Economic Performance of Organic Farming in Romania and European Union

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ABSTRACT
This study aims to offer an overview of the current status of organic farming in Romania and European Union. Items related to organic farming are approached, namely: conceptual framework, principles, national and community legislative and regulatory framework, sustaining policy of organic farming, as well as the comparative analysis of organic farming sector in Romania and other states of the European Union.

KEYWORDS: *organic farming, environment protection, health, Good Agriculture and Environment Conditions*

JEL Classification: *Q15, Q18.*

INTRODUCTION

In the scientific literature, related to this topic, we meet the term "ecological farming", as well as "biological farming" or "organic farming". Therefore, it is necessary to specify that all three terms refer to the same type of farming, one friendly to the environment, but they are used in different European countries. Thus, the word "organic" is being used since the early 1990, in English speaking EU countries (United Kingdom, Ireland). In France, Italy, Portugal, Holland it's counterpart is used, "biological", while in Denmark, Germany and Spanish speaking countries the term is "ecological". In Romania, all three terms are used, but mostly we meet the term "ecological", especially in the national legislation that regulates this area, in the official documents of Ministry of Agriculture and Rural Development (MARD) or the Ministry of Environment and Forests.

Organic farming is the opposite of intensive farming and can equally be considered an alternative to traditional farming, as well as for the intensive, industrial farming. This type of farming definitely depends on the ecological factors targeting environment protection, plant health, animal health, food safety and last, but not least, consumers' health.

Organic farming involves giving up entirely the use of chemical fertilizers, pesticides and all chemicals administered in agriculture, necessary nutrients being provided through non-conventional means. Thus, bacterial activity allows the absorption of nitrogen in soil and crop rotation with vegetables enables enriching the nitrogen content in the soil. Potassium

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is supplied by burning vegetable wastes, while phosphorus is taken from the organic matter. Livestock organic matter (manure), the treatment of organic waste and compost represent basic natural fertilizers allowed in this type of farming system. (Popescu, 2001, Bran et al., 2004).

In terms of agro-technical works, organic farming is against excessive mechanization in order to avoid soil compaction and deterioration of physical, mechanical and biological characteristics of the topsoil layer. As regard of technological and economic terms, organic farming does not require significant financial investment or large-sized farms, but requires a higher workforce (Cicea, Subic & Pirlogea, 2010). Although organic farming system productivity is quite low, average yields per hectare or per head are half of those obtained in conventional intensive agriculture; the efficiency of this system is justified by higher prices paid for green products, as well as its environmental benefits and consumer health (Marries & Ionescu, 2008; Ciocoiu, 2006).

1. LITERATURE REVIEW

According to the Food and Agriculture Organization approach (FAO, 1998), organic or ecological agriculture is a holistic system of agricultural production management, which promotes and improves the health of agro-ecosystems, including biodiversity, biological cycles and soil biological activity. This type of agriculture emphasizes the use of regional management conditions that require locally adapted systems. Such could be done by using, where possible, cultural, biological and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system. (Commission of the European Communities, 2004).

Unlike the conventional agriculture, which represents an energy-intensive system, costly to society, with harmful potential over the environment and public health, organic farming concept is based on a holistic approach, in which nature is perceived more than just its component elements alone (Lampkin, 2001).

Regulation (EC) nr834/2007 defines organic production as a global agricultural and food production management system, which combines best environmental practices, a high level of biodiversity protection, natural resource conservation, applying high standards of animal welfare and a production method in accordance to the preferences of certain consumers for products produced using natural substances and processes.

Codex Alimentarius Commission considers that organic production system is designed to: improve biodiversity in the entire system, increase soil biological activity, maintaining long term soil fertility, plant and animal origin waste recycling in order to restore the nutrients to the soil, minimizing the use of non-renewable resources, promotion of healthy use of the soil, water and air, as well as minimizing all forms of pollution that may result from agricultural practices, careful management of agricultural products, with particular emphasis on processing methods to maintain ecological integrity and essential qualities of the product at all stages of processing, establishing a conversion period for the farms which are to practice organic farming, period to be determined by specific factors such as history of agricultural land, crop type and species of animals (FAO, 2002).

