ANALYSIS OF THE REVEALED COMPARATIVE ADVATANGE (RCA) OF MOLDOVAN HORTICULTURAL PRODUCTS ON EXTERNAL MARKET

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Alexandru CEBAN
Academy of Economic Studies of Moldova
Chisinau, Republic of Moldova
Email account: ceban.alexandru.rpjh@ase.md
ORCID ID: https://orcid.org/0000-0002-3300-4054

Abstract: *The horticultural sector has a vital role in the economy of the Republic of Moldova due to its important share in the agricultural output and contribution to exports. The paper aims to quantify the international competitiveness of Moldovan horticultural products (vegetables, nuts and fruits) on the external market through the RCA index. Calculations were based on the Balassa's standard RCA formula and the export data retrieved from the World Integrated Trade Solution (WITS) database for the period 2020–2024. The findings reveal a strong and stable comparative advantage in several high-value categories like walnuts, fresh grapes, apples, plums, and sour cherries, while promising growth is noted for carrots, onions, hazelnuts, and some berries. These results demonstrate Moldova's specialization in traditional fruit and nut production based on the accumulated expertise and recent investments in intensive orchards. The paper concludes with recommendations intended for the consolidation of the existing advantages and addressing constraints related to perishability, quality standards, and market diversification.*

Key words: *Revealed Comparative Advantage, horticulture, fruits, nuts, vegetables, Moldova, competitiveness*

JEL: F14, Q17

Introduction

The agricultural sector of the Republic of Moldova represents an active and dynamic sector, being in a continuous process of transformation and modernization, playing a significant role in the socio-economic development of the country by providing the rural population with jobs, ensuring food security (Stratan et al, 2023), primarily at the family level, but also with an expansion to higher levels (local, regional and even national), as well as through the important export quantities of raw and processed products of agricultural origin (Lucasenco & Ceban, 2025).

At the same time, the horticultural sector is an essential element of the agricultural sector in particular (Iațișin, 2024), but also of the economy of the Republic of Moldova in general, and together with cereal crops (wheat and corn), oilseeds (sunflower and rapeseed) and alcoholic products (wines), horticultural products, especially fruits, occupy a significant share in the total value of agricultural production, also holding an important share in the export of agri-food products of the Republic of Moldova. The role of this sector is not only to generate profit for entrepreneurs, but also to create added value throughout the entire value chain (Golban, 2014; Stratan et al, 2014; Iațișin, 2025), with increases in the value of production, new jobs, additional income, but also of the international recognition through recognized products, the country brand and the quality of the products.

Exports of Moldovan fruits on the foreign market are of particular importance, due to their significance in the export potential of the country (Fala & Fala, 2025; Lucasenco & Ceban, 2022). At the same time, they are mostly placed in the top five most exported Moldovan-origin products on the external market (Stratan & Lucasenco, 2022).

At the national level, the topic of the horticultural sector has been addressed by several experts in various contexts and forms. A strictly sub-sectoral approach, at the product level (apples, cherries, plums, nuts, etc.) is noted in the works of Ceban & Lucasenco (2021), Ceban & Lucasenco (2023), Iațișin (2022), Turețchi & Ceban, (2022). Aspects related to the modernization of the horticultural

sector, especially the fruit sector, can be found in the works of Turețchi (2025), Balan (2023), and aspects related to competitiveness were addressed by Litvin & Dobrovolschi (2015), Golban & Gorgos (2017), Zbancă et al (2017). Furthermore, the educational and quality management context was researched by Bălan et al (2025) and Litvin & Zbancă (2025). The Revealed Comparative Advantage (RCA) approach in order to assess the competitiveness of horticultural products with respect to the world market was analyzed by Stratan et al (2023). The work includes calculation of RCA for all agri-food products, including fruits at 2-digit level. The same approach was found in the work of Lucasenco & Ceban (2020) but in the framework of the regional level, with comparisons between Moldova, Romania and Ukraine. With respect to EU countries, RCA at the 2-digit level was calculated in the work of Cimpoies and Sarbu (2020).

Even if the scientific literature with respect to the horticultural sector of Moldova is a comprehensive one, with in-depth analysis and various approaches, it still lacks some updated data on the RCA, especially at the 6-digit level. Specifically, this gap is going to be addressed by the author in this scientific study.

Therefore, the aim of the paper is to quantify the international competitiveness of Moldovan horticultural products (vegetables, nuts and fruits) on the external market through the RCA index.

