ORGANIC PRODUCTION OF LAVENDER IN SERBIA - ECONOMIC AND FINANCIAL ANALYSIS

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ABSTRACT

The main aim of this study is to access possibilities of organic production of lavender in Serbia. As a result that 1999 and 2020 have been dubbed the "Year of Lavender" in the US, researchers and practitioners focused various aspects lavender production and cultivation. Lavender is an aromatic-medicinal plant, cultivated in Mediterranean region. The plants have used twofold: as an essential oil as well as a flower. In this study, the authors use a comparative analysis and feasibility study as research methods. The results of comparative analysis revealed that the main countries in organic production of lavender were Bulgaria, France, China, Ukraine, Spain and Morocco. Also, the feasibility study in Serbia showed positive effect on organic lavender production in Serbia. This can be the case study for organic production of lavender to other farmers in Serbia. The limitations and future research agenda will be presented, too.

Introduction

The main proposition of organic agriculture is healthy ground-healthy herbals and animals-healthy people. According to World Health Organization (WHO), herbs are kind of plants which one or more parts contain biological active elements which can be used in therapy or pharmacy. There are about 700 species of medicinal, aromatic and spice plants in Serbia, and close to 300 are in circulation (Jevdjovic, 2012). However, irrational, uncontrolled and unprofessional collection cannot be unlimited. It is necessary to respect the principles of sustainable use of natural resources, and thus greater education of the population about organic collection and organic plantation cultivation.

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The main idea of the authors is to analysis organic production of lavender due to the fact that organic production of medical and aromatic herbs participates in the percents less than 1% in total organic food production in Serbia.

There are a few studies that analyzing conventional or organic production of lavender from the perspective of business analysis and project management (Adam, 2006; Lesage-Meesen et al., 2015; Giray, 2018). Therefore, aforementioned argument, along with practical usefulness, motivates the authors of paper to conduct the research entitled *The feasibility studies of organic production in the Republic of Serbia*. In this study, the authors will present preliminary results about organic production of lavender in Serbia.

This paper is structured as follows. The first part is devoted to the general information of production of lavender, review of past research and compilation of harvest yields. In second part, the research materials and methods are presented. The third part outlines the results divided into five main sections: Impact of COVID-19 on the organic market, Review of the largest producers of lavender flowers, An Analysis of the World lavender oil market, Organic production of medical and aromatic plants in Serbia, and Feasibility Study of organic lavender production at farm X in Serbia. The final part presents the discussion.

General information about lavender production

There are various botanical names of lavender, i.e. *Lavandula angustifolia, Lavandula x intermedia*. But common names for lavender are garden lavender or common lavender.

The first decision in lavender production is to choose between the followed commercial uses (McCoy, 1999): fresh flowers, dried flowers or cosmetic manufacturing i.e. soaps, or oil. The production of lavender includes two main lavender varieies, such as (McCoy, 1999):

1. **Lavandin varieties** (*lat. Lavendula x intermeidia*) are high productive both in form of crops and essential oil, as well. Lavandins flowers have slightly gray color. Commercial names of lavandin oil are "*Grosso, Abrialii, Suer, Standard, or Maime Epis"*. Tender "*Lavenders L. latifolia"*, or "*Spike Lavender"*, can be hybrid but also native species of *lavandin* originated from the Mediterranean region. "*French lavender or Fringed lavender"* (*lat. Lavendula dentata*) raises in Spain and primary uses in dried form. "*L. stoechas, Spanish lavender"* has dark purple flowers, and also used for same purpose. It is appropriate for acid soils. "*Lavandula x allardii, or giant lavender"* is a hybrid form when cross aforementioned two species of lavandin.
2. **English lavender** (*lat. Lavendula angustifolia*) varieties have blue flowers, and best suited in dried form. The best known commercial names of English Lavender including the "*Nana Alba, Rosea, Jean Davis, Lodden Pink, Twickle Purple, Royal Purple, Mitcham Cray, Munstead, and Summerland Supreme"*. The ability to flower twice has "*Irene Doyle"* (Tucker, 1984) as well as high concentration of oil therefore it suitable for production of essential oil.

