Food and Agriculture Organization
of the United Nations

DEVELOPMENT OF ORGANIC AGRICULTURE IN CENTRAL ASIA

Proceedings of the International Conference held during 22-24 August 2017 in Tashkent & Samarkand, Uzbekistan

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Preface

Organic agriculture started in early twentieth century by pioneers who observed the changes in practices and lifestyles and tried to develop systems that kept natural processes as their guide. Parallel to the intensification around mid-twentieth century, negative effects started to appear on environment and human and animal health and consequently whole planet. Today, major economic problems, food security, malnutrition, unemployment or food prices and risks imposed by land degradation, water pollution, climate change and agricultural systems are discussed together for a better world in the future.

According to the data of 2015, organic agriculture is practiced in 179 countries out of which 88 have their own national legislative framework. The total area under organic management including in conversion has reached to 50.9 million hectares making up 1.1% of the total agricultural land. Additionally, 39.4 million hectares of organic land is devoted to wild collection. More than 2 million beehives and organic aquaculture are converted into organic on a total of 0.5 million hectares. The total retail market value has reached 85 billion US dollars, mainly in USA and Europe, Asia having a share of 8%. In Asia, China and India are the two leading countries for organic production.

Organic agriculture is defined in Codex Alimentarius as 'holistic production management system' which promotes and enhances agroecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. Organic on one hand reduces reliance on off-farm inputs and on the other hand requires locally adapted systems developed based on local and international knowledge and is governed by a legislative framework. The Food and Agricultural Organization of the United Nations (FAO) closely following the advances in the field of organic production and trade carried out Technical Cooperation Projects (TCP) in Central Asian countries to help governments in establishing a legislative framework, institutional and capacity building and identifying market opportunities. FAO in cooperation with the Ministry of Agriculture and Water Resources of Uzbekistan organized the International Conference on Development of Organic Agriculture in Central Asia during 22-24 August 2017 within the framework of the Project TCP/UZB/3501. The major objectives were to bring together experiences in Central Asian and neighboring countries, discuss locally adapted systems and best practices and finally to initiate a network to allow future cooperation. The Conference was attended by

researchers, extensionists, representative of civil society organizations, farmers' organizations and private companies as well as practitioners.

The Proceedings of the Conference aims to compile the data collected during the Conference and archive for future. It is composed of 6 chapters, including Declaration of the International Conference. The chapter on keynote speeches include presentations of Mr. Zejiang Zhou, the president of International Federation of Organic Agricultural Movements (IFOAM) Asia introducing organics worldwide and Asia, of Mr. Giuseppe Calcagni, Vice Chair of International Nut and Dried Fruit Foundation (INC) on dried fruit and nut industry and their demand for quality and Mr. Aydın Ünsal, Board member of Textile Exchange on requirements for organic cotton and textile industry. The chapter on Country profiles gathers data on specific aspects and data related to organic production. In Central Asian countries organic products are already being produced and exported to main markets; however, detailed and reliable data is not available. Thus, data gathered allows readers to evaluate status of organic in each country. The third chapter on legislation discusses the drafted legislative systems in different countries with strengths and weaknesses. The chapter on technical methods deals with the organic practices applied throughout the whole production chain from soil fertility, pest and disease management to post-harvest handling and processing. The final chapter on marketing focuses on domestic markets, export markets and producer and consumer attitudes in trade of organic products.

All papers are reviewed by 8 members of the editorial board before being compiled as the Proceedings. We express our gratitude to all who have attended the Conference, prepared manuscripts and reviewed and shared their experiences. Thanks also go to the organization committee.

The Proceeding of the Conference will surely provide the initial information to promote further collaboration between countries, institutions, research and practices and producers and traders. As mentioned in the Declaration of the Conference, we hope that this platform and the initiative will be further supported and repeated in the coming years.

Prof. Dr. Shukhrat Teshaev,
Vice-Minister, Ministry of Agriculture and Water Resources, Uzbekistan

Prof. Dr. Hafız Muminjanov,
Agricultural Officer, FAO

24 August 2017, Tashkent, Uzbekistan

Foreword

The mandate of FAO is to combat hunger and malnutrition that still affects almost 800 million people or about 12% of the world population. Considerable efforts are invested, to try and get rid of this dramatic situation in partnership with the member states, national and international research and development institutions.

FAO's major tasks consist of advising member states in defining and implementing food and nutrition security strategies adapted to the local agro-climatic conditions and the international food market context. It facilitates a forum for the establishment of food safety and quality standards, provides guidelines, and develops concepts related to different approaches and technologies for food production.

Green Revolution helped to considerably increase the world's food production based on the intensive crop varieties, inputs and energy. However, to meet the current and future food and nutrition requirements of an expanding population, agriculture should be based on "sustainable intensification". This approach includes a series of measures for the conservation of the natural resources and inputs, essentially, water, soil and biodiversity. This is replicable over time since it is sustainable from environmental, economic and social points of view.

The technical guidance for sustainable crop production intensification are based on the "Save and Grow" paradigm of FAO, aiming at increasing productivity with less and environment friendly inputs and appropriate methods.

The key principles of Save and Grow are the restoration and maintenance of the natural soil fertility, Conservation Agriculture and Integrated Pest Management to reduce or eliminate pesticide applications, which are harmful for the environment and the consumer.

This approach also covers organic agriculture that is one of the main areas of FAO's activities in the region.

Thus, I welcome this International Conference on Development of Organic Agriculture in Central Asia and congratulate the hosts and the participants for the excellent contributions and sharing the latest scientific information.

The international conference is organized jointly by FAO and the Ministry of Agriculture and Water Resources of Uzbekistan. We have the participants from

about 20 countries to discuss the lessons learned on adoption and promotion of organic agriculture. Interactive discussions at the Conference will allow participants to analyse the status and the perspectives of organic production in their home countries. The conference will also aim to hammer out a strategy for accelerating the spread of organic production in the region – taking into account environmental, economic, social, policy, and institutional factors. This will help to make organic agriculture more performant and sustainable not only in Central Asia but will create an impact in other regions.

We know that statistics on organic agriculture have not always been easy to access. That is a reason why FAO has recently included this type of information in FAOSTAT. Also, FAO maintains and monitors an Organic Agriculture network. Additionally, technical assistance is provided to governments seeking to establish organic agriculture systems for both domestic and international markets.

FAO is specifically interested in identifying opportunities and market niches of organically produced crops in developing countries and countries with emerging economies. These are of interest for the small-scale farmers, who still form the great majority of the farming community who supply our daily food.

In this context, FAO has been assisting member countries in developing organic supply chains of different commodity groups based upon the needs of the country or the region (for example tropical fruits in West Africa and the Caribbean, cotton in East Africa, medicinal plants in South Asia, tea in East Asia), improving operators' skills and supporting services capacities (in Bolivia, Peru, Serbia, Palau), developing organic guarantee systems (in Turkey, India, Mongolia, Macedonia, Azerbaijan), strengthening stakeholders participation and national strategies (in Eastern Europe and Central Asia).

The latest global data on organic farming as presented in the 2015 survey carried out by the Research Institute of Organic Agriculture and IFOAM and announced in the 2017 reveals that the positive trend seen in the past years continues: Consumer demand is increasing, reflected in the significant market growth of 11% in the United States of America, the world's largest organic market. More farmers cultivate organically, more land is certified organic, and 179 countries report organic farming activities.

The market research company Organic Monitor estimates the global market for organic food in 2015 to have reached 81.6 billion US Dollars (equal to more than 75 billion Euros). The United States is the leading market with 35.9 billion

Euros, followed by Germany (8.6 billion Euros), France (5.5 billion Euros), and China (4.7 billion Euros). In 2015, most markets showed a two-digit growth rate. Denmark has the highest share of organic in the food market by 8.4%. The highest per capita spending was in Switzerland (262 Euros), Denmark (212 Euros) and Sweden (196 Euros).

Currently there more than 2.4 million organic producers in the world. As in previous years, the countries with the most producers were India (585,200), Ethiopia (203,602) and Mexico (200,039).

A total of 50.9 million hectares were organically managed at the end of 2015. Annual growth made between 2014 and 2015 was 6.5 million hectares, the highest seen till to date.

More than 10% of farmland is organic in 11 countries. Australia is the country with the largest organic agricultural area (22.7 million hectares, with 97% of that area used for grazing), followed by Argentina (3.1 million hectares) and the United States of America (2.0 million hectares). 45% of the global organic agricultural land is in Oceania (22.7 million hectares), followed by Europe (25%; 12.7 million hectares) and Latin America (13%; 6.8 million hectares) (FIBL&IFAOM, 2017).

There are also come constraints faced for the promotion of organic agriculture that are related to:

i. the needed incentives or subsidies to compensate for yield and income reduction during the transition period (this is valid only when conversion is from a high input system and this is usually not the case in small scale low-input farming systems in developing countries) and
ii. to the process and cost involved for the certification, which is a requirement for added value.

