**Ana URSU**

*Institute for Agriculture Economy and Rural Development,*
*"Gheorghe Ionescu Sisesti" Academy of Agriculture and Forest Sciences*
*ursu.ana@iceadr.ro*

# RESEARCH STUDY ON THE ECONOMIC EFFICIENCY OF CONVENTIONAL AND ORGANIC PRODUCTION SYSTEMS IN THE CONTEXT OF APPLICATION OF AGRICULTURAL POLICY MEASURES IN ROMANIA

ABSTRACT

The purpose of this paper is to analyze on a comparative basis the conventional and organic production systems for 12 crops, synthesizing a series of indicators that reflect the economic effort, mainly the economic effect and the economic efficiency. The research is oriented towards the theoretical and practical argumentation of the need for the involvement of agricultural policy measures in Romania, highlighting the causes of state intervention in order to maintain in cultivation the areas for some of the investigated crops (soybeans, tobacco, hops, sugar beet, rice, etc.). In this respect, it demonstrates that in the absence of subsidies, farmers could give up cultivating the above-mentioned crops and should invest to develop other more profitable crops. The importance of these aspects is related to the fact that the forms and tools for developing the agricultural sector are multiple, the subsidies to farmers becoming one of the most important ones in the recent period.

**Key words:** economic efficiency, production systems, conventional farming, organic farming, agricultural policy, subsidies.

**JEL Classification:** O12, P50, Q18, Q57.

## 1. INTRODUCTION

In the current context of sustainable agriculture – generically called "conventional" because the regulations imposed by the CAP are under constant change, therefore not leaving time for a production technology to be accepted by tradition – and the technical-economic substantiation of production costs should be based on optimizing the effects of regulations with divergent effect. On the one hand there is an increasing demand for food for a growing population (9 billion by 2050). The calculated increases, of about one billion tons of cereals and 200 million tons of meat, can be achieved only by agricultural production intensification. Sincerely interested in environment protection, the supporters of "conventional" farming favour the idea of ecological intensification, i.e. the use of various forms of integrated farming that apply fewer synthetic products (fertilizers, crop

protection products), while having in view the stimulation of biological processes from the agricultural ecosystems, such as biological nitrogen fixation, biological crop protection methods, etc.

Yet there is a strong current of public opinion against the intensification of agriculture. Using correct arguments (danger of groundwater pollution by nitrates from agricultural sources) or fanciful arguments (rapeseed is a harmful crop that destroys soil), EU has imposed many technological restrictions that significantly hinder the production process. Out of these reasons, organic farming emerged as an alternative to the intensive, conventional (industrialized) farming practice that is based on maximizing production through the use of synthetic chemical fertilizers, and highly energy intensive inputs in large quantities in order to continuously increase farm production, destined to a growing population, predominantly urban. The conventional soil tillage is intensive, and most often high capacity agricultural machinery is used, which mainly under irrigation conditions increase the degradation and environment pollution risk. On such farms, the major goal is to obtain a maximum profit, while minimizing the natural environment resources protection. Large-sized farms are organized, concentrating land and production processes, capital and labor, while the social living conditions in the rural area are neglected to a great extent.

Organic farmers are those people with different motivations, from practical businessmen or farmers who exploit the market opportunities to small subsistence farmers seeking a healthy lifestyle. Undoubtedly, most farmers who started organic farming in the 60s and 70s were new to farming business and had to face many problems. But those pioneers have now gained a rich experience, and many of them are as pragmatic as any commercial farmer, trying to make things work. There is no way by which people can be forced into organic farming and become successful organic farmers; any individual must be sufficiently convinced and motivated to reach the necessary input management level. “Organic farming is far from being a return to the past, it is intended to be a farming type for the future. For an agricultural entrepreneur, the sources of opportunities are important “unexpected success (a good production year); unexpected failure (natural disasters); unexpected external event (evolution of demand for agricultural products, current and prospective competitors that emerge on the market); the gap between reality and expectations; changes on the market and agro-industrial structure; demographic changes (incomes, professions, age), etc. The agricultural entrepreneur must start from the analysis of opportunities, of sources of opportunities” (Samuil, 2007).

## 2. STATE OF KNOWLEDGE

The concerns for organic farming have been known for several decades in the economically developed countries. Basically, organic farming relies on the use of those means and methods provided by the society, by the scientific and technical

advances that contribute to high yields, consistent and of high quality in terms of environment protection, suitable for adaptations for a farming system closer to the need for health promoting food (Samuil, 2007).

