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FROM SOIL TO TABLE: EVALUATING CONVENTIONAL AND ECOLOGICAL CULTIVATION SYSTEMS IN SOUTH-WEST OLTENIA, ROMANIA

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Abstract

In the context of rising concerns about sustainability and environmental impact, this article focuses on analyzing two remarkable agricultural systems in the South-West Oltenia Development Region: the conventional and the ecological, and emphasizes one of the foundational crops for the region, wheat. The research was derived from a comprehensive questionnaire applied on 18 farms in the South-West Oltenia region: half of them employing ecological practices and the other half using conventional methods. Our primary focus was to determine the most economically viable agricultural system for the area. Through this analysis, the article not only illustrates the evolution of this crop's production from 2020 to 2022, but also provides insights into production costs and their valorization in the market. Moreover, it underscores the importance and advantages of each agricultural system, highlighting potential long-term benefits from both economic and sustainable perspectives. To provide a solid and well-grounded analysis, statistical methods were employed, combined with data obtained fromthe questionnaire administered directly at the farm level in the region. This methodology offers a clear perspective on the profitability and efficiency of the two agricultural systems in the specific context of South-West Oltenia.

Key words**:** *ecological agriculture, conventional agriculture, agricultural systems, conversion, wheat cultivation, sustainability, profitability*

INTRODUCTION

Sustainability has become a cornerstone in discussions related to agriculture [7] as there's an acknowledgment of the impact that conventional farming methods can have on the environment and biodiversity. Ecological farming, for instance, aims to present an alternative to these conventional techniques, [5] emphasizing the preservation of natural resources and minimizing environmental impact [11, 12].

In the EU, there's a noticeable shift from traditional to organic farming, [8, 15] hinting at a brighter future for the organic sector. This trend is especially strong in countries like France, Spain, Italy, and Romania [1].

In 2020, a big part of the EU's organic farmland was dedicated to permanent grassland, predominantly in Spain, France, and Germany [10].

This grassland mainly supports organic livestock. Other areas focus on crops like feed for livestock, cereals, and long-standing crops such as fruits and olives [18].

Some crops, like dry pulses, have a large portion grown organically, standing at 24%. From 2014 onwards, there's been a surge in the organic cultivation of grains and industrial crops. When it comes to farm sizes, organic ones in the EU tend to be larger than traditional farms [14] (Figure 1).

On average, organic farms cover 41 hectares, compared to 16 hectares for traditional farms.

In today's agricultural paradigm, the choice between conventional and ecological systems is more than just a matter of farming practices [3]; it is a reflection of the broader socio-economic and environmental priorities [9]. Within the scope of this article, we cast our analytical gaze on these two distinctive agricultural models as they find expression in

the South-West Oltenia Development Region. The South-West Oltenia Region offers ideal conditions for growing fertile crops, particularly cereals and oil-producing plants [13].

