Scientific Papers. Series B, Horticulture. Vol. LXIX, No. 2, 2025
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

THE INFLUENCE OF ORGANIC AND CONVENTIONAL CULTIVATION SYSTEMS ON SOME QUALITY AND PRODUCTIVITY INDICES OF THREE PEACH VARIETIES GROWING IN SOUTHEASTERN ROMANIA

Andreea Mihaela UDREA-BRASLĂ[1], Mihaela OLARU[1], Cătălin-Viorel OLTENACU[1], Nicoleta OLTENACU[1, 2], Ailin MOLOȘAG[1], Damian DRAGOMIR[1], Vlăduț HOLT[1]

[1]Research and Development Station for Fruit Tree Growing Băneasa, 8 Ion Ionescu de la Brad Blvd, District 1, Bucharest, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, 011464, Bucharest, Romania

Corresponding author: postolici.mihaela@scdpbaneasa.ro

Abstract

The peach (Prunus persica L.), native to China, is a fruit tree of global importance, appreciated for its nutritional and sensory qualities. This study analyzes the influence of organic and conventional cultivation technology on some fruit quality indices (firmness, sugar content, acidity, pH) and productivity of three peach varieties - 'Catherine Sel1', 'Springcrest' and 'Raluca' - grown in south-eastern Romania. The results showed that the conventional system significantly influenced the fruit weight, 61.64 g compared to 37.36 g in the organic system, and consequently the productivity was higher in the 'Catherine Sel1' variety. The fruit firmness was similar for both systems, while the sugar content was higher in fruit from conventional culture (17.3 °BRIX compared to 15 °BRIX). The pH values were comparable, with the 'Raluca' variety recording the highest pH (3.76) and the citric acid content showed minor differences between the systems (0.97% vs. 0.91%), with the 'Springcrest' variety reaching the highest value of 1.78%.

***Key words**: organic system, conventional system, quality indices, peach, productivity.*

INTRODUCTION

The peach (*Prunus persica* L.) is one of the most important fruit species globally, valued for its nutritional and sensory qualities, such as its high vitamin, mineral and antioxidant content. Native to China, the fruit spread rapidly to temperate regions of the world and is now cultivated in many areas, including south-eastern Europe. In Romania, peach is an important crop with significant economic value in the agricultural sector. Peaches (*Prunus persica* L.) are the third most produced fruit in the world after pears and apples and have a huge domestic and export market. Peaches are rich in various nutritional compounds including vitamins, minerals, carbohydrates, organic acids and antioxidants (Naqash & Naik, 2022).

At the same time, the interest in sustainable agriculture has led to the development and application of organic farming practices, and the comparison of organic and conventional farming systems has become an important research topic in fruit growing. While organic farming is generally less productive than conventional farming, it can still produce higher quality fruit. This suggests that the focus should not only be on quantity, but also on quality (Munné-Bosch & Bermejo, 2024).

MATERIALS AND METHODS

The present study aims to evaluate the influence of organic and conventional cultivation systems on some relevant parameters of fruit quality and productivity, analyzing three peach varieties: 'Catherine Sel1', 'Raluca' and 'Springcrest' found in south-eastern Romania.

Figure 1 shows the 'Catherine Sel 1' peach variety, developed in 2001 at the Research and Development Station for Fruit Growing in Constanța (SCDP). It originated through the self-pollination of the American variety 'Catherine', followed by a careful selection of hybrid progenies. This variety is the first clingstone peach for the industry. The variety has been tested in comparative competition crops at Valu lui Traian and the University of Life Sciences in Bucharest, demonstrating outstanding performance in the pedoclimatic conditions of Romania. The variety is characterized by medium-sized fruits, weighing between 80-110 grams, spherical in shape with a deep, pointed top and narrow and medium to deep peduncular cavity. The skin is medium-thick with dense, fine pubescence and a greenish-yellow ground color with reddish tints in the sunny areas of the fruit, giving it an attractive appearance. The pulp is yellow-orange, firm, rubbery, free of fibers and reddish infiltrations, with a pleasant taste and flavor that intensifies during processing, making it ideal for processing.

Figure 1. Catherine Sel. 1 variety
(Source: SCDP Constanta website)

The variety has a high sugar content (11-13% expressed refractometrically) and does not disintegrate on boiling. On the tree side, 'Catherine Sel1' is frost-hardy and tolerant to the main fruit diseases, such as leaf blight and leaf spot. Being a self-fertile variety, it does not require a pollinator and is characterized by a high vigour, which ensures a constant and very high yield of about 35-40 kg/tree, which can reach 22-25 t/ha for a density of 625 trees/ha, respectively 30-33 t/ha for 833 trees/ha. The tree goes into economic fruiting in the third year after planting, which makes it an attractive choice for growers who want a fast and steady production of high-quality fruit (SCDP Constanta).

Figure 2 shows 'Springcrest', an American apricot variety developed in 1969, known for its high vigor and self-fertility. The fruits of this variety have an average weight of 65-75 g and are spherical in shape. The skin is predominantly yellow-orange, with a deep crimson red over almost the entire surface and a freckled appearance on the shaded side.

