DOI: 10.2478/agr-2022-0004

sciendo THE ANNALS OF "VALAHIA" UNIVERSITY OF TARGOVISTE

LINKING AGRICULTURE WITH ORGANIC FARMING, CHALLENGES TO UPCOMING FOOD SECURITY AND ENVIRONMENTAL SUSTAINABILITY

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Abstract

The challenges posed by population growth and the need to ensure access to healthy and nutritious food in sufficient quantities imply the need to change the paradigm and the way of thinking about new production and consumption patterns, scalable, integrated and adaptable to the requirements of agroecological production, on the principles of sustainability. Thus, we will be able, at the same time, to quantify the effects on socio-ecological systems, in a context of consumption that puts more and more pressure on the planet's resources. Discussions, but especially solutions, on sustainability and innovation in agriculture are urgent, due to the need to ensure the source of basic foodstuffs and to meet primary food needs, as well as consumer access to them. Ensuring the need for food for a growing population must be based on maintaining productive ecosystems (in this case land) and sustainable production systems, without affecting the evolution and even the existence of upcoming generations, by ensuring a responsible and sustainable future. The main purpose of this scientific paper is to promote agroecology and encourage innovation, by promoting organic farming, in conjunction with sustaining steady economic growth, so necessary for the population's access to nutritious and sufficient food, with direct effects on a healthy and active life.

Keywords: organic farming, agroecology, sustainability, production, food security, innovation

1. INTRODUCTION

Sustainable agriculture is showing a growing trend due to the evolution of the ecological awareness of the masses, but also of the local, zonal, national and global authorities. Thus, organic farming is a sustainable alternative for both developing and developed economies. Organic farming is different from conventional farming and aims to make sustainable use of natural processes and substances.

The European Union is the world's largest importer of food and that is why, with the launch of the European Green Deal, it is firmly committed to helping the global transition of the food system to sustainable production. As the largest importer. EU, can and must, through its policies and trade agreements with non-EU countries, influence and stimulate its trading partners to use sustainable agricultural practices, as well managed resource management.

This is so necessary because European farmers have to or rather are forced, to meet very high standards of environmental protection, which implicitly lead to high production costs. These regulations are imposed on European farmers, but such conditions are not imposed on imports of food products from non-EU countries, which unfortunately could be to the detriment of the European producer.

The EU, through the Farm to Fork Strategy, part of the European Green Deal, wants to create an environmentally friendly, healthy and last but not least, fair food system throughout its territory.

Through this Strategy, the EU has set itself the goal, among other things, of bringing the agricultural area devoted to organic farming to 25% of the total existing agricultural land in the Union by 2030. Also, to move to organic production and help the development of the sector, both farmers and associated agricultural enterprises operating in the food chain can receive several incentives and financial support.

Agroecology is based on local information and traditional knowledge, to which are added the achievements of modern science and innovation, that through the use of ecological processes, can and must contribute to the protection of agricultural resources and the increase of agricultural crops, with direct results on improving health and of lifestyle, prosperity, resilience and recovery of local economies.

Agroecology is a multi-, pluri- and transdisciplinary science and agroecological production use resources (water, soil, natural and cultivated diversity of animal species and plant varieties) and locally available information (knowledge that people have and communities).

Unsustainable agricultural practices, with an impact on people and the environment, must be replaced by ecological agricultural management, which will allow the transition to a sustainable business model of agricultural systems, based on sustainable agricultural practices. Agriculture through organic and sustainable production has several environmental advantages, with direct effects and benefits on the economy and society.

The European Union is currently in a phase of transition, thanks to the ambitious goals set to be achieved by 2030, where the coherence of agricultural policies and their observance will also benefit rural development.

From the point of view of the global workforce, more than a billion people work in agriculture, generating food of over 1.3 trillion$ worth per year, and organic farming offers new employment opportunities in production, processing and related services.

Therefore, it is very important that farmers, the first link in agriculture, ensure through their work and efforts, in addition to "everyday" food and the protection of the environment, nature in general, by strengthening their position in the production chain, which determines the strengthens of their capacity to become part of the necessary solutions in terms of food safety and security and not of the problems by implementing a type of nonperforming agriculture, with negative and undesirable effects on the environment, biodiversity loss and climate change.

We can say with all conviction that agriculture is the largest industry in the world. Thus, approx. 50% of the total living area is owned by agricultural land.