There are concerns about the food situation in the conditions of demographic explosion, on one hand, and the decrease of natural resources and environment degradation, on the other hand. In this regard, there is an attempt to put into practice an innovative management of ecological systems, this approach also including elements of the agri-food sector (Gruia, 1998).

Most works deals with the economic efficiency of agricultural production in terms of sustainable development (Burja, Burja, 2009), significant differences being found between the two systems as regards crop diversification, soil fertility management, control of pests and diseases, as well as fertilizer application. Overall, the organic yields are on the average by 25% lower than conventional yields, varying by types of crops and species and depending on the comparability of agricultural systems (Gabriel, Salt, Kunin and Benton, 2013).

*The context of agricultural policy measures.* The European Commission conducted a study (ARC 2020, 2014) comparing the two production systems, conventional and organic, to see which one brings higher profits for the European farmers. The research took into account various economic aspects of farm production costs and efficiency, product prices and subsidy system. Although the study has its limits – only the large crop farms are taken into consideration, it provides some interesting conclusions. Thus, organic farming brings an income comparable to or in some cases even higher than conventional farming, but this is largely due to the fact that subsidies for organic farming are higher than those for conventional agriculture.

The coupled support is a payment scheme granted under the Common Agricultural Policy 2015–2020. For the crops from the crop production sector, established by law, the coupled support is an additional form of financial support from European funds, adding to the other direct payment schemes, namely: *single area payment scheme, redistributive payment, payment for agricultural practices beneficial for climate and environment, payment to young farmers,* as appropriate.

The coupled support is a direct payment to be granted to farmers for certain crops affected by certain difficulties, which are considered important for Romania, out of economic, social and environmental reasons. The coupled support for crops has brought significant amounts into the farmers' accounts, but very few farmers benefited from these grants in 2015. Because of this, the Ministry of Agriculture made certain proposals to simplify the payment schemes, so that as many farmers as possible can apply for these payments.

According to MARD Order no. 619/2015, the coupled support for *soybean* (Article 42) is granted to active farmers who obtain a minimum annual production of 1300 kg soybeans / ha; for *hemp for oil and/or fiber* (Article 46) it is granted to active farmers, who prove that they have achieved a minimum production of 500 kg seeds/ha and/or 5000 kg/ha of dry hemp stalks; for the *rice* crop (Article 47) is granted to growers who have contract to sell a minimum production of 4,500 kg/ha

rice and can prove it on the basis of fiscal invoice and contract; for *hops* (Article 49) it is granted to the active farmers who can prove that they have obtained a minimum yield of 490 kg dry hop cones/ha; for *sugar beet* (Article 50) it is granted to active farmers who can prove the sale of a minimum production of 26,400 kg/ha, based on fiscal invoice for legal entities, on the basis of a certificate from the sugar factory for natural persons respectively.

Farmers are granted support for their agricultural production ranging from 200 up to 1200 euro/ha, but on the other hand they are forced to follow rules that make them helpless against losses caused by biological aggressors (weeds, diseases and pests).

## 3. MATERIAL AND METHOD

The research was conducted using data processed in the research project ADER 13.1.2 *"Technical-economic costs and selling price estimates for wheat, barley, corn, sunflower, rapeseed, soybean, beet sugar, rice, hemp, hops, tobacco, potatoes for conventional and organic farming"*. The technological information sheets for each crop come from the technology provided by INCDA Fundulea, partner in the project.

The research methods used in the study:

– *Qualitative analysis* of information on agricultural policy measures (Government's Emergency Ordinance no. 3/2015 approving the application of payment schemes in agriculture in 2015–2020 and Order no. 619/2015 approving the eligibility conditions and implementation modality of payment schemes referred to in Art. 1 paragraphs (2) and (3) of Government's Emergency Ordinance no. 3/2015), direct payment schemes + coupled support respectively;

– The *constructive regulatory method* was used in the design of analysis variants, on the basis of which a system of technical and economic indicators was calculated that reflects the actual economic efficiency. In order to determine the economic efficiency in the 12 crops, in the production year 2015–2016, the main determining elements were taken into consideration: costs, prices, income and income rate, etc. The study also highlights the influence of financial support on the profitability of investigated crops. In order to most accurately reflect the necessary efforts, as well as the effects obtained in the conventional and organic farming practice, we shall present the following indicators:

- indicators that reflect the *economic effort* – working time input, production costs;
- indicators that reflect the *economic effect* – average yield, total incomes, average selling price on the farm;
- indicators that reflect the *actual economic efficiency* – labour productivity, production costs, gross profit, profit rate, production costs in 1000 RON incomes, material expenditures in 1000 RON incomes, etc.).