Organic farming is assigned a set of principles that range from stimulating "the natural forces" in order to restore harmony between nature and cultivated plants by a minimum of interference people and total abandonment of the administration of such industrial chemicals. Therefore, the International Federation of Organic Agriculture Movements (IFOAM) established as principles of organic farming, the following (IFOAM, 2006):

- The principle of health – organic farming should sustain and enhance the health of soil, animals, people and planet as an undivided whole;
- Ecological principle – organic farming should based on living ecological systems and cycles, work with them, follow them, and contributed to their support;
- The principle of fairness – organic farming should be based on relationships that ensure fairness with regard to common environment and life opportunities;
- The principle of management – organic farming should be managed in a responsible manner and with caution in order to protect the health and welfare of present and future generations and environment.

Council Regulation (EC) no. 834/2007 on organic production and labelling of organic products regulates 14 specific principles, applicable to organic farming. Among those are:

- Maintenance and enhancement of flora and fauna, as well as natural fertility of the soil;
- Minimizing the use of non-renewable resources and off-farm inputs;
- Recycling wastes from crops and animal productions
- Maintain local or regional ecological balance in making decisions about production;
- Maintain plant and animal health;
- Obtaining livestock green products from animals coming from organic farms;
- Choice of breeds, given animals capacity to adapt to local conditions, resistance to de diseases or other health problems;
- Feeding the livestock with organic fodder and non-agricultural natural substances;
- Maintaining the biodiversity of natural aquatic ecosystems etc.

2. METHODOLOGY

In this study, we will analyse the size of the organic farming sector in Romania and European Union.

Therefore, we consider necessary and appropriate the comparative analysis of the main indicators of organic farming in Romania and EU countries, namely, resource and outcome indicators, as well as identifying the causes of certain evolutions in each country and highlighting the positive effects of such agriculture on the environment and consumer health.

- Indicators of resources and results presented and analysed in this study refer to:
- Organically cultivated agricultural area, including agricultural land in conversion;
- Livestock raised organically;
- Registered organic operators;
- Organic farming production.

Also, we mention that the analysis of the above mentioned indicators development will be carried out for the period 2005 - 2009, in Romania, as well as compared to the indicators of the European Union countries, in the reference period.

We considered appropriate such an analysis because, in the last years, organic farming has been given increasing importance in Europe. In the developed countries of the European Union, organic farming has come to represent a significant sector, summing over 10% of the agricultural cultivated area. Furthermore, in both the old and the new Member States of the European Union, this type of farming is promoted through specific policies and instruments of the Common Agricultural Policy (CAP) and considerable funds are allocated. Moreover, agricultural area of organic cultivation is an important indicator of the extent to which land is sustainably managed.

3. REGULATORY AND SUPPORT POLICY FOR ORGANIC AGRICULTURE

Regulating and sustaining organic farming includes the legal and institutional framework, financial instruments designed to encourage the application of environmental measures and the practice of organic farming which are found both in the market measures as well as in the rural development within the CAP and the National Action Plans.

3.1 Legal and institutional framework

European legislation

Community regulatory framework regulating the organic farming resulted in the adoption of Regulation (EEC) No 2092/1991 concerning the way to obtain organic products and their presentation, as well as the presentation of food products, regulation adopted by the European Council on June 24, 1991. This Regulation was amended and supplemented several times, the most important changes being made in 1999, when the Council has established Community rules for obtaining organic products animal origin and has created a concrete framework so that the Community legislation should regulate in the future the as well as vegetal production animal - Regulation (EC) No 1804/1999.

In 2004, the European Commission adopted the "European Action Plan for Ecological Food and Agriculture", when were established 21 concrete measures for achieving the objectives of organic products market development and improving standards by increasing efficiency, transparency and consumer confidence.

In 2007, Regulation (EC) No 834/2007 on organic production and labelling the organic products repeals Regulation (EEC) no. 2092/91. The main provisions of this Regulation refer to: purpose, scope and definitions of organic farming, objectives and principles for organic production, production rules, ban of genetically modified organisms, the prohibition of ionizing radiation usage, products and substances used in agriculture and criteria for authorizing them, conversion criteria, production of processed feed, exceptional standards of production, labelling, controls, imports and exports of organic products.

Also, in 2008 the Commission adopted Regulation (EC) no. 889, establishing the detailed rules for the implementation of Regulation (EC) No 834/2007 on organic production and control of organic products. In 2009, the Commission adopted Regulation (EC) No 710, establishing the detailed rules for organic aquaculture livestock and seaweed production, which amends Regulation (EC) No 889/2008.

