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The Plants Cultivation in Organic Farming System – a Precious and Useful Gift

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Abstract. Researchers and organic farmers discovers, tries to explain and even to find solutions with sustainable effect of the main contemporary problems: physical, chemical and biological degradation of agricultural lands, pollution of soils with nitrates, nitrites and heavy metals, land abandonment, biodiversity decreasing, climatic change, subsistence production and their negative effect: the starvation and social inequity.
This paper reviews the most important technical and scientific information regarding the theoretical and practical characteristics of organic farming, the potential of Romania in organic farming, evolution of the total area of ecological agriculture and of the area of the key organic crops in Romania and the organic cereals, legumes and industrial crops by Romanian counties.

Keywords: organic farming, characteristics, ecological agriculture, potential and evolution

Introduction

Plants cultivation in organic system is, everywhere in the world, a relative new concern from the first half of 20th century, of an increasing number of farmers preoccupied and passionate by production of living food in an amount sufficient, varied and accessible for human and all other living creatures, in context of rising risk of contamination of food and agricultural products by toxic substances: natural or artificial chemical substances – nitrates, nitrites, heavy metals, pesticides and other harmful chemicals; organisms or substances they produced, of bacteria *(listeria, salmonella, E.coli etc.)* and viruses *(norovirus)*, respectively toxins, hormones *(in milk)*, antibiotics *(in meat)* and physical contamination - hairs, steel wool, pieces of plastic etc. Also, organic agriculture, at least partly, can mitigate the impact in nature caused by intensification, in frequency and intensity, of extreme phenomena: unexpected, unusual, unpredictable, severe or unseasonal weather (heat waves and tremendous frost) and their effects on agriculture – drought, dust storm, floods, landslide, thunderstorms and associated phenomena (large hail, high winds, tornadoes, deadly lighting etc.), causing decreasing of soil fertility by soil erosion and

exhausted of nutrients, soil and air pollution, the explosion of diseases, many incurable for the moment, of the plants, animals and humans. [10]

Here we examine the theoretical and practical characteristics of the organic agriculture, the natural and economical potential of Romania in organic farming, the evolution of the total area of organic agriculture and of the area of the main organic crops in Romania and the present surface of the organic cereals, legumes and industrial crops by counties.

Material and Methods

The paper is based on impartial and detailed analysis of scientific information about theoretical and practical characteristics of organic farming, and showing of the natural and economic potential of Romania, and of the main statistic indexes of ecological agriculture evolution in Romania.

Results and Discussion

The theoretical and practical characteristics of organic agriculture;

As long as the organic farming is regulated, in all its components, by specific laws and standards issued by European Commission and IFOAM, the theoretical and practical characteristics of organic agriculture are similar everywhere, including Romania.

The theoretical characteristics of organic agriculture;

Terminology

According to Regulations (CE) 834/2007 and 889/2009, in EU countries are used, with the same meaning, 3 different terms: **organic agriculture** (*England, Cyprus, Ireland and Malta),* **biological agriculture** (*Austria, Belgium, Bulgaria, France, Greece, Italy, Luxembourg, Netherlands and Portugal*) and **ecological agriculture** *(Croatia, Denmark, Finland, Lithuania, Poland, **Romania,** Slovenia, Sweden and Hungary).* Also, other countries use in parallel 2 terms: organic and ecologic agriculture *(Estonia),* biological and ecological agriculture *(Czech Republic, Germany, Latvia, Slovakia and Spain).*

„Ecological Agriculture", is a term protected and designated by E.U. to Romania for definition of this organic system and it is similar with terms "organic agriculture" or "biological agriculture" which are used in other EU member states.[11] Also, the term „Ecological Agriculture" is accepted and used by the all Romanian experts in agroecology, since 1977 to present, when it is discussed about agricultural applied ecology. [4]

History

Ecological agriculture has deep historical roots, in special as practical occupation, all the great human civilisations – Mesopotamian, Arab, Greek, Roman, and Chinese, being based on prosper and unpolluted agriculture, without chemical

fertilizers and artificial pesticides,[8, 10] dominated, in thinking and work, only by wisdom and skill.[10]

The theoretical bases were layed in 1920 – 1960s, immediately after agricultural industrialization process and „the green revolution" started:

-Rudolf Steiner in Germany, founder of „biodynamic agriculture";

-Sir Albert Howard and Eve BALFOUR in England who founded the school of „organic agriculture",

-H. Müler and H.P. Rusch, in Switzerland, author of concept „Muller-Rusch" of „organo-biological agriculture";

-C. LEMAIRE and J. BOUCHER in France, founders of the „biological agriculture" school. [10]

The list of scientists who contributed essential to the development of ecological agriculture includes other representative scientist names: Johan Wolfgang GOETHE, Ernst HAECKEL, Ehrenfried PFEIFFER, E. KOLISKO, L. KOLISKO, Cloude AUBERT and Bill MOLLISON.

A crucial role in development of organic agriculture had the International Federation of Organic Agriculture Movements (IFOAM), an umbrella association of organic farmer associations, agricultural foundations, agriculture and agro-industrial companies and individual supporters. IFOAM was founded in 1972 in Versailles/France for promotion and development of organic, biological or ecological farming systems all over the world.

