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SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT III

Thematic Proceedings



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PREFACE

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STATE AND THE IMPORTANCE OF ORGANIC PRODUCTION TO HUMAN HEALTH

Vera Popović¹, Marko Burić², Vesna Gantner³, Snežana Janković⁴, Dragan Dokić⁵, Vladimir Filipović⁶, Jela Ikanović⁷, Radmila Bojović⁸

Abstract

Sustainable resource management and environmental protection are the basis for ensuring long-term stability and quality of agricultural production on the global food market where organic production has a great chance. In this study, organic crop production in Serbia is analyzed in comparison with neighbouring countries, and the prospects for the development of organic crop production in our country are indicated by SWOT analysis. Trend of growth in value of organic production is recorded a continuous upward path, due to the increased awareness of people about the importance of consuming health-safe foods, produced in a certified system of organic agriculture. Organically produced plant derived food products have a higher nutritional value than conventional ones and lower level of contamination in organic crops, which is why the risk of diseases caused by contaminated food is significantly reduced. Main benefits organic productions are health-safe products, economic profit/benefit, preserving the environment and health.

Key words: *organic plant production, health-safe products, SWOT analysis*

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Introduction

Sufficiency quantity of nutrients is the basis of good health, productive lives and longevity for everyone. Nutrient availability to people is primarily determined by the output of food produced from agricultural systems. If agricultural systems fail to provide enough quantity of diverse food all the nutrients essential to human life, people will suffer, societies will deteriorate and national development efforts will stagnate. Importantly, plant foods provide most of the nutrients that feed the developing world. As a result of population pressures, many global food systems are not currently providing enough micronutrients to assure adequate micronutrient intakes for all people. This has resulted in an increasing prevalence of micronutrient deficiencies (e.g., iron deficiency, vitamin A deficiency, and iodine deficiency disorders) that now afflicts over three billion people globally, mostly women, infants and children in resource-poor developing countries (Welch, 2002).

Organic plant production rises due to the growing desire of people to consume healthy food. The modern trend in nutrition sets new requirements for the quality and health safety of food. Conventional agriculture due to the application of pesticides and fertilizers, led to the loss of individual plant and animal species, while organic farming is based on the principles of protection and preservation of plant and animal species and the environment. Organic production in the world records a growth trend. Organic production of agricultural and other products is based on the application of organic production methods at all stages of production and aims to reduce the use of chemicals and excludes the use of GMOs and products consisting of or derived from GMOs, as well as the use of ionizing radiation. Organic farming aims to produce safe high quality and high nutritional value food in an environmentally sustainable way, maintaining the genetic diversity of agro and ecosystem, preserving the environment, maintaining and improving soil fertility, reducing all forms of pollution, improving health and making profit (Popović, 2015; Popović et al., 2012a; 2012b; 2013a; 2013b; 2014; 2017; 2019; 2020; 2021; Stevanovic et al., 2018; Ikanović & Popović, 2020, Filipović et al., 2021; Zejak et al., 2022).

Organic agriculture is defined today in various ways, although some common principles exist for all of them - to not use synthetic fertilizers and chemical pesticides (Lotter, 2003). Some commonly used definitions of organic agriculture are the ones used by: FAO - "Organic farming is a holistic pro-

duction management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity”, IFOAM - “Organic agriculture is a production system that sustains the health of soils ecosystems and people” (IFOAM *Annual Report 2007*), and USDA - “Organic farming is a production system that excludes the use of synthetically produced fertilizers, biocides, growth regulators, and livestock feed additives such as antibiotics and growth hormones” (IFOAM *Annual Report, 2007*; Ikanović & Popović, 2020). There is a general idea that organic farming contributes to improved human and environmental health.

Organic production and certification methods provide a safe product produced in accordance with the legislation governing the field of organic production. An organic product is a product produced and labelled in accordance with the law and legislation adopted pursuant to the law (Ikanović & Popović, 2020).

Potential benefits from organic production arise from improved: soil fertility, organic matter content and biological activity; better soil structure and reduced susceptibility to erosion; reduced pollution from nutrient leaching and pesticides; and improved plant and animal biodiversity (Kasperczyk & Knickel, 2006). The increase in organic market and production is evident in the world as and one might expect a continuous increase in the market share of organic products as well as in areas of organically certified land for organic production around the world (Johansson et al., 2014).

Quite a number of studies are available examining the impact on amounts of certain nutritional compounds of organic crop cultivation practices (Hussain et al., 2010; 2012). Studies have also been done (Benbrook et al., 2013) have focused on a more holistic and full understanding as to whether organic production influences public health.