– The *comparative analysis* used in comparing the specific indicators of conventional farming system and the specific indicators of the organic farming system.

The research analyzes the modality to increase the economic efficiency and to determine this efficiency, but has a touch of relativity determined only by using information that is provided, identifying opportunities for improvement/updating of indicators.

*"Since Romania does not have data on the yields and producer prices for organic production, and in other Member States there are very few data in this regard, these data must be estimated on the basis of information, of assumptions respectively."*

## 4. RESULTS AND DISCUSSIONS

The purpose of the study is to evaluate the conventional and organic farming systems in order to track the profitability objectives of investigated crops. The economic efficiency is related to the agricultural system capacity to ensure sufficient and competitive production to meet the market and population's needs. A first comparison of the two types of farming systems refers to the input costs (pesticides, fertilizers, fuel and oil for agricultural machinery). In the case of organic farming, due to its extensive character, fertilizer and pesticide costs are lower. By contrast, there are no significant differences between the two systems as regards the costs of lubricants and fuels used for the agricultural works (Table 1/columns 6 and 7).

Organic farming uses more labor than conventional agriculture. The variable expenditures in the case of organic crops are lower than for conventional crops. On the average, the amount of 1044 euro per year is spent for one hectare of organic land, while 1872 euro are spent for one hectare under conventional farming (Table 1/ columns 8 and 9). The variable expenditures include the costs of fertilizers, seeds, plant protection and mechanization (tractor driver wages, fuel, repairs and spare parts, etc.), supply and crop insurance. This category excludes the labour cost, payment of rent and overheads and management costs.

*Table 1*

Indicators reflecting the economic effort

| Crt. no. | Crops | Average yield (kg/ha) | | Labour input (man-hours/ha, man-hours/t) | | | | Variable expenditures (RON/ha) | | Variable expenditures (euro/ha) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CONV | ECO | CONV | | ECO | | CONV | ECO | CONV | ECO |
| | 1 | 2 | 3 | 4 | | 5 | | 6 | 7 | 8 | 9 |
| 1 | Wheat | 4000 | 2500 | 27.3 | 6.8 | 73.2 | 29.3 | 2846.8 | 1891.8 | 633 | 420 |
| 2 | Barley | 4000 | 2500 | 109.7 | 27.4 | 43.2 | 17.3 | 4404.1 | 2415.6 | 979 | 537 |
| 3 | Maize | 5000 | 3000 | 45.7 | 9.1 | 80 | 26.6 | 3417.5 | 3790.7 | 759 | 842 |
| 4 | Sunflower | 2500 | 2000 | 65.8 | 26.3 | 86 | 41.4 | 3305.9 | 2189.0 | 735 | 486 |

*Table 1* (continued)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Soybean | 3000 | 1500 | 67.2 | 22.4 | 83.2 | 55.5 | 4791.9 | 2942.1 | 1065 | 654 |
| 6 | Rapeseed | 2500 | 1700 | 103.1 | 41.3 | 42.3 | 24.9 | 3331.2 | 2259.3 | 740 | 502 |
| 7 | Sugar beet | 40000 | 30000 | 19.3 | 0.5 | 249.8 | 8.3 | 6100.0 | 3421.9 | 1356 | 760 |
| 8 | Rice | 3500 | 3000 | 22.9 | 6.5 | 78.5 | 26.2 | 4923.0 | 8512.3 | 1094 | 1892 |
| 9 | Hemp | 45000 | 35000 | 13.2 | 0.29 | 13.2 | 0.38 | 5536.5 | 4195.3 | 1230 | 932 |
| 10 | Hops | 1500 | – | 512.3 | 341.5 | – | – | 40361.1 | – | 8969 | – |
| 11 | Tobacco | 1500 | – | 265.2 | 176.8 | – | – | 5979.8 | – | 1329 | – |
| 12 | Potatoes | 30000 | 18000 | 408 | 13.6 | 385 | 21.4 | 16086.4 | 15366.4 | 3575 | 3415 |

*Source:* author's calculations.

The economic efficiency of farming systems significantly decreased due to the climate, agronomic and socio-economic factors. While input prices are rising, the prices of agricultural products are decreasing (Table 2/column 4).

