Contribution of Organic Farming for Achieving the Objectives of Sustainable Agriculture

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Abstract

Organic farming supports sustainable agriculture and connects not only food requirements in an environmentally friendly way, but also future requirements to fight climate change. Organic production is an agricultural system that combines biodiversity, good environmental and climate action practices, high animal welfare standards and conservation of natural resources. The objectives of the research are to identify the contribution of organic farming to the economy and sustainable development. In pursuing this, statistical data regarding the area under organic farming have been analyzed and correlated to the use of chemical resources. The main findings show that the sector of organic farming has developed in Romania, in the last period. The topic is relevant because organic farming has a double role: social, it develops a specific market that responds to consumers' demand for organic products, and it provides goods that contribute to the protection of the environment and animal welfare.

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JEL classification: Q18, 15

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1. Introduction

Sustainable development, including sustainable agriculture, is a current topic in United Nation' agenda, political debates, and academic literature. This paper starts from the premise that organic farming contributes to achieving sustainable development goals, in all their three dimensions: environment, economic and social. Organic farming has significant environmental benefits, including soil health, enhanced biodiversity, a lower carbon footprint and reduced pollution. Organic farming practices contribute to the conservation of ecosystems and mitigate the impacts of climate change. From a social perspective, organic farming ensures health benefits by reducing people's exposure to harmful chemicals. Economically, while it provides producers' access to niche markets and higher product prices, it also raises challenges such as higher production costs and

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demands more intensive practices of labor (Butu et al., 2019). Moreover, organic farming support local food systems and, as such, strengthen community ties, contributing to the preservation of traditional agricultural methods. The research argues that organic farming plays a key role in the pursuit of sustainable agriculture, by offering numerous environmental, economic and social benefits (Rosu, 2023; Rodino et al, 2019). However, in order to realize its full, organic farming requires continued innovation, research, and supportive public policies.

Practicing sustainable agriculture systems is very important for ensuring food security and environmental protection (Aceleanu, 2016). In this respect, organic farming plays an increasingly important role due to the ecological balance it promotes and its contribution to the conservation of natural resources (Ion, 2012). Organic farming is based on a philosophy aimed at reducing negative environmental impacts through production methods such as: crop rotation, composting of plant debris and use of beneficial organisms to avoid pests. The holistic approach to organic farming could make a significant contribution to achieving agricultural sustainability, as it improves soil fertility and biodiversity, reduces greenhouse gas emissions and protects human and animal health.

This article aims to demonstrate that the principles of organic farming have an important role and contribute significantly to sustaining sustainable agriculture. The objectives of the research are to identify the dimension of organic agriculture in Romania and its benefits, using, for this purpose, statistical data on the organic agricultural area, the agricultural area on which chemical fertilizers are administered, the number of economic agents active in the field of organic agriculture.

The research starts from the premise that organic farming is constantly developing in Romania and that it has many benefits, including healthier food products, due to the reduction of the consumption of chemical fertilizers used.

The work consists of five parts. After introduction, a brief literature review is presented, then the data and methods used for the analysis are described. The next part shows the results obtained, which are then discussed. Finally, conclusions are drawn.

2. Literature review

Numerous other studies have shown the dimension of organic farming in Romania (Ion, 2012; Popescu and Pop, 2013; Găgeanu et al., 2014; Jelocknic et al., 2015; Popovici et al., 2018 etc.), showing that organic farming is continuously developing. Ion (2012) notes that area under ecological farming has grown ten times in the last ten years. Moreover, the accelerated growth of indicators' values shows the significant potential of development organic farming in Romania.

The EU report on organic farming (2024) shows that, in 2022, organic products accounted for around 4% of the total EU agro-food market, generating €45 billion in sales. Also, in the period 2014 and 2022, EU sales of organic products more than doubled. However, significant differences are observed

between member states, regarding both sales and area under organic farming. While in Denmark people spent €365 per capita in 2022 to but organic food, in Romania people spent only €2 per capita. France, Spain, Italy and Germany are top four countries as regarding the area under organic farming, cultivating more than 1.5 million hectares and accounting, all together, for 56% of the total organic area in the EU.