Figure 2. Springcrest variety
(Source: SCDP Constanta website)

The flesh is yellow in color, without infiltrations, with a firm, juicy and adherent to the stone. It has a pleasant, slightly acidic taste and is considered excellent quality. The fruit ripens between June 20-30 and is characterized by high productivity. Thanks to its characteristics, this variety of apricot is used both for fresh consumption and for industrial processing, being used in compotes, jams, nectars and juices.

Figure 3. Raluca variety
(Source: SCDP Constanta website)

Figure 3 presents the peach variety 'Raluca', approved in 2001 and also known as V.T. HP-03. This variety was developed at the Research and Development Station for Fruit Growing in Constanța (SCDP) through the hybridization of the 'Liana' and 'Melania Dumitru' varieties. Tested at Valu lui Traian and USAMV Bucharest, it was characterized by high productivity and fruit quality.

The fruits are medium-sized (100-110 g), rounded, slightly asymmetrical, with greenish-yellow and reddish - grey skin on 70% of the surface. The pulp is yellow-orange, juicy, without fiber and with a pleasant taste. The stone is medium and non-sticky to the flesh. Harvest maturity occurs in the first two decades of July. The tree is resistant to frost, requires phyto-sanitary protection, flowers abundantly and is self-fertile. Productivity is high (30-35 kg/tree). The variety is suitable for fresh consumption and processing and is economically valuable due to the quality fruit and early ripening period. Recommended in all areas favorable to peach.

This research is important in view of the diversity of peach varieties and the significant differences between cropping systems, which can influence both the physico-chemical characteristics of the fruit and the yields obtained. In this context, emphasis is placed on fruit quality parameters such as firmness, sugar content, acidity and pH, which are essential factors in determining market quality and consumer preferences. Peaches, nectarines and plums are high in fiber and among the 12 most nutritious fruits, they are in the middle percentile (Olaru Mihaela et al., 2024).

Preliminary results of the study indicate that the conventional farming system produced significantly heavier and more productive fruit compared to the organic system. Notable differences were also observed in sugar content and acidity of the fruit, with an advantage of conventional cultivation in sugar concentrations.

These findings are key to understanding the impact of different cultivation methods on the quality and quantity of apple products, providing valuable information for farmers who want to optimize peach production and meet market demands. Comparative nutritional studies on organic versus conventional fruit, emphasise that conventional cultivation often results in higher fruit weight, yield, sugar content and acidity, which are crucial for understanding the impact of cultivation methods on fruit quality (Maciej Gąstoł, 2020).

Fruit quality parameters were analyzed (weight, sugar content, acidity, firmness, pH).

The land on which the experiment is located belongs to the Băneasa Research-Development Station for Fruit Growing, the peach plantation was established in 2019. The experiment was conducted using a 4 x 2 m planting scheme, corresponding to a density of 1,250 trees/ha. It falls into the super-intensive category, ensuring efficient use of space, high production and modern plantation management, including the possibility of mechanizing some technological works. The experiment was bifactorial, taking into account the following experimental factors:

- **Factor A - Variety**
  - a1 - Catherine Sel1
  - a2 - Raluca
  - a3 - Springcrest
- **Factor B - farming system**
  - b1 - conventional system
  - b2 - organic system

Analyses were performed on a sample of 20 fruits per variety. The determinations concerned: fruit weight, soluble solid contents, measured with the Hanna Instruments HI 96800 digital refractometer (BRIX%), pH, determined with the Hanna HI 700630 pH meter, titratable acidity, determined with the Hanna Instruments model 230V Minitrometer (%) and fruit firmness, measured with the Effegi Penetrometer with 8 mm diameter piston (kg/cm^2).

The determinations were performed on fruit from the 2024 production, production influenced by 2024-specific climatic conditions. The predominant soil in the area is a reddish luvisol, and reddish luvisols and stagnosols are found in depressional areas and the cracks of the land (Dragomir et al., 2023). High clay content can lead to challenges such as compaction and poor aeration, which can hinder root development and water infiltration (Dimitrov et al., 2017).

Table 1. Chemical properties of Moara Domnească soil (Source: Nicoleta Oltenacu et al., 2024)

Oriz.	Depth (cm)	Soil pH ui	Total content			
			Humuss %	N-NO_3%	P_2O_5%	K_2O%
Ap	0-20	5.27	2.46	0.135	0.159	1.65
A/B	20-45	5.20	2.3	0.120	0.130	1.05
Bt	45-150	5.10	2.17	0.100	0.108	0.99
Cca	150-200	5.35	1.85	0.07	0.115	1.23

Understanding soil physical and chemical properties is crucial for developing effective land management strategies, particularly in areas prone to erosion and degradation due to climate change (Prachowski et al., 2024).

Figure 4 illustrates the monthly maximum and minimum temperatures, showing significant variations between seasons.

Maximum temperatures reach highs in the summer months, with a peak of 39.40°C in July, followed by 37.70°C in June and 36.90°C in August. Lows over the same period remain positive but more moderate (14.00°C in June and July, 14.80°C in August).