*Table 2*

Indicators reflecting the economic effect

| Crt. no | Crops | Average yield (kg/ha) | | Production value (RON/ha) | | Farmgate price (RON/kg) | | Farmgate price (Euro/t) | | Eco/conv production differences | Eco/conv price differences |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO | (col 3/ col2*100)–100 (%) | (col 5/ ol4*100)–10 (%) |
| | 1 | 2 | 3 | 6 | 7 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | Wheat | 4000 | 2500 | 2724 | 3375 | 0.681 | 1.350 | 151.3 | 300.0 | –37.5 | +98.2 |
| 2 | Barley | 4000 | 2500 | 2724 | 3250 | 0.681 | 1.300 | 151.3 | 288.9 | –37.5 | +90.9 |
| 3 | Maize | 5000 | 3000 | 3405 | 3660 | 0.681 | 1.220 | 151.3 | 271.1 | –40.0 | +79.1 |
| 4 | Sunflower | 2500 | 2000 | 4000 | 4000 | 1.600 | 2.0 | 355.6 | 444.4 | –20.0 | +25.0 |
| 5 | Soy | 3000 | 1500 | 5490 | 3568.5 | 1.830 | 2.379 | 406.7 | 528.7 | –50.0 | +30.0 |
| 6 | Colza | 2500 | 1700 | 4162.5 | 3638 | 1.665 | 2.140 | 370.0 | 475.6 | –32.0 | +28.5 |
| 7 | Sugar beet | 40000 | 30000 | 6600 | 6000 | 0.165 | 0.2 | 36.7 | 44.4 | –25.0 | +21.2 |
| 8 | Rice | 3500 | 3000 | 3500 | 9000 | 1.000 | 3.000 | 222.2 | 666.7 | –14.3 | +200.0 |
| 9 | Hemp | 45000 | 35000 | 5107.5 | 5141.5 | 0.114 | 0.1469 | 25.3 | 32.6 | –22.2 | +28.9 |
| 10 | Hop | 1500 | – | 47550 | – | 31.700 | – | 7044.4 | | – | – |
| 11 | Tobacco | 1500 | – | 8566.5 | – | 5.711 | – | 1269.1 | | – | – |
| 12 | Potatoes | 30000 | 18000 | 22500 | 20250 | 0.750 | 1.125 | 166.7 | 250.0 | –40.0 | +50.0 |

*Source*: author's calculations.

Lower yields are obtained in organic farming than in conventional faming systems (Table 2/columns 2 and 3). The production differences (column 8) range from 14% in the rice crop (3500 kg/ha conventional rice – 3000 kg/ha organic rice) to 50% in the soybean crop (3000 kg/ha conventional soybean – 1500 kg/ha organic soybean), In wheat, farmers obtain 4–6 tons per hectare of wheat grown conventionally and only 2.5–4 tons per hectare of wheat grown organically.

In the investigated crops, the organic/conventional price difference for the 12 crops in the production year 2015 – 2016 for which price estimates were made ranged from 21.2% in sugar beet to 200% in rice (Table 2/column 9).

The production differences between the organic and conventional products are highlighted in Table 2, column 8, ranging from 14% in rice to 50% in soybean. The lower yields of crops grown under the organic farming system are mainly due to the lower nitrogen content in spring, on the one hand, and to the weed, disease and pest control that is not based on synthetic means, on the other hand. The prices of organic products are important to compensate for the differences in yields, which can lead to lower production values.

*The income growth rate* is lower than the expenditure growth rate, the incomes/expenses ratio being less than 1 for the crops grown under conventional system (wheat, barley, maize, rice, hemp), while for those grown under organic system the incomes/expenses ratio is less than 1 only in maize and rice (Table 3/columns 8 and 9).

*Table 3*

Correlation coefficient between incomes and expenditures

| Non-irrigated crops | Average yield (kg/ha) | | Incomes from main production | | Main production expenditures | | Correlation coefficient (income/expenditure ratio) | |
|---|---|---|---|---|---|---|---|---|
| | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Wheat | 4000 | 2500 | 2724 | 3375 | 2887.6 | 2364.7 | 0.943 | 1.427 |
| Barley | 4000 | 2500 | 2724 | 3250 | 5134.5 | 2560.8 | 0.531 | 1.269 |
| Maize | 5000 | 3000 | 3405 | 3660 | 3596.1 | 4319.1 | 0.947 | 0.847 |
| Sunflower | 2500 | 2000 | 4000 | 4000 | 3641.4 | 2776 | 1.098 | 1.441 |
| Soybean | 3000 | 1500 | 5490 | 3568.5 | 5260.1 | 3483.6 | 1.044 | 1.024 |
| Rapeseed | 2500 | 1700 | 4162.5 | 3638 | 3963.8 | 2640.8 | 1.050 | 1.378 |
| Sugar beet | 40000 | 30000 | 6600 | 6000 | 6407.8 | 5378.3 | 1.030 | 1.116 |
| Rice | 3500 | 2500 | 3500 | 7500 | 4987.1 | 9443.4 | 0.821 | 0.865 |
| Hemp | 45000 | 35000 | 5107.5 | 5141.5 | 5820.9 | 4418 | 0.877 | 1.164 |
| Hops | 1500 | – | 47550 | – | 45065.5 | – | 1.055 | – |
| Tobacco | 1500 | – | 8566.5 | – | 8004.3 | – | 1.070 | – |
| Potatoes | 30000 | 18000 | 22500 | 20250 | 20437 | 18001 | 1.101 | 1.125 |