All varieties are flowered in the period from mid to late June to early July. The concentration of water in crops are 70-80% water and became dried in 7 to 14 days. Harvest time for some varieties is from the second through the fifth year, and for others can be up to 30 years. For fresh flower use, the harvest is manually. For production of essential oil, lavender is harvest by specially designed machinery.

Review of past research

The majority of studies about lavender are in the field of Phytochemistry (i.e.Vokou, 1993; Sharma et al., 1992), Chemical technology, Food technology, and Medicine (i.e. Buchbauer et al., 1992), and Economics of Agriculture (Foster, 1993; Marz et al., 2012; Marz et al., 2013; McCoy, 1999 Willer et al., 2021; Golijan, 2016; Kalentic et al., 2014; Simic, 2017; Pantiž et al., 2021; Fedajev et al., 2021). There are a few studies that analyzing conventional or organic production of lavender from the perspective of business analysis and project management (Adam, 2006; Lesage-Meesen et al., 2015; Giray, 2018). Therefore, aforementioned argument, along with practical usefulness, motivates the authors of paper to conduct the research entitled *The feasibility studies of organic production in the Republic of Serbia*. In this study, the authors will present preliminary results about organic production of lavender in Serbia.

Since 1999 was announced as "Year of Lavender" in the United States, the interest for information and literature about production of lavender had been increased. The analysis of relevant literature in the U.S. showed the following (McCoy, 1999):

- All interest parts in lavender production need to understand that Lavendula species has complex variety. The choice will be depend on production goals, such as fresh or dried flower or oil.
- The essential oil production embodies knowledge about the phytochemistry of lavender varieties.
- During the time, numerous aspects of lavender use have been found (i.e. aromatic, cosmetic, culinary, decorative, medical),
- Traditionally, lavender has been used as a perfume and for antimicrobial purpose.
- It is important to note that lavender has been used since the first century A.D. but it is still remained a common herb in almost every household.

The results of the studies during the 90-ies of XX pointed to new using of lavender essential oils such as:

- To storage food (Vokou, 1993);
- To protect wardrobe against inspects (Sharma et al., 1992);
- Medical use as sedative (Buchbauer et al., 1992).

Comparative of the harvest yields of essential oil and flowers from lavender crops

The majority of studies have been conducted over 30 years ago (Foster, 1984; McGimpsey, 1994; El-Sherbany et al. 1997). The study from the Netherlands showed that essential oils of lavender can be used as natural pesticide, especially to storage food (Vokou, 1993). The same results of this characteristics have been proven in India (Sharma et al., 1992). Other important results have been same concentration of essential oil of natural lavender as well as hybrid crops.

The comparative analysis between various size of stem showed that the highest percentage of rooting was obtained from 8-10 cm long (Boyadzhieva et al., 1977). The experiment conducted in Bulgaria embodied mechanized cultivation and harvest (Tsachev, 1976). The researchers have compared three French varieties of lavender such as "Superb, "Abrial", and "Normal" to determinate the concentration of essential oil. The results showed better yields of first two aforementioned varieties (Chingova et al. 1973).

Materials and methods

The source of meta data about organic agriculture at the world has been *The World of Organic Agriculture Statistics and Emerging Trends 2021* (Willer et al., 2021). Data about organic agriculture in Serbia have been collected from the followed sources:

- *Organic agriculture in Serbia 2012* (Marz et al., 2012),
- *Organic agriculture in Serbia 2013* (Marz et al., 2013),
- *Organic agriculture in Serbia at a Glance 2014* (Kalentic et al., 2014), and
- *Organic agriculture in Serbia at a Glance 2017* (Simic, 2017).

The authors collected and analyzed various statistical data, such as:

- Data about organic medical and aromatic plants in Serbia in 2015, collected by Ministry of Agriculture of Republic of Serbia (Golijan, 2016),
- Data about new agriculture enterprises in Serbia (Fedajev et al., 2021), and
- Data about production of fine lavender essential oil worldwide (Giray, 2018).