In order to calculate the RCA for Moldovan horticultural products with respect to the world, the standard formula of RCA (Balassa, 1965) was used:

$$RCA_{MDA} = \frac{\frac{X\_MDA\_p}{X\_MDA\_total}}{\frac{X\_world\_p}{X\_world\_total}} \quad (1)$$

Where:

X_MDA_p – Moldova's exports of the product *p*

X_MDA_total – Moldova's total exports of goods

X_world_p – World total exports of the product *p*

X_world_total – World total exports of goods

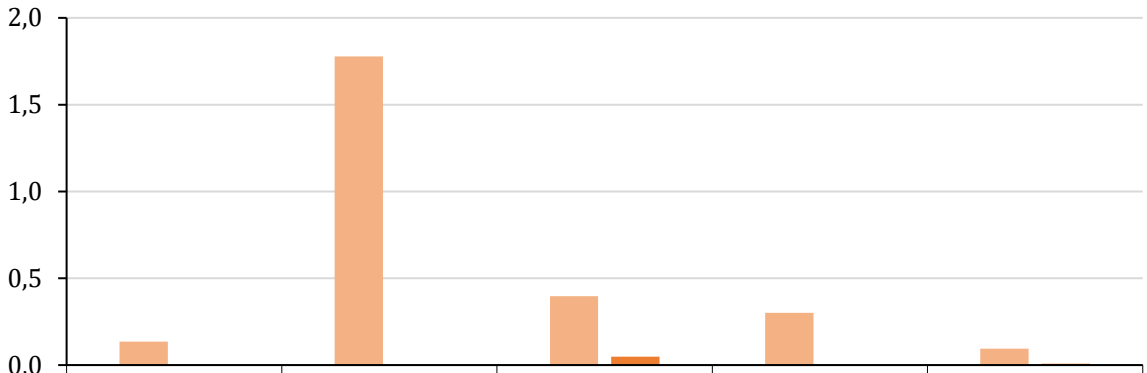
If RCA value > 1, then Moldova has a comparative advantage in the product *p* with respect to the world.

The data for carrying out the calculations of the RCA were retrieved from the WITS database (2026) and covers the period 2020 – 2024. The relatively concise period of 5 years is explained by the most recent changes that take place in the agricultural sector of the Republic of Moldova, mostly the ones related to climate change impact, selection of different varieties of fruits and vegetables for planting etc.

Basic content

Production of *vegetables* in Moldova is of most importance for ensuring the food security, due to the population dietary needs in fiber and vitamins for a better nutrition and wellbeing of the human body (Zbanca et al, 2025).

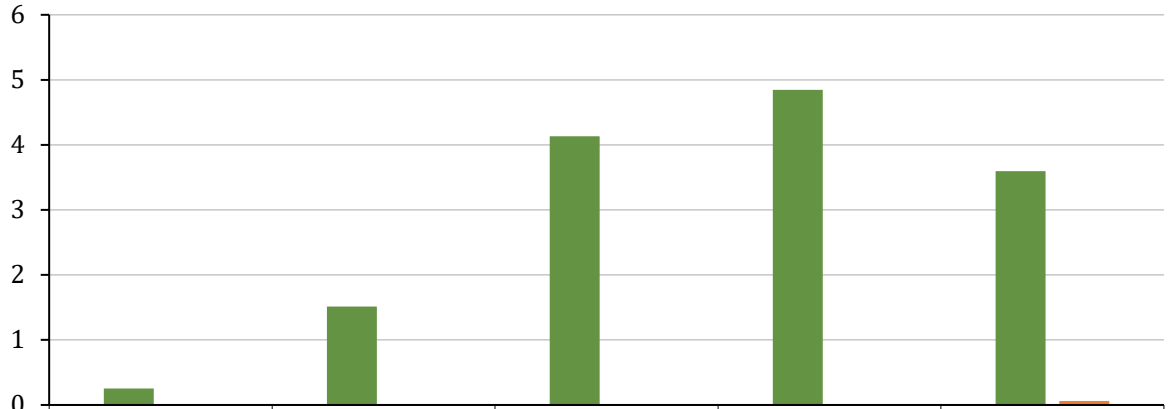
Thus, RCA values for Moldovan *potatoes and tomatoes* are quite moderate compared to other horticultural products, with some notable differences between them. Only in 2021 potatoes registered values greater than 1, while in other years, all the value were indicating on the lack of competitiveness on the international market. Tomatoes have values close to 0 during the 5-year period. Therefore, the produced potatoes and tomatoes are mostly intended for the local consumption, with small amounts directed to export to other countries. The existing competitiveness for Moldovan tomatoes on the foreign market from Spain or Turkey, seasonality of products, as well as the technological limits point on a weak position for Moldova in the global chain of tomatoes (Figure 1).