*Source*: author's calculations.

*The cost per unit of output* is an indicator reflecting the economic efficiency of expenditure items per product; Mystery Shopping assignment calculations achieved a cost ranging from 126 RON/t for hemp and 30044 RON/t for hops, as crops grown in the conventional system (Table 4/col. 4) and 126 RON for hemp and 3147.8 euro/t for growing rice (Table 4 col. 5); the conventional wheat, barley, maize, rice, hemp crops and the organic maize and rice crops have negative taxable income ratios, which equates to a diminution of the extent to which the used resources brought profit.

*Table 4*

Indicators reflecting actual economic efficiency

| Crops | Labor productivity in value terms (W)RON man-hour | | Production cost (RON/t) | | Gross income (RON/ha) | | Taxable income ratio (%) | | Total expenditures in 1,000 RON main production | | Costs of materials in 1,000 RON main production | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| Wheat | 99.9 | 46.1 | 722 | 946 | –163.6 | 1010.3 | –5.7 | 42.7 | 1060.1 | 700.7 | 501.5 | 288.7 |
| Barley | 24.8 | 75.2 | 1284 | 1024 | –2410.5 | 689.2 | –46.9 | 26.9 | 1884.9 | 911.1 | 1038.5 | 545.5 |
| Maize | 74.4 | 45.8 | 719 | 1439.7 | –191.1 | –659.1 | –5.3 | –15.3 | 1056.1 | 1180.1 | 494.3 | 707.7 |
| Sunflower | 60.8 | 48.3 | 1457 | 1388.0 | 358.6 | 1224.0 | 9.8 | 44.1 | 910.4 | 962.6 | 459.2 | 261.6 |
| Soybean | 81.6 | 42.9 | 1753 | 2322.4 | 229.9 | 84.9 | 4.4 | 2.4 | 958.1 | 976.2 | 561.1 | 502.6 |
| Rapeseed | 40.4 | 86.1 | 1586 | 1553 | 198.7 | 997.2 | 5.0 | 37.8 | 952.3 | 725.9 | 454.4 | 277.4 |
| Sugar beet | 341.5 | 24.0 | 160.2 | 179.3 | 192.2 | 621.7 | 3.0 | 11.6 | 970.9 | 896.4 | 520.4 | 160.8 |
| Rice | 152.9 | 114.6 | 1425 | 3147.8 | –1487.1 | –443.4 | –29.8 | –4.7 | 1424.9 | 1049.3 | 715.0 | 619.7 |
| Hemp | 385.9 | 389.7 | 129.4 | 126.2 | –713.4 | 723.5 | –12.3 | 16.4 | 1139.7 | 859.3 | 792.8 | 547.0 |
| Hops | 92.8 | – | 30044 | – | 2484.5 | – | 5.51 | – | 947.7 | – | 775.8 | – |
| Tobacco | 31.1 | – | 5336 | – | 245.7 | – | 3.1 | – | 970.2 | – | 610.6 | – |
| Potatoes | 55.2 | 52.6 | 681.2 | 1000.1 | 2062.9 | 2249.0 | 10.1 | 12.5 | 908.3 | 888.9 | 586.4 | 651.6 |

*Source*: author's calculations.

The explanation and correct assessment of the effect of the physical production volume of wheat, barley, maize, rice and hemp on gross profit can be considered negative from the economic and financial point of view, in the conditions in which the correlation efficiency of cost index (the effort) and the physical production volume index (the effect) was not observed, this being the essential condition for lowering the cost per unit of product.

*Labour productivity* (ratio of the main production value to the working time – man-hours/ha): the 12 conventional crops have higher productivity compared to the crops from the organic system, as the working time is reduced compared to the organic farming. (Table 4, columns 2 and 3).

Subsidies play an important role in making crops profitable. Table 7 presents the gross income, the net income + subsidies, gross income rate, net income rate + subsidies, as well as subsidies share in net income.