Meanwhile, Romania cultivates less than 1 million hectares. Organic farms in Romania are mostly commercial and provide opportunities for the younger generation to make use of market niches in the area of horticulture, beekeeping and dairy especially in Transylvania or in arable crops in the country's fertile plains (Lozan and Arndt, 2022).

This article further provides an analysis with more up-to-date data and an analysis of the relationship between organic farming and the area on which chemicals are administered, based on the premise that, as organic farming has developed, the consumption of chemical fertilisers used has decreased

3. Methodology

In order to carry out this research, data were extracted from official statistical databases, including national and international sources. Primary sources included: National Institute of Statistics (INS) Romania, Ministry of Agriculture and Rural Development - MARD (Reports on organic farming certification, chemical fertiliser use and national agricultural policies), Eurostat. These sources were chosen for their reliability and accessibility in providing relevant data about agricultural practices in Romania.

In order to perform the analysis, data were collected on the following variables:

- Total agricultural area (measured in hectares) and organic agricultural area (hectares).
- Use of chemical fertilisers (measured in kilograms of active substances per hectare).
- Number of operators registered in organic farming

To observe trends in the adoption of organic farming practices and the reduction in the use of chemical fertilizers, data were collected over a period of at least 10 years, depending on the latest available data series.

The data have been analyzed and correlated. The correlation has been made between area under organic farming and chemically fertilized area to identify whether the latter is influenced by the area under organic farming

4. Findings

The specific objectives of organic farming, also mentioned in the Common Agricultural Policy (CAP), such as the contribution of the ecological agriculture (EA) to mitigating climate change (reducing greenhouse gas emissions, improving

carbon sequestration), promoting sustainable development and efficient management of natural resources, (water, soil and air) preserving habitats and maintaining biodiversity, obtaining high-quality food beneficial to human health are common objectives with sustainable agriculture.

In Romania, according to the data provided by the Ministry of Agriculture and Rural Development in 2023, the area certified for organic farming represented approximately 5% of the total utilised agricultural area, which reflects a progress compared to previous years (Figure 1), but still modest compared to other European countries such as Austria (25.7%) or Estonia (23.4%). However, the use of fertilisers shows an average of 58 kg of active substance per hectare in 2022, putting Romania below the European average of 151 kg (World Bank, 2024).

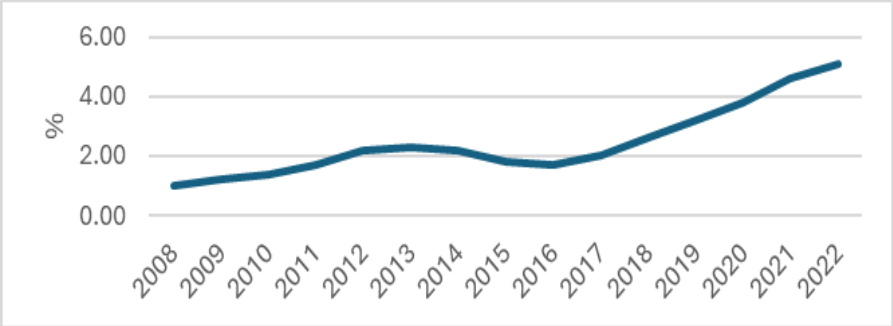

Figure 1. Shares of organic agricultural area in total agricultural area, %
Source: based on National Institute of Statistic data

The Common Agricultural Policy (CAP) is a basic element in promoting sustainable agriculture, in particular through measures aimed at expanding permanent grassland, permanent crops with permanent green cover, reducing soil work, crop rotation and crop rotation including leguminous plants, sustainable use of pesticides and reducing their use. As you can see, there are elements in the CAP to achieve common goals in organic farming and sustainable agriculture.

In this respect, we present an analysis of the evolution of the area under permanent grassland compared to the area under organic farming. The increase in the area of ecological agriculture (EA) results in a larger area occupied by permanent grassland (Figure 2).