Despite that today organic agriculture is developing in the countries with different size and economy, some small countries, such as Bhutan and the Pacific island of Niue have opted for an "all organic" strategy, in order to compete with quality products and landscapes. More recently, Kazakhstan and Iran requested FAO for assistance in organic agriculture to better position themselves and providing pesticide-free systems for their consumers. FAO also assisting Azerbaijan in improving national legislation and institutional set up for organic production, certification and marketing. Similar activities is being implemented also in Kyrgyzstan and Tajikistan.

In Uzbekistan, currently FAO, in close cooperation with the Ministry of Agriculture and Water Resources, is implementing a project on the development of organic farming and institutional capacity building. In the framework of the project the technical support provided in formulation of the law and national regulations and standards as well as improving the capacities of farmers, researchers, extension specialists and policymakers. The projects also assisted to carry out the study on status of organic production in Kazakhstan and Azerbaijan and define the future prospects within the global context. Also the books are published in Russian, English and National Languages. We consider these books as our contribution to the Region and a good present for the Conference participants.

The Book for Uzbekistan is in preparation and aim to facilitate and fasten sound implementation of organic agriculture in Uzbekistan and Central Asia. One of the tangible outputs of the project in Uzbekistan is the organization of this International Conference that will help networking, further regional cooperation and increase outreach and sustainability through the publication of the Book of Conference Proceedings in English, and Russian.

With this few remarks, I would like to thank the Conference organizers, warmly welcome you all and wish a very productive meeting hoping this Conference will be an opening for a series of conferences in Central Asia.

Ms. Yuriko Shoji,

FAO Sub-regional Coordinator
for Central Asia,
FAO Representative in Uzbekistan

CHAPTER I: KEYNOTE SPEECHES

1

Current status and development trend of organic agriculture in the world and Asia

Zejiang Zhou[1]

Abstract

The paper aims to give an overview of development in organic farmland and markets during the last two decades by presenting latest available figures on overall production trends, types of production, producers, and market values and shares. There is a significant share in the area under organic management but higher increases are seen in the markets especially in developed countries. Asia especially appears as a production center embracing 35% of organic producers and possess further future potential for organic production.

Key words: producers, markets, retail value, beekeeping, cotton, wild collection

Organic agriculture in the world

The total land under organic management has reached to 50.9 million hectares in 2015 and its share in the total land is 1.1% (Figure 1). Oceania has the largest share due to bigger farm sizes and type of production (Figure 2). Similarly, Australia, which contributes to Oceania as the region, leads as a country. It has far most the largest organic area, which is mainly devoted to extensive animal husbandry (Figure 3). Australia is followed by Argentina. If the share of organic is considered, then the situation differs and Liechtenstein becomes the leader with 30.2% organic share followed by Austria (21.3%), Sweden (16.9%) and Estonia (16.5%). According to figures of 2015, there are more than 10 countries having organic area more than 10% of the total (Figure 4).

The area of cultivated organic land has exceeded that of wild areas (Figure 5); however, the crops or type of utilization varies from one regions to the other (Figure 6). In Oceania, almost all of the organic land is devoted to permanent grassland whereas in Europe and North America, shares of arable land and permanent grassland are close to each other. At worldwide level, permanent grasslands cover 65%, arable land 20%, permanent crops 8% and others or no details 7%. The development between 2004 and 2015 show that all land

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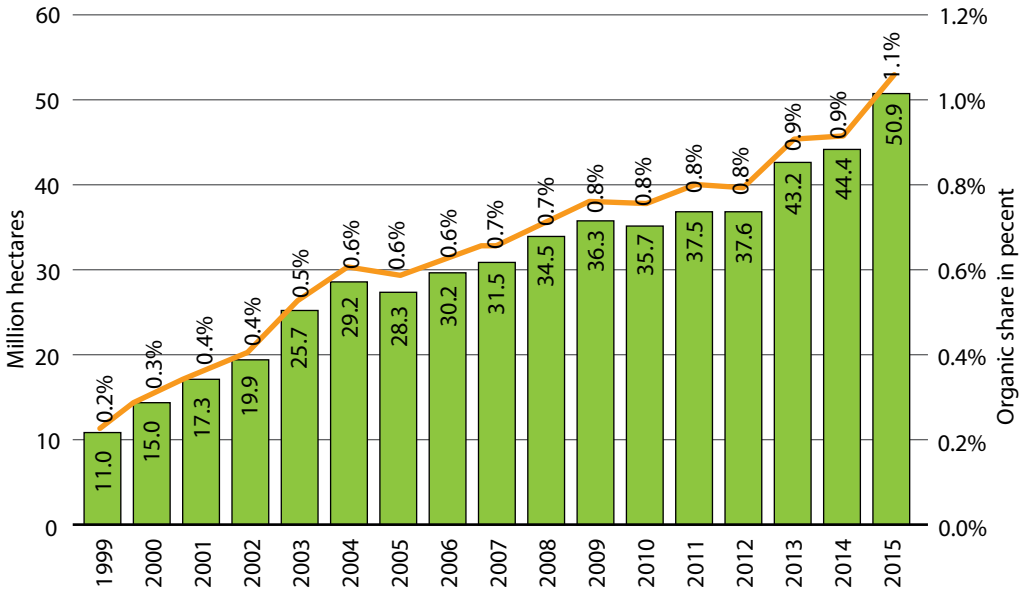

Figure 1. Growth of the organic land and its share in total agricultural land between 1999 and 2015
(Source: FIBL, IFOAM and SOEL Surveys 1999-2017)

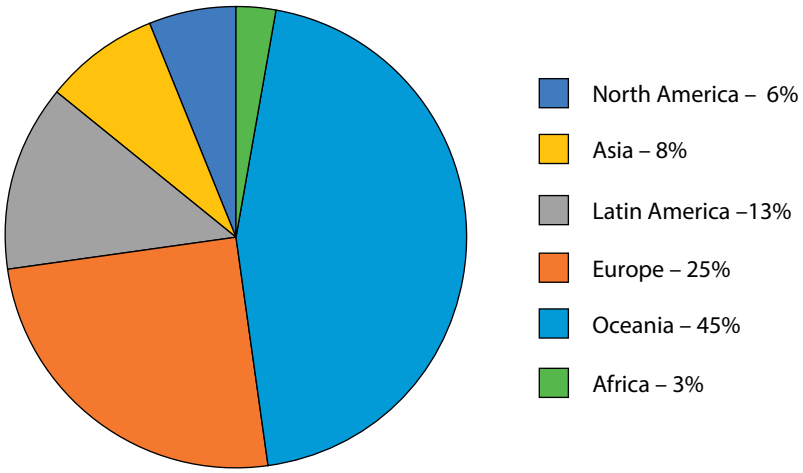

Figure 2. Distribution (%) of organic land by regions in 2015
(Source: FIBL Survey 2017)

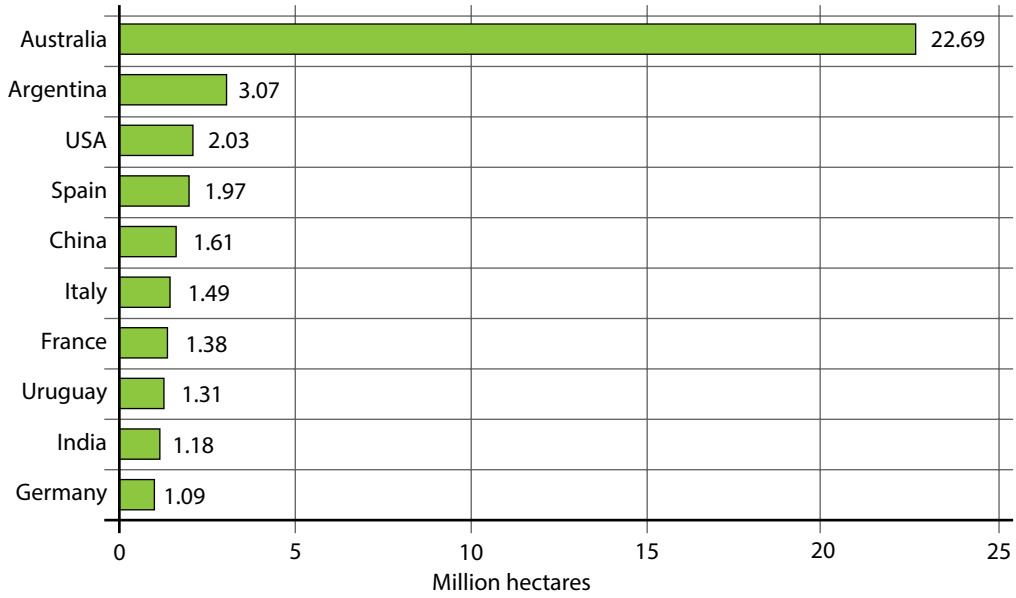

Figure 3. Top ten countries with the largest areas of organic land in 2015
(Source: FIBL Survey 2017)