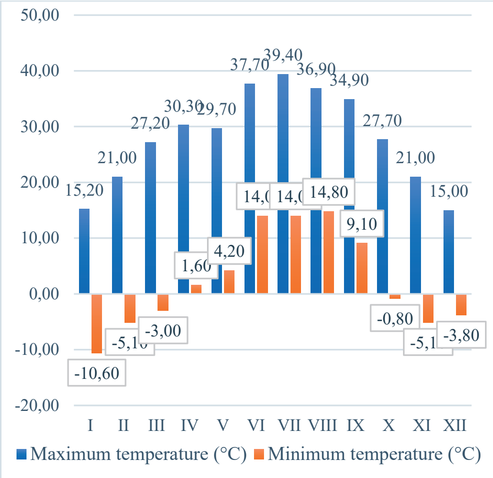

Figure 4. Distribution of maximum and minimum temperatures in 2024 (Source: Moara Domneasca Weather Station)

In winter, the contrast is strong, with highs ranging from 15.20°C in January to 21.00°C in February and November, but with extreme negative lows, reaching -10.60°C in January and -5.10°C in February and November.

These variations reflect a temperate-continental climate characterized by cold winters and very hot summers. In the context of climate change, there is a trend of increasing annual temperatures, with warmer summers and milder winters, which may affect agriculture and local ecosystems. Adapting to these changes becomes essential for managing the impact on the environment and the economy.

Figure 5 shows the monthly rainfall distribution, showing significant variations throughout the year. The total amount of precipitation recorded is 557.2 mm, but it is unevenly distributed, with peaks in March, November and December (above 80-120 mm) and lower values in summer and early autumn.

This uneven distribution can create major problems, such as periods of drought in the warm months, affecting agriculture and water supplies, followed by episodes of heavy rainfall in the cold months, which can lead to flooding and soil erosion.

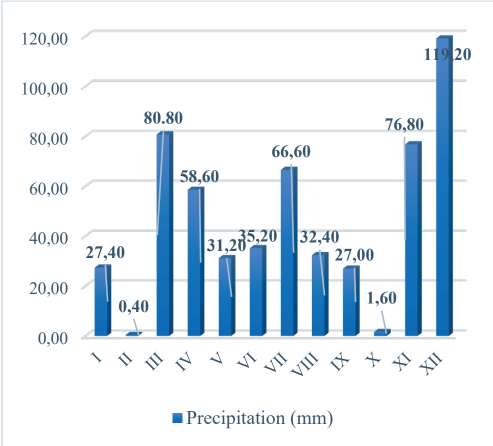

Figure 5. Distribution of precipitation in 2024 (Source: Moara Domnească Weather Station)

In the context of climate change, such variations are becoming more pronounced, requiring water management measures and adaptation of agricultural practices. Higher temperatures and extreme weather events such as droughts and floods reduce agricultural productivity, threatening food security (Eswaran et al., 2024). In hot summers, even if, as shown in the graph, there is precipitation, it is not properly distributed. Higher temperatures caused by climate change cause species to migrate, leading to biodiversity loss, while extreme weather events reduce crop productivity, threatening food security. Adaptation strategies, such as the development of climate-resilient crops, are key to managing these economic and environmental impacts (Mostafa et al., 2025). The amount of rainfall is insufficient during critical periods for crops, and due to high temperatures and soil type, evaporation is very intense. This prevents water from infiltrating and being used efficiently by the plants. To compensate for this problem, we have used irrigation, thus providing the necessary moisture for the plants and preventing production losses due to drought. Modern fruit growing cannot succeed without an adequate water regime, which is essential for the health and productivity of the fruit species. Irrigation is emphasized as a crucial tool for effective growth management of fruit trees (Oltenacu & Oltenacu, 2014).

RESULTS AND DISCUSSIONS

Table 2 presents the comparative analysis of the technological operations performed in the experimental peach batch studied, highlighting the differences between two production systems: the conventional system and the organic system.

Table 2. Technological works realized in this experimental lot

Active substance of PPP	Recommended dose	Required dose	Value lei
Copper sulfate 20%	5	2.50	197.37
Paraffin oil 60% Neem oil 10% Orange oil 2.5% Rapeseed oil 5% Vegetable oil (glycerol - inert material) 20%	100%	0.50	40.16
Fungicide and insect - acaricide Limocide	6	3	1151.32
Trichoderma atroviride (harzianum spp.); Trichoderma hamatum; Trichoderma koningii;	0.5	0.25	276.32
Bacillus thuringiensis subsp. Kurstaki - 2x109 cfu/ml Glycerol - 20% (inert material)	1	0.5	294.74
Copper hydroxide, Copper oxychloride	4	2	136.84
Paraffin oil 96.5 g/kg, formulation ingredients	1.5	0.75	131.58
copper 272 g/l (copper hydroxide 136 g/l	4	2	157.89
copper oxychloride 136 g/l	1.5	0.75	921.05
60% mimosa tenuiflora extract; - 20% citrus fruit extract.	3	1.5	807.89
Neem extract	3	1.5	455.26
Vegetable oils	3	1.5	368.42
Azadirachtin 10 g/l	3	1.5	1710.53
Paraffin oil 800 g/l	1.5	0.75	131.58
			Total lei: 6780.95

In the conventional system, the main interventions include mechanical or manual pruning, chemical fertilizer application, spraying with plant protection products, green pruning, tillage with a palpatory tiller and mechanical mowing**.** The system also involves mechanized operations such as servicing agricultural machinery and transporting materials. Instead, in the organic system, the technological work is adapted to agro-ecological principles, including hand weeding, crown-forming pruning, branch pruning, soil loosening, hand mowing and the use of alternative plant protection methods such as spraying with vermorel.