2. METHODOLOGY

The methodology used consisted in analyzing the reports and interpreting the statistical data provided by the Romanian Ministry of Agriculture and Rural Development, the National Institute of Statistics International Organizations (eg. EUROSTAT) and research institutes (eg. The Research Institute of Organic Agriculture - FiBL, IFOAM - Organics International) whose object of activity is, among others, research and information in the field of organic farming. The data were processed by statistical-mathematical methods and presented in detail on point 3. Results and discussions. Also, the study of the specialized literature at the national and international level was taken into account regarding the benefits of organic farming compared to conventional farming, as well as social responsibility and accountability and education in the fields of environmental protection, food bioresources and food security, topics of strategic importance in the current environmental and geopolitical conditions. Indicators analyzed in this scientific paper were the area of ecological agricultural land, the number of operators active in organic farming, such as producers, processors, importers, exporters and the market for organic food.

3. RESULTS AND DISCUSSIONS

If the 2050 population projection is to come true, we will have to provide food for about 10 billion people, in the conditions in which we face each other with many challenges in terms of climate change, the environment and biodiversity and health (COVID-19 pandemic). That raises the question of how global food systems will cope with these systemic challenges, the unequal distribution of resources and production risks, but also how we will understand the ability of agricultural systems to supply and meet food demand for a growing population, without exhausting resources. In order to ensure and meet current and future needs, the actions we take for a sustainable food system must encompass the three pillars, namely the environment, the economy and society (EUFIC, 2022 [5]).

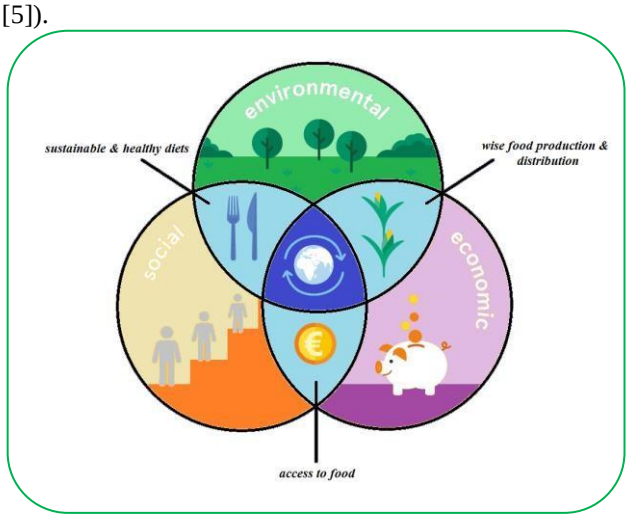


Figure 1 Pillars of the sustainable food system
***Source*: EUFIC-European Food Information Council, 2020**

With a desire to increase the well-being and health of EU citizens by ensuring food security and safety, for stimulating the Union's economy and reducing major damage to the environment as well as to the destruction of natural resources, the European Commission [6], [7], [8]) amended and supplemented the agricultural policies (Common Agricultural Policy - CAP) and implemented new development strategies at EU level (European Green Deal).

Today, the agricultural industry is no longer seen only as a food producer but has a multifunctional approach (Maura Farrell et al., 2022 [1]), totally different from the perception of the past, where the services it provides and the functions it has to them, contributes and has a great influence on environmental challenges, with direct results in ensuring food security.

Thus, the transformation of the food system requires a collective approach, from local (short food supply chains), zonal, regional and global (both public authorities at all levels and the private sector), civil society, but also every citizen, to increase the mass consciousness of the population and the understanding of the major problems facing humanity.

An important role in the development of agriculture and the transformation of the food system, with direct results on socio-economic needs and the prevention of concessions between productivity and sustainability, is played by innovations, and their implications in the daily activity imply the application in practice of solutions, with positive effects on the final products and services offered.

Thus, the development and implementation of a model of agricultural production on the principles of sustainability is very important. There is a lot of talk about "smart agriculture", "digitalization of agriculture" and "agricultural robotization", but these topics will be addressed in several subsequent scientific papers. Organic farming and the sustainable development of the environment are key factors that directly contribute to the well-being of humans and animals, being agriculture with clear production rules and methods (without synthetic fertilizers and pesticides, medicines and additives), with mandatory control schemes and specific labeling.

3.1. The globally and Community space situation of ecological agricultural land.

The area cultivated globally involved in organic production (completely transformed and converted) in 2020 was 74 926 006 hectares, increasing by 2 968 154 hectares compared to 2019 (71 957 852 hectares). Organic farming adds value to the rural economy, and organic farms help to create and preserve landscapes and conserve biodiversity, as well as water and soil quality.