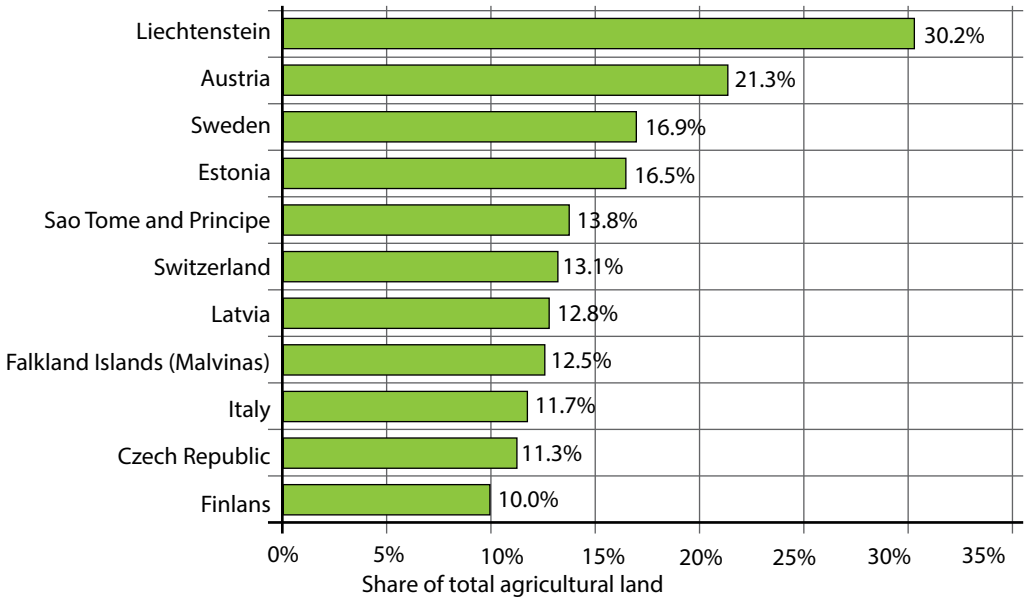

Figure 4. Countries with at least 10% share of organic in total agricultural land
(Source FIBL Survey 2017)

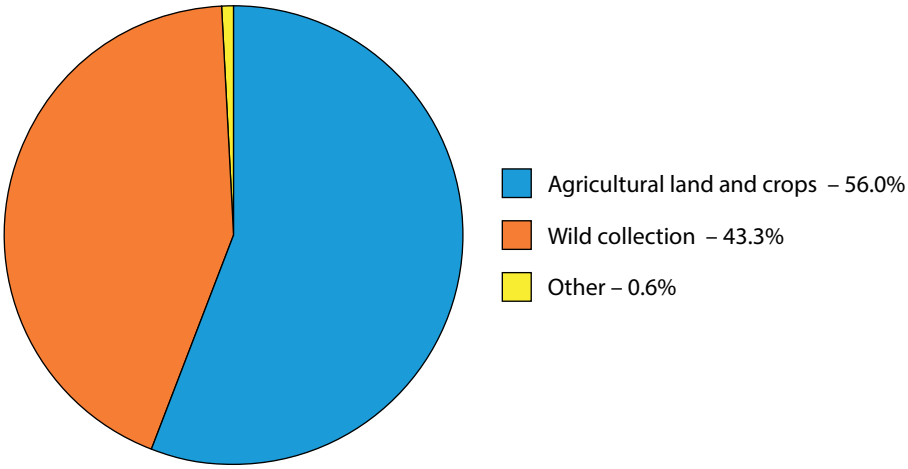

Figure 5. Distribution of all organic land (Source: FIBL Survey 2017)

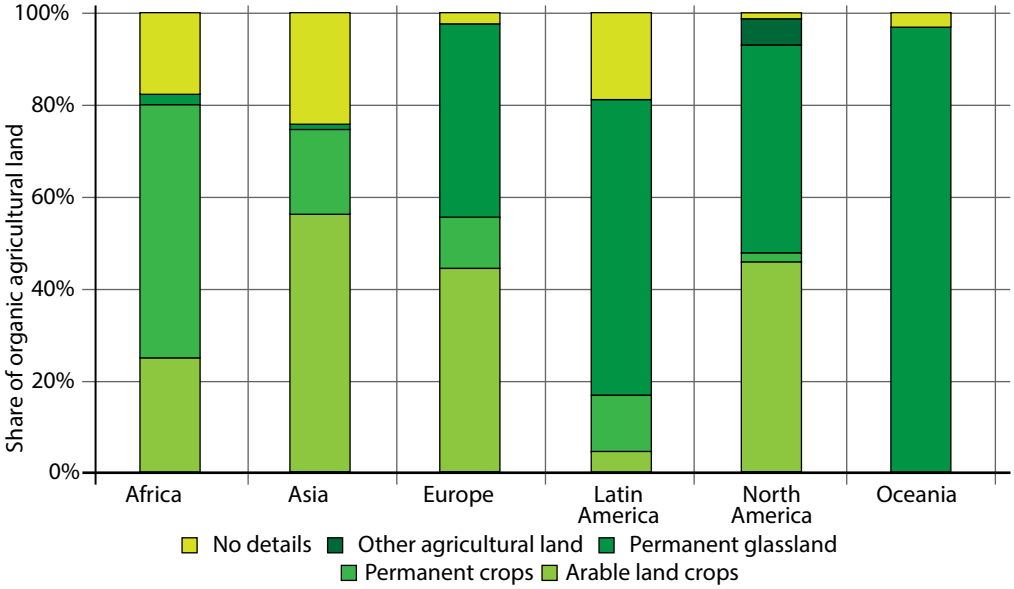

Figure 6. Distribution (%) of main land uses of organic cultivated land (Source: FIBL Survey 2017)

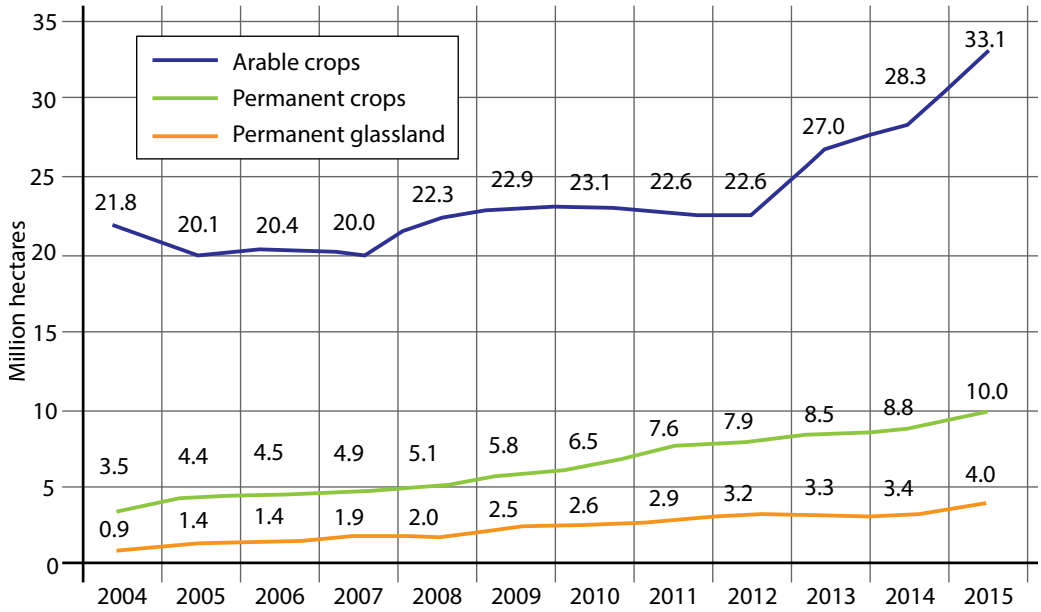

Figure 7. Development of organic land by land use type
(Source: FIBL, IFOAM, SOEL Survey, 2017)

use types have increased in organic however lately the highest increase is in permanent grasslands (Figure 7).

Key arable crops are cereals (3.89 million hectares), green fodders (2.51 million hectares), oilseeds (1.24 million hectares), fiber crops (0.45 million hectares) and dry pulses (0.41 million hectares). As seen in Figures 8 and 9, dry pulses acreage displays a steady growth with a higher increase in 2015 whereas organic cotton showed a decrease after a peak in 2009-10 season. Among permanent crops, coffee is leading with 0.91 million hectares, followed by olives (0.67 mio ha), nuts (0.41 mio ha), other fruits and berries (0.37 mio ha) and grapes (0.31 mio ha) (FIBL Survey, 2017).

