

## Current Status and Future Prospects of Organic Cereal Production in the World

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### Abstract

The aim of organic agriculture is production of high quality food, which will contribute to human health, nature protection and conservation of the overall ecosystem. Globally, cereals are the most organically grown crop (3.3 million ha). The greatest production takes place on the European continent. The most cultivated species are as follows: wheat, maize, rice, barley, oat, sorghum, millet, triticale and buckwheat. China and USA are global leaders in cereal production in the organic system. Organic cereal production in the Republic of Serbia has a primary role and is performed on the area of 4251.94 ha. The majority of this production is done in the region of Vojvodina. According to obtained scientific results, nutritive value, and especially with a view to the status and requirements of the market, cereal production is extremely actual. Moreover, due to unlimited possibilities and market requirements, cereal production is a great challenge to agricultural producers.

*Key words:* cereals, organic food, organic production, organic soil, market

### Introduction

The system of organic agriculture integrates the principles of ecology and agriculture, and thereby the sustainability and efficiency of the agro-ecosystem are provided.

This type of agricultural production is based on ethical principles of health, ecology, equity and care, with the aim to ensure higher quality of human health and life, with the development of rural economy (Subić et al., 2010; Torjusen et al., 2004; Šiljković, 2002).

Organic agriculture, as an ecologically sustainable system provides high crop yield with a minimum effect on environmental factors, especially on soil fertility, which is a basis of plant growth. On the other hand, conventional agriculture increases yields, but at the same time, has adverse effects on the ecosystem. Considering that the intake of fertilisers and energy in organic food production is lower by 34-53%, and of pesticides even by 97%, the reduction of yield by only 20% is not so significant (Pejanović et al., 2012). In his daily diet, man has been always using cereals. Daily consumption of whole cereal grains is one of the basic principles of healthy and proper nutrition. Organic cereal production has been increasing daily all over the world. Wheat, maize, rice, barley, oats, rye, sorghum, millet, triticale and buckwheat are the most commonly grown cereals.

The chemical composition of cereal grains and their properties are crucial factors of exceptional importance not only of food and feed produces but also in their industrial processing. The content of carbohydrates, important sources of energy, amounts in grain of the majority of cereals to approximately 70%. Furthermore, contents of proteins, fats and vitamins amount to 10-17%, 1.5-10% and up to 2%, respectively, while all this is accompanied by a high share of crude fibre and amino acids (Glamočlija, 2012). Maize, wheat and rice make up 87% of all grains produced world-wide, and at the same time provide 43% of total calories in food (Radosavljević, 2010).

Surveying global trends and scientific data on food production, the objective of this study was to present the most important traits and the state of organic cereal production in the world, because the organic agriculture sector is a major challenge not only for the economy, industry and science, but also for future generations.

## Organic agricultural production

While conventional agriculture is still the backbone of agri-food industry in all countries, especially European ones, organic agriculture has become its important integral part, and at the present time, despite the global economic crisis, it still has a trend of continuous growth and ever increasing interest of producers. Despite the fact that areas under this type of production have been increasing (especial in the EU countries), the demand for organic cereals, fruits and feedstuff is still unsatisfactory (Kalentić et al., 2014; Roljević et al., 2009).

According to the latest reports of FIBL and IFOAM (2016), organic production continues to have a positive upward trend - the demand of consumers has been increasing, which is reflected in the significant market growth of 11% in the USA, the world's greatest organic food market. More farmers are opting for this type of production. More land is certified organic and 172 countries in the world provide official reports on organic farming on their territories. The latest global data on organic agriculture were presented by FIBL (Research Institute of Organic Agriculture) and IFOAM (International Federation of Organic Agriculture Movement) at the BIOFACH fair held in Nurmberg (Germany) on February 12, 2016 ([www.organic-research.net/](http://www.organic-research.net/)). The market research company Organic Monitor has estimated that the global market for organic food in 2014 reached 80 billion US dollars (more than 60 billion euros) (Golijan and Popović, 2016). The leading countries are the USA, Germany, France and China with 27.1, 7.9, 4.8 and 3.7 billion euros, respectively ([www.ifoam.org](http://www.ifoam.org)).

According to the current data, 2.3 million organic producers were reported in 2014. As in previous years, the countries with the most producers were India (650.000), Uganda (190.552) and Mexico (169.703). Based on the most recent reports of FIBL and IFOAM (2016), by the end of 2014, organic producers managed 43.7 million hectares, which is an increase of almost 0.5 million hectares compared to 2013 data. Australia is the country containing the largest organic agricultural area (17.2 million hectares, with 97% of that area used for grazing), followed by Argentina (3.1 million hectares) and the USA (2.2 million hectares). A total of 40% of the global organic agricultural land is in Oceania (17.3 million hectares), followed by Europe (25% - 11.6 million hectares), and Latin America (15% - 6.8 million hectares) (Figure 1).