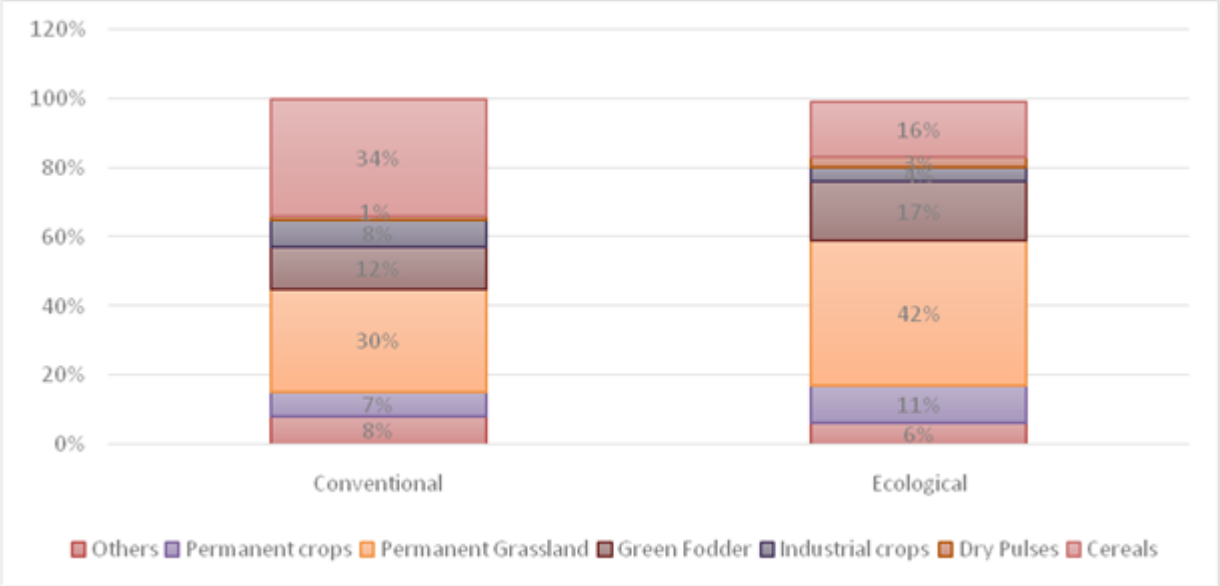

Fig. 1. Land use of conventional and organic agriculture, in 2020, by crop (%)
Source: European Comission, DG AGRI calculation based on Eurostat, p. 6 [6].

In this paper it is mainly paid attention to the cultivation and performance of an integral crop, very important in Romania, namely wheat which is noteworthy that it is the predominant cereal crop cultivated and used to make bread for around 40% of the global population [22].

Exploration lies a multi-faceted aim: First, we want to highlight the inherent characteristics and merits of both the conventional and ecological systems. This involves assessing how each system aligns with modern agricultural goals, from sustainability to yield maximization. Second, by examining the period between 2020 and 2022, we provide a temporal snapshot of the dynamics at play, offering readers a clear trajectory of how this crop has fared in recent years within each system. This includes a critical look at the costs of production, which often serve as a deciding factor for many farmers pondering between these two systems. Beyond the costs, the method of valorization and the consequent pricing strategies offer a window into the broader market mechanics and how each system integrates within it.

In this context, the purpose of the paper is to comparatively analyze conventional and the ecological wheat croping in 18 farms in the South-West Oltenia region of Romania, based on a structured questionnaire used in field survey.

MATERIALS AND METHODS

In conducting our study, we leaned on documentation, analytical review, and the refinement of data.Grounded in the practices of synthesis, drawing analogies, and contrasting analysis, we structured our research approach. To ensure the depth and accuracy of our insights, our study draws on empirical data. By leveraging statistical tools and methodologies, we have analyzed data sourced from a meticulously designed questionnaire. This questionnaire was administered across 18 agricultural operations in the region, specifically divided into 9 conventional and 9 ecological farms. Each of these farms was further segmented based on three different size dimensions (between 1-30 hectares, between 30-50 hectares and over 100 hectares).The data gathered from the questionnaire was analyzed using Microsoft Excel's pivot table feature. This software aids

in organizing and showcasing data efficiently and coherently, making it suitable for detailed study and documentation. The examination focused on factors like the scale of the farm operations, educational background, average yields, cost of production, and the pricing of the produce.Ultimately, the study's findings are geared towards helping stakeholders, be it farmers, policymakers, or investors, make informed decisions based on the profitability and sustainability of the conventional and ecological agricultural systems in the South-West Oltenia Development Region.

RESULTS AND DISCUSSIONS

In order to make the analysis more relevant, we chose to examine farms focusing solely on wheat. It is well known that wheat holds a significant place in the agricultural landscape of Romania, [21] not just due to the favorable climatic conditions that allow it to thrive. This crop has become an integral part of the country's economy, having a consolidated status not only through its yield but also its role in exports. [16, 17, 20]. Traditionally, Romania has had a close relationship with the land, with agriculture always being one of its main sectors [2].