In Europe the essential role in development and promotion of organic agriculture had the European Council (EC). EC elaborated the first Regulation (EEC) no. 2092/91 on organic products and indications referring of agricultural products and indications referring thereto on agricultural products and foodstuffs, also Council Regulation (EC) No 834/2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91 and Commission Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production labelling and control.

In Romania, ecological agriculture appeared in 1977 – 1978s and developed in parallel with agroecology, the newest branch of ecology. The first scientists who pronounced the term and wrote about ecological agriculture, underlying its importance was Ioan PUIA in 1977 [4], and then Petre PAPACOSTEA, author of the book „Agricultura biologică". [3] Ioan Puia is, also, one of the first promoters of the term "Agricultura ecologică". For the author, ecological agriculture means more than plant cultivation and animal husbandry, but, also, it means an equilibrate manipulation of all another components of the agroecosystems which generate specific agro-climaxes. [5]

Another important step for development of ecological agriculture in Romania was setting up of 4 representative NGOs in period 1997 - 2000: Organic Farmers

Association of Romania (BIOTERRA), Romanian Association for Sustainable Agriculture (A.R.A.D.), Agroecology Association (Agroecologia) and National Federation of Ecological Agriculture (F.N.A.E.).

In Romania, ecological agriculture was official recognized in 2000s, by Government Ordinance (OUG) No 34 of 17 April 2000 about ecological agro-foods products and OUG No 913 of September 2001 about Norms for applying of the OUG No 34/2000, and then by many other Orders of Ministry of Agriculture about labelling of ecological agriculture products, regulations of Inspection and Certification system and certification in ecological agriculture, Regulations about the Import and Export of ecological products etc.

Definitions and Principles

Organic farming is a production system that sustains the **health** of soils, ecosystems and people. It relies on **ecological** processes**,** biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic farming combines tradition, innovation and science to benefit the shared environment and promote **fair relationships** and a good **quality of life** for all involved. [11 - 13]

The International Federation of Organic Agriculture Movements (IFOAM) established, according with this definition**, four principles of organic farming** [14]:

Principle of health

Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.

The role of organic agriculture, whether in farming, processing, distribution, or consumption, is to sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings. In particular, organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well-being. In view of this it should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects.

Principle of ecology

Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

This principle states that production is to be based on ecological processes, and recycling.

Organic agriculture should attain ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity. Those who produce, process, trade, or consume organic products should protect and benefit the common environment including landscapes, climate, habitats, biodiversity, air and water.

Principle of fairness

Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

Fairness is characterized by equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings.

Natural and environmental resources that are used for production and consumption should be managed in a way that is socially and ecologically just and should be held in trust for future generations. Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs.

Principle of care

Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture. Science is necessary to ensure that organic agriculture is healthy, safe and ecologically sound. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge offer valid solutions, tested by time. Organic agriculture should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones, such as genetic engineering. Decisions should reflect the values and needs of all who might be affected, through transparent and participatory processes.

Organic agriculture is the science or art of management to have under control the living organisms and theirs environment in the benefit of humans, by modern methods which do not damage any component of the environment". [10]

Goal and Objectives

The organic farming is aiming the harmonization of dynamic interactions between soil, plants, animals and humans. It is aiming harmonisation of interactions between ecological, economic and social offers of the agroecosystems and human, animal and other living organism basic needs for food and inhabitation, respective feed and shelter and all other specific needs. [9]

The objectives of organic farming are according of the imperative of the 21 century – ***from the survive to the supervive*** and ecological, economical and social dimensions of organic farming system:

Table 1. Ojectives of organic farming [9]

Environmental objectives	Plant production objectives	Livestock production objectives	Social objectives
- equilibration of the energetic balance; - increasing and conservation of the soil fertility; - protection of water and aquatic life; - recovery and conservation of biodiversity; - stimulation of microorganisms, flora and fauna activity; - recovery and protection of the natural landscape; - minimisation of the agriculture impact on environment	- natural integration, including cosmic, of crops species and cultivars; - optimization of the crops structure; - optimization of the dimension of nutritive space; - recovery of natural equilibrium of water, nutrients, weeds, pests and diseases;	- optimisation of the rate plant/animal; - improving and conservation of genetic resources; - respecting of the intrinsic needs of animals about feed, shelter, motion, couple,"exploitation" etc.;	- development of the multifunctional farming systems; - diversification of agricultural production; - decreasing of the use of non-renewable resources; - improving of the labour productivity and of the life of organic producers; - recovering and conservation of material and spiritual traditional values;

Practical Characteristics of Organic farming

Types of organic farming

In practice exists three types and a few subtypes of organic farming, according to relationship with environment and human society:

Properly organic farming [1] (organic agriculture, biological agriculture or ecological agriculture) is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasises the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system. Also, three different driving forces can be identified for organic agriculture:

- Consumer or market-driven organic agriculture. Products are clearly identified through certification and labelling. Consumers take a conscious decision on how their food is produced, processed, handled and marketed. The consumer therefore has a strong influence over organic production.
- Service-driven organic agriculture. In countries such as in the European Union (EU), subsidies for organic agriculture are available to generate environmental

goods and services, such as reducing groundwater pollution or creating a more biologically diverse landscape.