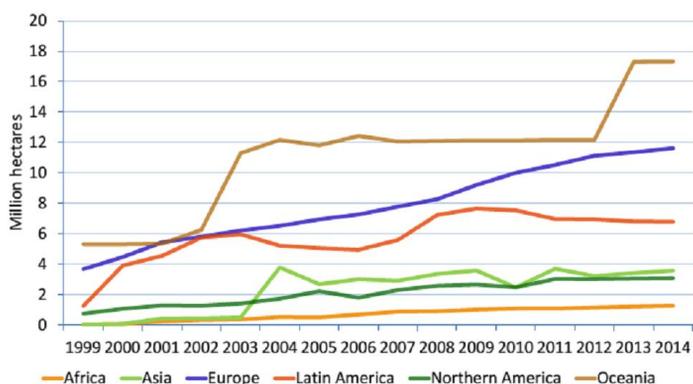


Fig. 1. Growth of the organic agricultural land by continent 1999-2014  
*Раст површина под органском производњом по континентима у периоду 1994-2014 година* (Source: <http://www.ifoam.org/>)

## Global production of organic cereals

Organic agricultural lands are divided into three main groups according to the type of crop: field crops (mostly cereals, vegetables, forage and industrial plants), permanent crops (orchards, vineyards, oil groves) and pastures. The area of 4.7 million hectares is used as pastures. This means that the share of pastures in the total organic agricultural land in the EU countries amounts to 45.7%. The share of field crops is 42.8%, while the share of permanent crops is the lowest and amounts to 11.5% (Forti and Henrard, 2015). Among field crops, cereals and forage crops occupy the largest areas in the EU countries, and these two crop categories together make up more than 80% of the total area of organic lands in even 14 countries (including the areas under conversion) ([www.fibl.org](http://www.fibl.org)).

In 2014, cereals had the largest share in the markets of Lithuania and Romania (61.8 % and 55.7 %, respectively) ([faostat.fao.org](http://faostat.fao.org)). Organic cereal production in the world still has a trend of continuous growth. In 2014, it was performed on the area of 3.3 million ha, which is an increase of 2.032.099 ha in the last 10 years. The greatest production is recorded on the European continent (1.911.845 ha), followed by Asia (755.473 ha), North America (557.329 ha), Latin America (123.223 ha), Africa (6.845 ha) and Oceania (2.724 ha). According to the FAO data ([faostat.fao.org](http://faostat.fao.org)), in 2013, cereal production was carried out on the area of 714 million ha, with only 0.5% within the system of organic production.

Based on data provided by FAO ([faostat.fao.org](http://faostat.fao.org)), the leading producers of cereals in the world are India (99.2 million ha), China (94.1 million ha), the USA (59.6 million ha) and Russia (40.3 million ha). China and the USA are the greatest producers of organic cereals (565.000 ha and 330.000 ha, respectively). It means that share of organic cereal production in China and the USA amounts to 0.6% and 0.55%, respectively. These two countries are followed by Canada (with 228.885 ha) and Italy (with over 200.000 ha). Areas under organic cereals production were increased twice in the period from 2004 to 2014 (1.2 million ha). However, in 2014, a drop of these areas of 78.000 ha or 2.3% was noted, mainly due to a great reduction in organic oats production in Canada ([www.ifoam.org](http://www.ifoam.org)). Available data point out that in 2014 less than 12% (over half a million ha) of areas under organic cereals crops were in the process of conversion, which would be a significant increase in their supply ([www.biofach.de](http://www.biofach.de)). Central and Eastern Europe are very large producers and exporters of cereals and grains. Cereals were the largest crop group covering 1.9 million ha in Europe (1.5 million ha in EU) out of 11.6 million ha under organic crops in the whole Europe (Lernoud and Willer, 2016).

In 2013, organic cereal production in Europe was practiced on the area of 1.854.727 ha, with a share of 1.4% in the total of agricultural land. These areas were increased in 2014 to 1.911.506 ha, whereby the share amounted to 1.5 %, hence the total change of these areas in relation to 2013 amounted to + 3.1 % (Tab. 1). Organic cereal production reached the growth of 38% in the 2005-2014 period. In the EU countries, Italy, Germany and Spain have the largest production of organic cereals (Meredith and Willer, 2016). Germany with a market share of organic products of 31% is the most important country to which Serbia exports not only cereals, but all categories of organic products, while France holds second place (17%), and is followed by Great Britain (10%) and Italy (8%) (Schaack, 2012; Riffiod, 2012; www.organicmonitor.com).

Tab. 1. Organic cereal production in European countries in 2014

*Органска производња житарица у земљама Европе у 2014. години*

Country <i>Држава</i>	Area under cereals (ha) <i>Пов. под житима (ha)</i>	Growth, 2013/14 <i>Раст, 2013/14</i>	Growth, 2005/14 <i>Раст, 2005/14</i>
EU-28	1.525.662	-0.3%	37.8%
Europe	1.911.506	3.1%	70.7%
EU-15	1.098.430	1.2%	15.6%
EU-13	427.232	-4.1%	171.6%
CPC	163.794	0.2%	-
EFTA	14.295	-3.4%	15.8%
Other Eur. countries	208.281	42.6%	-

*Source: Meredith and Willer (2016)*

According to previous reports of the Ministry of Agriculture and Environmental Protection (2016), total areas under organic cereal production amount to 4251.94 ha (out of which 2069.05 ha are in the process of conversion, while 2182.89 ha are organic agricultural land) (Figure 2).