This study aims to analyze organic production in Serbia and indicate the possibilities for its improvement.

Materials and Methods

This study is the analysis of the organic agriculture in the world and Serbia. The database was FAO 2022. A SWOT analysis was presented in order to indicate the possibilities for further improvement of organic production. The results shown were processed using descriptive statistics and presented in tabular and graphical forms.

Results and Discussion

Organic production in the world and in Yugoslavia ex countries

In 2020 in the world the total area under organic production covered 74.93 million hectares, organic share of area was 1.6%, export to EU and USA was 4,666,220 MT, and area growth by 4,1%, Table 1.

Table 1. *Organic agriculture area in world [ha], Organic area share of total farmland [%], Organic producers in the world, and Export to EU and USA, 2020.*

Country	Organic area [ha]	Organic share of area [%]	Numbers of organic producers	Growth 2019-2020 [%]	Export to EU and USA, MT
World	74,926,006	1.6	3,369,417	+4.1	4,666,220

Source: Research Institute of Organic Agriculture FiBL, 2022. www.fibl.org/fileadmin/documents/shop/1344-organic-world-2022.pdf

Table 2. *Organic agriculture area in Yugoslavia ex countries [ha], Organic area share of total farmland [%], Organic producers in the world, and Export to EU and USA, 2020.*

Country	Organic area [ha]	Organic share of area [%]	Numbers of organic producers *	Export to EU and USA, MT
Croatia	108,610	7.2	5,153	28
Slovenia	52,078	10.8	3,685	3
Serbia	19,317	0.6	439	15,847
Montenegro	4,823	1.9	423	56
North Macedonia	3,727	0.3	863	361
B&H	1,692	0.1	86	1,582

Source: FiBL survey 2022, based on data from governments, the private sector, and certifiers. For retail sales data: FiBLAMI- survey 2022, based on data from government bodies, the private sector and market research companies. Export data: Traces/European Commission and USDA. For detailed data sources, see annex, p.322 *Total number includes data for countries with less than three producers.

In the countries of the former Yugoslavia: Serbia, Montenegro, Bosnia and Herzegovina, Croatia, Slovenia and Macedonia, there is a growing trend of areas under organic production. Croatia had the largest area under organic production (108,610 ha), followed by Slovenia (52,078 ha), Serbia (19,317

ha), Montenegro (4,823 ha), North Macedonia (3,727 ha) and Bosnia & Herzegovina (1,692 ha), while the largest exporter was Serbia (15,847 MT), Table 2, Pictures 1 and 2. Numbers of organic producers amounted to Croatia (5,153), Slovenia (3,685), Serbia (439), Montenegro (423), North Macedonia (863) and Bosnia & Herzegovina (86), Table 2.

By continents, Oceania had the highest share of the total areas (47.92%), followed by Europe (22.82%), South America (13.27%), Asia (8.20%), North America (4.99%), and Africa (2.78%), while the EU is an important producer with a share of 19.84% (Zejak et al., 2022). In 2000, this type of agricultural production covered an area of 14.98 million ha worldwide. The largest areas were in Europe (4.58 mill. ha) and North America (4.58 mill. ha), followed by Oceania (3.92 mill. ha) and South America (3.81 mill. ha) – which is 15% of its arable land. Europe produces ¼ of the global organic production, and in 2010-2020, organic production areas increased by 70.49%. During the same period, a significant increase in such areas took place in Africa (94.65%), followed by the EU (83.69%), Latin America (18.80%), Asia (1.50%), while the decline in the areas was noted in North America (-1.68%). The areas under organic production in the world grew by 104.33%, but the areas remain small compared to the total global plant production and amount to 74.93 mill. ha in 2020, which is 1.5% of the total area (Zejak et al., 2022).

Organic agricultural production today is set as one of the priorities for the development of agriculture. The SWOT analysis is a sound tool and can also be very useful in a slightly less formal strategy formulation, Table 3.

Table 3. *The SWOT analysis of organic production*

Strengths	Opportunities	Weaknesses	Threats
Health safe product	Increased demand	Little subsidies from the state	Insufficient education of producers
Large supply organic product	Producers have higher income	More investments	Change in legislation
Market Position and incentives	Customer satisfaction	Small farms	Fuel price growth
Growing production.	Preservation human health.	Large workforce	Economic recession
Customer base	Market growth	Insufficient product supply	Insufficient market capacity
Organic brand recognition	Use of European funds	Small farms	Natural disasters

Source: Ikanović & Popović 2020; Zejak et al., 2022.

Figure 1. Organic production area in Croatia, Slovenia, Serbia, Montenegro, North Macedonia and Bosnia & Herzegovina in 2020.