National legislation

During the pre-accession, the efforts of harmonizing Romanian legislation to the EU one commenced with the adoption of GEO No 34/2000 concerning organic foods, approved by Law no. 38/2001 (published in Official Gazette no. 172/21.04.2000) which regulated the scope of organic farming, organic farming authority, rules and general principles of organic production during the conversion period, the inspection system and the certification of organic products in Romania. Then, a number of normative acts followed, that regulated the labelling of organic products, advertising primary organic products and processed products, with references to the ingredients used in their preparation, inspection bodies' conditions for accreditation and certification in organic farming, import and export of organic food[2].
After 2007, the national legislation regulating the organic farming and organic products was materialized in 6 normative acts amended and supplemented (Order of Minister of Agriculture, Government Decision, Emergency Ordinance)[3] which contain provisions on the objectives, principles and standards applied to organic production and processing aspects, labelling, trade, import, inspection and certification of organic production.

Inspection and control bodies

In Romania, monitoring and certification of organic products is currently provided by *private certification and inspection bodies*. They are approved by the Ministry of Agriculture, Forestry and Rural Development, based on criteria of independence, impartiality and competence established by Order No. 65/2010, approving the Rules of organizing the inspection and certification system, approval of the certification and inspection bodies, surveillance of control body's activity. MARD's approval of inspection and certification bodies is preceded mandatory by their accreditation in accordance to European standard EN ISO 45011:1998, issued by a competent body for this purpose.

In Romania, 16 inspection and the certification bodies are operating, approved by MARD to conduct the inspection and certification of organic products, according to the provisions of the Ministerial Order no. 65/2010, as follows: 5 in Bucharest, 2 in Ilfov County (Voluntari and), 2 in Constanţa County (in Valul lui Traian and Mihail Kogălniceanu),

[2] Joint Order no 417/2002 and no. 110/2002 of the Minister of Agriculture, Food and Forestry, and the President of the National Authority for Consumer Protection, Official Gazette no. 778/25.10.2002, Order no. 70/2002, the Minister of Agriculture, Food and Forestry, regarding the establishment of a Committee for the development of ecological agriculture in Romania, Order no. 721/2003, the Minister of Agriculture, Forestry, Water and Environment to approve the Rules on the import and export of organic products, Official Gazette no. 701/7.10.2003; Law. 513/2006 approving Government Emergency Ordinance no. 62/2006 amending and supplementing GEO No. 34/2000 concerning organic foods, Official Gazette no. 16/10.01.2007

[3] Order no. 219 of March 21, 2007, approving the rules concerning registration of operators in organic farming amended by Order no. 252 of 10.11.2010, Emergency Ordinance no. 34 of 17 April 2000 on organic foods Order no.51 of 1 March 2010, for approval of national rules to allow imports of organic food products from third countries; Order no. 65 of March 17, 2010, approving the rules of organizing the system of inspection and certification, approval of the certification and inspection bodies, surveillance of control bodies activity amended by Order no. 6 of January 11, 2011 and Order no. 181 of July 22, 2011; Decision no. 759 of July 21, 2010, concerning specific aid for increasing the quality of agricultural products in the organic farming sector amended by Decision no. 1095/2010, Decision no. 1303 of 15 December 2010 and Decision no. 590 of June 8, 2011; Order no. 17 of January 20, 2011, concerning the approval of discounts and exclusions applicable to the payment requests of specific aid for improving the quality of agricultural products in organic farming sector, as amended by Order no. 147 of June 16, 2011

1 Iaşi County (in Iaşi), 1 in Prahova County (in Ploieşti), 2 in Mureş County (in Iernut and Sighişoara), 1 in Cluj County (in Cluj Napoca), 1 in Bacău County (in Bacău), 1 in Timiş County (in Timişoara).

Following the controls carried out by the inspection and certification bodies, the operators that have complied with the rules of production will receive a certificate of organic product, and they will be able to label their products with the specification "ecological". The following are required on the organic label applied on a product: the reference to the organic production, logos, names and code of the inspection and certification body that carried out the inspection and issues its organic product certificate.