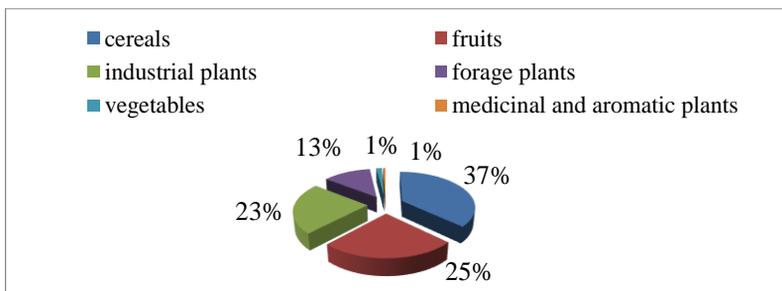


Fig. 2. The percentage share of areas under organic cereal production in Serbia in the total areas under organic plant production in 2015

*Удио површина под органском производњом житарица у Србији у укупној површини под органском производњом у 2015. години*

The largest organic cereal production was practiced in the region of the Province of Vojvodina in 2014 (with the share of 91%, i.e. 2583.54 ha). In the succeeding year (2015), this area doubled and amounted to 4045.57 ha (Figure 3). Somewhat smaller areas are located in southern and eastern Serbia (158.77 ha), Šumadija and western Serbia (16.15 ha), while the smallest area was reported to be in the vicinity of Belgrade (31.45 ha).

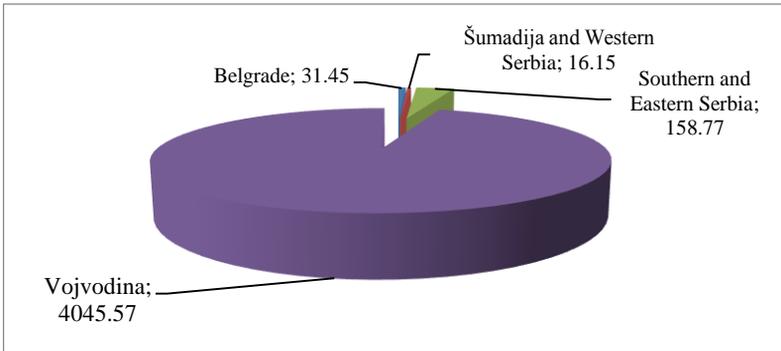


Fig. 3. Areas under organic cereal production over regions in Serbia (2015)  
*Површине под органском производњом житарица по регионима Србије (2015)*  
 (Source: Ministry of Agriculture and Environmental Protection, 2016)

The most significant organic cereal production is performed in the region of Vojvodina, and the greatest organic land areas (2800.88 ha) are located in the South Banat District.

## Conclusion

Conventional agriculture with high crop yields provides the survival of civilisation. However, hyperproduction is present in industrialised, developed countries, which is a significant problem in achieving profit, the main driving force of capitalism. One of types of solution of reduction of surpluses of this food and hyperproduction is encouraging agricultural producers to produce organic food by following a growing trend of demand in national and international markets, which is unlimited. Consumers in countries world-wide, particularly in those with smaller budget, respond to the reduced purchasing power caused by rising prices of organic food, because its consumption is not of primary importance. Although per capita income in our country has been increasing during the past 10 years, consummation of organic food is still limited due to the increase in prices. Organic products in our market are primarily imported, while amounts of cereals, vegetables, fruits and various processed products produced in our country are limited.

Despite all these factors, the increase of organic food production is reported not only in the world but in our country too.

Production of organic food of high nutritional value, such as production of organic cereals, is an important challenge to agricultural producers, because the potential of production and export of such products are unlimited.

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# Стање и перспективе органске производње житарица у свијету

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## Сажетак

Органска пољопривреда има за циљ производњу висококвалитетне хране, дајући допринос здрављу људи, благостању природе, као и очувању цјелокупног екосистема. На глобалном нивоу житарице су најзаступљенија врста усјева у органској производњи (3,3 милиона ha). Највећа производња одвија се на Европском континенту. Најчешће узгајане врсте су пшеница, кукуруз, пиринач, јечам, овас, раж, сирак, просо, тритикале и хељда. Кина и САД су водећи лидери у свету када је у питању производња житарица по органском систему. Од укупних површина са органским статусом у Републици Србији, примарну улогу заузима органска производња житарица (4251,94 ha). Највећи вид ове производње житарица одвија се у региону Војводине. Према досадашњим научним резултатима, нутритивној вриједности, а нарочито са освртом на стање и потребе тржишта, производња житарица је изузетно актуелна, а с обзиром на неограничене могућности и потребе тржишта представља велики изазов за пољопривредне произвођаче.

*Кључне ријечи:* житарице, органска храна, површине под органском производњом, органско земљиште, тржиште

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