- Farmer-driven organic agriculture by developed alternative modes of production to improve their family health, farm economies and/or self-reliance. In many developing countries, organic agriculture is adopted as a method to improve household food security or to achieve a reduction of input costs. Produce is not necessarily sold on the market or is sold without a price distinction as it is not certified. In developed countries, small farmers are increasingly developing direct channels to deliver non-certified organic produce to consumers. In the United States of America, farmers marketing small quantities of organic products are formally exempt from certification.

Many scientists, including professor Ioan Puia, first Romanian scientist who used the term ecological agriculture, and us, said this farming system is not similar with organic or biological farming, however there are many similarities. Ecological agriculture means more than land cultivation and animal husbandry, as well ”harmonization” of all components of agroecosystems which can generate agroclimax. Also, ecological agriculture includes all methods, including organic, which regenerate ecosystem services like: prevention of soil erosion, water infiltration and retention, carbon sequestration in the form of humus, introduction of symbiotic species and increased biodiversity.[22] Also, ecological agriculture is based on the laws and principles of the agroecology and use the modern techniques of conservation agriculture – practicing minimum soil disturbance , anaging of the top soil to create a permanent organic soil cover and practicing diverse crop rotations or crop interactions [20], and why not, utilisation of the precision agriculture, revolutionary techniques for all agriculture system types, including for ecological agriculture.

Biodynamic agriculture [19] is a form of alternative agriculture, more or less, similar to organic farming, but it includes various esoteric drawn from the ideas of Rudolf Steiner (1861–1925). Initially developed in 1924, it was the first of the organic agriculture movements. It treats soil fertility, plant growth, and livestock care as ecologically interrelated tasks, emphasizing spiritual and mystical perspectives viewing the farm as a living “holistic organism”. Biodynamics has much in common with other organic approaches – it emphasizes the use of manures and composts and excludes the use of artificial chemicals on soil and plants. Methods unique to the biodynamic approach include its treatment of the farm as a living ”holistic organism” and of the animals, crops, and soil as a single system, an emphasis from its beginnings on local production and distribution systems, its use of traditional and development of new local breeds and varieties.[21] Some methods use an astrological sowing and planting calendar. Biodynamic agriculture uses various herbal and mineral additives for compost additives and field sprays; these are sometimes prepared by controversial methods, such as burying ground quartz stuffed

into the horn of a cow, which are said to harvest "cosmic forces in the soil", that are more akin to sympathetic than agronomy.

No difference in beneficial outcomes has been scientifically established between certified biodynamic agricultural techniques and similar organic and integrated farming practices. Biodynamic agriculture lacks strong scientific evidence for its efficacy and has been labeled a pseudoscience because of its overreliance upon esoteric knowledge and mystical beliefs.

Natural farming [2] is knowing as **Fukuoka farming –** an organic agriculture type of local and/or family interest authored by Masanubu Fukuoka, a Japanese farmer/philosopher, based on 4 practical recommendations:

No cultivation because turning of the soil with plow or hoe *Ruins the Soil* by loosen (erosion) and compacting of the soil and decreasing of types and proliferation of microorganisms, and it is not necessary because ***The Soil Works Itself*** by cultivation of "the right crops for the right lands";

No fertilizer, because *Crops Depend on the Soil*: they have no need basically for fertilizers and nutrients; *Fertilizers are not Realy Necessary* as far as crops depend on the soil land the crop grew as a result of the absorption of nutrients by the roots and plant has a shape perfectly adapted to the natural environment and crop growing is neither too fast nor too slow, but in total harmony with the great cycles of nature, and because of the Countless Evils of Fertilizer: plants weakened by fertilizers have a lowered resistance to diseases and pests, and are less able to overcome other obstacles to growth and development; fertilizer applied to soil usually is not as effective as in laboratory experiments; Damage caused directly by fertilizers is also enormous; One major problem with fertilizer use is the deficiency of trace components.

No weeding, because no all weeds are dangerous and the weeds enrich the soil. In nature plants live and thrive together, but man sees things differently – he sees coexistence as competition; he thinks of one plant as hindering the growth of another and believes that to raise a crop, he must remove other grasses and herbs.

No pesticides, because *Insect Pests and Diseases Do Not Exist* in Nature undisturbed by the man. The smart thing to do would be to stop treating insects as pests and find a way that eliminates the need for control measures altogether.

The natural agriculture (farming) systems are ***agroforestry*** and ***permaculture*** too.

Agroforestry is a land use management **system** in which trees or shrubs are grown around or among crops or pastureland. It combines shrubs and trees in agricultural and forestry technologies to create more diverse, productive, profitable, healthy, ecologically sound, and sustainable land-use **systems**.

Permaculture, originally 'Permanent Agriculture', is a system of agricultural and social design principles centred arround simulating or directly utilizing the patterns and features observed in natural ecosystems.

The list of the organic farming types has to be completed with the **Low External Inputs Sustainable Agriculture**, which is necessary, especially before of

starting conversion period. This farming type is based on using of local resources of soil, climate and labour forces and, if it is necessary, of fertilizers, pesticides, conventional equipment, food additives etc., but only to cover of deficits of these and do not affect the environment. In this way the farming system is equilibrated as natural, economically and socially potential by gradual decreasing of conventional technology and replace of it with ecological technology, in proportion as it is accepted by the system, and the system do not given any sign of "reject" of the new ecological technology.