Table 3 shows the plant protection products used in treatments applied within the conventional cropping system.

Table 3. Chemical plant protection products applied to Peach

Active substance of PPP	Recommended dose	Dosage required	Amount lei
220–25% metallic copper, 10–12% soluble or organic sulfur	5	2.50	72.37
790 g/L paraffin oil.	1	0.50	52.63
Dodine	2	1.00	136.84
clorantraniliprol 200 g/l	0.18	0.09	10.53
difenoconazol 250 g/l	0.2	0.10	73.68
50 g/l lambda – cihalotrin	0.2	0.10	69.74
dodine 400 g/l	2.0	1.00	151.32
500 g/kg fenpira-zamine	1	0.50	657.89
Difenoconazol 250 g/L	0.2	0.10	55.26
250 g/l cipermetrin	0.2	0.10	39.47
difenoconazol 250 g/l	0.2	0.10	73.68
deltametrin (piretroid)	0.3	0.11	27.63
6,7 % Piraclostrobin, 26,7 % Boscalid	0.5	0.25	46.05
Lambda - cihalotrin 50 g/l	0.15	0.08	69.74
Luna fluopiram 200 g/L+tebuconazol 200 g/L400SC	0.5	0.25	85.53
spirotetramat 100 g/l	1.875	0.94	888.16
20% metallic copper and 80% neutralized copper sulfate	2.6	1.30	163.16
			Total lei: 2673.68

It includes active substances used to protect plants against diseases and pests, including compounds such as metallic copper, dodine, chlorantraniliprole, as well as various fungicides and insecticides. The total cost of applying phytosanitary treatments is 2673.68 lei.

Table 4 shows the organic plant protection products applied for the same species. These include alternative products based on natural ingredients such as copper sulphate, vegetable oils (paraffin, neem, orange, rapeseed), natural extracts and beneficial micro-organisms such as Trichoderma spp., Bacillus subtilis and Bacillus thuringiensis. This type of treatment aims at an integrated and sustainable protection of the crop, reducing the environmental impact. However, it is observed that the ecological treatment scheme involves a higher cost, with a total of 6780,95 lei, compared to the costs of phytosanitary treatments for the conventional system.

The analyzed data highlight the influence of the cultivation method (conventional or organic) on some physical and environmental parameters and fruit biochemicals for thee varieties: 'Catherine Sel 1', 'Raluca' and 'Springcrest'.

Table 4. ECO plant protection products applied to Peach species

Conventional system	**Organic system**
Disking	Crown-forming cuts
Removing dead trees	Thinning ground
Apply chemical fertilizers	Spraying plantations
Irrigated plantations	Servicing irrigation system
Green pruning	Deservit sistem irigat
Harvested apricots for internal consumption	Servicing agricultural machinery
Worked the soil with a rotary cultivator on the rows of trees	Worked the soil with a rotary tiller on rows of trees
Prepare solution for spraying	Various transportation
Serviced the spraying machine	Mechanical mowing
Mowed the trimmings (manually)	Loosened the soil between rows of trees
Serviced irrigation system	Plantation watering
Serviced agricultural machinery	Tilled the soil with a rotary cutter with feeler between rows of trees
Various transportation	Tractor + machinery maintenance
Administered chemical fertilizers	
Mechanical mowing	
Tractor + machinery maintenance	
Worked the soil with a rotary tiller on rows of trees	
Spraying plantations	

Table 5. Physical determinations of fruit by cropping system

Conventional system	**Organic system**
Row-harrowed with hoe	One by one digging
Administered chemical fertilizers	Weeding or suppressing shoots of young plantations
Pruned or suppressed shoots of young plantations	Weeding dead trees
Pinching shoots	Tightening branches in piles

Dependent Variable	**Factor**	**Mean Difference**	**Significance**	**Significance meaning**
Weight	a1b1-a1b2	23.4375	0	***
	a2b1-a2b2	7.5175	0.039	*
	a3b1-a3b2	8.6525	0.086	n.s
Firmness	a1b1-a1b2	1.1175	0.126	n.s
	a2b1-a2b2	0.33	0.49	n.s
	a3b1-a3b2	0.385	0.84	n.s.
Production	a1b1-a1b2	2.9325	0	***
	a2b1-a2b2	0.8925	0.378	n.s.
	a3b1-a3b2	0.9975	0.456	n.s.
Factor A- Varietal a1 -Catherine sel 1 a2 - Raluca a3 - Springcrest	Factorul B – culture system b1 - conventional b2 - ecological		n.s. - not significant * - significant ** - distinctly significant *** - highly significant	

Fruit weight is significantly influenced by the cropping system, being higher in the conventional system. Conventional systems often produce larger fruit, but organic methods can increase firmness due to better soil management practices (Iancu & Gavat, 2009). For the variety 'Catherine Sel 1', the difference is very significant (+23.4375 g, p<0.001), which indicates a better development of this variety under the conditions offered by fertilization and treatments specific to conventional agriculture. Also for 'Raluca', fruit weight is significantly higher in the conventional system (+7.5175 g, p<0.05), although the difference is not as pronounced. However, 'Springcrest' shows no significant differences between the two systems (+8.6525 g, p=0.086), suggesting a stability of fruit mass whether grown under organic or conventional systems. On the other hand, fruit firmness is not influenced by the cropping system for any of the varieties. The values obtained for 'Catherine Sel 1' (+1.1175, p=0.126), 'Raluca' (+0.33, p=0.490) and 'Springcrest' (+0.385, p=0.840) show that this characteristic remains stable, regardless of whether the fruit is grown under conventional or organic farming.

