

# The Factors Influencing a Choice of Fruit-Seedling Suppliers—A Case Study of Apple and Blueberry Orchard Producers in the Republic of Serbia

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## ABSTRACT

The research focuses on the factors influencing the choice of fruit seedling suppliers by agricultural producers in the Republic of Serbia. The aim of the paper is to identify the decision-making factors when choosing between domestic and foreign suppliers. Through questionnaires and in-depth interviews with fourteen agricultural holdings, key decision-making determinants were identified: seedling quality, supplier reputation, price, adaptability to local conditions, and availability of technical support. The results show that producers often prefer foreign suppliers due to higher productivity and plant health safety, although domestic suppliers offer moderate prices and more flexible payment terms. Digital marketing and peer recommendations are significant sources of information. The analysis indicates the need to strengthen domestic production standards and improve suppliers' communication strategies.

**Keywords:** seedling material, fruit growing, procurement, quality, information channels

## INTRODUCTION

The agricultural sector represents an important component of the Serbian economy, with a significant contribution to the gross domestic product, employment, and the country's export. Within this sector, fruit production holds a special place, driven by favorable climatic conditions and a rich tradition of fruit cultivation (Stojković et al., 2020). However, the dynamics of international trade in agricultural products, particularly fruit

planting material, depend on various internal and external factors that require careful analysis and strategic planning (Dokić et al., 2020).

The intensive fruit production assumes high-quality planting material. The production of planting material in Serbia has a long tradition. Organized nursery production began to develop around 150 years ago. At that time, the import of various fruit varieties from France

and Germany also began (Gogić & Ivanović, 2017). On a global scale, the production of fruit planting material is rapidly evolving, following modern trends and technologies (Pavlović et al., 2020). In contrast, Serbia still predominantly relies on traditional production with varieties that are gradually losing market competitiveness. Customer demands dictate the structure and scale of nursery production (Milić et al., 2006). Nevertheless, in order to ensure satisfaction across the entire production chain, nurseries must also achieve positive financial results. Business conditions influenced by risks stemming from global crises such as the COVID-19 pandemic and the war in Ukraine have led some investors to abandon or postpone the initiation of planting—that is, the

establishment of orchards.

The selection of seedling suppliers represents a crucial decision for fruit producers in the Republic of Serbia, significantly influencing the long-term productivity of their orchards. This decision is affected by a complex set of factors, ranging from the quality and genetic authenticity of the planting material to the supplier's reputation and after-sales support. Understanding these factors is essential for producers aiming to establish successful and sustainable fruit production systems. The objective of this research is to identify the key determinants influencing the choice of seedling suppliers among fruit producers.

## MATERIAL AND METHODS

The analysis encompassed quantitative data collection through structured questionnaires, supplemented with qualitative analyses using in-depth interviews. The selection of fourteen agricultural holdings was based on a purposive sampling strategy, ensuring a sample of eight blueberry producers and six apple producers. All surveyed agricultural producers are engaged in intensive, plantation-style fruit production, equipped with modern technology, irrigation systems, anti-hail nets, and the necessary machinery. Additionally, only producers who established their fruit orchards (or part of them) between February 2022 and February 2025 on the territory of the Republic of Serbia were included.

The rationale for selecting producers who planted during this specific time frame lies in the fact that this period represents the post-COVID era, marked by the reactivation of economic activities and price stabilization,

which encouraged investment. The impact of the COVID-19 crisis was significant for the sale of planting material both in Serbia and globally, due to widespread order cancellations, which led to a decline in selling prices. During that period, some agricultural producers who were more risk-tolerant made decisions to invest in perennial fruit plantations, taking advantage of the situation in which their initial capital investments were significantly lower due to reduced seedling prices at the time.

The questionnaire consisted of fourteen questions divided into two sections. The first section focused on information about the area, types, and age of fruit seedlings at the time of planting, as well as expected yields and the timeline for achieving the first and full harvest. The second section included questions related to a broad range of variables, including producers' perceptions of seedling quality, price competitiveness, supplier reliability, access to

technical support, and the impact of marketing and communication channels. Special emphasis was placed on understanding the reasons behind producers' choices between domestic and foreign seedling suppliers. In this study, the term "foreign suppliers of fruit planting material" refers to suppliers from developed markets of high-productivity planting material, primarily from European Union countries, which are Serbia's main foreign trade partners in the import of seedlings. More precisely, foreign suppliers in this study mainly originate from Italy for pome fruit (e.g., Griba Vivai, Salvi Vivai, Vivai Mazzoni, GeoPlant Vivai) and the Netherlands for berry fruit (e.g., Fall Creek, Schrijnwerkers). The questionnaires also collected information on the seedlings market.