Regulations of organic farming

Organic farming is the only farming system which is regulated, in all its components, by (inter)national or private regulations, an ensemble of ecological, technical, scientific, social, legal etc. norms *(rules, principles, procedures etc.)* for conversion, plant cultivation, animal husbandry, processing of food and feed, trading, labelling, logos, advertising, control system etc.

The most important examples are international and national Regulations quoted in paragraph *3.1.1.b:*

- Regulation (EEC) no. 2092/91 on organic products and indications referring of agricultural products and indications referring thereto on agricultural products and foodstuffs;

- Council Regulation (EC) No 834/2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, and amendments (2);

- Commission Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production labelling and control, and amendments (18);

- Commission regulation (EC) No 1235/2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries, and amendments (30); respective:

- Emergency Ordinance of the Government O.U.G. nr 34/17 April 2000 followed by law 38/2001 about ecological agro-foods products;

Conversion [16]

Conversion means the transition from non organic to organic farming within a given period of time, during which the provisions concerning the organic production have been applied.[16] It refers to the physical and biological processes the farmer and the farming system must undergo to comply with organic standards. [7]

Conversion characteristics

Conversion is:

- a long-term process because require more time and effort to re-introduce diversity, to improve soil fertility significantly, especially in more specialised and intensive farms and to gain experience by the operator. The conversion period start when the operator has notified his activity to the competent authorities and subjected his holding to the control system. The lenght of conversion period for plant cultivation and plant products is, at least, two years before sowing, or in the case of perennial crops other than grassland, at least three (3) years before the first harvest of products. Also, the conversion period may be shorted or extended by the competent authority, depending on conditions of past use of the land, level of the residues in the soil, and in the case of perennial crop, in the plant, management capacity of the operator and environmental factors;

- a successful conversion requires a careful assessment of the resources available and the interactions between components in that system (Robyn) by organizing of the system components such that all elements of the farm activities interact positively and are compatibly with natural living systems and cycles (IFOAM, 2005) ;

- the conversion process requires a multiple and high level of commitment to succeed and often entails financial risk[7] , because each individual need support of family, friends and authorities, respective, the crops yield is decreasing and the products can not be sold as organic during conversion period;

- ease of conversion is largely dependent on what you start with – if you start with a degraded resource base then that's what you'll end up with;[7]

- economic pressures resulting from previous activities can be the biggest constraint to successful conversion;[7]

- there are no fixed methods for organic conversion[7], because each farm unit is an individual and distinct system.

Steps of conversion:

1. Primarily, the conversion process begins with personal or the team (family) conversion as attitude and approach.[7]
2. The gathering as much information about organic farming as possible[7], from diferent sources: the internet, including the site of the IFOAM-EU and Ministry of Agriculture; organic farming publications and journals; conferences and field days; organic farmers; certification bodies etc.
3. Establishing a viable marketing strategy. It is needed to assess marketing option including the availability of markets, premiums available (generally none for in-conversion products), marketing alliances, and value adding potential. As the saying goes "Sell before you sow". [7]

4. Compare the organic standards with how farm currently operates and look for possible differences. Check any points that are not clear and proceed to develop and implement your Organic Management Plan (OMP).

5. Developing an Organic Management Plan (OMP), an essential pre-certification strategy,[7] [10] which contain:

5.1 The ecological, economical and social resources of the farm, especially how it will facilitate organic conversion as soil types, topography and irrigation layout, location of water courses, wetlands and windbreaks. An easy way for inventoried resources of a farm is the SWOT analyse;

5.2 The strategy of convert of the farm, by respecting organic standards;

5.3 The foresee of the potential hazards, like contamination from substances and practices that are not permitted, and risk management strategy. A risk assessment system would require asking at each point in the production process: *What are the potential sources of contamination during the production, harvesting, storage, transporting and processing of the crop? Which of these contamination risks are significant and likely to occur if not properly managed? What must be done to control these risks to an acceptable level? What records or evidence will I need for me to demonstrate that I have controlled the hazard?*

5.4 The crop rotation design - the implication of each crop on subsequent crops in the rotation as potential to host pests and diseases, weed management, fertility management and livestock requirements, and the need to balance this choice with what is profitable for the farming business. The generate crop rotation, by integration of legumes increases positive environmental impacts and at the same time reduces economic returns, thus leading to greater trade-offs between economic and environmental benefits.[6]

5.5 The modification or replacement of existing farm equipment and structures. This could include specialised sowing and weed management equipment or construction of special storages such as sealed grain silos that allow for CO_2 disinfestation of stored grain to control insect pest;

5.6 The monitoring of the impact of management and the changes that you have made during conversion, by records of crop production, cropping history, soil tests and fertility, fertiliser inputs, pest and disease management and crop and sales;

5.7 Assessment of the capital investment require for changes, e.g. machinery, grain storages, processing, packaging, and marketing of produce.

5.8 Appying for certification by sending the completed application form describe the products that you wish to have certified and the management practices currently used;

5.9 Start conversion - slowly – gain experience with new crops and techniques and the potential output of the system. Start with a couple of plots entering the rotation for a couple of seasons. Other plots are then brought into production and the original plots progress into later stages of the rotation. This way the original plots

are always a couple of years ahead and mistakes learnt here hopefully won't be repeated.