	2020	2021	2022	2023	2024
Potatoes	0,14	1,78	0,40	0,30	0,09
Tomatoes	0,00	0,00	0,05	0,00	0,01

Figure 1. RCA for potatoes and tomatoes with respect to world, 2020 – 2024
Source: author's calculations based on WITS (2026)

For *onion and garlic*, Moldova is mostly competitive in onion, with RCA values higher than 1 starting with 2021. The maximum value for Moldovan onion was reached in 2023 (4.9), while in 2024 it reached 3.6. Garlic has 0 values in most of the analyzed years, with a small increase up to 0.1 in 2024. Thus, the difference between these two products is quite notable. On the international markets, garlic is facing a strong competition from China, while at the national level, there are still low product quantities and high costs for production (Figure 2).



	2020	2021	2022	2023	2024
Onion	0,26	1,51	4,13	4,85	3,59
Garlic	0,00	0,00	0,00	0,00	0,06

Figure 2. RCA for onion and garlic with respect to world, 2020 – 2024
Source: author's calculations based on WITS (2026)

Carrots, on the other side, register an impressive and steady growth, going from 0.32 in 2020 to values higher than 4–7 in the following years, indicating a clear specialization in growth. *Cabbage* also presents a positive, but less impressive evolution of the RCA value, reaching 2.8 in 2024. At the same time, other vegetables like cucumbers, beans and peppers are on the lowest side, with values close to 0. The high perishability of these products, their seasonality together with competition from other more specialized countries determine a lack of comparative advantage on foreign markets (Figure 3).

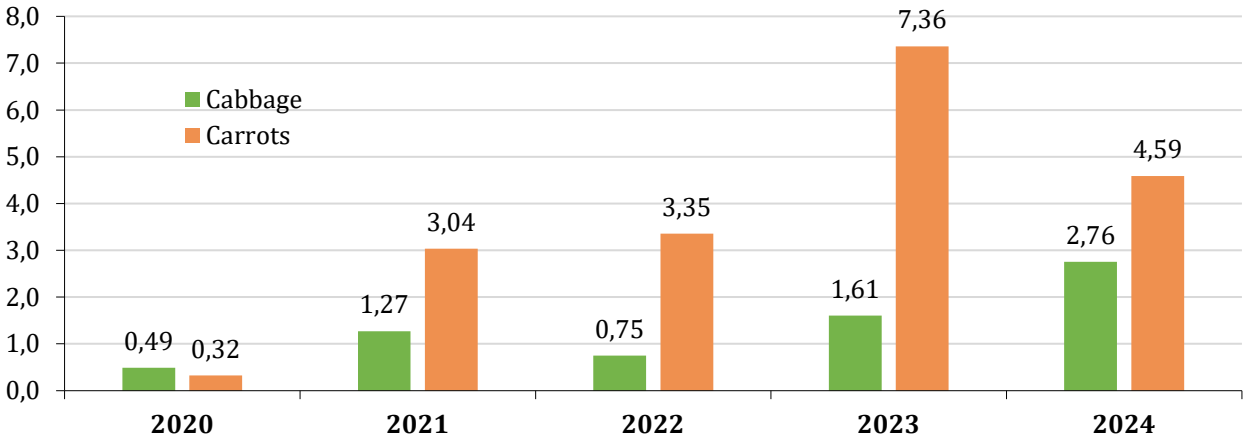
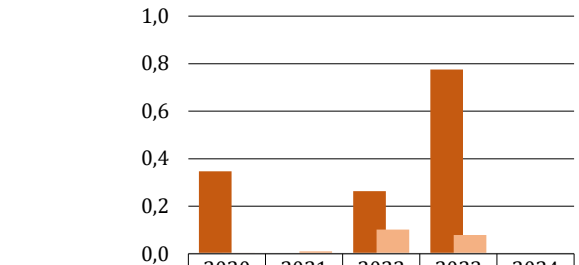


Figure 3. RCA for cabbage and carrots with respect to world, 2020 – 2024

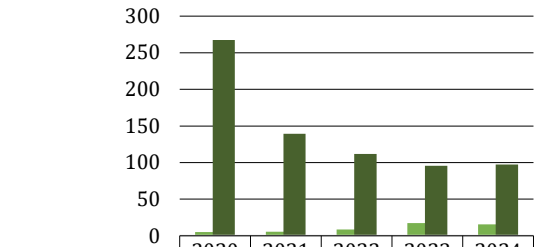
Source: author's calculations based on WITS (2026)

From the economic point of view, the development of the vegetable production may lead to the further diversification of export destinations, but in order to increase the competitive advantage in some products or to consolidate it in others, there is an obvious need to improve the quality of production, increase the quantities, and invest in packaging and cold logistics.