3.2. Financing in the market share and the CAP Rural Development framework

In the context of rural development, the schemes and support measures implemented in the 2011 campaign also include Agri-environment payments, Measure 214, 5th package Organic agriculture (version 5.1 crops on farmland including fodder plants, version 5.2 vegetables including mushrooms and potatoes, version 5.3 orchards, version 5.4 vines, version 5.5 medicinal and aromatic herbs). Agri-environment payments are granted to farmers who take, on a voluntary basis, agri-environmental commitments for a period of 5 years from the date of signing the commitment. Rural development measures are measures included in the Axis II of the National Rural Development Plan (PNDR 2007-2013).

Another financial instrument was established by the Decision no. 759 of July 21, 2010, on granting specific aids in order to improve the agricultural products quality in the organic farming sector, as amended by Decision no. 1095/2010 and Decision no. 1303 of 15 December 2010 and Decision no. 590 of June 8, 2011. *Specific aid for the quality improvement of agricultural products in organic farming sector* is given, in the form of additional annual payments, to vegetal and livestock production holdings that are registered in the organic farming system and are, also, in the conversion period from conventional to organic farming**.** Funding of specific support is provided from the European Agricultural Guarantee Fund (EAGF), and temporarily granted from the state budget through MARD budget, the total budget limit (ceiling) rises to 3,098,000 euros or 2,373,000 euros for plant production and 725,000 euros for animal production (MARD, 2011).

CAP reform initiated in 2003 under measures aimed at the agricultural market, has established changes in granting direct support schemes for the agricultural sector. Thus, the majority of the financial support is paid regardless of the production volume - decoupling principle, also conditioned by the compulsoriness that farmers maintain the land in good agricultural and environmental conditions - the principle of cross compliance (Bran et al, 2009).

According to this last principle direct payments to farmers are granted only to compliance with environmental, public health, plant health and animal welfare, to maintain agricultural land (especially when is no longer used for business purposes) in good agricultural and environmental conditions. These rules that all European farmers must meet in order to receive direct payments (subsidies) refer to:

- *Statutory Management Requirements* (SMR - Statutory Management Requirements) based on the 18 items of EU legislation linking agriculture and environment, animal welfare, animal health and public health. Five of these relate to the environment (Directive 79/409/EEC on the protection of wild birds; Directive 80/68/EEC relating to the

groundwater protection against pollution caused by certain dangerous substances; Directive 86/278/EEC regarding environmental protection, and particularly, of the soil, when municipal sludge is used in agriculture; Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources; Directive 92/43/EEC on the conservation of natural habitats, wild flora and fauna)

- a set of minimum standards that define Good Agriculture and Environment Conditions (GAEC – Good Agriculture and Environment Conditions). If a farmer does not comply with the requirements and standards imposed by these rules, CAP subsidies can be reduced or, in extreme cases, cancelled. Moreover, in addition to cross compliance, they can be also sanctioned under the relevant directives or regulations.

4. ORGANIC AGRICULTURE PERFORMANCE IN ROMANIA COMPARED TO EUROPEAN UNION COUNTRIES

In Romania, the concerns for organic farming are relatively recent; they manifested after 2000, by adopting specific legislative framework, adapted and harmonized to EU requirements.

Agricultural land certified according to the organic farming system requirements totalled more than 97 000 hectares (around 0.7% of total agricultural area) in 2006 and over 182 000 ha in 2010 (1.3% of total agricultural area), main organic crops being cereal grains, forage crops and pastures, oilseed, vegetables and fruits (cherries, sour cherries) (MARD, 2011).

From 2000 to 2010, organic agricultural land area increased by 10.5 times (from 17,400 hectares to 182,700 ha). This corresponds to an average annual growth rate of almost 20%. For 2010, the cultivated area by organic production is over 260,000 ha. This trend is based on the growth of the arable area and surface related to the collection of spontaneous flora.

Table 1. Number of operators and agricultural area in organic farming, Romania

No. crt.	Indicator	2006	2007	2008	2009	2010
1	Number of registered organic operators, of which:	3409	3834	4191	3228	3155
	▪ processing operators	39	48	85	70	75
2	Organic agricultural area (ha), of which:	97099	123666	87972	151115	182706
	▪ organic arable area (ha)	45605	65112	86454	110014	148033
	▪ organic permanent crops (ha)	51200	57600	46007	39232	31579
	▪ organic meadows and pastures (ha)	294	954	1518	1869	3093
3	Collecting of wild flora (ha)	38700	58728	81279	88883	77294

Source: MARD, 2011

The number of MARD registered operators in the organic farming system, in 2010, was of 3155 of which 3080 producers, 75 processors, 16 importers, 6 exporters, 58 other operators (wholesalers and retailers). Of the total number of processors registered in 2009, 18% work in fresh fruit and vegetables sector, 16% in the milling, bakery and confectionery segment, 17% in the segment of honey, 10% milk products, 6% other products, 2% wine, oil and margarine and 1% heliciculture (MARD, 2010).