Table 1. Comparative evolution of ecological agricultural land, including in-conversion areas, 2019-2020, by region and hectares

Region	2019	2020
Oceania	35 873 526	35 908 876
Europe	16 494 912	17 098 134
Latin America	8 296 331	9 949 461
Asia	5 713 875	6 146 235
Northern America	3 647 623	3 744 163
Africa	1 937 873	2 086 859

***Source*: FiBL – Research Institute of Organic Agriculture and IFOAM – Organics International, 2022**

The surface of ecological agricultural land increased in 2020, compared to 2019, by 4.1%. Organic farming is practiced in over 190 countries, and in the last 10 years, there has been a growing global interest in organic farming, with the area of organic farming increasing by 104.3% compared to 2010. If we refer to by region, the most spectacular expansion took place in Oceania, where interest in organic farming is growing, and the area of ecological land has increased by 215.4% (+24 525 183 hectares).

Thus, in 2020, the agricultural land recorded increase on all continents, the largest taking place in Latin America with + 19.9% ⇨ +1 653 129 hectares, followed by Europe + 3.7% ⇨ +603 222 hectares, Asia +7.6 % ⇨ +432 360 hectares, Africa + 7.7% ⇨ +148 986 hectares, North America + 2.6% ⇨ +96 539 hectares and Oceania + 0.1% ⇨ + 35 350 hectares (FiBL & IFOAM, 2022 [2]).

For an easier views of the ecological agricultural land area globally, in %, we present figure 2.

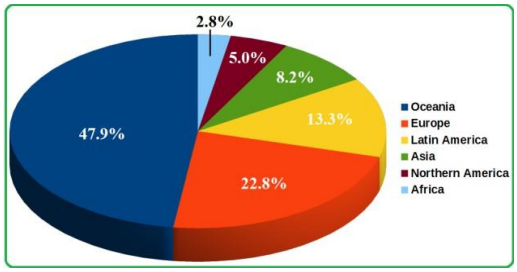


Figure 2. The share of regions in the global ecological agricultural land, in 2020 *Source*: FiBL and IFOAM - Organics International, 2022

According to statistical data published by FiBL and IFOAM - Organics International in 2022, for the year 2020, the top 20 countries with the largest land area used in organic farming, in hectares, are shown in figure 3, in ascending order, from Romania (468 887 hectares) to Australia (35 687 799 hectares), the country with the largest area in the world involved in ecological production.

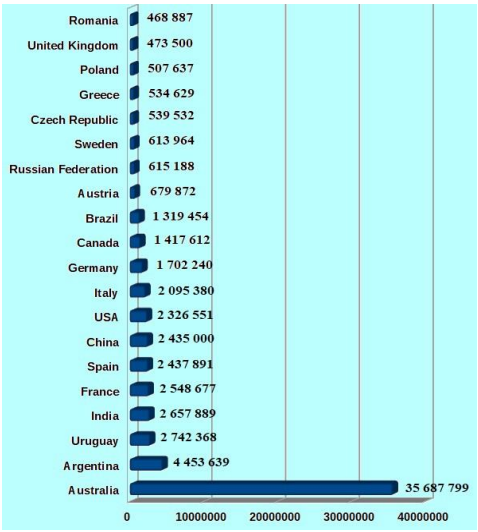


Figure 3. Top 20 countries with land areas involved in organic farming, including areas in conversion.
***Source*: FiBL and IFOAM – Organics International, 2022**

Significant increases of more than 10% of the ecological agricultural land area were registered in countries such as Argentina + 21.3% ⇨ +0.78 million hectares, Uruguay + 27.9% ⇨ +0.60 million hectares, India + 15.6% ⇨ +0.36 million hectares and France (+ 13.7% ⇨ +0.31 million hectares (FiBL & IFOAM, 2022 [2]).

As for the European Union, in 2020, the cultivated area involved in ecological production was 14.9 million hectares (14.7 million hectares according to Eurostat data, 2022 [4]), an increase of 5.3% compared to 2019 (FiBL & IFOAM, 2022 [2]), with the share of ecologically cultivated area in total EU agricultural land of 9, 2 million hectares (FiBL & IFOAM, 2022 [2]), or 9.1 million hectares (Eurostat, 2022 [4]).

The top 3 countries in the European Union with the largest area of land used for organic farming include France with ~ 2.5 million hectares, Spain ~ 2.4 million hectares and Italy ~ 2.1 million hectares.