In terms of fruit yield, 'Catherine Sel 1' stands out with a highly significant difference in favour of the conventional system (+2.9325 kg, p<0.001), indicating higher productivity when using conventional fertilization and crop protection methods. However, for 'Raluca' (+0.8925 kg, p=0.378) and 'Springcrest' (+0.9975 kg, p=0.456), the differences are not significant, suggesting that these varieties maintain their productivity whether they are grown under organic or conventional systems.

Table 6. Biochemical determinations of fruit by culture system

Dependent Variable	Factor	Mean Difference	Significance	Significance meaning
BRIX	a1b1-a1b2	0.82	0.046	*
	a2b1-a2b2	1.46	0.001	**
	a3b1-a3b2	0.29	0.196	n.s.
pH	a1b1-a1b2	0.0175	0,68	n.s.
	a2b1-a2b2	0.34	0	***
	a3b1-a3b2	0.1175	0.114	n.s.
Citric acid	a1b1-a1b2	-0.0075	0.717	n.s.
	a2b1-a2b2	-0.0875	0.048	*
	a3b1-a3b2	-0.135	0.031	*
Factor A- Varietal a1 -Catherine sel 1 a2 - Raluca a3 - Springcrest	Factor B - cropping system b1 - conventional b2 - organic		n.s. - not significant * - significant ** - distinctly significant *** - highly significant	

As for the sugar content, it is significantly higher in conventional cultivation for the variety 'Catherine Sel 1' (0.82, p<0.05), and for 'Raluca', the difference is even more pronounced, being distinctly significant (1.46, p<0.01). These results suggest that the conventional system favors carbohydrate accumulation in these two varieties. On the other hand, in 'Springcrest', the difference between the two cropping systems is not significant (0.29, p=0.196), indicating that this variety maintains its sugar levels regardless of the farming technology used.

The analysis of fruit pH shows that only 'Raluca' presents a very significant difference between the two cultivation systems, having a higher pH in conventional (0.34, p<0.001). In the case of the other varieties, 'Catherine Sel 1' (0.0175, p=0.680) and ‘Springcrest‘ (0.1175, p=0.114), the differences are not significant, which indicates that this characteristic remains constant regardless of the cultivation method.

At the citric acid level, the differences are significant only for the varieties ‘ Raluca‘ and ‘Springcrest‘ , where a decrease is observed in the conventional system. In ‘Raluca‘, the difference is significant (-0.0875, p<0.05), and in ‘Springcrest‘ , it is also significant (-0.135, p<0.05). In contrast, for ‘ Catherine Sel 1‘, no significant changes were observed between the two cultivation systems (-0.0075, p=0.717), suggesting that this variety has greater acidity stability. Organic peaches show higher titratable acidity and sugar levels compared to conventional ones, improving flavor profiles (Castro et al., 2014). Comparative interpretation of varieties according to the cropping system.

The comparative analysis of the three varieties, ‘Catherine Sel 1‘, ‘Raluca‘ and ‘Springcrest‘, within the two cultivation systems, conventional (b1) and organic (b2), highlights significant differences in terms of the physical and biochemical parameters of the fruits.

Table 7. Comparison of physical and biochemical parameters between varieties in the conventional system