The collected data were analyzed using descriptive statistics to identify the most frequently cited factors in supplier selection

and to uncover potential differences in preferences between blueberry and apple producers. Statements from producers collected through in-depth interviews were presented descriptively. Each interview lasted approximately 45 to 60 minutes per respondent.

The qualitative data from the interviews were analyzed using manual thematic analysis. The process involved several systematic steps: initial reading of transcripts, open coding to identify key segments of text, and axial coding to organize related codes into broader analytical themes. Codes were developed both inductively from emerging patterns in producers narratives, and deductively, based on the research focus on seedling supplier selection. The transcripts were reviewed and manually coded using spreadsheets.

## RESULTS AND DISCUSSION

The data presented in Table 1 summarize the findings from the first section of the questionnaire, focusing on newly established fruit orchards and producers' expectations. Among blueberry producers, all eight respondents have foreign planting material, while three of them also have domestic seedlings in smaller quantities. For apple orchards, there is a clearer distinction. All company-type farms use only foreign planting material, while individual farms use domestic seedlings exclusively or in combination. Specifically, two individual apple producers reported having both domestic and foreign seedlings. Regarding blueberry producers, the varieties planted do not differ between domestic and foreign planting material. In contrast, apple orchards show a clear distinction

in varietal selection depending on the origin of the planting material. Producers using foreign seedlings frequently grow high-value or proprietary cultivars such as Pink Lady, a club variety typically available only through licensed foreign suppliers, but also variety of other red color apples such as Gala, Red chief and Braeburn. On the other hand, producers using domestic seedlings primarily cultivate more commonly available varieties such as Idared, Golden Delicious, and Granny Smith. Both blueberry and apple growers, regardless of sourcing seedlings from domestic or foreign suppliers, reported or anticipated the first yield in the second year after planting. However, expectations regarding the time to reach full production capacity differ. Respondents who procured seedlings from foreign suppliers

anticipate achieving full yield in the fourth year post-planting, which is one to two years earlier than those who used domestic planting material.

Table 1. Data on Established Commercial Fruit Orchards

	Blueberry Orchards		Apple Orchards	
	Domestic Planting Material	Foreign Planting Material	Domestic Planting Material	Foreign Planting Material
Number of individual farm type	2	5	4	2
Number of company farm type	1	3	-	2
Location by regions of Republic of Serbia	Belgrade; Šumadija and Western Serbia	Belgrade; Šumadija and Western Serbia	Šumadija and Western Serbia; Southern and Eastern Serbia	Vojvodina; Šumadija and Western Serbia
Total area of newly established orchards (ha)	2.75	12.95	11.40	10.00
Variates	Duke	Duke	Idared, Golden Delicious, Greany Smith	Pink Lady, Braeburn, Red Chief, Gala, Greany Smith
Total number of newly established plants	11,410	55,240	49,390	45,400
Number of plants per hectare	3,600 – 4,500	3,600 – 4,500	3,580 – 5,040	3,580 – 5,040
Age of planted seedlings (years)	2	2	1-2	1-2
Expected or actual first yield from planting (in years)	2	2	2	2

Expected full yield from planting (in years)	5	4	6	4
Expected yield at full production (kg per plant)	3	3.2 – 3.5	12-15	15-18

Source: Author

Another critical aspect examined was the expected yield at full production. In this regard, seedlings from foreign suppliers are expected to produce higher yields. Respondents perceive foreign-sourced planting material as more productive.

Table 2. Key decision factors in selecting seedling suppliers

Factors	Characteristics of factors		Importance on supplier choice decisions
	Domestic suppliers	Foreign suppliers	
Seedling quality	Limited (varied genetic traits)	High (certified, disease-resistant)	Critical factor for majority of growers
Price	Competitive market prices	Significantly higher costs	Important consideration but often secondary to quality
Delivery reliability	Variable performance	Consistent on-time delivery	Highly valued by commercial growers
Long-term results	Moderate yields, slower ROI	Superior yields, faster ROI	Increasingly important for investment decisions
Payment flexibility	Deferred payments accepted	Advanced payment required	Important for smaller producers
Technical support	Limited assistance available	Comprehensive establishment support	Valued by less experienced growers
Legal certainty	Weak contract enforcement	Strong EU legal protections	Critical for large-scale investments

Source: Author

The research highlights the complexity of decision-making among Serbian fruit producers when selecting seedling suppliers. Seedling quality emerges as a key factor, with producers favoring suppliers known for delivering healthy and genetically pure planting material. The reputation and reliability of suppliers also play significant roles, as producers seek long-term partnerships with nurseries that have a proven track record of timely delivery of quality seedlings and adequate after-sales support. Consequently, all respondents identified seedling quality and supplier reputation as key factors in their decision-making process, particularly highlighting the importance of trust in supplier reliability. This theme was reflected in producers' emphasis on timely delivery and consistent quality: "I chose foreign suppliers because their seedlings are consistently high-quality, and they deliver them reliably and on time."