Table 2. Evolution of ecological agricultural land by country in the EU-27, 2019-2020

EU-27*)	Organic agricultural land [ha]		1-year growth	
	2019	2020	[ha]	[%]
Austria	669 921	679 872	9 951	1.5
Belgium	93 119	99 075	5 956	6.4
Bulgaria	117 779	116 253	-1 526	-1.3
Croatia	108 127	108 610	483	0.4
Cyprus	6 240	5 918	-322	-5.2
Czech Republic	540 986	539 532	-1 454	-0.3
Denmark	285 526	299 998	14 472	5.1
Estonia	220 737	220 796	59	0.0
Finland	306 484	315 112	8 628	2.8
France	2 240 797	2 548 677	307 880	13.7
Germany	1 613 785	1 702 240	88 455	5.5
Greece	528 752	534 629	5 877	1.1
Hungary	303 190	301 430	-1 760	-0.6
Ireland	73 952	73 952	0	0.0
Italy	1 993 225	2 095 380	102 155	5.1
Latvia	289 796	291 150	1 354	0.5
Lithuania	242 118	235 471	-6 647	-2.7
Luxembourg	5 814	6 118	304	5.2
Malta	55	67	12	21.8
Netherlands	68 068	71 607	3 539	5.2
Poland	507 637	507 637	0	0.0
Portugal	293 213	319 540	26 327	9.0
Romania	**395 228**	**468 887**	**73 659**	**18.6**
Slovakia	197 565	222 896	25 331	12.8
Slovenia	49 638	52 078	2 440	4.9
Spain	2 354 916	2 437 891	82 975	3.5
Sweden	613 964	613 964	0	0.0

***Source*: FiBL and IFOAM – Organics International, 2022** *)
Even though the United Kingdom left the European Union on 31 January 2020, for the analysis carried out in this scientific paper and for the continuity of the data, we did not take into account the information related to this state.

Out of a total of 27 EU member states, 3 countries remained on the same area of organic farming in 2020 as in 2019: Ireland 73 952 hectares, Poland 507 637 hectares and Sweden 613 964 hectares and 5 countries decreased in 2020 compared to 2019: Bulgaria -1 526 hectares (-1.3%), Cyprus -322 hectares (-5.2%), Czech Republic -1 454 hectares (-0.3%), Hungary -1 760 hectares (-0.6%) and Lithuania -6,647 hectares (-2.7%). The rest of the countries have increased their area of ecological agricultural land. Regarding the evolution of the ecological agricultural land area in 2020, compared to 2019, in the top 5 countries with the highest growth is also Romania (5th place) with +73 659 hectares ⇨ + 18.6%. On the 1st place is France with +307 880 hectares ⇨ + 13.7%, followed by Italy with +102 155 hectares ⇨ + 5.1%, Germany +88 455 hectares ⇨+ 5.5% and Spain +82 975 hectares ⇨ + 3.5%.

3.2. The globally and Community space situation of the number of operators involved in organic farming.

As we mentioned, more than a billion people work in agriculture globally. In terms of operators activating in organic farming globally, there are 3 368 254 producers (approximately about 91% are in Asia, Africa and Europe), 112 911 processors, 7 703 importers and 9 963 exporters (FiBL & IFOAM, 2022 [2]).

Table 3. Comparative evolution of the number of producers in organic farming, in 2019-2020, by regions

Region	2019	2020
Asia	1 588 400	1 808 464
Africa	1 588 400	1 808 464
Europe	428 677	417 977
Latin America	224 388	270 472
Northern America	22 153	22 448
Oceania	16 117	15 930

***Source*: FiBL and IFOAM – Organics International, 2022**

In 2020, compared to 2019, the number of producers involved in organic farming increased by 238,360 (+ 7.6%). Globally, in the period 2010-2020, there was an increase of 90.6% in the number of producers in organic farming. If we refer strictly to regions, the largest increase in the number of producers was recorded in Asia, + 195.9% (+1 197 342), and at the opposite pole was Latin America with -12.1% (-37 075). The situation of the number of ecological agricultural producers in 2020, on all continents, was as follows: Asia (+ 13.9% ⇨ +221 228), Latin America (+ 20.5% ⇨ + 46 084) and North America (+ 1.3% ⇨ +295), their number increased, while in Africa (-2.0% ⇨ -16 795), Europe (-2.5% ⇨ -10 700) and Oceania (-1.2% ⇨ -187) decreased (FiBL & IFOAM, 2022 [2]).
As we did on the surface of ecological agricultural land, for an easier views of the number of ecological producers globally, we present figure 4.