Parameters	Variety	Mean Difference	Std. Error	Significance	Significance meaning
Weight	b1a1-b1a2	7.3575	4.38943	0.266	n.s.
	b1a1-b1a3	4.6675	4.38943	0.559	n.s.
	b1a2-b1a1	-7.3575	4.38943	0.266	n.s.
	b1a2-b1a3	-2.69	4.38943	0.817	n.s.
	b1a3-b1a1	-4.6675	4.38943	0.559	n.s.
	b1a3-b1a2	2.69	4.38943	0.817	n.s.
Firmness	b1a1-b1a2	5.62500(*)	1.5605	0.014	*
	b1a1-b1a3	-2.955	1.5605	0.196	n.s.
	b1a2-b1a1	-5.62500(*)	1.5605	0.014	*
	b1a2-b1a3	-8.58000(*)	1.5605	0.001	**
	b1a3-b1a1	2.955	1.5605	0.196	n.s.
	b1a3-b1a2	8.58000(*)	1.5605	0.001	**
BRIX	b1a1-b1a2	0.19	0.28207	0.784	n.s.
	b1a1-b1a3	6.28000(*)	0.28207	0	***
	b1a2-b1a1	-0.19	0.28207	0.784	n.s.
	b1a2-b1a3	6.09000(*)	0.28207	0	***
	b1a3-b1a1	-6.28000(*)	0.28207	0	***
	b1a3-b1a2	-6,09000(*)	0.28207	0	***
pH	b1a1-b1a2	-0.17750(*)	0.04233	0.006	**
	b1a1-b1a3	-0.0875	0.04233	0.152	n.s.
	b1a2-b1a1	0.17750(*)	0.04233	0.006	**
	b1a2-b1a3	0.09	0.04233	0.139	n.s.
	b1a3-b1a1	0.0875	0.04233	0.152	n.s.
	b1a3-b1a2	-0.09	0.04233	0.139	n.s.
Citric acid	b1a1-b1a2	0.16250(*)	0.04683	0.017	*
	b1a1-b1a3	-0.93000(*)	0.04683	0	***
	b1a2-b1a1	-0.16250(*)	0.04683	0.017	*
	b1a2-b1a3	-1.09250(*)	0.04683	0	***
	b1a3-b1a1	0.93000(*)	0.04683	0	***
	b1a3-b1a2	1.09250(*)	0.04683	0	***
Production	b1a1-b1a2	1.3525	1.25267	0.549	n.s.
	b1a1-b1a3	1.66	1.25267	0.417	n.s.
	b1a2-b1a1	-1.3525	1.25267	0.549	n.s.
	b1a2-b1a3	0.3075	1.25267	0.967	n.s.
	b1a3-b1a1	-1.66	1.25267	0.417	n.s.
	b1a3-b1a2	-0.3075	1.25267	0.967	n.s.
Factor A- Variety a1 -Catherine sel 1 a2 - Raluca a3 - Springcrest	Factor B - cropping system b1 - conventional b2 - organic		n.s. - not significant * - significant ** - distinctly significant *** - highly significant		

Fruit weight analysis does not reveal significant differences between the studied varieties, indicating a comparable fruit mass, regardless of the variety.

Regarding fruit firmness, the ‘Springcrest‘ variety presents a significantly higher consistency than 'Raluca' (8.5800, $p<0.01$), suggesting a firmer tissue structure under conventional cultivation conditions.

The evaluation of the biochemical composition highlights notable variations between genotypes. ‘Catherine Sel 1‘ and 'Raluca' register a significantly higher sugar content compared to ‘Springcrest‘ (6.2800 and 6.0900, $p<0.001$). Regarding acidity, ‘Springcrest‘ presents the highest concentration of citric acid, with significant differences compared to the other varieties analyzed (1.0925, $p<0.001$). At the same time, the pH values are slightly higher in 'Catherine Sel 1' compared to 'Raluca' (-0.1775, $p<0.01$), which suggests a slightly lower acidity for this genotype. In terms of productivity, no significant differences are evident between the varieties, which indicates a comparable productive potential of these varieties in the conventional cropping system.

Table 8. Comparison of physical and biochemical parameters between varieties in the ecological system

Parameters	Variety	Mean Difference	Std. Error	Significance	Significance meaning
Weight	b2a1-b2a2	-8.56250(*)	1.09172	0	***
	b2a1-b2a3	-10.11750(*)	1.09172	0	***
	b2a2-b2a1	8.56250(*)	1.09172	0	***
	b2a2-b2a3	-1.555	1.09172	0.37	n.s.
	b2a3-b2a1	10.11750(*)	1.09172	0	***
	b2a3-b2a2	1.555	1.09172	0.37	n.s.
Firmness	b2a1-b2a2	4.83750(*)	0.4307	0	***
	b2a1-b2a3	-3.68750(*)	0.4307	0	***
	b2a2-b2a1	-4.83750(*)	0.4307	0	***
	b2a2-b2a3	-8.52500(*)	0.4307	0	***
	b2a3-b2a1	3.68750(*)	0.4307	0	***
	b2a3-b2a2	8.52500(*)	0.4307	0	***
BRIX	b2a1-b2a2	0.83000(*)	0.23458	0.016	**
	b2a1-b2a3	5.75000(*)	0.23458	0	***
	b2a2-b2a1	-0.83000(*)	0.23458	0.016	**
	b2a2-b2a3	4.92000(*)	0.23458	0	***
	b2a3-b2a1	-5.75000(*)	0.23458	0	***
	b2a3-b2a2	-4.92000(*)	0.23458	0	***
pH	b2a1-b2a2	.14500(*)	0.04856	0.037	*
	b2a1-b2a3	0.0125	0.04856	0.964	n.s.
	b2a2-b2a1	0.,14500(*)	0.04856	0.037	*
	b2a2-b2a3	-0.1325	0.04856	0.055	n.s.
	b2a3-b2a1	-0.0125	0.04856	0.964	*
	b2a3-b2a2	0.1325	0.04856	0.055	n.s.
Citric acid	b2a1-b2a2	0.08250(*)	0.02118	0.009	**
	b2a1-b2a3	-1.05750(*)	0.02118	0	***
	b2a2-b2a1	-0.08250(*)	0.02118	0.009	**
	b2a2-b2a3	-1.14000(*)	0.02118	0	***
	b2a3-b2a1	1.05750(*)	0.02118	0	***
	b2a3-b2a2	1.14000(*)	0.02118	0	***
Production	b2a1-b2a2	-0.6875	0.27502	0.079	n.s.
	b2a1-b2a3	-0.275	0.27502	0.595	n.s.
	b2a2-b2a1	0.6875	0.27502	0.079	n.s.
	b2a2-b2a3	0.4125	0.27502	0.336	n.s.
	b2a3-b2a1	0.275	0.27502	0.595	n.s.
	b2a3-b2a2	-0.4125	0.27502	0.336	n.s.
Factor A- Variety a1 -Catherine sel 1 a2 - Raluca a3 - Springcrest	Factor B - cropping system b1 - conventional b2 - organic	n.s. - not significant * - significant ** - distinctly significant *** - very significant			