Organic production activities may differ from one region or country to the other based upon the prevailing conditions. For wild collection, Europe is the leading region by contributing 45% to the organic area mainly due to vast areas in Finland, Romania and Bulgaria (Figure 10). Africa comes the second with 30%, Asia the third with 14%, Latin America by 10% and North America by 0.1%.

Organic beekeeping areas are also increasing worldwide. There was a 3.7 fold increase in the number of beehives between 2007 and 2015 reaching to

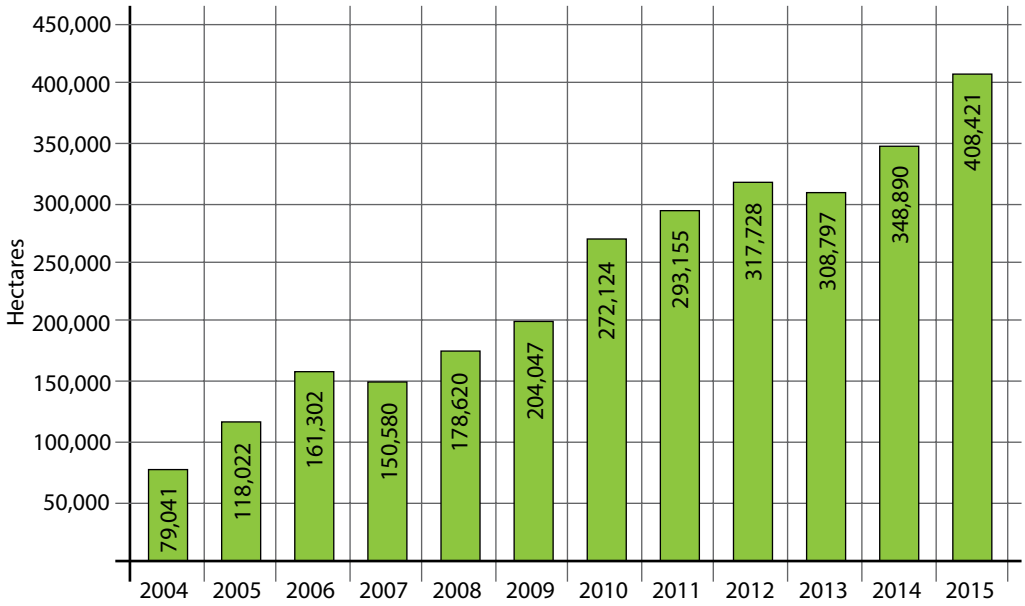

Figure 8. Dry pulses: Development between 2004 and 2015
(Source: FIBL, IFOAM and SOEL Survey, 2016-2017)

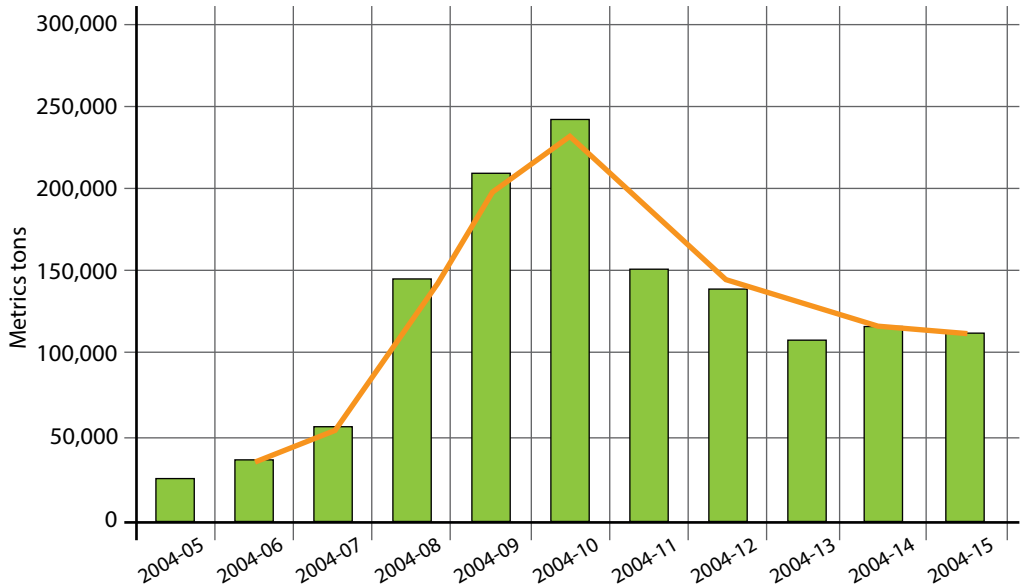

Figure 9. Organic cotton fiber lint: Production trend since 2004-2005
(Source: Textile Exchange)

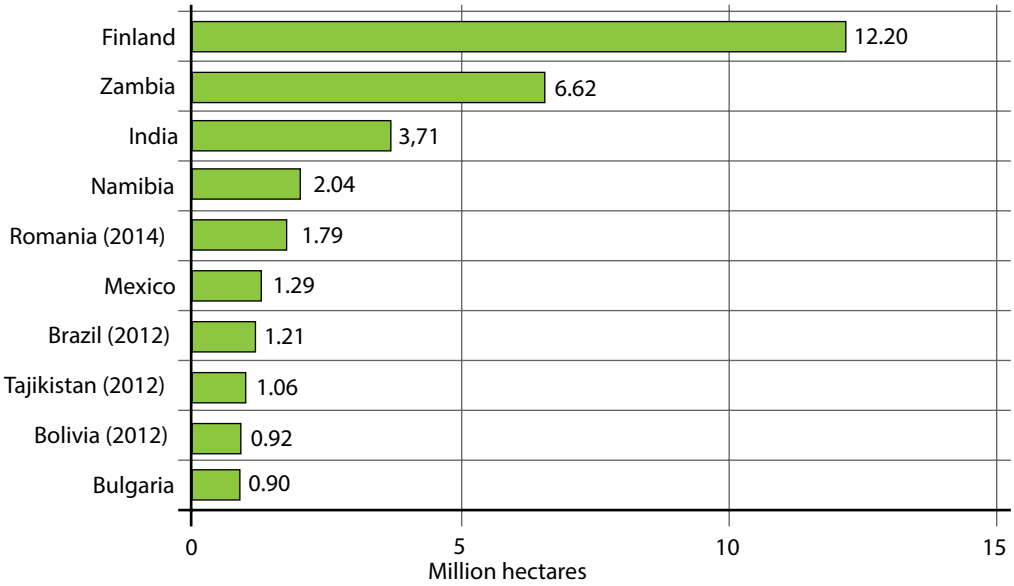

Figure 10. Ten countries with the largest area of organic wild collection
(Source: FIBL Survey 2017)

2 055 485 beehives. Organic beehives are mostly in Latin America (45%) and Europe (40%) followed by Asia (8%), Africa (6%) and others (1%). Among top ten countries, Brazil is the leader by having more than 30% of the world organic beehives, followed by Italy, Bulgaria and China (Figure 11) (FIBL Survey, 2017).

The total area devoted to organic aquaculture is reported as 31 279 even if stated as not complete (FIBL Survey, 2017). Eighty percent of these areas are in Asia, 19% in Europe and 1% in Latin America. In terms of production volume, China is the leading country (Figure 12).

Organic producers

According to 2015 figures, there are 2.4 million organic producers. There has been a steady increase since 1999 and the increase in the number of producers was by more than 160'000, or over 7% between 2014 and 2015 (Figure 13). The country with the most organic producers is India, followed by Ethiopia and Mexico (Figure 14). More than 84% of the producers are in Asia, Africa, and Latin America. The shares of continents are as follows: Asia (35%), Africa (30%), Latin America (19%), Europe (14%), Oceania (1%) and North America (1%).