From this point of view, we analyzed the influence of financial support amounting to 733.6 RON/ha/163.0161 Euro/ha on the profitability of conventional and organic crops (wheat, barley, maize, sunflower, rapeseed, tobacco, potatoes), as well as the influence of direct payments and coupled support granted on differentiated basis for the soybean, rice, hops, sugar beet, hemp crops, etc. (O.M.A.R.D. no. 619/2015; according to this order the active farmers receive coupled support if they meet certain conditions).

The soybean, sugar beet and hops crops have taxable income ratios below the breakeven taxable income, while in rice and hemp they are negative.

To maintain the land areas into cultivation, the active farmers receive coupled support (OMARD 619/2015) (Table 6, Table 10). The taxable income ratio (Table 6/ columns 5 and 6) has values within the normal range in potato crops (10%), sunflower (9.8%) and rapeseed (5%) and values under the normal range in the other crops. The share of subsidies in net income in both types of agriculture represents more than 60% (except for the conventional barley and potato crops). The financial support intensity is higher when income is lower (Table 5/columns 9 and 10).

*Table 5*

Indicators reflecting the actual economic efficiency

| Crops | Average yield (kg/ha) | | Gross income (RON/ha) | | Net income + subsidy (RON/ha) | | Taxable income ratio (%) | | Net income rate+ subsidy (%) | | % of subsidy in net income | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO | CONV | ECO |
| 1 | 2 | 3 | 4 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Wheat | 4000 | 2500 | –163.6 | 1010.3 | 596.1 | 2563.1 | –5.7 | 42.7 | 20.6 | 108.4 | 123 | 66.9 |
| Barley | 4000 | 2500 | –2410.5 | 689.2 | –1291.2 | 2293.4 | –46.9 | 26.9 | –25.1 | 89.6 | –56.8 | 74.8 |
| Maize | 5000 | 3000 | –191.1 | –659.1 | 573.1 | 1160.9 | –5.3 | –15.3 | 15.9 | 26.9 | 128 | 147.7 |
| Sunflower | 2500 | 2000 | 358.6 | 1224.0 | 1035.0 | 2742.7 | 9.8 | 44.1 | 28.4 | 98.8 | 70.9 | 62.6 |
| Soybean | 3000 | 1500 | 229.9 | 84.9 | 2137.2 | 2015.4 | 4.4 | 2.4 | 40.6 | 57.9 | 91.0 | 96.5 |
| Rapeseed | 2500 | 1700 | 198.7 | 997.2 | 900.7 | 2552.2 | 5.0 | 37.8 | 22.7 | 96.6 | 81.5 | 67.1 |
| Sugar beet | 40000 | 30000 | 192.2 | 621.7 | 4432.0 | 4792.8 | 3.0 | 11.6 | 69.2 | 89.1 | 96.4 | 89.1 |
| Rice | 3500 | 2500 | –1487.1 | –443.4 | 2250.8 | 3281.6 | –29.8 | –4.7 | 45.1 | 34.8 | 162.3 | 111.3 |
| Hemp | 45000 | 35000 | –713.4 | 723.5 | 1542.8 | 2749.8 | –12.3 | 16.4 | 26.5 | 62.2 | 138 | 77.9 |
| Hops | 1500 | – | 2484.5 | – | 5448.6 | – | 5.51 | – | 12.1 | – | 61.7 | – |
| Tobacco | 1500 | – | 245.7 | – | 940.0 | – | 3.1 | – | 11.7 | – | 78.04 | – |
| Potatoes | 30000 | 18000 | 2062.9 | 2249.0 | 2466.5 | 2622.8 | 10.1 | 12.5 | 12.1 | 14.6 | 29.7 | 28 |

*Source:* author's calculations.

*Table 6*

Coupled support for soybean – % of net income + total subsidies

| Coupled support Soybean | CONV soybean 3.0 t/ha | ECO soybean 1.5 t/ha | Subsidy | |
|---|---|---|---|---|
| | | | RON/ha | Euro/ha |
| Total subsidy | 91% | 96.5% | 1944.072 | 432 |
| Notified grant | 68% | 72.6% | 1462.5 | 325 |
| Awarded grant | 56.6% | 60.1% | 1210.5 | 269 |
| Direct payments | 34.3% | 34.4% | 733.5725 | 163.0161 |

*Source*: author's calculations.

Total soybean subsidies = direct payments (163.0161 euro/ha) + coupled support (269 euro/ha).