Table 2. Livestock in organic farming, Romania

Livestock	2006	2007	2008	2009	2010
Cattle	11365	6985	7567	8145	5358
Cow milk	8236	4889	4,297	4303	2332
Pigs	1,652	1,174	416	603	320
Sheeps	86180	59680	121175	51470	18883
Hens	4300	4320	6080	9400	21580

Source: EUROSTAT, 2012

Livestock raised under organic production system are significantly reduced in the analyzed period, for almost all species, except laying hens, which increased by 400%. Thus, in 2010, compared to 2006, cattle herds are reduced by 52.8%, dairy cow herds are reduced by 71.7%, pigs herds by 80.6% and sheep herds by 78.2%. The main causes of livestock decline mentioned above are the lack of organized selling markets for organic products, high costs for breeding and maintenance of animals, inadequate support from the public power for this sector's development, especially until 2007, but also 2007 onwards.

The data above shows that the organic farming system in Romania has a very small size, but in the future it might become a viable alternative to the traditional agriculture, primarily due to its lower conversion costs, and, secondly, because over 40% of the country's agricultural surface is operated by farms with sizes up to 5 hectares.

Table 3. Agricultural area cultivated in organic system, EU 27 (including agricultural area in conversion)

No. Crt.	EU 27 member states	2006		2008		2010	
		Hectars	%*	Hectars	%*	Hectars	%*
1	Austria	477802	16.7	492632	17.5	543605	19.7
2	Belgium	29308	2.1	35721	2.6	49005	3.6
3	Bulgaria	4692	0.1	16663	0.6	25648	0.8
4	Cyprus	1979	1.3	2322	1.6	3575	2.5
5	Czech Republic	281535	6.6	341632	8.0	448202	10.6
6	Denmark	138079	5.3	150104	5.6	162903	6.1
7	Estonia	72886	8.8	87346	9.6	112972	12.5
8	Finland	144667	6.5	150374	6.6	169168	7.4
9	France	552824	2	583799	2.1	845442	3.1
10	Germany	825539	4.9	907786	5.4	990702	5.9
11	Greece	302264	3.6	317824	3.8	309823	3.7
12	Hungary	122765	2.9	122816	2.9	127605	3.0
13	Ireland	39947	1	44751	1.1	47864	1.2
14	Italy	1148160	9.0	1002410	7.9	1113740	8.7
15	Latvia	150016	8.8	161625	9.1	166320	9.4

16	Lithuania	96718	3.5	122200	4.6	143644	5.4
17	Luxembourg	3630	2.8	3535	2.7	3720	2.8
18	Malta	20	0.2	12	0.1	24	0.2
19	Nederland	48425	2.5	50434	2.6	46233	2.4
20	Poland	228009	1.6	313944	2.0	521970	3.4
21	Portugal	214242	5.8	211071	6.1	201054	5.8
22	Romania	107578	0.8	140132	1.0	182706	1.3
23	Slovakia	120410	5.7	140755	7.3	174471	9.0
24	Slovenia	26831	5.5	29838	6.1	30696	6.3
25	Spain	736938	3	1129840	4.5	1456670	5.9
26	Sweden	225431	7.1	336439	10.8	438693	14.1
27	United Kingdom	605706	3.5	737631	4.6	699638	4.3
29	EU 15	4887276	3.4	6154363	4.8	7078284	5.4
30	EU 27	6100695	3.4	7633636	4.3	9016093	5.0

***** share of organic cultivated area in total agricultural area
Source: FiBL, 2012

Due to its extensive character, in the European Union, organic farming system was supported and promoted within the Common Agricultural Policy, after 1992, as a follow up of the Mac Sharry reform, but concrete actions and measures have been implemented since the adoption of Agenda 2000. In this context, organic farming has been an alternative of the industrial type agriculture, thereby aiming to reduce the effects generated by the crisis of overproduction and environmental damage.