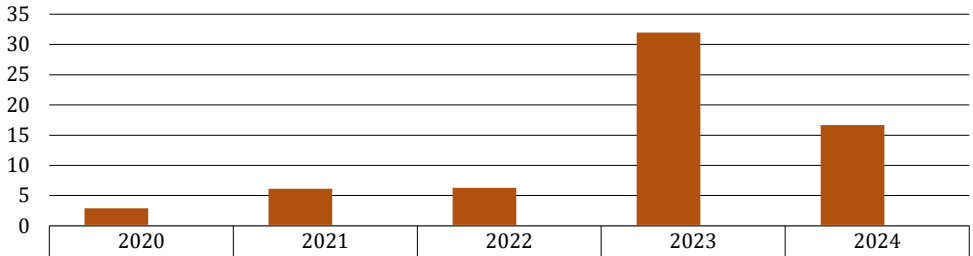
The *nut* growing sector is one of the most ascending sub-sectors of Moldovan horticulture (Zbanca et al, 2020), with walnuts being among the most valuable products. Thus, the peeled common walnuts register extremely high RCA values reaching 267 in 2020, and remaining consistently in the range of 95–139 in the following years. Hazelnuts in shell are also on a growing path, reaching 32 in 2023, and walnuts in shell also present solid values of RCA between 5 and 17. Nevertheless, almonds show quite low RCA figures, having a limited competitiveness compared to other products in the same category of nuts (Figure 4).



	2020	2021	2022	2023	2024
Almonds in shell	0,35	0,00	0,26	0,78	0,00
Peeled almonds	0,00	0,01	0,10	0,08	0,00



	2020	2021	2022	2023	2024
Walnuts in shell	5,1	5,6	8,6	17,5	15,4
Peeled walnuts	267,3	139,2	111,8	95,5	97,1



	2020	2021	2022	2023	2024
Hazelnuts in shell	2,91	6,12	6,30	31,99	16,69
Peeled hazelnuts	0,02	0,02	0,05	0,01	0,01

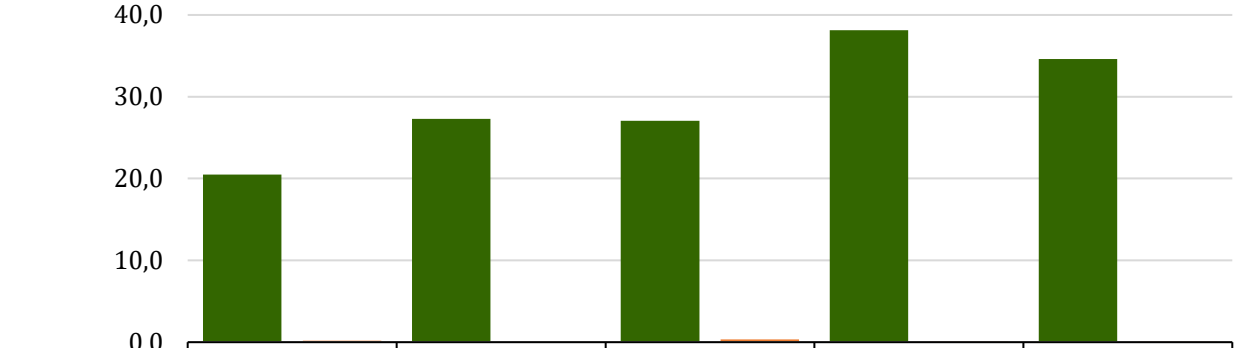
Figure 4. RCA for various types of nuts with respect to world, 2020 – 2024

Source: author's calculations based on WITS (2026)

Taking into account that Moldova is a large walnut producer, together with the increasing global demand for walnuts as a healthy food, the massive comparative advantage in peeled walnuts results from low labor costs, but also their good quality. At the same time, the growth in hazelnuts points on the diversification of nut plantations and some doses of adaptation of producers to the requirements of modern markets. The nut sector has positive effects on the rural economy and also on the trade balance, placing Moldova in the position of a competitive supplier of walnuts and hazelnuts, that has some stability and high performance in the sector.