Price is also a significant consideration when choosing suppliers. Domestic producers of fruit planting material have a competitive advantage due to moderate seedling prices. Although price is important, respondents demonstrate a nuanced approach, often prioritizing long-term value over short-term savings. They are willing to invest in high-quality planting material and reliable service, reflecting a strategic focus on maximizing orchard productivity and minimizing potential losses due to plant health issues or genetic inconsistencies. Over two-thirds of respondents noted that, despite higher costs, foreign seedlings offer greater security and lower long-term risk, which is crucial for investments expected to be exploited over more than fifteen years. This aligns with another major theme that emerged: the "perceived quality of imported seedlings." Producers associated foreign seedlings with expectations

of better genetic traits, higher yields, and stronger disease resistance. As one respondent answered, "Foreign seedlings may cost more, but they grow faster, are stronger, and give better long-term results."

In direct comparisons of expected yields, all respondents favor foreign seedlings. However, individual decisions reflect varying perspectives on investment return periods. Buyers of domestic seedlings argue that lower initial investment costs lead to quicker returns. Conversely, those favoring foreign suppliers contend that, despite higher initial investments, the higher yields and faster achievement of full production capacity offer advantages in calculating return periods. Moreover, the technical support provided by foreign seedling suppliers, including assistance during orchard establishment, can result in initial investment savings through more efficient planting and recommendations for equipment and irrigation systems.

The study also indicates interest in domestic seedling suppliers, stemming from the belief that local seedlings are better adapted to Serbia's climatic and soil conditions. Respondents who established orchards using both foreign and domestic seedlings emphasized that the availability of seedlings from domestic producers is a crucial factor in supplier selection, as foreign planting material often requires reservations over a year in advance, necessitating detailed planning. One apple grower remarked, "I had to reserve my seedlings 14 months ahead—it's stressful, but worth it for the quality." Additionally, one-third of respondents highlighted that domestic producers are more flexible regarding financing options, such as deferred payments and even compensation arrangements. As one blueberry producers with both, domestic and foreign



seedling responded: “The local supplier allowed me to pay in three instalments, with the last part through compensation, by selling them the fruit harvested from those very seedlings. With the foreign supplier, I had to pay everything upfront, even before the seedlings were delivered.”

To further enhance their sales, the surveyed blueberry producers noted that foreign suppliers have developed channels for purchasing fresh blueberries. This offers potential seedling buyers additional security in their investments, as suppliers commit to buying the produced fruit.

Over three-quarters of respondents prefer domestic seedlings when applying for national subsidies for establishing fruit orchards. This advantage is reflected in the reference prices stated in the regulations governing the conditions for obtaining subsidies. Specifically, the reference prices used by the Directorate for Agrarian Payments, a body of the Ministry of Agriculture, Forestry, and Water Management of the Republic of Serbia, are approximate to the selling prices of domestic seedlings and significantly lower than the selling prices of foreign planting material suppliers.

Channels through which producers learn about potential suppliers vary—recommendations from fellow producers and industry experts remain a strong source of information. Half of the respondents indicate that, in addition to traditional sources, digital platforms are becoming increasingly influential, with online searches, specialized agro forums, and supplier websites playing a significant role in gathering data on seedling availability, prices, and characteristics. The use of digital platforms in information gathering highlights the growing importance of online marketing

and communication strategies for seedling suppliers (Rutsaert & Donovan, 2020). Notably, smaller vendors can advertise through digital media in an efficient and cost-effective manner directly to their target audience (Marašević et al., 2018). Regularly publishing expert advice on social media further contributes to credibility in the eyes of potential buyers, as it demonstrates expertise and commitment to quality (Rajković et al., 2021). Suppliers who effectively communicate the value of their products and services through digital channels are likely to gain a competitive advantage in the Serbian market.

The significant role of word-of-mouth recommendations underscores the importance of building strong relationships with producers and fostering a reputation for reliability and customer satisfaction. Direct marketing in sales enables personalized communication with customers, increasing the chances of repeat purchases and strengthening customer loyalty (Zarić et al., 2016). Insights from this research into the decision-making process of Serbian fruit producers can serve as guidelines for both producers and suppliers. Seedling suppliers can use these findings to tailor their marketing and communication activities, emphasizing what matters most to producers: seedling quality, reputation, and technical support. On the other hand, producers can make more informed decisions when selecting suppliers, considering a broad range of factors beyond just price.