In the ecological culture, the 'Springcrest' variety is noted for the firmness of the fruits. Also, the firmness of the fruits is the highest at 'Springcrest' (8.5250, p <0.001), which confirms the tendency observed in the conventional system.

The weight of the fruits remains similar between varieties, without significant differences. At the biochemical level, ‘Springcrest‘ has a significantly higher sugars compared to ‘Catherine Sel 1‘ and ‘Raluca‘ (5.7500, p <0.001), which suggests that this variety accumulates carbohydrates in the ecological system. Also, the acidity is the highest at ‘Springcrest‘, having the highest citric acid content (1.1400, p <0.001), which can influence the taste of fruits.

As for the pH of the fruits, the differences are less pronounced, but ‘Catherine Sel 1‘ has a slightly higher pH compared to ‘Springcrest‘ (-0.1450, p <0.05), which indicates a lower acidity to this variety. In terms of production, there are no significant differences between varieties, which suggests that, similar to conventional culture, all three varieties have a comparable productive potential.

Table 9 presents a comparison of the costs associated with peach cultivation in the two cultivation systems: conventional and organic.

Tabel 9. Peach cost analysis: conventional vs. ecological

Conventional system	Price (lei)	Ecological system	Price (lei)
Mechanical works	2885.75	**Mechanical works**	6378.33
Manual works	19254.8	**Manual works**	22578
Fertilizers NPK-16.16.16	1280	**Fertilizers NPK-16.16.16**	0
Phytosanitary products	2673.68	**Phytosanitary products**	6780.95
Diesel fuel	269.08	**Diesel fuel**	195.12
Diesel cost	2098.82	**Diesel cost**	1521.94
Total/lei	25788.4	**Total/lei**	30673.3

According to Table 9, the total costs related to peach cultivation in the conventional system are 25,788.4 lei, while for the organic system they reach 30,673.3 lei, which indicates an increase of approximately 22% in expenses in the case of the organic method.

The main cost differences are noted in the following categories:

Mechanical work is significantly more expensive in the organic system (6,378.33 lei) compared to the conventional one (2,885.75 lei). This difference is generated by the need for more frequent and more intensive interventions to maintain the health of the plantation in the absence of chemical pesticides.

Manual work involves a higher cost in the organic system (22,578 lei) compared to the conventional one (19,254.8 lei), which reflects the additional effort required to maintain the trees and apply biological treatments.

Phytosanitary products represent a category of costs that varies considerably: in the conventional system they are 2,673.68 lei, and in the organic system they reach 6,780.95 lei. The difference is due to the use of organic products, which are more expensive, but also to the need for their more frequent application.

Fertilizers represent an exclusive expense for the conventional system. Complex fertilizers of the NPK-16.16.16 type were applied, worth 1280 lei, while in the organic system no synthetic chemical fertilizers were used.

The data in Figure 6 indicate that the conventional system provides higher production, while the organic system compensates with a higher selling price. Conventional systems are usually more productive due to the use of chemical inputs, but organic systems offer economic benefits through higher prices for organic fruits. Conventional systems usually achieve higher yields, but at the cost of environmental degradation (Devilliers et al., 2023). In the conventional system, production varies between 3,881.25 kg/0.5 ha ‘Springcrest‘ and 4,962.5 kg/0.5 ha ‘Raluca‘. At a price of 5 lei/kg, the maximum economic value achieved is 24,500 lei for ‘Raluca‘ and 19,406.25 lei for ‘Springcrest‘. In the organic system, production is lower, ranging between 3,256.25 kg/0.5 ha ‘Springcrest‘ and 3,512.5 kg/0.5 ha ‘Raluca‘. However, due to a higher price of 10 lei/kg, the maximum economic value achieved is 35,125 lei for ‘Raluca‘ and 32,562.5 lei for ‘Springcrest‘. Organic systems may have lower immediate yields, but can provide long-term economic benefits through sustainable practices and reduced input costs (Nakhaii et al., 2024).

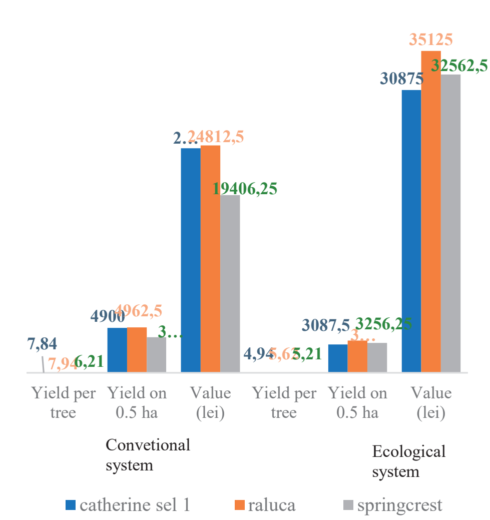

Figure 6. Production recorded in conventional and organic systems

Thus, the conventional system is more productive, but the organic system offers an economic advantage through higher fruit prices. The choice of cultivation method depends on the farmer's economic objectives and access to markets for organic fruit.