In this study, we used a mix method approach. Content analysis has been used for qualitative data. Analysis of quantitative data has been conducted with comparative analysis (i.e. lavender oil production (Lesage-Meesen et al., 2015), as well as cost-benefit analysis in the feasibility study of organic lavender production at Farm X in Serbia. The main goal of cost-benefit analysis is to determine feasibility of the project by gathering information about total costs and benefits of the project. Cost-benefit analysis is " a systematic method for quantifying and then comparing the total costs to the total expected revenues of the project" (Stobierski, 2019; Lojaničić et al., 2021). The main advantages of cost-benefit analysis can be summarized through data-driven approach, simplifying decision making process, and uncovers hidden costs and benefits, on the

one side. On the another side, disadvantages are difficult to predict all variables, better suited to small and medium projects, and removes the human factor.

Next section is devoted to research results.

Results

The results of this study present into the following parts:

3.1. Impact of COVID - 19 on the organic market

3.2. Review of the largest producers of lavender flowers

3.3. An Analysis of World Lavender Oil Markets

3.4. Organic production of medical and aromatic plants in Serbia

3.5. Feasibility study of organic lavender production at Farm X in Serbia

Impact of COVID-19 on the organic market

The results of one study have been revealed that during the COVID - 19 pandemic, food sales growth rapidly. Health, climate changes, and environmental issues become more important during the pandemic (Willer et al., 2021).

The key question is: *Will organic production continued to growth after COVID-19 pandemic?* The analysis of aforementioned meta data showed that interest for organic products would continue to growth (Willer et al., 2021). It is important to notice that in some groups of existing consumers the salaries are less than before 2019. Therefore, they will not be able to buy same nor more organic products than before 2019.

The results of scenario analysis revailed that organic production would raise by the same rate as organic market. The small and medium enterprises are dominant at organic market. In the case of Serbia, the results of the analysis of number and share of new enterprises are presented in Table 1. The same trend will be continued along entering new ones.

Table 1. New agriculture enterprises in Serbia in the period 2015-2019.

Year	No of enterprises	Index (previous/ current year)	Share in total new enterprises
2015	235	114.00	0,51
2016	262	111.50	0,55
2017	294	112.20	0,57
2018	333	115.00	0,58
2019	1,138	341.70	0,54

Source: Fedajev et al. (2021), p.554

In the industry of organic production of food, the financial support will be necessary. This financial injection can be provided by various EU funds or National Investment Funds. In Slovenia, the project entitled *Biodiversity's restoration, preservation & enhancement - Organic production of lavender* started in 2017 (*See at website* https://najdistoritev.si/iskalnik/izdelki-iz-sivke/)

Review of the largest producers of lavender flowers

Table 2. presents the largest producers of lavender flowers in the world. The base year was 2017. and the prices indexed in U.S. dollar ($).

Table 2. The largest producers of lavender flowers in the world in 2017

Product Name	Size	Country	Price
Lavender Flowers Extra	1lb	Croatia/Albania	$22.75
Lavender Flowers Extra	4 oz	Croatia/Albania	$8.92
Lavender Flowers Super	1lb	France	$33.92
Lavender Flowers Super	4 oz	France	$11.75
Organic Lavender Flowers Extra	1 lb	Croatia/Albania	$27.67
Organic Lavender Flowers Extra	4 oz	France/Albania	$10.17
Organic Lavender Flowers Super	1 lb	France	$40.42
Organic Lavender Flowers Super	4 oz	France	$13.33

Source: Starwest Botanicals (2021)

The data from the latest review in European Union showed that in 2018, 21.1% of French lavender were grown organically and Bulgaria has produced more than 24,500 tons of organic lavender (Willer et al., 2019).

An Analysis of World lavender essential oil markets

The main producers of lavender essential oil production came from Bulgaria, France, China, Ukraine, Spain and Morocco (Lesage-Meessen et al. 2015). In 2016, 380 tonnes of lavender essential oil have been produced, and the portion is 280 tonnes came from Bulgaria, and the rest 100 tonnes from France (Giray, 2018). Worldwide the producers used more than 30 species of lavender to produce Lavender Essential Oil. Each species of Lavender is renown for different purposes. To produce the highest quality of Organic Lavender Oil – Bulgarian Lavender Essential Oil the best variety is "Lavandula Vera", also known as "Bulgarian Lavender". The main producers of organic lavender oil in Bulgaria are:

1. Organic lavender Bulgaria (http://www.agrobiofarm.com/lavender-oil/)
2. Lavande Biologique Bulgarie.

The most famous producers of French lavender are:

- Dried lavender Organic (https://daisyshop.co.uk/Dried-lavender-Organic),
- Organic Lavender, French (https://www.absolute-aromas.com/cms.jsp?menu_id=25048&prodref=OR023%2F10ML).