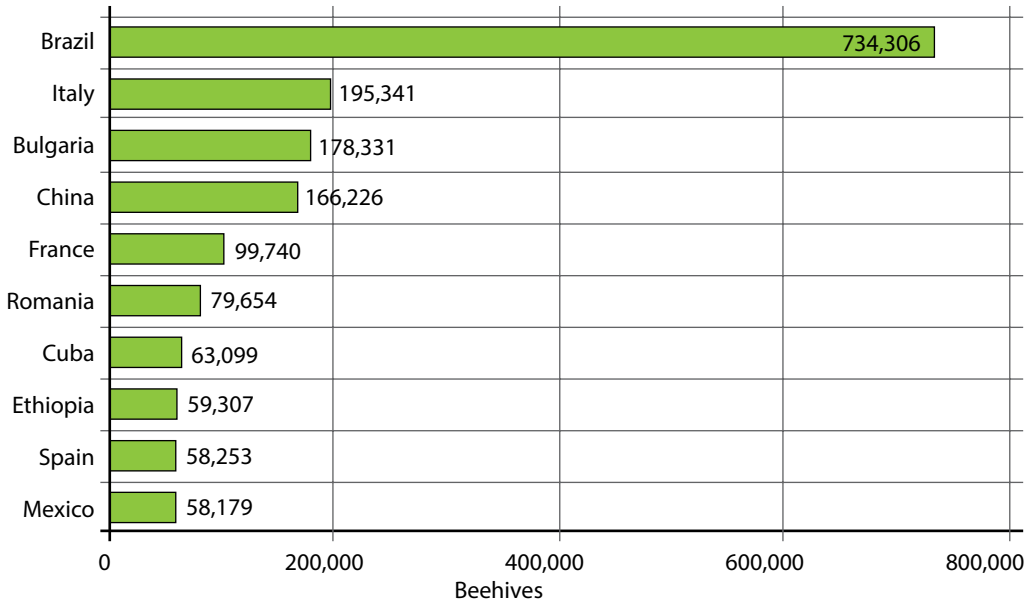

Figure 11. Ten countries with the largest number of beehives
(FIBL Survey, 2017)

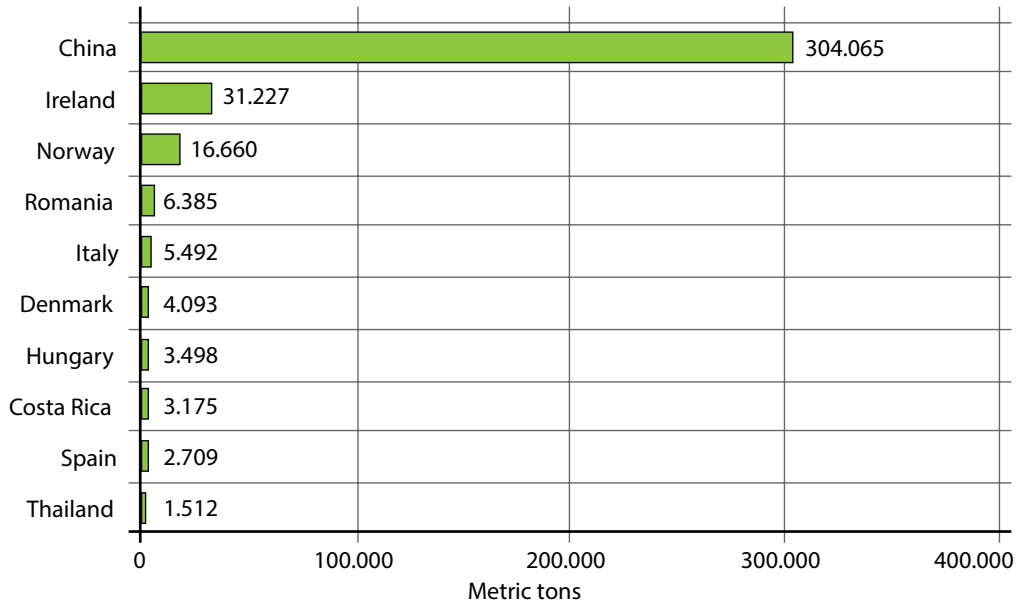

Figure 12. Top ten countries in organic aquaculture by production volume in 2015
(FIBL Survey, 2017)

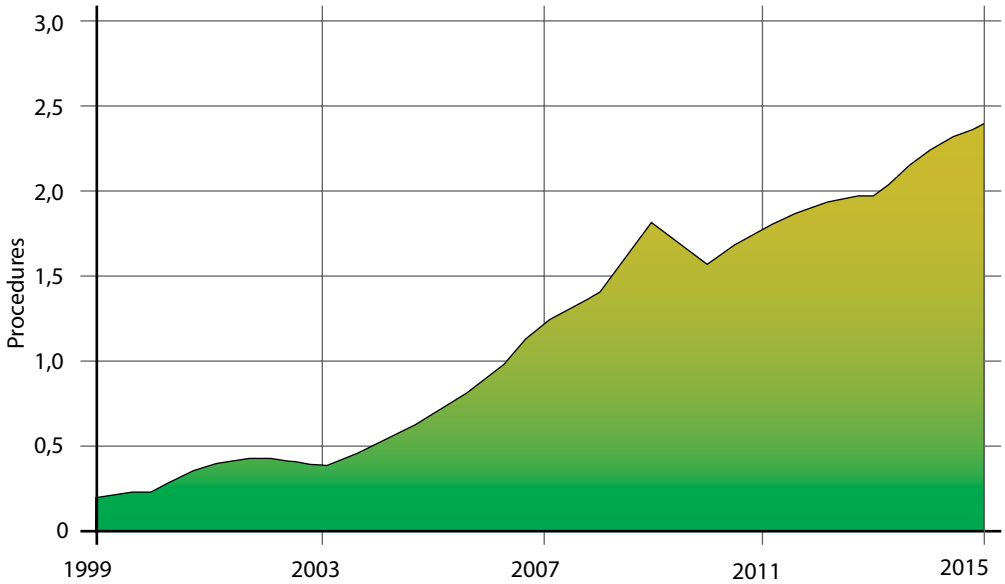

Figure 13. Increase in the number of producers between 1999 and 2015
(Source: FIBL, IFOAM and SOEL Surveys)

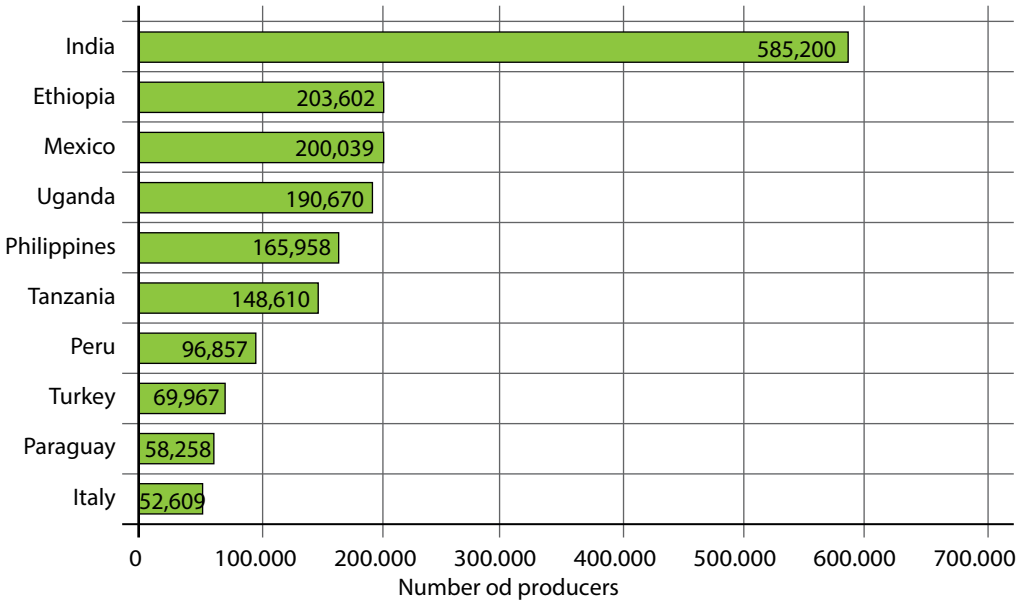

Figure 14. The top ten countries with the highest number of producers
(FIBL Survey 2017)

Organic markets

All over the world, the organically managed farmland as well as the value of organic products reaching to the consumers are increasing. As could be seen in Figure 15, the retail market size is increasing at a higher rate than the production giving opportunities for new producers. The world market of organic agricultural and food products is reported as 75 billion Euros in 2015. The largest single market is the USA followed by the EU (27.1 billion €) and China. The countries with the largest market for organic food are the United States (35.8 billion €), followed by Germany (8.6 billion €), France (5.5 billion €) and China (4.7 billion €). By region, North America has the lead (38.5 billion €), followed by Europe (29.8 billion €) and Asia.

The highest shares of the organic retail sales as value on country and regional basis is shown in Figure 16. The highest shares of organic market as percent of the total market is in Denmark (8.4%), followed by Switzerland (7.7%), Luxembourg (7.5%), Sweden (7.3), Austria (6.5% figures of 2011), Germany (4.8%), Netherlands (4.3%), France (2.9%), Belgium (2.5%) and Italy (2.3%). As two leading markets, the retails sales of organic foods in USA and in European Union are showing a continuous growth as presented in Figures 17-19. In Europe, the growth prevails both in EU and non-EU countries. Except, Italy, Belgium and France where organic retailers still have important shares in sales, general retailers almost dominate organic retailers in all other European countries.