CONCLUSIONS

The comparative analysis of the two cultivation systems, conventional and organic, highlights significant differences in terms of both production and economic value of the fruits. The conventional system ensures a higher yield, due to the use of chemical fertilizers and synthetic phytosanitary products, with a maximum production of 4,962.5 kg/0.5 ha 'Raluca'. In contrast, the organic system generates a lower production, but the higher selling price of organic fruits compensates for this disadvantage, leading to a higher economic value, reaching 35,125 lei for 'Raluca' at a price of 10 lei/kg.

From a qualitative point of view, fruits from the organic system have a higher sugar content and a more pronounced acidity in certain varieties, which can positively influence the organoleptic profile. Production costs are higher in the organic system, with an increase of approximately 22% compared to the conventional system, due to intensive manual work and the use of alternative plant protection products.

Thus, the choice of crop system depends on the farmer's economic objectives and market requirements. The conventional system maximizes productivity and economic efficiency in the short term, while the organic system offers superior financial benefits through premium fruit prices, along with a reduced ecological impact and sustainable agricultural practices.

ACKNOWLEDGEMENTS

This research activity was carried out with the support of the Research and Development Station for Fruit Tree Growing Baneasa and colleagues from the University of Agronomic Sciences and Veterinary Medicine of Bucharest. It is an integral part of the Thematic Fruit Growing Plan 2021–2027, subcomponent II: Pomological technologies with a favorable impact on the environment and rural development, item 2.10: Research on the Behavior of Certain Fruit Tree and Shrub Species in an Organic Cultivation System

REFERENCES

Abdel Rauf Mostafa, Allaa M. Owes, Shimaa Ghoniem (2025). Interconnected Impacts of Climate Change on Biodiversity, Agriculture, and Human Health, *Advances in Basic and Applied Sciences*, doi 10.21608/abas.2025.340299.1055

Danielle dos Santos Bonfim de Castro et al. (2014). Comparative evaluation of organic and conventional farming on chemical quality parameters and antioxidant activity in fruits.

Dragomir, D., Hoza, D., & Oltenacu, V.-C. (2023). Study regarding the behavior of three chokeberry cultivars (*Aronia melanocarpa*) cultivated in organic system. *Scientific Papers. Series B, Horticulture*, *67*(2). Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653.

Esther Devilliers, Niklas Möhring, Robert Finger (2023). Estimation and comparison of the performance of low-input and conventional agricultural production systems, Agricultural & Applied Economics Association.

Fatemeh Nakhaii (2024). Evaluating ecological sustainability of mechanized and traditional systems of damaskrose production using extended exergy analysis.

G. Dimitrov et al. (2017). Structural Characteristics of Reddish Soils from the North-eastern Part of Sofia Field; *Știința solului, Agro-chimia și Ecologia, Vol. XLIX*, Nr. 3, Sofia, 2015.

https://scdpconstanta.ro

Jan Prachowski et al. (2024). Erosion risk analysis in a changing climate; Soil and Water Research.

Maciej Gąstoł (2020). Evaluation of organic versus conventional nutrient management practices in fruit crops, Fruit Crops, Diagnosis and Management of Nutrient Constraints, Pages 541-554.

Mihaela OLARU et at. (2024). Cercetări privind influența distanțelor de plantare asupra unor indici de calitate la unele soiuri de nectarin cultivate la SCDP Băneasa București, *Analele SCDCPN Dăbuleni, Vol. 27*/2024

Mihail Iancu, Corina Gavat (2009). the influence of management system and nitrogen fertilization on leaf and fruit chemical components in 'springcrest' peach variety.

Oltenacu N., Oltenacu C. V. (2014). Influence of the drip irrigation on the physical and chemical plums characteristics.

Oltenacu, N., Oltenacu, C.V., Olaru, M., Udrea Braslă, A., Dragomir, D., Holt, V., & Basarabă, A. (2024). The influence of variety and some technological factors on fruit firmness and productivity on three apricot varieties cultivated at the Research and Development Station for Fruit Growing Băneasa, Bucharest. *Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series, 54*(2).

Saadiya Naqash, Haroon Naik (2022). Peach Wastes and By-Products: Chemistry, Processing, and Utilization. Book Handbook of Fruit Wastes and By-Products.

Sathyapriya Eswaran et al. (2024). Climate Change Impacts on Agricultural Systems Mitigation and Adaptation Strategies: A Review, *Journal of Experimental Agriculture International*, *Volume 46* [Issue 11].

Sergi Munné-Bosch, Núria F. Bermejo, 2024. Fruit quality in organic and conventional farming: advantages and limitations. *Trends in Plant Science*, *Volume 29*, Issue 8.

EX·TERRA·AVRVM

VITICULTURE
AND OENOLOGY

EX·TERRA·AVRVM