In this context, Romanian farmers are highly efficient in cultivating wheat, thus maximizing profits and profitability. Wheat, being used in a wide range of products, is extremely versatile and, therefore, very attractive to farmers. The profitability of this crop is a key factor. The fact that wheat is relatively resistant to climatic variations, especially drought, makes it less risky for farmers. This is a major consideration in a country where the irrigation infrastructure has been and continues to be a challenge. Last but not least, the economic context plays a significant role. Wheat benefits from government subsidies or other forms of support, [4] making it even more attractive to those involved in the agricultural sector. The fact that wheat represents a valuable export for Romania establishes its importance in the agrarian and economic structure of the country [19].

Table 1 shows the proportions concerning the main crops cultivated at the level of the surveyed farms, based on the category of owned land area. It is evident that wheat enjoys greater popularity, being present in a higher percentage, both at the conventional and ecological systems level.

Furthermore, it can be observed that there are farms that cultivate wheat and sunflower in parallel and others that focus solely on wheat cultivation. Among the chosen farms, we note that in the conventional system, there is a farm (5.56%) with an area of over 100 hectares that also grows corn. Meanwhile, in the ecological system, we find a small-sized farm that has also opted for this crop.

Table 1. The main crop cultivated at the level of the farms interviewed

	Conventional agriculture			Ecological agriculture		
	10-30 ha	50-100 ha	over 100 ha	10-30 ha	50-100 ha	over 100 ha
Sunflower	0%	5.56%	0%	5.56%	0%	5.56%
Wheat	16.67%	11.11%	11.11%	5.56%	16.67%	11.11%
Corn	0%	0%	5.56%	5.56%	0%	0%

Source: Questionnaire on the sustainability of conventional and ecological agricultural systems, applied in the South-West Oltenia region, (2023)

If we talk about predominant crops, wheat clearly dominates, covering over 70% of all farms (72.22%), regardless of the type of agriculture practiced. This is followed by sunflower, which is found in approximately 17% of the farms (16.67%), and corn, with 11.11%.

Table 2 presents the ways in which agricultural production is valorized in the South-West Oltenia region, whether were discussing conventional or ecological agriculture.

For conventional agriculture, 33.33% of the production is capitalized through intermediaries, with only 11.11% processed

directly in factories and 5.56% capitalized on their own farms. Breaking it down further by education level and type of operation, we observe that respondents with high school education capitalize 11.11% of their production through intermediaries. LLCs (S.R.L.) account for 11.11% of the capitalization through intermediaries. Those with higher education tend to diversify their capitalization methods, with 22.22% using intermediaries, 11.11% opting for processing factories, and 5.56% capitalizing at their own farms. Self-employed person(P.F.A.) predominantly rely on intermediaries, accounting for 5.56%. Meanwhile, non-authorized individuals (P.F.N.) focus exclusively on capitalizing at their own farms, contributing 5.56%. LLCs play a larger role in this sector, managing 16.67% through intermediaries and 11.11% in processing factories.

Regarding ecological agriculture, 44.44% of the production is capitalized through intermediaries. Among these, individuals with higher education dominate this category, capitalizing 44.44% of their production through intermediaries and 5.56% directly at processing factories. Sole enterprises (I.I.) focus strictly on intermediaries, accounting for 5.56%. Sole proprietors capitalize 11.11% of their production through intermediaries. LLCs, as evident, have a dominant role, managing 27.78% through intermediaries and 5.56% in processing factories.

The questionnaire incorporated an analysis from the perspective of education level to assess its influence. From the results, it is clear that individuals with higher education, both in conventional and ecological sectors, have a broader approach in capitalizing their production, balancing between direct processing in factories, capitalizing at their own farms, and intermediaries. In contrast, those with high school education seem to rely more heavily on intermediaries. The choice of capitalization method might be influenced by the depth of knowledge, access to resources, or networks that higher education might offer.