Organic agriculture in Asia

Organic agriculture has been rather stable during the period between 2004 and 2005. The sharp increase in 2004 is mainly due to inclusion of China in data collection (Figure 20). China and India are the leaders in organic production not only in Asia but also at world level (Figure 21). Most of the organic production comes from arable crops as cotton, oil seeds and permanent crops as tea, nuts or dried fruit. Major crop pattern varies from one country to the other (Figure 22).

Conclusion

Organic production of agricultural and food products are increasing. Now it is the third phase of the global organic movement. Starting from early 20th century, during the first phase, Organic 1.0, Pioneers were concerned about the lifestyle, food, farming practices and relationships between human health and the health of the earth.

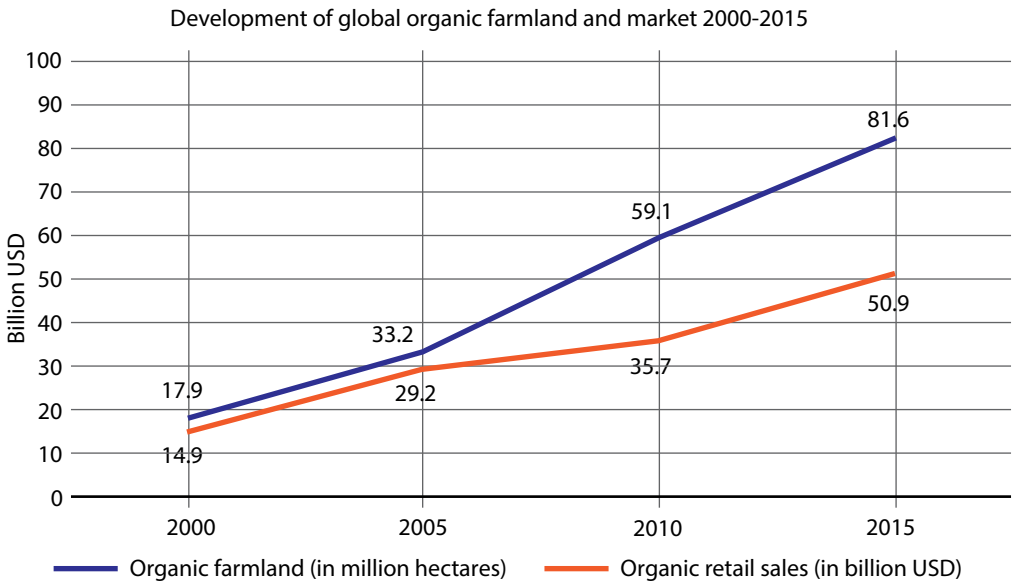

Figure 15. Increases in organic farmland area (mln ha) and retail market value (bln USD)
(Source: Organic Monitor (market) and FiBL survey 2002-2017 (farmland))

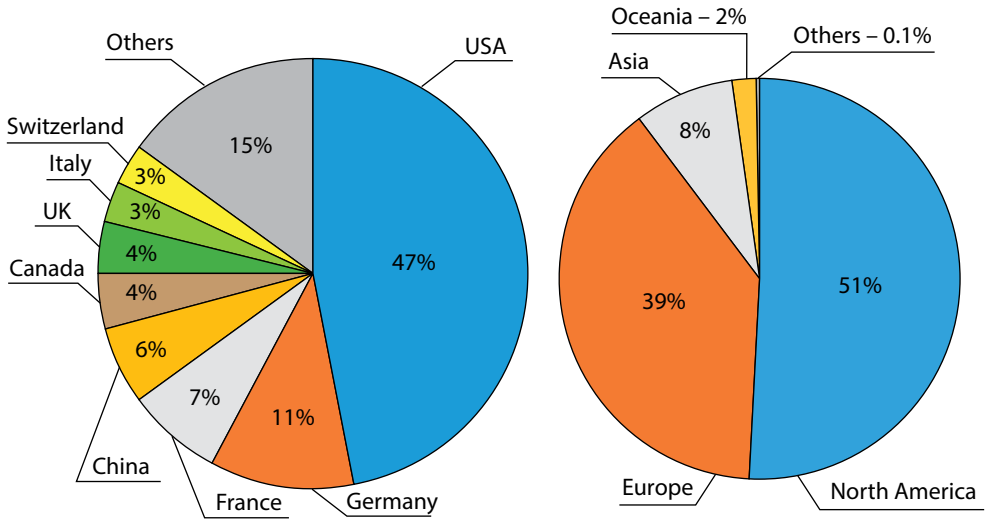

Figure 16. Global shares (%) of organic in retail market values in countries and in regions
(Source: FIBL Survey 2017)

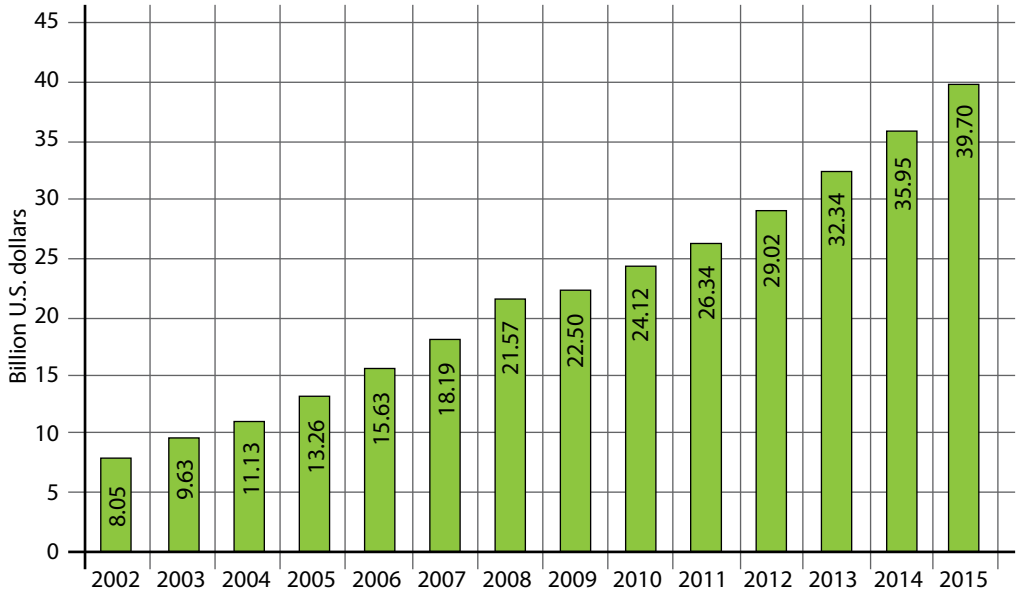

Figure 17. Growth of retail sales of organic food in US (2002-2015)
(Source: Organic Trade Association)

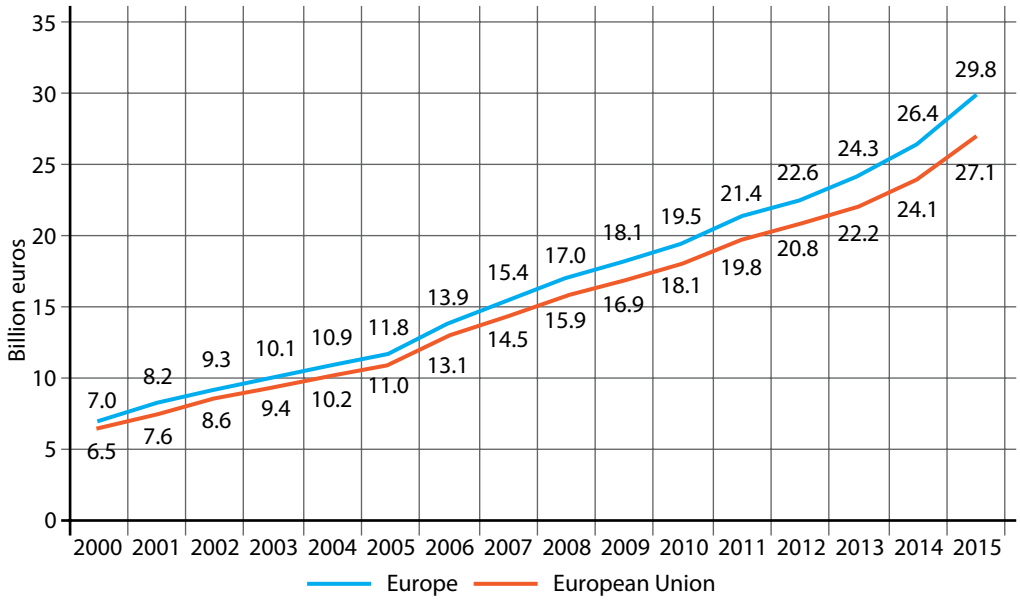

Figure 18. Market development of organic food in Europe and European Union
(Source: FIBL, AMI Surveys 2006-2017, Organic Data Network Surveys, 2013-2015)