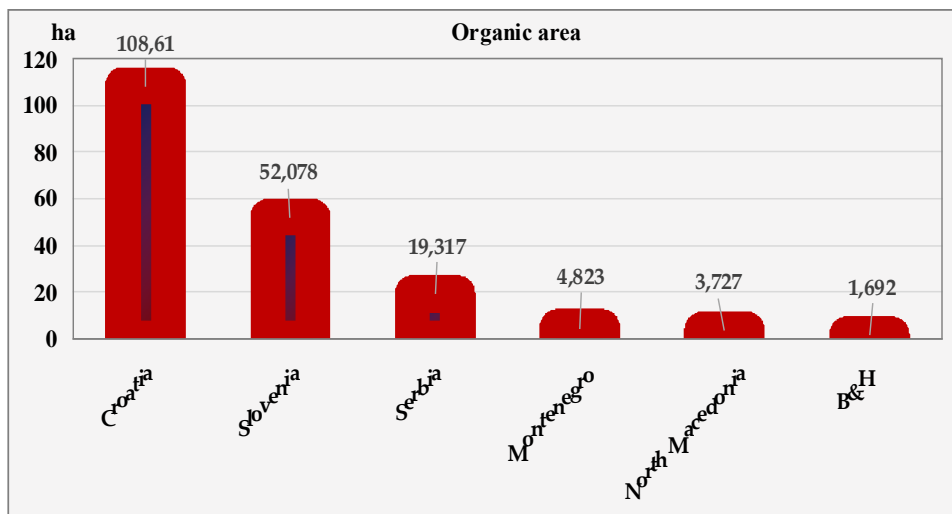
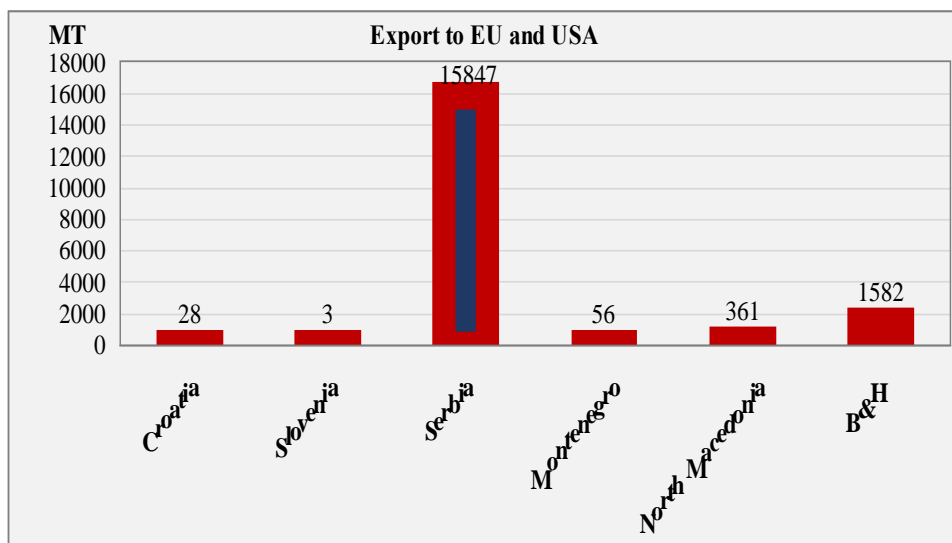


Figure 2. Export to EU and USA from Croatia, Slovenia, Serbia, Montenegro, North Macedonia and Bosnia & Herzegovina in 2020.



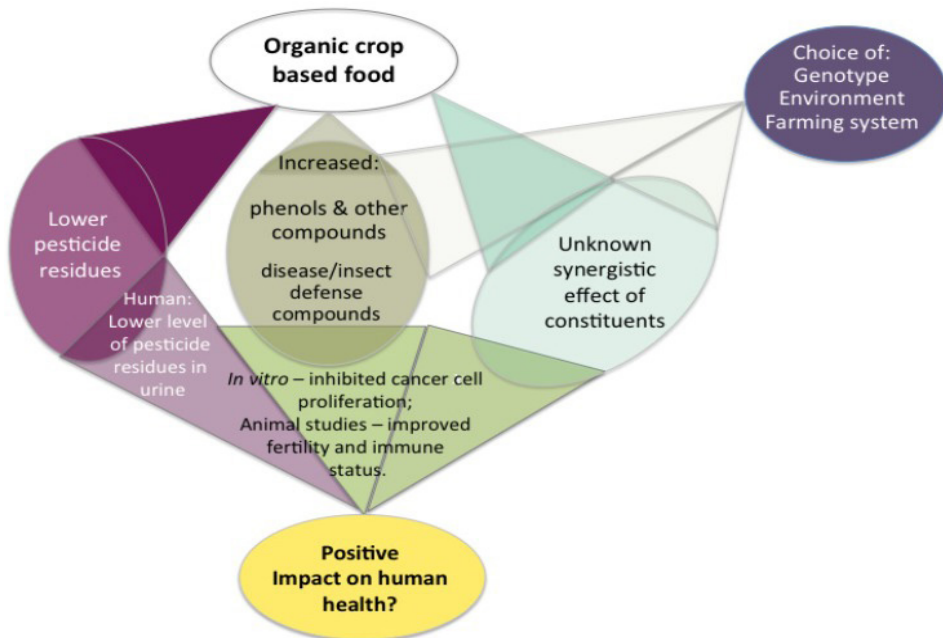
How Organically Produced Crops Contribute to Human Health?