According to Davis (2020), as a results of focus on lavender in North Carolina many new, small lavender farms have been established. Well-known varieties of lavender that can be cultivated are: Provence, Grosso, Phenomenal, Hidcote, Munstead, and Superblue. Mainly U.S. A. lavender producers are focused on essential oil and culinary uses. Beus (2021) stated the lack of market and infrastructure for lavender producers in the U.S. A.

Organic production of medical and aromatic plants in Serbia

Organic farming became more popular and profitable in Serbia (Simin et al., 2019). In the report entitled Organic production in Serbia, the authors have notice that there is no official methodology on which they can evidenced the information about total area of medical herbs (Marz et al., 2012). Same data can be found in the Study published in 2013 (Marz et al., 2013). In report for 2014, the authors concluded that there were no data about the areas exploited for medicinal herbs (Kalentic et al., 2014). Therefore, data about organic plant production are presented in Table 3.

Table 3. Organic production of medical and aromatic plants in Serbia

Year	Production (in tons)
2011	59.50
2012	28.40
2013	132.60
2014	60.90

Source: Simic (2017)

In 2015, the value of export of medicinal and aromatic plants has been in amount of 32.200 euros (Simic, 2017). According to data provided by Ministry of Agriculture of Republic of Serbia, and summarized by Golijan (2016), the organic medical and aromatic plants in Serbia, in 2015, was carried out on an area of 70.94 ha from which 68.27 ha have been in the organic status. The comparative 2015 to 2014, the production has been raised by 10.01 ha. The total turnover of medicinal plants in Serbia achieved equally by large - scale production and by collecting the wild herbs. The highest production of medicinal and aromatic plants was in region South and East Serbia, with 40.31 ha in 2015 (Golijan, 2016). Classification by plants varieties has been showed that the majority of organic plants cultivates lavender (23,45 ha).

There are no official data about organic production of lavender in Serbia. At this moment, in domain of lavender flowers production in Serbia there are two successful plant (i.e. Tamnjanica - Municipality of Bela Palanka) i Bukovac - Municipality of Novi Sad).

Therefore, the next section elaborates the main parts of the feasibility study conducted at Farm X in Serbia.

Feasibility study of organic lavender production at Farm X in Serbia

The main parts of feasibility study of organic lavender production in Serbia were:

1. Summary which embodied the following information: farm location, brief development of farm, the main reasons for investing own sources in lavender production (i.e. as a basis for product/service diversification), the list of other investors (i.e. EU fund, National or local investment fund raising).
2. The main results: In the last year, the Farm X increased its revenue by at least 80% (approximate value based on "Grily Naturae - kmetija Osterc – Investing in organic lavender production"). The exponential raise can be reached after third year.
3. General recommendation is to *increase people's awareness of high-quality, organic products* i.e. lavender. In order to do this, farm owners need to interconnect with local community as well as with other public authorities, and organizations that promoting organic food.
4. Cost/benefit analysis had been reviled that after third year yields from lavender dramatically increase therefore the profit start to increase as well. Investment can be expand to production of essential organic lavender oil, soap, creams.
5. *Key lessons for farm owners*: a) joint the Organic food cluster or engage other farm owners to start a organic lavender production, distribution, export or marketing.

Moreover, farm owners can form a Cluster of Organic lavender in Serbia or at local level; b) sell organic lavender at fairs and other events; c) connect with tourism organizations in order to increase revenues from lavender production; d) share agriculture machine with other farmers, and e) improve their knowledge about lavender productions, cultivation, seeds or varieties of lavender, distribution, marketing, export thorough partnership with universities and/or engaging consultants in aforementioned areas of expertise.