The practice of organic farming systems can lead to a reduction in the areas on which chemical fertilizers are applied. This naturally results from the fact that the organic system uses natural fertilization methods such as composting, manure use and crop rotation to maintain and increase soil fertility. The practices mentioned above reduce dependence on harmful chemicals, preserve soil biodiversity, prevent groundwater pollution and maintain balance in agricultural ecosystems. The increase of the area in organic agriculture determines a lower consumption of chemical fertilizers as can be seen from the following table and demonstrated by analyzing the correlation between variables and the relationship between them.

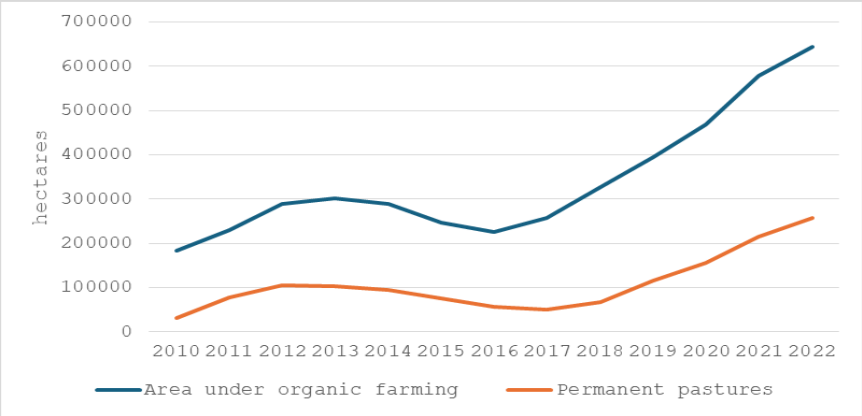

Figure 2. Evolution of the area under permanent grassland compared to the area under organic farming (hectares)

Source: based on Ministry of Agriculture and Rural Development data

Statistical data regarding the area under organic farming are then correlated to statistical data regarding the chemically fertilized area to find whether the latter is influenced by the fact that the area under organic farming has increased in the last years, as seen in Figure 3.

Table 1

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.408034576
R Square	0.166492215
Adjusted R Square	0.097033233
Standard Error	157369.7009
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	59361894960	59361894960	2.396986108	0.147526916
Residual	12	2.97183E+11	24765222774		
Total	13	3.56545E+11			

Source: processing the National Institute of Statistic data

As observed in Table 1, there is a correlation of 0.4 between the area cultivated in organic farming and that on which chemical fertilisers are used, which means an average dependency, the area cultivated with chemical fertilisers being

also influenced by other factors, such as the total agricultural area cultivated in a given year.

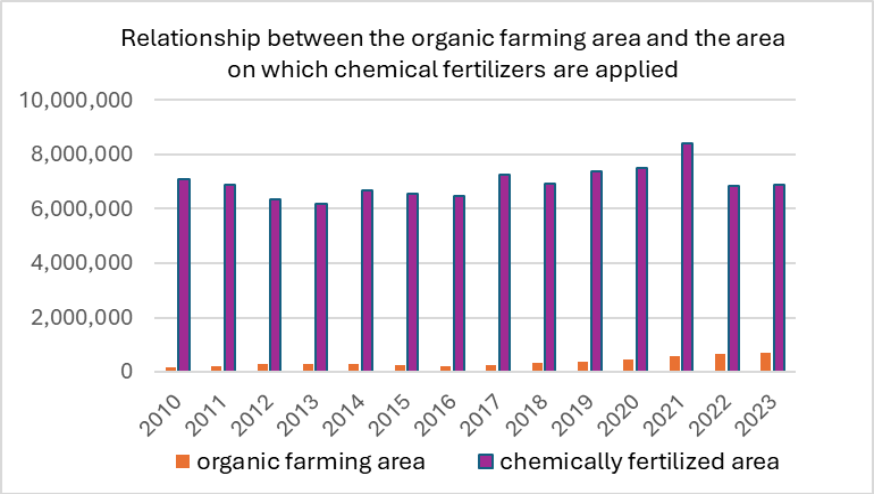

Figure 3. Relationship between the organic farming area and the area on which chemical fertilizers are applied
Source: based on National Institute of Statistic data.