Table 2. The main way of capitalizing the production

	Processing factory	**Own farm**	**Intermediaries**	**Total**
CONVENTIONAL AGRICULTURE	**11.11%**	**5.56%**	**33.33%**	**50.00%**
High school studies	0.00%	0.00%	11.11%	11.11%
L.L.C.	0.00%	0.00%	11.11%	11.11%
Highereducationstudies	11.11%	5.56%	22.22%	38.89%
Self-employedPerson (PFA)	0.00%	0.00%	5.56%	5.56%
Non-authorized individuals (PFN)	0.00%	5.56%	0.00%	5.56%
L.L.C.	11.11%	0.00%	16.67%	27.78%
ECOLOGICAL AGRICULTURE	**5.56%**	**0.00%**	**44.44%**	**50.00%**
Highereducationstudies	5.56%	0.00%	44.44%	50.00%
Sole enterprises (I.I.)	0.00%	0.00%	5.56%	5.56%
Self-employedPerson (PFA)	0.00%	0.00%	11.11%	11.11%
L.L.C.	5.56%	0.00%	27.78%	33.33%
TOTAL	**16.67%**	**5.56%**	**77.78%**	**100%**

Source: Questionnaire on the sustainability of conventional and ecological agricultural systems, applied in the South-West Oltenia region, (2023).

Table 3 presents the distribution of respondents based on the type of agriculture practiced, average production per hectare, production cost, and average selling price for the year 2020. If we analyze the average production in tons per hectare, we see that in the case of conventional agriculture, 4 respondents recorded a production between 5-6 t/ha, while for ecological agriculture, 4 respondents fell within the 2-3 t/ha range. Production costs also differ. All 4 respondents from ecological agriculture with yields of 2-3 t/ha have costs under 2,000 RON, while in conventional agriculture we see a wider range of costs. For instance, one respondent with a yield of 4-5 t/ha had costs between 2,500-3,000 RON, while another, with the same yield of 4-5 t/ha, had costs between 4,000-

4,500 RON. Regarding selling prices, the two types of agriculture have a similar spectrum. For instance, for ecological agriculture with a yield of 2-3 t/ha, the price varies between 0.7-0.9 RON/kg, while for those in conventional agriculture with a yield of 5-6 t/ha, prices range between 0.8-1.2 RON/kg. Thus, the collected data indicates that conventional agriculture offers higher production but often at greater costs, while ecological agriculture appears to be more economical from a production cost perspective, but with a smaller yield. The selling price per kg does not differ significantly between the two practiced types of agriculture.

Table 3. Distribution of respondents by type of agriculture practiced, average production per ha, cost of production and average selling price of wheat, 2020

WHEAT	**Conventional agriculture**			**Total conv**	**Ecological agriculture**			**Total eco**	**Total**
Average production (t/ha)/ cost of production 000 RON/ average price RON/kg	10-30 ha	50-100 ha	over 100 ha	No.	10-30 ha	50-100 ha	over 100 ha	No..	conv + eco
2-3 t					3	1		**4**	**4**
under 2,000 RON					3	1		**4**	**4**
0.7-0.8					1			**1**	**1**
0.8-0.9					1			**1**	**1**
0.9-1						1		**1**	**1**
1.1 - 1.2					1			**1**	**1**
3-4 t						1	1	**2**	**2**
3.5-4,000 RON							1	**1**	**1**
1.3-1.4							1	**1**	**1**
under 2,000 RON						1		**1**	**1**
0.8-0.9						1		**1**	**1**
4-5 t	1		1	**2**			2	**2**	**4**
2.5-3,000 RON	1			**1**			1	**1**	**2**
0.7-0.8	1			**1**					**1**
1.1 - 1.2							1	**1**	**1**
3-3,500 RON							1	**1**	**1**
1.3-1.4							1	**1**	**1**
4-4,500 RON			1	**1**					**1**
0.8-0.9			1	**1**					**1**
5-6 t		2	2	**4**		1		**1**	**5**
2.5-3,000 RON		2		**2**					**2**
0.8-0.9		2		**2**					**2**
3-3,500 RON			1	**1**		1		**1**	**2**
0.8-0.9						1		**1**	**1**
0.9-1			1	**1**					**1**
under 2,000 RON			1	**1**					**1**
1.1 - 1.2			1	**1**					**1**
over 6 t	2	1		**3**					**3**
2.5-3,000 RON		1		**1**					**1**
0.8-0.9		1		**1**					**1**
3.5-4,000 RON	1			**1**					**1**
0.6 0.7	1			**1**					**1**
under 2,000 RON	1			**1**					**1**
0.7-0.8	1			**1**					**1**
Total	3	3	3	**9**	3	3	3	**9**	**18**