5.10 Record observations in details about evolution of the ecological, economical and social components of a farm during conversion;

Redesign the conversion plan each year to take into account your experiences on each plot.

Certification

Certification refers to a formal process which assesses and then accredits the farming system for compliance with organic standards.[7] It means having a farm and farming methods inspected to confirm that they meet the certifier's standards for organic farming. Certification is essentially aimed at regulating and facilitating the sale of organic products to consumers.

Public organic certification

Organic certification[23] is a certification process for producers of organic food and other organic agricultural products. In general, any business directly involved in food production can be certified, including seed suppliers, farmers, food processors retailers and restaurants. Requirements vary from country to country, and generally involve a set of production standards for growing, storage, processing, packaging and shipping that include:

- avoidance of synthetic chemical inputs (e.g. fertilizers, peticides, antibiotics, food additives),irradiation, and the use of sewage sludge;
- avoidance of genetically modified seed;
- use of farmland that has been free from prohibited chemical inputs for a number of years (often, three or more);
- keeping detailed written production and sales records (audit trail);
- maintaining strict physical separation of organic products from non-certified products;
- undergoing periodic on-site inspections.

EU countries acquired comprehensive organic legislation with the implementation of the EU-Eco-regulation in 1992. Supervision of certification bodies is handled on the national level. There are currently fourteen organisations accredited by the Romanian Ministry of Agriculture and Rural Development to inspect and certify organic producers. Certifiers have their own set of standards which must be complied with EU Regulations no. 834/2007 and 889/2008.

Why certification of organic farming system? [7]

- Certification ensures the integrity of the organic product from 'plot to plate';

- Certification also protects the interests of genuine organic producers in maintaining and increasing their market share;

- Domestic consumers recognise a certified organic product as their best guarantee that the product was produced using organic practices;

- Organic certification addresses a growing worldwide demand for organic food;

- It is intended to assure quality and prevent fraud, and to promote commerce.

The certification process[7]

Once you have applied to the certifier and they determine that an organic system is possible (based on the information provided in the statutory declaration), then an inspector will contact farmer to arrange a suitable inspection time. This inspection usually takes 2–4 hours but may take longer, especially on large properties.

The inspector will go through the application and statutory declaration with farmer and ask questions. The farmer and the inspector together inspect the farm, machinery and livestock. The inspector may take soil or product samples to determine if there are any chemical residues. Problem areas could include old dip sites and grain storages

The inspector then makes an overall assessment of the property and farmer management. The inspector's report and recommendation are reviewed by a certification review committee. The farmer may be asked for more information, or require further inspections and tests for chemical residues. If successful, the farm will be approved for 'pre-certification'. The pre-certification phase demonstrates to the certifier farmer ability to manage his enterprise organically.

Following pre-certification, another inspection takes place and if farmer have met organic standard requirements, a certificate of certification is granted and farmer will be required to enter into a licensing agreement with the certifier. From initial application to certification will take 12 months. The farm is now at the stage of certification that is commonly referred to as the 'in-conversion' level. A further two years 'in-conversion' is generally required before 'organic' level is issued by the certifier.

Re-inspections. Once certified, re-inspection your farm will be carried out annually. Random (unscheduled) inspections are also carried out as part of the certifier's responsibility to meet organic requirements.

What do I have to do to stay certified? [7]

To comply with and retain organic accreditation organic standards must be followed. Any breach of the standard, such as the use of a prohibited substance, will result in temporary, or for continunon-compliance, permanent de-certification.

How much will certification cost?

A number of fees are associated with becoming certified. The amount and type of charges imposed depend on the certification organization.

The farmer is typically required to engage in a number of new activities to certify a farm, in addition to normal farming operations [23]:

- **Study** the organic standards, which cover in specific detail what is and is not allowed for every aspect of farming, including storage, transport and sale.

- **Compliance** — farm facilities and production methods must comply with the standards, which may involve modifying facilities, sourcing and changing suppliers, etc.
- **Documentation** — extensive paperwork is required, detailing farm history and current set-up, and usually including results of soil and water tests.
- **Planning** — a written annual production plan must be submitted, detailing everything from seed to sale: seed sources, field and crop locations, fertilization and pest control activities, harvest methods, storage locations, etc.
- **Inspection** — annual on-farm inspections are required, with a physical tour, examination of records, and an oral interview.
- **Fee** — an annual inspection/certification fee (depending on the certificatrion organization and the size of the operation). There are financial assistance programs for qualifying certified operations.
- **Record-keeping** — written, day-to-day farming and marketing records, covering all activities, must be available for inspection at any time.

In addition, short-notice or surprise inspections can be made, and specific tests (e.g. soil, water, plant tissue) may be requested.

For first-time farm certification, the soil must meet basic requirements of being free from use of prohibited substances (synthetic chemicals, etc.) for a number of years.

Certification for operations other than farms follows a similar process. The focus is on the quality of ingredients and other inputs, and processing and handling conditions. A transport company would be required to detail the use and maintenance of its vehicles, storage facilities, containers, and so forth. A restaurant would have its premises inspected and its suppliers verified as certified organic.