Another indicator that emphasizes the dimension of organic farming is the number of operators acting in this sector, illustrated in Figure 4.

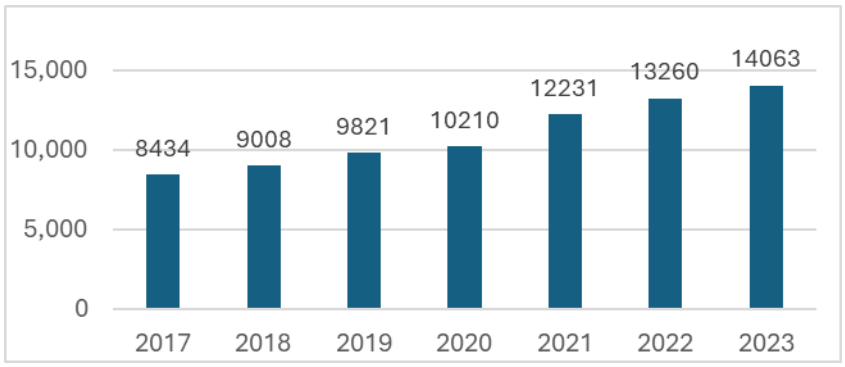

Figure 4. Evolution of the number of operators registered in organic farming in the last 7 years
Source: based on Ministry of Agriculture and Rural Development data.

The number of operators has increased, even the amount of financial support granted to organic operators has remained constant over the last 7 years. Farmers have become aware of the importance of organic farming for the environment and climate and the benefits that certified food provides to people's health.

The organic farming sector must be discussed in relation to the Green Deal policies, such as the urgent need for action, more resilient soils and increasing the sustainability and resilience of food systems that can be successfully applied in organic agriculture in Romania because organic production rules provide for the sustainable use of natural resources, maintaining biodiversity, does not use of chemicals. All this has an important contribution in slowing down the erosion process and improving the health of the soil. Annual monitoring of the total area cultivated in organic farming contributed to increase the sustainability of the food system, providing high-quality products for consumers.

The main objective of the Green Deal, soil carbon sequestration, contributes to mitigating climate change by practicing both organic and sustainable agriculture. Capturing CO2 emissions can be achieved by the vegetation that covers the soil, which is able to convert carbon dioxide in the atmosphere, through photosynthesis, into oxygen and organic matter.

Depending on the crop category and land use, carbon may remain in the soil for a longer period of time. The most important techniques are: incorporating crop residues, choosing perennial leguminous crops that contribute to improving soil quality and productivity, crop rotation, reducing the risk of soil erosion by establishing a crop rotation comprising perennial leguminous plants and grasses, followed by weeding plants such as maize, sunflower.

Soil works are of particular importance for soil conservation. In order to avoid soil compaction, the technology involves minimizing the soil works and thus the fuel expenses will be reduced. The best examples of new technologies are: minimum tillage, vertical tillage, strip tillage and no tillage.

5. Conclusions

This article showed the dynamics of organic farming in Romania and its benefits for consumers and the environment, demonstrating that as organic farming develops, the area on which chemical fertilisers are administered is reduced. Both the area under organic farming and the number of operators have significantly increased over the last 5 years, although the financial support to operators registered in organic farming remained the same for the 2023-2027 programming period.

This development of organic farming has beneficial effects on both the environment and consumers by providing healthy food for which fewer chemicals have been used. As regards the environment, as the amount of carbon in the soil increases, the quality, structure and fertility of the soil is improved, the retention capacity of soil water increases, the storage capacity of nutrients increases, the risk of erosion decreases and biodiversity is maintained.

Soil carbon sequestration is practiced in both organic and sustainable agriculture, representing one of the most important measures applied in the fight against climate change.

The results are relevant in the context of achieving the Green Deal objectives. Both agricultural methods can contribute to achieving the objectives by applying soil carbon sequestration measures, at micro level (improving soil quality, reducing technological costs and obtaining high value-added crops) and at global level (by helping to neutralize CO_2 emissions and slow down global warming).

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