Trough the world an increasing interest for food production in organic agriculture is seen and one key reason for this interest is the assumption that organic food consumption is beneficial to public health. Consumption of organic food seems to be positive from a public health point of view, and synergic effects between various constituents within the food are likely (Johansson et al., 2017).

Comparing the effects of organic and conventional production systems on chemical properties and phenolic compounds of two tomato types (standard and cherry) it was established that the higher level of bioactive compounds in organically produced tomato fruits compared to conventional ones. Tomato fruits contain a high level of antioxidants such as vitamin C, polyphenols (including flavonoids), and carotenoids (such as lycopene and β -carotene). The levels of carotenoids and phenolics are very variable and may be affected by ripeness, genotype and cultivation. Organic tomatoes presented a higher ratio of reducing sugars/organic acids, and contained significantly more total sugars, vitamin C and total flavonoids, 3-quercetin rutinose, and myricetin in comparison with the conventional fruitage (Hallmann, 2012). Organically produced plant derived food products have a higher nutritional value, including antioxidants than conventional ones. Due to the fact that there is a lower level of contamination in organic crops, the risk of diseases caused by contaminated food is significantly reduced (Györéné et al., 2006).

The reasons for an eventual positive effect of consumption of food based on organic crop on public health are summarized in Figure 3.

Figure 3. Proof of concept for interaction of different factors resulting in a possible positive impact on human health by organic crop based food.



Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4025038/>

Organic crops contain a significantly higher amount of certain antioxidants (vitamin C, polyphenols and flavonoids) and minerals, as well as have higher dry matter content than conventional ones. The products also have a lower level of pesticide residues, nitrate and some heavy metal (Györéne et al., 2006). The consumption of organic food, as well as regular and frequent consumption of organic products generally reduces the risk of overweight and obesity, both for women and men, as well as non-Hodgkin lymphoma in case of woman. Consumption of organic fruits and vegetables, as well as dairy products significantly reduces the risk of pre-eclampsia in pregnancy and eczema in infants. Positive effect on selected health problems probably results from a reduced amount of pesticide residues and an increased secondary plant metabolites intake which characterize organic food (Glibowski, 2020).

The uses of pesticides will increase the incidence of assorted cancers and therefore the risk of Parkinson unwellness [2].

Differences in the composition between organic and conventional crops are limited, such as a modestly higher content of phenolic compounds in organic fruit and vegetables, and likely also a lower content of cadmium in organic cereal crops. Organic dairy products, and perhaps also meats, have a higher content of omega-3 fatty acids compared to conventional products (Mie et al., 2017).

Besides the impact on public health through possible positive effects of consumption of organic food, public health might also be influenced through organic cultivation, for it effects the environment. The low amounts of pesticide residues and heavy metals reported in organically produced crops might be one part of bases for an anticancer effect of organic food (Johansson et al., 2014). Organic agricultures produce are good safety food system compared to conventional agriculture and lower impacts on the human, soil and atmosphere.

Conclusion

Agriculture have to find sustainable solutions to problem reduction of malnutrition with micronutrient which are alarming for human existence are needed. Organic production is ways in which plant nutritionists can contribute to preventing it in sustainable way. Organically produced plant derived food products have a higher nutritional value and antioxidants quantity than conventional ones but also a lower level of contamination in organic crops, which is why the risk of diseases caused by contaminated food is significantly reduced. That way produced plant foods will provide most of the nutrients that feed the developing world and will enable a healthy life for the human population.

Organic farming practices are designed to meet the following goals: Improve soil and water quality; Cut pollution; Provide safe, healthy places for farm animals (livestock) to live;

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