Source: Questionnaire on the sustainability of conventional and ecological agricultural systems, applied in the South-West Oltenia region, (2023).

The data from Table 4. provides information about the average yield per hectare, production cost, and average selling price for wheat in 2021, distributed, of course, across the two systems, conventional and ecological. When analyzing the average production, we

notice that most farmers practicing conventional agriculture have a higher average production, with 5 out of the respondents (approximately 56%) producing between 5-6 t/ha. On the other hand, in the case of ecological agriculture, 4 respondents (approximately 44%) report a production between 2-3 t/ha. Regarding production costs, there is a greater diversity in the case of conventional agriculture, with values ranging from under 2,000 RON to 3,500-4,000 RON. Ecological agriculture has lower costs, with 3 out of the 4 respondents who produce 2-3 t/ha having costs under 2,000 RON. Selling prices are within a fairly narrow range, generally varying between 0.7-1.2 RON/kg, regardless of the type of agriculture.

Table 4. Distribution of respondents by type of agriculture practiced, average production per ha, cost of production and average selling price of wheat, 2021

WHEAT	**Conventional agriculture**			**Total conv**	**Ecological agriculture**			**Total eco**	**Total**
Average production (t/ha)/ cost of production 000 RON/ average price RON/kg	10-30 ha	50-100 ha	over 100 ha	No.	10-30 ha	50-100 ha	over 100 ha	No..	conv + eco
2-3 t					2	2		**4**	**4**
2-2,500 RON					1			**1**	**1**
1.1 - 1.2					1			**1**	**1**
under 2,000 RON					1	2		**3**	**3**
0.8-0.9					1	1		**2**	**2**
0.9-1						1		**1**	**1**
3-4 t	1			**1**	1		2	**3**	**4**
2-2,500 RON	1			**1**					**1**
0.7-0.8	1			**1**					**1**
3.5-4,000 RON							1	**1**	**1**
1.3-1.4							1	**1**	**1**
4-4,500 RON							1	**1**	**1**
1.3-1.4							1	**1**	**1**
under 2,000 RON					1			**1**	**1**
0.7-0.8					1			**1**	**1**
4-5 t	1			**1**			1	**1**	**2**
2.5-3,000 RON							1	**1**	**1**
1.1 - 1.2							1	**1**	**1**
3-3,500 RON	1			**1**					**1**
0.7-0.8	1			**1**					**1**
5-6 t		3	2	**5**		1		**1**	**6**
2.5-3,000 RON		2		**2**					**2**
0.8-0.9		2		**2**					**2**
3-3,500 RON		1	1	**2**		1		**1**	**3**
0.8-0.9		1		**1**		1		**1**	**2**
0.9-1			1	**1**					**1**
under 2,000 RON			1	**1**					**1**
1.1 - 1.2			1	**1**					**1**
over 6 t	1		1	**2**					**2**
3.5-4,000 RON	1			**1**					**1**
0.6 0.7	1			**1**					**1**
4-4,500 RON			1	**1**					**1**
0.8-0.9			1	**1**					**1**
Total	3	3	3	**9**	3	3	3	**9**	**18**

Source: Questionnaire on the sustainability of conventional and ecological agricultural systems, applied in the South-West Oltenia region, (2023).