*Table 7*

Coupled support for hemp – % of net income + total subsidy

| Coupled support Hemp | Hemp CONV 45 t/ha | Hemp ECO 35 t/ha | Subsidy | |
|---|---|---|---|---|
| | | | RON | Euro |
| Total subsidy | 138% | 77.9% | 2142.072 | 476 |
| Notified grant | 91% | 51.2% | 1408.5 | 313 |
| Awarded grant | 56.6% | 19.5% | 873 | 119 |
| Direct payments | 47.5% | 26.7% | 733.5725 | 163.0161 |

*Source*: author's calculations.
Total hemp subsidies = direct payments (163.0161 Euro/ha) + coupled support (313 euro/ha).

*Table 8*

Coupled support for rice – % of net income + total subsidy

| Coupled support Rice | CONV rice 3.5 t/ha | ECO rice 3 t/ha | Subsidy | |
|---|---|---|---|---|
| | | | RON | Euro |
| Total subsidy | 162.3% | 111.3% | 3654.072 | 812.0161 |
| Notified grant | 129.8% | 89% | 2920.5 | 649 |
| Awarded grant | 90% | 61.7% | 2025 | 450 |
| Direct payments | 32.6% | 22.4% | 733.5725 | 163.0161 |

*Source*: author's calculations.
Total rice subsidies = direct payments (163.0161 euro/ha) + coupled support (649 euro/ha).

*Table 9*

Coupled support for hops – % of net income + total subsidy

| Coupled support Hops | CONV hops 1.5 t/ha | Subsidy | |
|---|---|---|---|
| | | RON | Euro |
| Total subsidy | 61,7% | 3654,072 | 747,0161 |
| Notified grant | 48,2% | 2025 | 500 |
| Awarded grant | 41,3% | 2920.5 | 584 |
| Direct payments | 13,5% | 733,5725 | 163,0161 |

*Source:* author's calculations.
Total hops subsidies = direct payments (163.0161 euro/ha) + coupled support (584 euro/ha).

*Table 10*

Coupled support for sugar beet – % of net income + total subsidy

| Coupled support Sugar beet | CONV sugar beet 40 t/ha | ECO sugar beet 30 t/ha | Subsidy | |
|---|---|---|---|---|
| | | | RON | Euro |
| Total subsidy | 96.4% | 89.1% | 4270.5 | 949.0161 |
| Notified grant | 78.9% | 73.9% | 3537 | 786 |
| Awarded grant | 60.9% | 56.3% | 2700 | 600 |
| Direct payments | 16.6% | 15.3% | 733.5725 | 163.0161 |

*Source:* author's calculations.
Total sugar beet subsidies = direct payments (163.0161 euro/ha) + coupled support (786 euro/ha).

Tables 6–10 present the percentage of financial support for soybeans, hemp, rice, sugar beet, hops; the intensity of support ranges from 61.7% in conventional hops to 162.3% in conventional rice, while in organic crops the support intensity is lower (because incomes are higher), this ranging from 77.9% in hemp to 111.3% in rice.

The average yields are lower in organic crops compared to conventional cops, while the gross income is higher, as the selling prices in organic crops are much higher. The selling prices for organic products are 1.2 to 2.5 times higher than the prices for conventional crops. As regards the direct costs of production, there are great differences between the two types of farming systems. Thus, the production costs are high in the conventional crops due to the use of large amounts of chemical fertilizers and pesticides.

In the organic crops, although the production levels are lower by 25–30% compared to the crops grown under the conventional system, the direct production costs are higher due to higher input costs. For example, for the conventional wheat crop with an average yield of 4 t/ha, the technological expenses amount to 2856.15 RON/ha, out of which 1366.1 RON/ha for raw materials. Instead, in the organic wheat crop for an average yield of 2.5 t/ha, the technological expenses are 3621.46 RON/ha, out of which 2307.9 RON/ha raw material costs.

The working methods adopted in the organic farming system do not lead to the diminution of expenses except for in certain technological links. Overall, the gross income rates for crops grown under the organic system are higher than for conventional crops (Table 5/columns 5 and 6).

## 5. CONCLUSIONS

The organic farming practice represents a real opportunity for rural economies, contributing to their sustainable development by improving employment in the agricultural sector. The agricultural policy measures applied in Romania aimed, on the one hand, to maintain production at its current level in order to ensure food security, and on the other hand, to provide support to farmers' incomes. The coupled support scheme, conditioned by obtaining certain production levels, which will be applied in the period 2015–2020 in the crop production sector, is meant to ensure profitability of the investigated crops.