Procurements from foreign suppliers are particularly considered when producers seek newer varieties or specific genetic traits that are not readily available from domestic producers. Advantages of foreign seedling suppliers highlighted by over half of the respondents include expert and scientific work, as well as long-standing laboratory research backing the

products they offer, which further instills buyer confidence in the quality and health of the seedlings.

Respondents who favored foreign fruit seedling suppliers during the survey were asked about factors that would contribute to a preference for domestic seedlings over foreign ones. For three-quarters of the respondents, the answer was a written guarantee of the health and quality of the seedlings. This group includes all surveyed blueberry producers and a portion of apple producers. Other respondents believe that even this would not be sufficient, as legislation in Serbia is not adequately developed in this area. They particularly emphasize that when purchasing foreign seedling materials, contracts are signed that include a clause specifying that, in the event of a dispute, the competent court is located at the supplier's headquarters in highly developed EU countries, where the rights and obligations of both parties are clearly defined by legal and sub-legal acts, providing agricultural producers with legal security. One apple grower, who planted both domestic and imported seedlings, recounted a serious issue with a local supplier: "I ordered Gala, but the domestic nursery gave me the wrong clone. I only realized after the first harvest, when buyers started refusing the fruit. I've been in a legal dispute with them for over two years now. The process is dragging on endlessly, and in the meantime, I'm stuck with fruit I can barely sell. If this had happened with

a foreign supplier, at least the contract and the court would offer me more protection."

The findings of this research point to the complexity of factors influencing the choice of fruit seedling suppliers among fruit producers in Serbia, emphasizing the importance of seedling quality, supplier reputation, and access to information. Repeat purchases from the same supplier are common when farmers perceive value and have trust in the distributor (Kang et al., 2015). The focus on seedling quality aligns with findings from other regions, where seedling quality is recognized as a key factor in the success of fruit orchards (Tesfaye et al., 2020). Investing in high-quality seedling material at the start of production is essential for achieving optimal yields and reducing the risk of disease or genetic defects (Singh et al., 2017).

The results of this study should be interpreted considering certain limitations, such as a relatively small sample size and a focus exclusively on blueberry and apple producers. Future research could encompass a larger number of farms and include producers of other fruit types to obtain a more comprehensive picture of supplier selection preferences in fruit production in Serbia. Further studies could also analyze specific attributes of seedling quality that are important to fruit producers in more detail.

## CONCLUSION

The research has shown that the selection of fruit seedling suppliers in Serbia depends on a range of factors, with quality and supplier reputation playing a central role. Although domestic suppliers have advantages in terms

of price, local adaptability, and sales conditions including better availability of seedlings and more flexible payment options. Foreign suppliers dominate in offering genetically superior varieties with higher yields and faster



onset of full fruiting. This reflects a strategic dilemma faced by producers between short-term savings and long-term productivity. An additional advantage of foreign suppliers, as noted by several producers, is the legal certainty they provide through detailed contracts governed by clearly defined regulations in the EU countries.

The significant role of digital platforms in the information gathering process highlights the growing importance of online marketing in the agricultural sector. At the same time, the lack of standardized guarantees for domestic

seedlings limits their marketability, especially in the case of blueberry plants. To increase the sales volume of domestic seedling producers, it is necessary to invest in modernizing production, implement strict quality control measures, and improve communication with fruit growers. Simultaneously, efforts should be made to educate fruit producers on the importance of high-quality planting material and to encourage collaboration between domestic and foreign nurseries.

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# Čimbenici izbora dobavljača sadnoga materijala voća – primjer proizvođača plantažnih nasada jabuka i borovnica u Republici Srbiji

## SAŽETAK

Istraživanje je usmjereno na čimbenike koji utječu na izbor dobavljača sadnoga materijala voća kod poljoprivrednih proizvođača u Republici Srbiji. Cilj je rada identifikacija čimbenika koji utječu na donošenje odluka prilikom odabira domaćih i inozemnih dobavljača. S pomoću upitnika i dubinskih intervjuja 14 poljoprivrednih gospodarstava identificirani su ključni čimbenici u donošenju odluka: kvaliteta sadnica, reputacija dobavljača, cijena, prilagođenost lokalnim uvjetima i dostupnost tehničke potpore. Rezultati pokazuju da proizvođači često preferiraju strane dobavljače zbog veće produktivnosti i zdravstvene ispravnosti sadnica, iako domaći dobavljači nude niže cijene i fleksibilnije uvjete plaćanja. Digitalni marketing i preporuke kolega predstavljaju značajne izvore informiranja. Analiza ukazuje na potrebu jačanja standarda domaće proizvodnje i unaprjeđenje komunikacijskih strategija dobavljača.

**Ključne riječi:** sadni materijal, voćarstvo, nabava, kvaliteta, informacijski kanali