Thus, we can conclude that conventional agriculture provides a higher average yield but at higher costs, while ecological agriculture exhibits both lower production

costs and a smaller average yield. Selling prices, just as in 2020, are relatively similar between the two agricultural systems.

In Table 5, we have a dataset referring to wheat production in 2022. Looking at the average yield per hectare for conventional agriculture, most of the production falls between 4-5 tons/ha and over 6 tons/ha. For ecological agriculture, the average yield is smaller, with most respondents reporting a production of 2-3 tons/ha. From this, it emerges that conventional agriculture is more productive in terms of yield per hectare. Production costs vary in both types of agriculture. In the case of conventional agriculture, the costs are spread between 2,500-3,000 RON and 4,500-5,000 RON. For ecological agriculture, the majority of costs fall between 2-2,500 RON.

Table 5. Distribution of respondents by type of agriculture practiced, average production per ha, cost of production and average selling price of wheat, 2022

WHEAT	**Conventional agriculture**			**Total conv**	**Ecological agriculture**			**Total eco**	**Total**
Average production (t/ha)/ cost of production 000 RON/ average price RON/kg	10-30 ha	50-100 ha	over 100 ha	No.	10-30 ha	50-100 ha	over 100 ha	No..	conv + eco
2-3 t					3	2		5	5
2.5-3,000 RON					1			1	1
1.7-1.8					1			1	1
2-2,500 RON					1	2		3	3
1.5-1.6					1	2		3	3
under 2,000 RON					1			1	1
1.1 - 1.2					1			1	1
3-4 t							2	2	2
3-3,500 RON							1	1	1
1.5-1.6							1	1	1
4.5-5,000 RON							1	1	1
1.7-1.8							1	1	1
4-5 t	2	2		4		1	1	2	6
2.5-3,000 RON	1			1					1
1.4-1.5	1			1					1
3.5-4,000 RON						1		1	1
1.7-1.8						1		1	1
3-3,500 RON		1		1					1
1.5-1.6		1		1					1
4-4,500 RON	1			1			1	1	2
1.4-1.5	1			1					1
1.7-1.8							1	1	1
4.5-5,000 RON		1		1					1
1.5-1.6		1		1					1
5-6 t		1	1	2					2
4-4,500 RON		1		1					1
1.7-1.8		1		1					1
4.5-5,000 RON			1	1					1
1.7-1.8			1	1					1
over 6 t	1		2	3					3
2.5-3,000 RON			1	1					1
1.7-1.8			1	1					1
4.5- 5,000 RON	1		1	2					2
1.3-1.4	1			1					1
1.6-1.7			1	1					1
Total	3	3	3	9	3	3	3	9	18

Source: Questionnaire on the sustainability of conventional and ecological agricultural systems, applied in the South-West Oltenia region, (2023).

Regarding the selling price, values range between 1.1 and 1.8 RON/kg for both types of agriculture. However, higher prices (1.7-1.8 RON/kg) are more frequently reported in the case of ecological agriculture.

CONCLUSIONS

From the analysis of conventional and ecological agricultural systems in the South-West Oltenia Development Region, a clear narrative emerges around the significance of wheat cultivation. While the conventional system holds its ground in terms of production volumes, the ecological paradigm is carving out its space in the backdrop of growing sustainability concerns. Intermediaries play a pivotal role in the market, pointing to opportunities for more direct producer-consumer links. Notably, education levels appear to shape decisions on how production is valorized, hinting at the value of expanded knowledge networks in the sector. As the global emphasis on sustainability grows, the evolution of these agricultural systems in the region will be a testament to the balance between economic robustness and environmental responsibility.

On the other hand, based on the data presented for the years between 2020 and 2022, and taking into account past developments, the following conclusion can

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