Private organic certification [23]

Besides the public organic certification regulation EU-Eco-regulation in 1992, there are various private organic certifications available:

Demeter International [21] is the largest certification organization for biodynamic agriculture, and is one of three predominant organic certifiers. Demeter Biodynamic Certification is used in over 50 countries to verify that biodynamic products meet international standards in production and processing. The Demeter certification program was established in 1928, and as such was the first ecological label for organically produced foods. Certification is difficult to come by and must be renewed annually. Demeter's "biodynamic" certification requires biodiversity and ecosystem preservation, soil husbandry, livestock integration and prohibition of genetically engineered organisms. The certification verifies the fulfillment of the standards on behalf of the farmers, which in turn guarantees high quality food products to the consumers. This is rewarded by receiving a higher price for food certified with the "Demeter" label, ranging from 10-30% on average.

Bio Suisse established in 1981 is the Swiss organic farmer umbrella organization. International activities are mainly focused on imports towards Switzerland and don't support export activities.

Global Organic Textile Standard (GOTS) is a private standard for Organic clothing for the entire post-harvest processing (including spinning, knitting, weaving, dyeing and manufacturing) of apparel and home textiles made with organic fibres (such as organic cotton, organic wool etc.). It includes both environmental and social criteria. Established in 2002, the standard is used in over 68 countries [40] and is endorsed by USDA and IFOAM. The material must be at least 95% organic, as certified by "recognized international or national standards." If the material is 70% organic, it can be labeled as "made with organic."

Alternative certification options:

Participatory Guarantee Systems (PGS) represent an alternative to public certification systems, especially adapted to local markets and short suply chains.[23] It is a focused quality assurance system, based on active participation stakeholders and are built on a foundation of trust networks and knowledge exchange. [17]

They can also complement public organic certification with a private label that brings additional guarantees and transparency. PGS enable the direct participation of producers, consumers and other stakeholders in:

- the choice and definition of the standards;
- the development and implementation of certification procedures;
- the certification decisions.

Participatory Guarantee Systems are also referred to as "participatory certification".[17] IFOAM – Organics International supports the development of PGS as an alternative and complementary tool to thirs-party certification within the organic sector and advocates for recognition of PGS by governments.

Certified Naturally Grown, offers a "non-profit alternative eco-labelling program for small farms that grow using USDA Organic methods but are not a part of the USDA Certified Organic program". [23]

In the UK, the interests of smaller-scale growers who use "natural" growing methods are represented by the ***Wolesome Food Association***, which issues a symbol based largely on trust and peer-to-peer inspection.[23]

Labelling

Labelling means any terms, words, particulars, trade marks, brand name, pictorial matter or symbol relating to and placed on any packaging, document, notice, label, board, ring or collar accompanying or referring to a product.[16] EU countries acquired comprehensive organic legislation with the implementation of the EU-Eco-regulation in 1992. In 2009 a new logo was chosen. It is a green rectangle that shows twelve stars placed such that they form the shape of a leaf in the wind. The new logo has been implemented since July 2010 through Regulation (EU) 271/2010 of 24 March 2010. The National logo **ae** is also in use from 2010.

European Union logo

National logo

Other charcteristics of organic plant cultivation

- Organic plant production should contribute to maintaining and enhancing soil fertility, to preventing soil erosion and to preservating and restorating of agroecosystem biodiversity. Also, plants should preferably be fed through the soil eco-system and not through soluble fertilisers added to the soil; [16]

- The essential elements of the organic plant production management system are soil fertility management, choice of species and varieties, multiannual crop rotation, recycling organic materials and cultivation techniques; [16]

- Additional fertilisers, soil conditioners and plant protection products should only be used if they are compatible with the objectives and principles of organic production, for elimination of pollution risks of environment (air, water, soil) and contamination of agricultural products with toxic substances; [16]

- In organic system, the plants could not be cultivated anywhere, anyway and by anyone;

- In organic system, the yields of cultivated plants are, for the moment, smaller with 5% and 50% during conversion period;

- The cultivation costs of plants in organic system are bigger due to the certification, more labour force, higher prices of the tractors, agricultural machinery and other inputs – fertilizers and plant protection products;

- The cultivation of plants in organic system it is different from all point of view – ecologically, economically and socially, than plant cultivation in conventional system, the organic production, labelling and control being regulated by legislative acts issued or adopted by a public authority, like European Commission, International Federation of Organic Agriculture Movements and local authorities.

- Currently, the organic agriculture it is attractive also due to quality of organic agricultural products and food – functional foods rich in nutritive compounds and bioproductives.

Natural and economical potential of organic farming in Romania

The potential of ecological agriculture of Romania is 10 – 25% from agricultural surface of Romania, which means 1,5 – 3,75 million agricultural hectares. In 2030, in Romania could be cultivated 1,2 – 1,5 million ha *(8 – 10% from agricultural surface)* in organic farming system and could be obtained food and agriculture products in value of minimum 1,2 thousand millions Euro.

Evolution of ecological farming in Romania

The evolution of organic farming in Romania is expresed by means of three indexis:

Evolution of area and number of operators in ecological agriculture

According to statistic information (Fig, 1) of the Romanian Ministry of Agriculture and Rural Development[18], the organic area increased continuously from 17 388 ha in 2000, to 226 309 ha în 2016, with an annual rate of 13 312 ha. Also, the number of operators in organic farming was increased in time from 3834 in 2007, to 10562 in 2016.