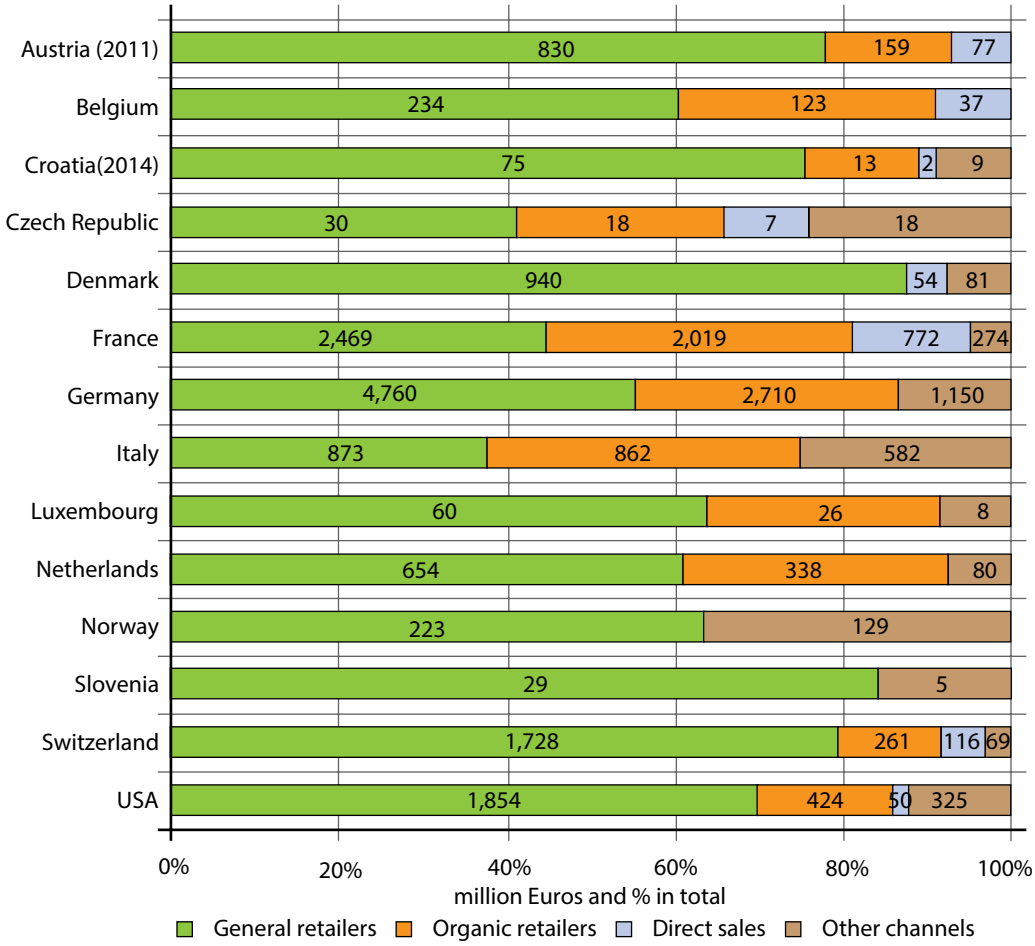

Figure 19. Retail sales values (mln Euros) and shares (%) by channels in selected European countries based on retail sales value in 2015 (Source: FIBL Survey, 2017)

The Organic 1.0 ended when IFOAM (International Federation of Organic Agriculture Movements (www.ifoam.bio)) was established in 1972. The second phase, Organic 2.0, started with IFOAM and was defined by codifying organic agricultural systems/certification systems along with government regulations as well as the development of organic technology and organic market.

IFOAM launched Organic 3.0 in 2015 with the mission of maintaining and enhancing the ecological and environmental sustainability of the planet, promoting the harmonization within human beings, and between human beings and the nature and laying firm foundation for the mainstreaming of organic agriculture.

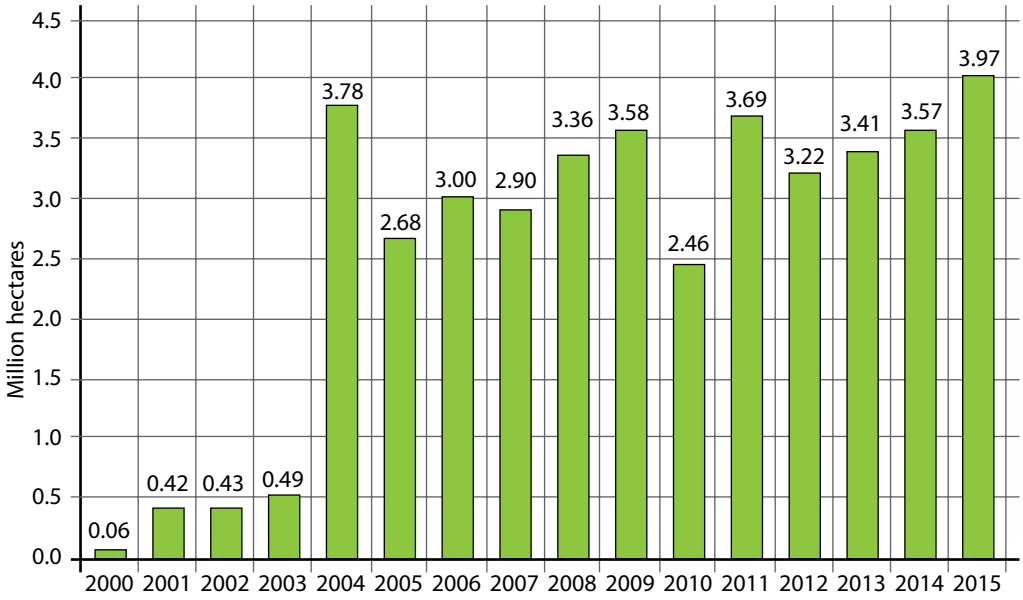

Figure 20. Development of organic agricultural land in Asia between 2000 and 2015
(Source: FIBL, IFOAM, SOEL Surveys 2002-2017)

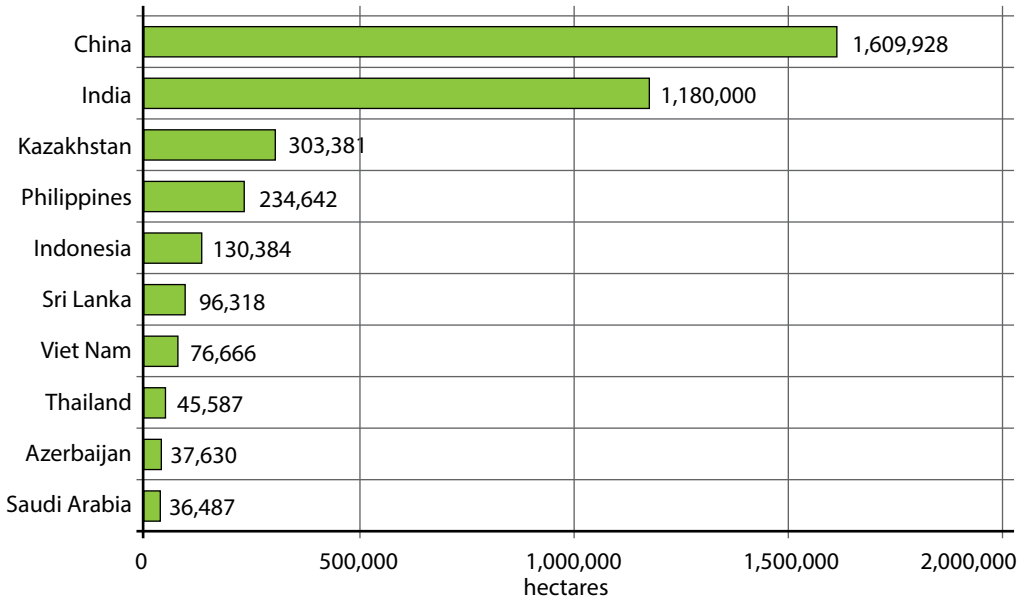

Figure 21. The ten countries with the largest organic area in Asia
(Source: FIBL Survey, 2017)