In the long term, the accumulated experience in nut production, the traditional specialization and the climate conditions will be the most important determinants for enhancing the comparative advantage in this sector. The focus could be placed on support of the secondary processing and obtaining international certifications that will contribute to an increased added value in this area.

Another tradition in Moldovan agricultural sector is cultivation of *grapes*, mostly intended for production of wine, but also for the consumption. Therefore, fresh grapes present constantly high RCA values ranging between 20 and 38, with a slight increase in the last 2 years, while dried grapes have values between 0 and 0.3, pointing on a lack of competitiveness (Figure 5).



	2020	2021	2022	2023	2024
Fresh grapes	20,5	27,3	27,0	38,1	34,6
Dried grapes	0,2	0,0	0,3	0,1	0,1

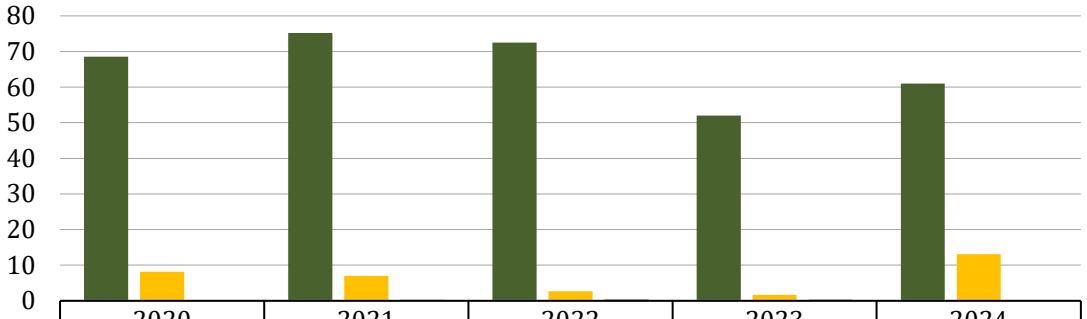
Figure 5. RCA for grapes with respect to world, 2020 – 2024

Source: author's calculations based on WITS (2026)

Generally, the grape growing sector or viticulture represents a historical legacy of the Moldovan agricultural sector. The sector has important links with the wine industry, but also with tourism in rural areas. Good soils and climate conditions have favored the cultivation of grapes, while the improved access to the EU market through the DCFTA has enhanced the orientation of grapes producers towards higher quality table grapes demanded by the EU market.

The *fruit* sector of Moldova is also based on tradition and specialization.

Among the analyzed *pome fruits* (apples, pears and quinces), *apples* dominate the group with high and relatively stable RCA values ranging between 52 and 75 during 2020 – 2024. *Quinces* have also a comparative advantage reflected through RCA between 1.7 and 13.1, while *pears* are under 1 (Figure 6).

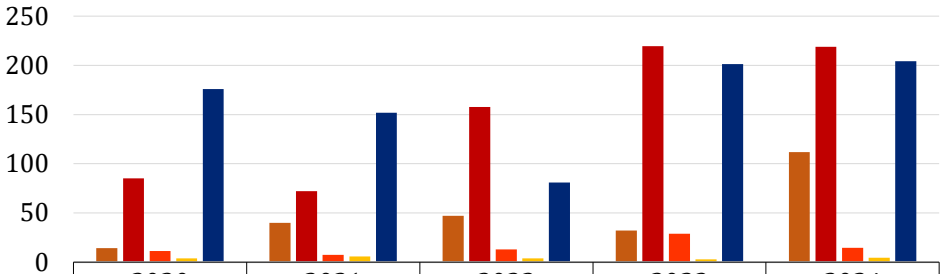


	2020	2021	2022	2023	2024
Apples	68,5	75,2	72,5	52,0	61,0
Quinces	8,1	7,0	2,7	1,7	13,1
Pears	0,0	0,3	0,5	0,4	0,1

Figure 6. RCA for apples, quinces and pears with respect to world, 2020 – 2024
Source: author's calculations based on WITS (2026)

The most recent evolutions in the apple sector have had a positive impact on the RCA values. Large investments in intensive and high-intensive orchards, adapted varieties, well-established association process in the sector and large export networks give a dose of stability and resilience of the high RCA even in the conditions of the current external shocks. Nevertheless, for a better integration in foreign markets, it is advisable the continuous modernization of plantations, investments in post-harvest infrastructure and a diversification of the export destinations toward West countries, Middle East, South Asia, etc.