However, since 2014, Romanian ecological agriculture surface is in ”free – fall” from 301148 ha in 2014 to 226309 ha in 2016, with many farmers (operators) quited ecological agriculture when they realised the support was less than they expected.[15] Until 2011, no support was available for conversion and full organic farming with only consumer or market-driven ecological agriculture. In the next two years (2012 and 2013) growth of organic farming was drived by, both, consumer or market, as well as enviromental services stimulated by subsidies, with the bigest annual growth rate of about 36000 ha. Therefore, the smart strategy to achieve the Romanian organic farming potential are these driving forces of organic farming development: consumer or market with strong influence over organic farming, and subsidies to generate environmental good and services, as well as farmers initiatives by developement alternative models of production to improve their family health, farm economies and/or self-reliance.

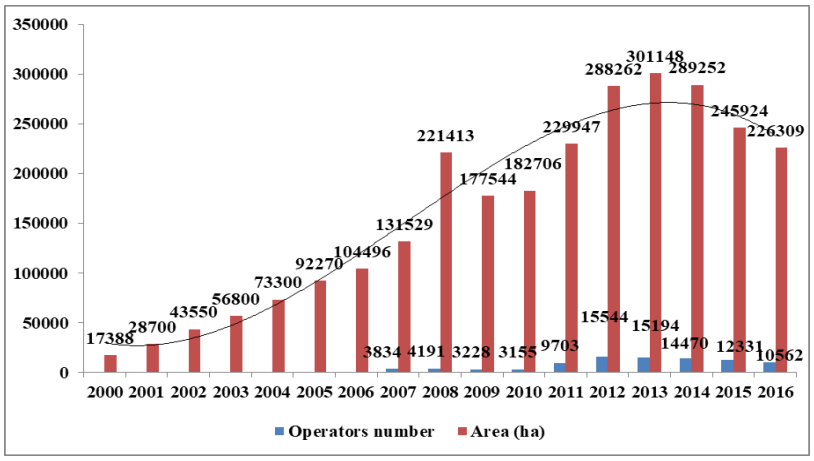

Fig. 1. Evolution of surface (ha) and number of operators in ecological agriculture

Key crops in ecological agriculture of Romania

In 2000 – 2014 period, the area of ecological agriculture (Fig. 2) was cultivated with: cereals (4000 ha in 2000, and 81440 ha in 2014), forage crops, including pastures and hayfields (9300 ha in 2000 and 89490 ha in 2014), oleaginous

crops (4000 ha in 2000, and 56 460 ha in 2014) and legumes (6088 ha in 2000, and, only, 1834 ha in 2014). The decline of the legume surface is a clear example that part of farmers do not bring about sustainable change, like simbiotic crops especially during conversion period, even that the conversion subsidies are attractive.

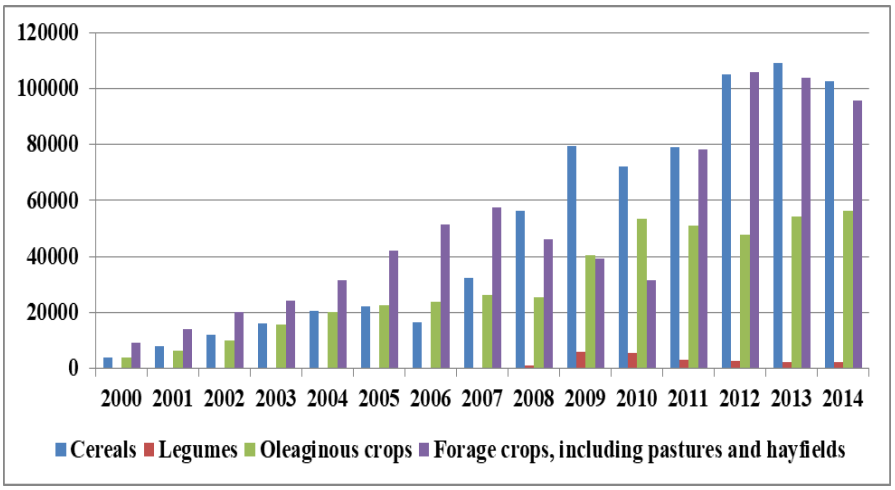

Fig. 2 Key crops in ecological agriculture of Romania

Ecological agriculture of Romania - territorial

In the beginning, the ecological agriculture was practiced in Transilvanian counties, and, according to information from 2014 (table 2), at present in all Romanian counties. Also there is a huge differences between counties as surface of ecological farming: 1 – 20 ha in Bucharest city and Gorj, Vâlcea and Harghita counties, and more of 12000 ha in Timiș, Constanța and Galați counties or about 43000 ha in Tulcea county.

Regarding the ecological crops surface, it is under natural potential of each county and crops structure is unbalanced, with an unusualy low surface of legumes. These explains why ecological agriculture surface was strong decreased in the 2015 – 2016 years, mainly because of the lower environmental sources (climate changes, soil fertility, biodiversity), and of the less scientifical and technical information and insufficient of national and EU rural development support for recovering and conservation of environment services.