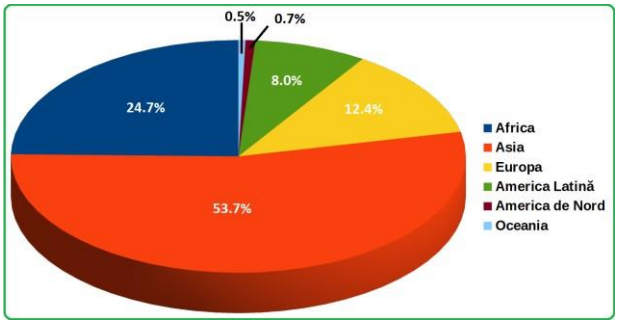


Figure 4. Percentage distribution of the number of ecological producers globally, in 2020 *Source*: FiBL and IFOAM – Organics International, 2022

The top 10 countries (according to statistics published by FiBL and IFOAM in 2022), for 2020, with the largest ecological producers globally are shown in figure 5, in ascending order, from France (53 255) to India (1 599 010), the country with the largest number of organic farmers.

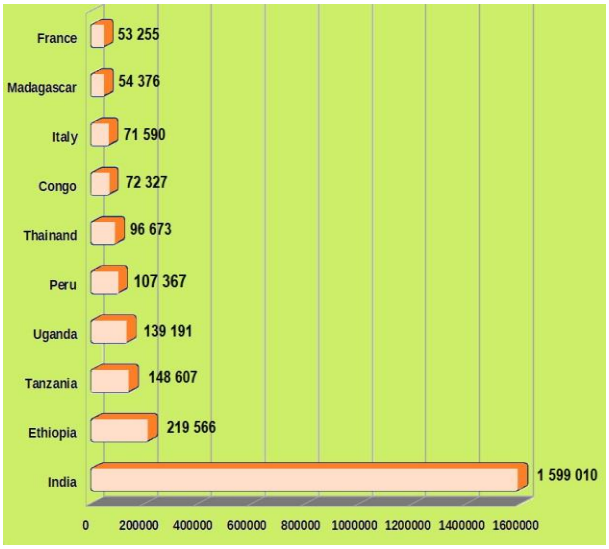


Figure 5. Top 10 countries with the largest number of ecological producers globally, in 2020 *Source*: FiBL and IFOAM – Organics International, 2022

By 2020, the number of producers involved in organic farming in the EU has increased to 349 499, with organic processors reaching 78 262. The top 3 countries with the largest number of EU producers are Italy with 71 590, France with 53 255 and Spain with 44 493. In terms of processors, Italy ranks first with 22 689, followed by France with 19 311 and Germany with 17 350.

Table 4. The situation in the EU-27 of ecological producers and processors, in 2020

EU-27	Producers	Processors
Austria	24 480	1 691
Belgium	2 494	1 585
Bulgaria	5 942	249
Croatia	5 153	395
Cyprus	1 223	70
Czech Republic	4 669	852
Denmark	4 186	1 162
Estonia	2 050	176
Finland	5 102	466
France	53 255	19 311
Germany	35 396	17 350
Greece	29 869	1 653
Hungary	5 128	521
Ireland	1 725	26
Italy	71 590	22 689
Latvia	4 171	65
Lithuania	2 417	124
Luxembourg	114	104
Malta	25	8
Netherlands	1 937	993
Poland	18 598	668
Portugal	5 945	1 036
Romania	**9 647**	**201**
Slovakia	716	119
Slovenia	3 685	139
Spain	44 493	5 561
Sweden	5 489	1 048

***Source*: FiBL-AMI survey 2022**

Romania ranks 8th in the EU in the number of producers with 9 647 and 18th in processors with 201 (FiBL & IFOAM, 2022 [2]).

3.3. Trends in the organic food market

The COVID-19 pandemic has triggered a change in consumers' perceptions of health and well-being, with a focus on changing the way they live and eat. Thus, at the beginning of the pandemic, the demand for organic food has increased, maintaining its current trend, even if organic production is influenced by a number of determinants and challenges that come from the competition due to the sustainability standards imposed. At the same time, consumers are becoming increasingly aware of the need to ensure ecological balance and biodiversity conservation (factors promoted by organic farming) and their impact on human health and wellbeing. The global organic food market is gaining ground due to the nutritional quality of the products (no food additives or industrial solvents), the lack of toxicity induced by the presence of pesticides and synthetic fertilizers, and the fact that it does not use genetically modified organisms, food without growth hormones or antibiotics.