In EU-27, the agricultural area cultivated in the organic system, including those in conversion, increased from 4.5 million hectares in 2001 (EUROSTAT, 2011), to 9 million hectares in 2010 (FiBL 2012), which corresponds to an annual average growth rate of about 10%. Organic farming had just about 5% of total EU utilized agricultural area in 2010 compared to 2% in 2000 and 3.4% in 2006.

In 2010, the old member states with the highest share of farmland operated in an organic system in total agricultural area, above the EU 27 average (5%), are the following: Austria, 19.7% (543605 ha), Sweden 14.1% (438693 ha), Italy 8.7% (1113740 ha), Finland 7.4% (169168 ha) 6.1% Denmark (162903 ha), Germany 5,9% (990702 ha), Spain 5.9% (1456670ha), Portugal 5.8% (201054 ha).
The new Member States with the largest share owned by organic farmland in the total agricultural area, above the EU 27 average, are the following: Estonia 12.5% (112972 ha), Latvia 9.4% (166320 ha), Czech Republic 10.6% (448202 ha), Slovakia 9.0% (174471 ha), Slovenia 6.3% (30696 ha).

Although in Romania the area cultivated in an organic system has only 1.3% of total agricultural area that is higher (182706 ha) than the surfaces in other Eastern European countries with high shares, mentioned above, except the Czech. The same position is also Poland and Hungary, which has a share of 3% organic area of total agricultural area.
The average size of organic farms in 2006 was of 34 ha for the EU-27, overall, compared to11.9 ha for all conventional farms, in 2008 was of 39 ha compared to 12.6 ha and in 2010

was of 41ha compared to 13 ha for all conventional farms. Generally, the average size of the holdings in the organic sector was higher than that of conventional holdings in most Member States, except Denmark, France and Luxembourg where the average size was smaller. Most notable differences were noted in the Czech Republic (223 ha compared to 89 ha) and Slovakia (421 ha compared to 28 ha) (EUROSTAT, 2010).

In 2010, there were a total of 219290 registered organic producers of the EU-27, Italy, Spain, Germany and Austria, each registering over 10% of total EU-27 producers. Thus, Italy ranged on the first place with 19.1% of total EU-27 producers. In 10 countries, including Bulgaria, Belgium, Hungary, Portugal, Netherlands, Slovakia, the share was less than 1%. From 2008 to 2010, the number of organic producers in the EU-27 increased by 11.6%, and during 2006-2010 the growth was of 22.2%. The highest rate of growth in the analysed period was registered in Bulgaria, 225%, Czech Republic, 265%, Poland, 124% and Sweden, 118%. By contrast, there are 4 countries (Denmark, Italy, Latvia and Romania) that number of producers decreased, ranging from -1.5% in the Romania to -12,5% in Latvia (own calculation, FiBL, 2012).

CONCLUSIONS

Organic farming has an increasing importance in the agricultural sector of many countries, regardless of their stage of development. In the developed countries of the European Union, organic farming has come to represent a significant part of the agricultural sector, (areas cultivated in an organic system represent 19,7% in Austria, 14,1% in Sweden), also, some developing countries of the Union Europe hold a growing sector of organic farming (areas cultivated in an organic system represent: Estonia 12,5%, Czech Republic 10,6%, Latvia 9,4%), but the output markets are small and disorganized.

All scientific trends that promote organic farming are considering an update of traditional farming methods and their blending with modern agricultural methods, which give this type of farming the status of scientifically based agriculture, with well-established methods, principles and techniques.

The necessity of introducing a non-polluting type of agriculture appeared immediately after starting the process of industrialization of agriculture, when criticism of the industrial development emerged, pleading for healthy food for the population.
Increasing awareness of the importance of product quality on human health has contributed to the development of opinion trends in favour of organic farming practice and to the development of markets for these products, given their specific characteristics (high prices of the products and low market share). Increased demand for organic products has led to the development of organic farming in the last years, and, increasingly, this sector has been in the attention of agricultural specialists, policy makers and the public.

ACKNOWLEDGEMENTS

This work was co-financed from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/56287 „Postdoctoral research programs at the forefront of excellence in Information Society technologies and developing products and innovative processes", partner Bucharest Academy of Economic Studies – Research Centre for "Analysis and Regional Policies".

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