Table 2. Ecological agriculture area of the arable crops on county in Romania (2014)

Total area (ha)	County	of which:										TOTAL (ha)
		Wheat	Barley	Maize	Sunflower	Rape	Soyabean	Sugar beet	Rice	Hemp	Potato	
1 - 20	București	2	0	0	0	0	0	0	0	0	0	**2**
	Gorj	1	0	2	0	0	0	0	0	0	0	**3**
	Harghita	2	2	0	0	0	0	0	0	0	3	**8**
	Vâlcea	17	0	0	0	0	0	0	0	0	0	**17**
50 - 70	Covasna	15	5	20	0	1	0	0	0	0	13	**55**
	Ilfov	55	0	10	0	0	0	0	0	0	0	**66**
100 - 200	Hunedoara	50	11	23	13	0	10	0	0	0	12	**118**
	Mehedinți	14	1	75	37	0	0	0	0	0	9	**137**
	Maramureș	9	11	52	1	0	0	0	0	0	77	**148**
	Brașov	54	19	45	12	0	0	0	0	0	24	**154**
	Argeș	150	0	4	22	0	0	0	0	0	0	**175**
201 - 400	Bacău	95	1	102	11	0	0	0	0	0	0	**209**
	Dâmbovița	210	5	11	31	0	0	0	0	0	0	**257**
	Cluj	33	65	48	41	19	23	0	0	0	73	**304**
	Bistrița-Năsăud	55	34	153	2	0	0	0	0	0	89	**332**
	Mureș	111	15	114	101	23	21	0	0	0	7	**392**
401 - 600	Sibiu	171	37	183	9	15	0	0	0	0	0	**415**
	Giurgiu	245	13	40	104	0	1	0	0	0	16	**419**
	Suceava	81	57	106	50	55	50	0	0	0	40	**439**
	Prahova	99	0	195	139	28	0	0	0	0	0	**460**
	Dolj	109	3	15	367	0	0	0	0	0	1	**495**
	Buzău	132	63	151	13	156	0	0	0	0	0	**515**
601 - 1200	Vaslui	315	16	19	66	275	0	0	0	0	0	**690**
	Caraș-Severin	298	21	486	139	31	14	0	0	0	39	**1027**
	Olt	573	55	85	96	305	47	0	0	0	1	**1163**
	Neamț	288	16	291	207	190	196	0	0	0	0	**1189**
	Satu Mare	469	102	270	46	0	302	0	0	0	0	**1190**
1201 - 3000	Bihor	182	15	1049	14	1	0	0	0	0	6	**1267**
	Sălaj	336	76	792	126	65	0	0	0	0	1	**1397**
	Alba	19	16	71	10	0	1262	0	0	0	49	**1426**
	Vrancea	1393	84	177	255	363	0	0	0	0	0	**2272**
3001 - 6000	Botoșani	920	135	792	482	161	625	0	0	0	6	**3120**
	Brăila	169	315	867	340	212	13	0	1514	0	21	**3450**
	Arad	2668	112	685	971	5	687	0	0	0	0	**5128**
	Călărași	1397	707	1763	311	989	21	0	0	70	0	**5258**
6001 - 12000	Teleorman	1377	2915	1039	953	390	50	0	0	20	0	**6743**
	Iași	2737	228	1029	625	629	3997	125	0	0	4	**9373**
	Ialomița	3554	724	2351	1091	1624	362	0	188	0	1	**9895**
12001 - 20000	Timiș	4462	151	2594	2924	681	1999	0	0	31	5	**12847**
	Constanța	6132	2324	1185	3527	1829	67	0	0	0	0	**15065**
	Galați	3509	1115	3577	4233	1322	135	0	2763	0	0	**16656**
> 40000	Tulcea	16552	5052	8289	5550	6696	687	0	0	0	1	**42826**
TOTAL (ha)		**49061**	**14520**	**28761**	**22916**	**16065**	**10571**	**125**	**4466**	**120**	**499**	**147104**

Conclusions

(1) Organic farming is a holistic production management system which promotes and enhances agro-ecosystem health, respecting biodiversity, biological cycles, and soil biological activity.
(2) Organic farming combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.
(3) Organic farming is the only farming system which is regulated, in all its components *(plant cultivation, animal husbandry, processing of food and feed, trading, labelling, logos, advertising etc.),* by an ensemble of norms and standards of different types : ecological, technical, scientific, social, legal etc. .
(4) The main characteritics of organic farming are: conversion (the transition from non organic to organic farming within a given period of time) and certification (formal process which assesses and then accredits the farming system for compliance with organic standards).
(5) Ecological agriculture is a distinct farming system based on laws and principles of agroecology: land cultivation and animal husbandry with ”harmonization” of all components of agroecosystems, generating sometime agroclimax.
(6) The Romanian ecological agriculture area increased continuously from 17388 ha in 2000, to 226309 ha în 2016, with an annual rate of 13312 ha. Also, the number of operators in ecological agriculture was increased in time from 3834 in 2007, to 10562 in 2016.
(7) The previosly decline of Romanian ecological agriculture (2014 – 2016) was caused by not introduction of sustainable changes in farmers activities (ex. Not introduction of symbiotic crops, especially during conversion period, even that the conversion subsidies are attractive).
(8) Key crops in ecological agriculture of Romania are cereals and forage crops (including also pastures and hayfields);
(9) Ecological agriculture is practiced everywhere in Romania but, under natural potential of each county, crops structure is unbalanced having an unusualy low surface of legumes.

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