The practical contribution of this paper is to provide a comparative analysis of the economic efficiency of the conventional and organic crops. The results of this analysis have revealed the following:

- *The organic crops use fewer inputs, but more labor. In some cases the input costs are higher than in conventional agriculture, due to their absence from the market*
- *Subsidies ensure the profitability of crops*

- *Low yields are offset by higher selling prices*
- *The organic crops can be more profitable than the conventional ones*

It can be said that the organic farming system is more cost-effective, while the revenue is different depending on the type of crops. As regards subsidies, they hold a significant share in revenue. Without this financial support, the crops could be replaced by more profitable ones, thus changing the order in the sector structure or in farmers' preferences. In order to increase the economic efficiency in organic farming, it is necessary that each crop becomes profitable, and as direct effect the profitability of all products and organizational structures, i.e. the more intense increase of the profitability of each product sold, up to reaching the competitiveness level required on the competitive market.

"The shift from conventional to organic farming is made step by step, so that the economic structures should not feel the effects of a fall in productivity, and manufacturers should gain confidence in the new systems and the necessary courage to start investments in this sector".

The proposed work may be subject to changes given the relativity of data (that belong to the production year 2015–2016), and it can be improved through further research. It remains to be seen whether the organic farming system will have increasing shares in the farming activities, as it is well-known that the attractiveness of this type of agriculture is given by the selling prices that can cover the differences in yields compared to conventional farming; or organic farming will exist as long as it is subsidized or until farmers are able to manage this system; during this transition/conversion period, we will have already created a consumer who became aware of the benefits of organic products, which will ultimately lead to an increase in demand for such products.

From the analysis of economic efficiency indicators it results that (in the absence of financial support granted under different payment schemes) the revenues from conventional farming ensure low profitability or certain crops (barley, rice, etc.) are unprofitable.

## 6. ACKNOWLEDGEMENT

This paper has been supported by the research project ADER 13.1.2. "Technical and economic substantiation of production costs and estimations of prices for wheat, barley, maize, sunflower, rapeseed, soybean, sugar beet, rice, hemp, hops, tobacco and potatoes for the conventional and ecological agriculture", in the period 2015–2018. The research project is coordinated by the Institute for Agriculture Economy and Rural Development and financed by Romania's Ministry of Agriculture and Rural Development.

## REFERENCES


1. Cojocaru C., (2000), *Analiza economico-financiară a exploataţiilor agricole şi silvice*, ediția a doua, Editura Economică, București.
2. Despa R., Zirra D., Avrigeanu A., Munteanu A., Nedelescu M., (2010), *Eficienta investitiilor*, Editura Universitara, Bucuresti.
3. Davidescu D., Velicica Davidescu, (1994). *Agricultura biologică – o variantă pentru exploataţiile mici şi mijlocii*. Editura Ceres, Bucureşti.
4. Grigore A.A., Abargaonitei S. V., Nancu D. V., Ghiculescu R. (2008), *Analiza comparativă privind eficienţa economică a produselor agricole convenţionale şi a celor ecologice*, Lucrări Științifice, vol. 51, seria Agronomie, Universitatea de Științe Agricole și Medicină Veterinară Iaşi.
5. Gruia R., (1998), *Managementul eco-fermelor*, Editura Ceres București.
6. Samuil C., (2007), *Tehnologii de agricultură ecologică,* Iași.
7. Toncea I., 2002. *Ghid practic de agricultură ecologică*. Editura AcademicPres, Cluj-Napoca.
8. Toncea I., Stoianov R., (2002). *Metode ecologice de protecţie a plantelor*. Editura Ştiinţelor Agricole, Bucureşti.
9. Ursu A., Cofas, E., (2016), *Research on financial support forms for Romanian agriculture producers. Case study: 2011–2015*, International Journal of Academic Reserch in Environment and Geography, Vol. 3, No. 2, December, 2016, pp. 9–16.
10. Ursu A., Șurcă E., Petre I., (2016), *Indicatori ai eficienței economice pentru agricultura convențională și ecologică,* Editura ASE, București.
11. Ursu A., (2016), *"The influence of coupled support to the crop production sector on the profitability of crops",* ASE Publishing House, Bucharest.
12. *** Agricultura ecologica sau conventionala, http://www.bio-romania.org [accesat 20.01.2017].
13. *** http://www.madr.ro/ro/agricultura-ecologica.html
14. ***Studiu privind calcularea nivelului plăților compensatorii ce urmează a se acorda în România în perioada 2014–2020, conform art. 29 din Regulamentul (UE) nr. 1305/2013, revizuită conform ultimelor observații ale AM-PNDR, 1.07.2014 [accesat 20.01.2017].