In the group of *stone fruits*, all the analyzed products present highly competitive degree on the international market. Thus, RCA for plums varies between 80 and 204, for sour cherries – between 72 and 218, for apricots – between 14 and 118, for cherries – between 7 and 29 and for peaches – between 3 and 6 (Figure 7).



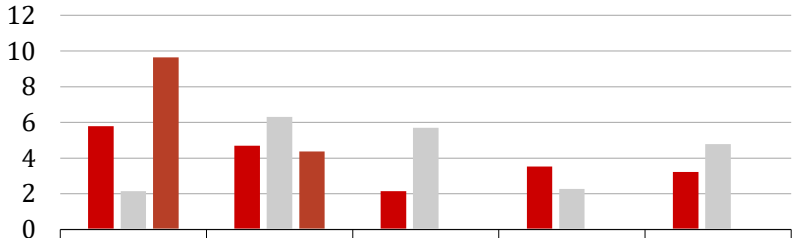
	2020	2021	2022	2023	2024
Apricots	14,2	39,9	47,2	32,1	111,8
Sour cherries	85,1	72,1	157,7	219,6	218,8
Cherries	11,3	7,4	12,9	29,0	14,5
Peaches and nectarines	3,8	5,8	4,0	3,0	4,4
Plums	176,0	151,8	80,9	201,3	204,2

Figure 7. RCA for apricots, sour cherries, cherries, peaches and nectarines and plums with respect to world, 2020 – 2024
Source: author's calculations based on WITS (2026)

The investments in intensive plantations, storage facilities and refrigeration infrastructure have amplified the comparative advantage of Moldovan stone fruits on external markets. The spectacular growth in sour cherries reflects the export orientation to the EU market as a result of adoption of international quality standards and modern technologies. In the future, the sector would benefit from

diversifying varieties, expanding processing capacities and investing in national branding, to transform the current comparative advantage into a sustainable competitive advantage on longer value-added chains.

As for some *berries*, like strawberries, raspberries, mulberries, blackberries, currants and gooseberries, RCA values are generally higher than 1, with some volatility in the last 3 years for currants and gooseberries (Figure 8).



	2020	2021	2022	2023	2024
Strawberries	5,8	4,7	2,2	3,5	3,2
Raspberries, mulberries and blackberries	2,2	6,3	5,7	2,3	4,8
Currants and gooseberries	9,6	4,4	0,0	0,0	0,0

Figure 8. RCA for strawberries, raspberries, mulberries and blackberries and currants and gooseberries with respect to world, 2020 – 2024

Source: author's calculations based on WITS (2026)

These figures may indicate on an expansion of berries production and a more pronounced export orientation. The increase in RCA for selected berries can be associated with investments in modern technologies like greenhouses and irrigation, and also the improved quality of products. Nevertheless, the still moderate levels of RCA suggest the existence of some constraints like the perishability of the products and the need for an efficient cold chain. Therefore, although there is potential for growth, Moldova's comparative advantage in the case of berries remains in a phase of consolidation.

Conclusions

The analysis of the RCA for Moldovan horticultural products confirms that this sector is one of the most competitive segments of the Moldovan economy on the foreign market, as Moldova holds a clear and quite strong comparative advantage in some traditional products, particularly walnuts, grapes, apples, plums, sour cherries, and apricots. All of these products consistently record RCA values higher than 1, and in some cases above 50 or even 100, pointing on a deep specialization and orientation to export. Some positive dynamics were also recorded in carrots, onions, hazelnuts, and several berry species.

At the same time, the analysis reveals important weaknesses in other segments. Products such as tomatoes, potatoes, garlic, pears, and dried grapes show limited or no comparative advantage on the global market.

Overall, the horticultural sector demonstrates significant resilience and export potential. However, the existing comparative advantages are not yet fully transformed into sustainable competitive advantages. In order to consolidate and further develop the identified comparative advantages, the following measures are recommended:

- Investments in the post-harvest infrastructure, especially for perishable products (berries, stone fruits, vegetables). This will contribute to reduce losses and extend the market reach.
- Promotion of product diversification and value addition of products. Secondary processing support and encouragement of the development of organic and GI certifications will increase the added value of the sector.

- Diversification of export markets. This will reduce the dependence on traditional destinations by actively promoting Moldovan horticultural products in Western Europe, the Middle East, South Asia, and East Asia.
- Enhancement of quality of products and investments in research and innovation. The continuous modernization of plantations with an emphasis on innovations, digitalization and new varieties together with strengthened education and extension services in fruit growing and post-harvest technologies will bring additional benefits for the sector.

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