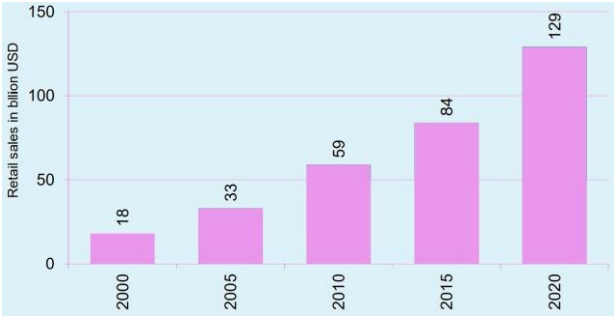


Figure 6. Evolution of the global market for organic food and drink in the period 2000-2020 Source: Ecovia Intelligence, by FiBL and IFOAM - Organics International, 2022

According to research and a report published in August 2021 by Research and Markets, the global food market in 2020 was valued at $ 167.85 billion, with an estimated growth of $ 368.94 billion in 2026. For this forecast period the Compound Annual Growth Rate - CAGR was

estimated at 14.59% (Research and Markets, 2021 [3]). As for the global organic food market, it is broken down by product type (global organic food market is dominated by fruits and vegetables, followed by organic meat and dairy products), mode of distribution (preferably hypermarket/supermarket) and region. For distribution, during the pandemic period, the winners were online retailers.

As we mentioned in the introduction to this scientific paper, the EU is the largest importer of food globally.

The number of operators operating in the field of import-export of organic food in the EU is shown in Table 5.

Table 5. The situation in 2020 of importers and exporters of organic products in the EU-27

EU-27	Importers	Exporters
Austria	58	4
Belgium	304	153
Bulgaria	22	2
Croatia	22	3
Cyprus	16	0
Czech Republic	324	154
Denmark	101	104
Estonia	38	18
Finland	56	33
France**)	662	-
Germany	1 916	1 349
Greece	45	40
Hungary	48	0
Ireland	24	2
Italy	544	885
Latvia	5	0
Lithuania	3	170
Luxembourg	7	0
Malta	17	0
Netherlands	479	132
Poland	267	319
Portugal	47	36
Romania	**30**	**27**
Slovakia	43	5
Slovenia	28	0
Spain	416	138
Sweden	298	15

***Source*: FiBL-AMI survey 2022**

**) We do not have data on organic food exporters in France, and no exporter is officially registered in Cyprus, Hungary, Latvia, Luxembourg, Malta and Slovenia.

In 2020, the number of importers of organic food in the EU was 5 820, with exporters reaching 3 589. The top 3 countries with the highest number of EU importers are Germany with 1 916, France with 662 and Italy with 544. In terms of exporters, Germany is in first place with 1 349, followed by Italy with 885 and Poland with 319. Romania is in 18th place in the EU at the number of importers by 30 and on the 13th place at exporters, with 27 (FiBL & IFOAM, 2022 [2]).

4. CONCLUSIONS

✓ Increasing efficiency and competitiveness in agriculture through innovation and know-how is strictly necessary to create a bridge between scientific research and practice, to find solutions to current and future challenges and social, economic and environmental problems, the challenges humanity is facing.

✓ Rethinking and redesigning agriculture in general and farms in particular, on the principles of sustainability and durability (eg high quality recycling of organic matter and manure - circular economy), so that farmers, by optimizing production and continuous improvement of short supply chains using economies of scale from collaborative production (farmers who produce as if it were a single farm), as well as consumers, to benefit from the significant potential that organic farming has.

✓ Continuing education of the population in all social backgrounds and age groups on increased responsibility and awareness of the characteristics and benefits of ecological production, with the motivation of the producer and the consumer on responsible production and consumption, with a direct result on increasing welfare.

✓ In the current situation, with an armed conflict on the country's border and a large trade deficit due to massive imports of processed products, Romania needs FoodHubs to help small and medium farmers.

✓ Poverty in local farming communities can be combated through high-performance management and efficient production marketing, with direct results in increasing work efficiency, providing diversified, healthy and nutritious food for both their families and communities of which they are part.

✓ Organic farming helps to ensure food security by increasing yields, resistance to disease and pests, helping to retain water in the soil and combating destabilization, and last but not least, combating climate change.

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