereals production, while this percentage drops to 2 % regarding the organic production of fresh vegetables of the total vegetable production. This is just the beginning of a new and innovative era in the world of agriculture in Greece, with organic farming techniques having a more active role in crop production.

4.2 The role of population, age, and education in agriculture

Population is a factor that should always be taken into consideration concerning the agricultural development of a country. As global population grows, so do its demands for water and food. It is

considered crucial for Agricultural sector and all the rural communities to adapt to this reality and overcome the different insufficiencies that emerge.

Despite the global population growth, the population of rural communities in Europe is getting lower during the last two decades [55]. In Greece, this percentage drops even more, with less than 10 % of the Greek population being occupied in the sector of Agriculture, Forestry and Fishing [71]. This decline of rural population is also accompanied by the preference of the young generation to work mostly in the Sector of Services, leaving mostly the older and/or middle-aged people working in the fields [71-72]. Ageing of the rural population influences the composition of the rural labor force, agricultural production, social organization within rural communities, and the general socioeconomic development. The older the farmers are, the more are affected by the climate change and environmental degradation as they have limited education, training skills and agricultural technology available. Most of the times, older farmers can not follow up different agricultural innovations (such as improved seeds and tools) either due to lack of financial resources, or skills or even of energy to adapt to new practices [73].

In addition to ageing, gender discriminations are also involved in the list of factors affecting the agricultural production and the economic development of a country in general. Gender difference in agriculture has been observed since the 19th century [74-75]. The dominance of male population in the primary sector of economy has an impact on the agricultural development. Gender divisions (especially for older women) limit the opportunities of females to get trained, obtain credit and participate in market exchanges, thus affecting the whole agricultural community and socioeconomic system [73]. As a result, women's work in agriculture is underestimated and sometimes neglected compared to men's, making women more vulnerable during the agricultural trade liberalization [74-76]. These inequality issues are more likely to be observed in developing countries. On the other hand, EU focuses on gender equality issues by applying policies that support women's land property rights and their education to ensure the economic growth and justice of the society [74].

The level of education is important for the development of the economy and especially of the agricultural sector. The higher the education and training level of the farmers are, the more skills they have, enabling them to deal with innovative agricultural technologies, taking into advantage of new opportunities in the marketplace. Nowadays, both males and females occupied in the Greek primary sector, have similar education levels with some differences, showing that the Greek community, as well as most of the European countries (especially in the North), has started following gender equality policies, enhancing more the education of women than in the past.

The level of education is also linked to the age of the farmers. Usually, the older ones have reached up to the primary education, while the younger generation is more likely to have finished the secondary school. For example, less than 10 % of the Greek young farmers have finished secondary education, while the older ones have only the basic training, showing that the majority of the farmers have learned their profession mostly empirically through practical experience [53, 71]. People holding a university degree are mainly working in the third sector of the economy.

In Europe, during 2016, more than one third of farmers have followed a training related to agriculture, 10 % of them have completed a full cycle of agricultural training, while the main form of training for most of them has been the practical experience [53]. Farmers of Luxemburg, Czechia, France, Latvia, Estonia, and Poland are the most trained, whereas more than 90 % of farmers of Romania, Greece and Bulgaria are just learning by doing (Figure 4) [53]. Farming based only on practical experience is related mostly to the older population of farmers, giving hopes for the training level of the younger generation.

Based on this information especially about the education level of people working in the primary branch of economy, it is considered crucial for all farmers to follow basic training and get more familiar with the technological innovations that can be used during the agricultural procedure, including all the technologies and practices that are used in precision farming [77].