Table 4. presents the results of economic analysis. The lavender production can be productive. This goes in line with the results of one study conducted on 10 farms in Mediterranean region (GokDogan, 2016), ongoing European Union project in Slovenia ("Grily Naturae - kmetija Osterc – Investing in organic lavender production") as well as other studies conducted in developing countries (Gul et al., 2016; Singht et al., 2007; Kakraliya et al., 2022).

Table 4. Economic analysis of organic lavender production in Serbia

Cost and revenues	Value (in EUR per ha)
Variable cost	798.39
Fixed cost	615.20
Total cost	1413.59
Gross profit	1540.98
Net profit	925.79
Relative profit	1.66

Source: Authors' calculation

In order to determinate feasibility of organic lavender production following cost have been calculated: cost of lavender seeds, cost of cultivation, and workforce cost. Total cost were 1413.59 euros per hectar, and net profit was 925.79 euros per hectar. Compared to convential production of lavender total cost were 15% lower, and net profit was 17% higher when farmer produces organic lavender crops (See Table 5).

Table 5. Comparative analysis conventional vs organic lavender production

Indicators	Conventional	Organic
Total cost	1201.55	1413.59
Gross profit	1818.36	1540.98
Net profit	1092.43	925.79

Source: Authors' calculation

For lavender producers it is important to find out how consumers are getting information about lavender. The results confirmed that consumers have heard about lavender from friend and directly from producers (Campbell et al., 2019). This information is useful to producers and retailers to improve marketing efforts as well as to increase sales of lavender flowers.

The results showed that consumers' willingness to pay have been reached maximum level in case of lavender flowers and the minimum level for culinary lavender (Berning et al., 2020). This information is important to small producers of organic lavender because the production of lavender flowers are lower than culinary lavender or lavender oil.

In Romania small farmers started their lavender business firstly for economic reasons, but they have been aware of ecological-friendly aspects of organic lavender production (Vijulie et al., 2022). Same study showed the obstacle of lavender production i.e. lack of funding for machines for processing lavender crops, lack of workforce, and weak of market outlet. The main constraits for lavender farmers could be classified as price, production and market conditions (Gul et al., 2016). This can be useful for Serbian lavender producers.

Based on the results of feasibility study, the organic lavender production can be a rewarding and economically profitable business, but it is important to do marketing research of lavender products (Rittenhouse, 2018).

Discussions

Two years ago, a group of researchers were investigating if lavender's yield and concentration of essential oil can be improved by using bio-stimulants (Giannoulis et al., 2020). The results have been showed that application of bio-stimulants significantly improved yield of production of lavender, but further studies will investigate the effects on an essential oil quality.

Based on chronological reports on the organic agricultural sector in Serbia, we identified some emerging trends (Simic, 2017; Oljaca, 2012):

1. The huge potentials of development of organic farming in Serbia;
2. Existing actors are poor interconnected in value chain at organic market;
3. IPA Component V (IPARD) will be opportunity for organic farmers to get more than 60% of necessary investments.
4. Relative low wages and low taxes can be comparative advantage for Serbia to foreign investors.
5. The portion of agriculture in European Union economy is the largest, therefore, it absorbs most of the EU budget, this can be opportunity for Serbia.
6. Bilateral Agreement between Germany and Serbia can be realized thorough advisory about the IPA framework, university partnerships, intensive promotion of new technologies and marketing systems, along with support for organic agriculture associations and partnerships.

Recommendations for success in production of lavender can be summarized as follows (Beus, 2021):

- At least one year, potential farmers need to research about lavender production as well as to consult established farmers.
- In the case of essential oil production of lavender, basic knowledge about technology, marketing, investment funds along with partnership with university had been required.
- In the case of lack of market lavender infrastructure, the key to success will be value-added products of lavender.

From the feasibility study, it can be concluded that production of organic lavender is profitable business for small farmers in Serbia. This goes in line with other studies conducted in developing countries (Gul et al., 2016; Singht et al., 2007; Kakraliya et al., 2022).

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Conflict of interests

The authors declare no conflict of interest.

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