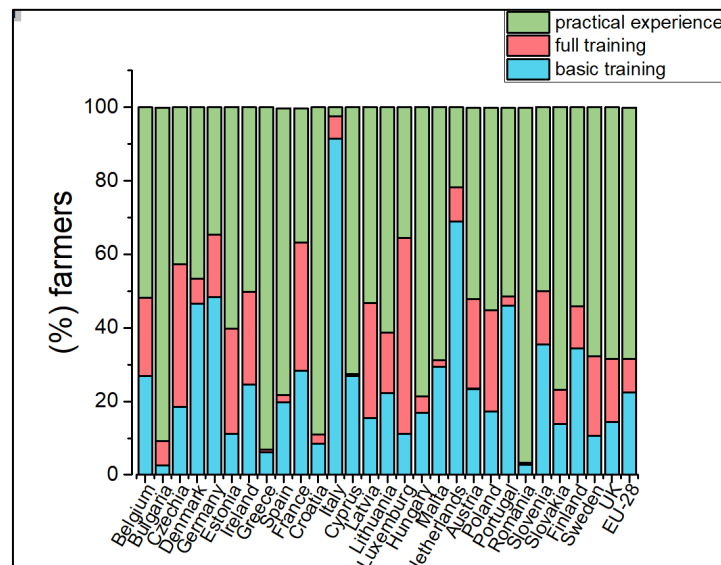


Fig. 4. The agricultural training levels of farmers across Europe [53]. Luxembourg is the country with the most trained farmers, while in Greece the practical experience of farmers is the main form of training.

5. DISCUSSION

Farmers should keep pace with all the scientific and technological advances and should be encouraged to use the technological applications in their everyday “agricultural life” to achieve a greater and more qualitative agricultural production. New perspectives in farming techniques are coming up, having a green aspect to minimize the impact of agriculture on water, air and soil quality, ecology, and climate change [77-81]. A strategy, such as the optimal agriculture 4.0 implementation, that provides innovative solutions in crops cultivation and management with respect to the environment could be applied on most of the agricultural products, especially in the Greek territory where there is a significant decline of the agricultural production.

The holistic Agriculture System (AGRO 4+) could be applied by all farmers as it could help them increase the quantity and the quality of the harvest while reducing the use of fertilizers, pesticides, water, and energy resources that cost a lot during the conventional agricultural procedure. More precisely, the optimal implementation of the “agriculture 4.0” techniques will have an impact on the cultivation and crop production not only by decreasing the expenses but also by following a more environmentally friendly line based on the climate change issues. Investing in a more climate friendly land use and performing new climate smart agricultural practices, the efficiency of food production will be increased with a smaller environmental footprint.

More specifically, high-tech techniques such as Artificial Intelligence, autonomous robotics, drones, satellites imagery and IoT (Internet of Things) sensors could be applied in different crop cultivations, during different periods of the agricultural procedure. Data processing algorithms, computer vision techniques, in combination with Artificial Intelligence could provide useful information such as lack of nutrients, growth problems, maturity for harvesting and plant diseases.

The multi-spectral images and measurements of the crop that could be performed, as well as the early detection and treatment of plant diseases, could help monitor the crop cultivation. The fact that any disease could be detected and treated at the source of the epidemic, in very early stages, even before it is visible to the human eye, leads to the elimination of the use of pesticides and fertilizers, improving the impact of the agricultural industry on the environment, and reducing the expenses of the producers. Based on precise maps which show the terrestrial conditions, the irrigation, the problems that may appear during the cultivation, the fertilization and the harvesting, the proper decisions and actions could be taken, and the efficiency of the agricultural production would be increased, while decreasing

the consumed amount of energy and money. The optimal agriculture 4.0 shows the path for the agriculture of the future.

6. CONCLUSIONS

Agriculture is a significant sector for the worldwide economy. It contributes to the development of each country, providing food, job opportunities and income to people. EU supports the agriculture of each member state through different policies, aiming at making farmers economically competitive through sustainable and environmentally friendly practices. Unfortunately, the agricultural sector faces a lot of problems in Greece, with most of them linked to the agricultural production and practices used. The agricultural land as well as the agricultural production of various products are declining over the years, especially for some specific crops. In the rest of Europe, the situation is much better, underlining the need of development of the Greek agricultural sector and its rotation towards the direction of precision agriculture.

Innovative strategies based on technological solutions should be implemented to increase productivity and its management in the Greek territory. To this respect, the whole agricultural sector should adapt to the new era of technological innovation activities and adopt high-tech techniques which should be applied in every agricultural procedure. Optimal agriculture 4.0 is a characteristic example of applying contemporary technological achievements and techniques in the agriculture sector, with respect to the environment. Finally, the appropriate training of all farmers (with respect to any gender equality issues), their financial support and the continuous encouragement by the Greek Government would help in achieving a proper development of the country's agriculture.

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