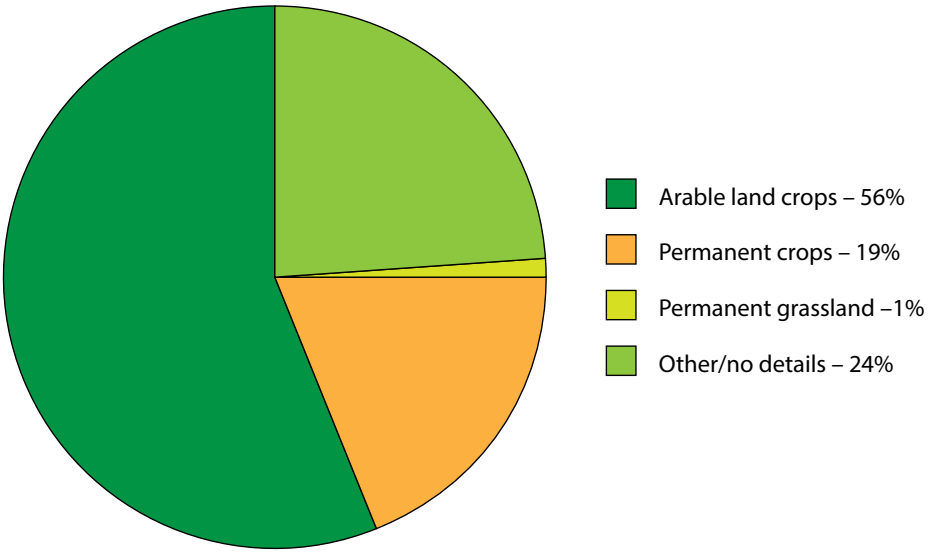

Figure 22. Land use types in organic agriculture in Asia
(Source: Survey, 2017)

Textiles from organic cotton and products

Aydın Ünsal[2]

Abstract

Parallel to the increasing awareness for environment and health, organic cotton production and products made of organic cotton and bio fibers are increasing. This paper gives an overview of organic cotton production and market size, major players and standards applied in the sector.

Key words: Textile exchange, bio based fibers, standards, traceability, manufacturing

Introduction

Most consumers do not know that almost 90% of conventional cotton is grown from genetically engineered seeds. Conventional cotton is considered as one of the most polluting and toxic crops in the world. Although it adds up to around 2.5% of the worldwide cropland, conventional cotton uses very high percentages of many chemicals. Although Genetically Modified (GM) seeds were supposed to be resistant to insects and pest and reduce use of chemicals, now they are using more chemicals especially herbicides as it has created new chemical resistant pests.

Damages caused by conventional cotton do not stop after cotton is picked from the fields. All these toxic chemicals used result in the discharged wastewater affecting the environment dangerously and damaging the ecosystems, which causes people to be exposed heavy doses of toxins. In addition, human rights violations and environmental tragedies are found in many cotton producing countries. Many African governments find it difficult to resist genetic technology lobby. Governments and foundations believe that genetic technology can defeat hunger in Africa.

Many of us may not realize that almost 60% of cotton is food. Cotton seeds end up in our food chain as cottonseed oil used in cooking and cottonseed meal as animal feed. Toxic pesticides used on conventional cotton also contaminate other neighboring food crops as chemical sprays drift along with the wind.

[2] Egedeniz Textiles, İzmir, Turkey (aydinunsal@superonline.com)

Cotton-synthetic blend fabrics also cause environmental pollution by introducing microfibers in the surrounding waters. Evaluating all these not so friendly or not so pleasant aspects of conventional cotton, over the years some brands started to investigate their sourcing of fibers used in their products. Industry knew it would not change overnight, but driven by their top managers, started to think sustainable business strategies would be the solution. Some companies are actively investigating ways to produce environmentally friendly products; the consumers can also contribute to solution by slowing down with consumption and take good care of their possessions.

In textile industry, world fiber consumption, oil-based synthetic fibers have more than 62% share and cotton has 25% share, which are followed by wood-based cellulose fibers around 6.5%, other natural fibers 5.5% and wool 1% (Figure 1). Twenty-five percent cotton share includes around 100,000 tons organic cotton whose is trying to go mainstream after many years of being a niche product. Only less than 1% is grown with organic agricultural practices.

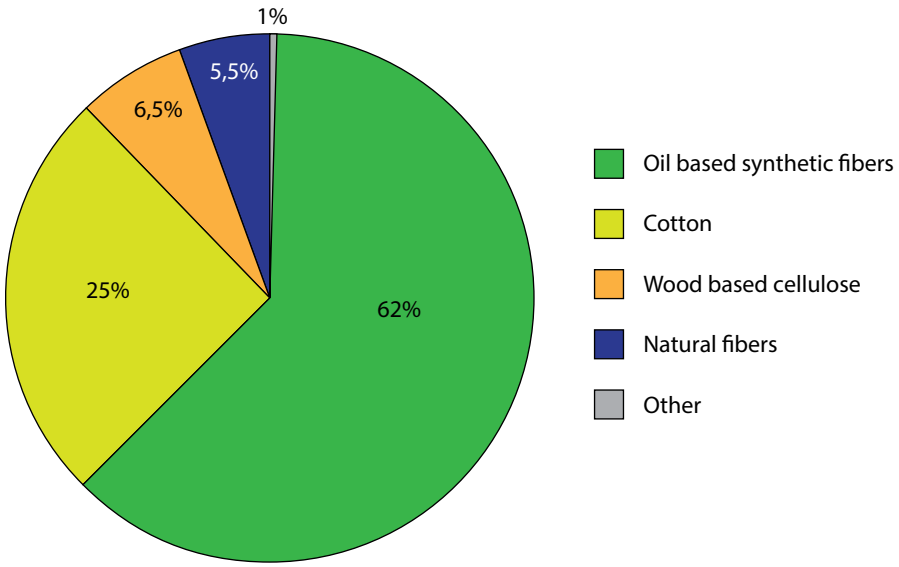

Figure 1. Share of fibers in textile industry (Source: Textile Exchange)

Organic cotton production and the market

Organic cotton production started first in Turkey through a Dutch project in 1990s. However, the project later moved to Africa. Today, Turkey ranks the third in organic cotton production.

Organic cotton fiber production peaked in 2009/10 season in the world (Figure 2) but further onwards there was a decline of about 3.8%. There were various reasons for this decline including the war in Syria, which had become one of the top ten organic cotton producers.

According to the figures of 2014-15, 193,840 farmers produce organic cotton on 350 033 hectares. The area starting conversion to organic between 2014/5 and 2017/eight are 85 671 hectares. The amount of organic cotton fiber produced is 112 480 meters. The Organic Cotton Market Report (OCMR) 2016 states that the market value is 15.8 billion US dollars with a stable growth. The GOTS and OCS certified facilities increased by 2%. Total organic fiber production equaled to 112,488 mi.

Who is the organic consumer? More and more people are buying organic, and the profile of these shoppers is gradually changing. Young, socially conscious

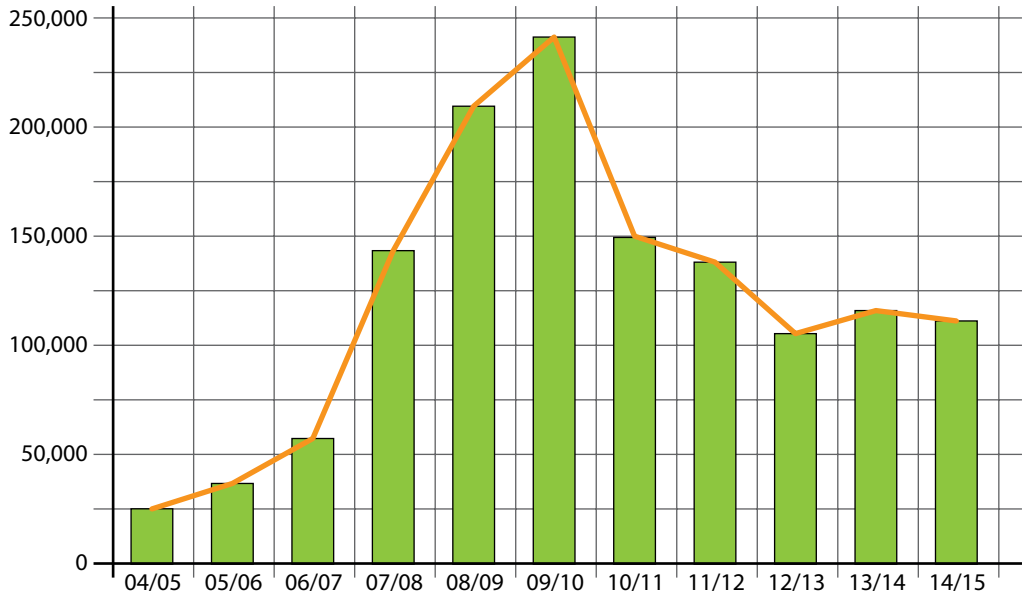

Figure 2. Global fiber production trends in organic cotton (Source: Textile Exchange)

consumers have contributed to growth in organic food and drink categories and will be the loyal shoppers of the future. Organic consumer is more likely to be between 25 and 44 and from a higher sociodemographic group. They are likely to have a household with three or more people, be working and have children. Millennials, people born from 1980 to the early 2000s, are also a key organic consumer. Those who like to look after their health and people with a strong social, ethical and environmental conscience and those willing to pay extra for products with associated quality assurance standards make up the new group of consumers.

As could be seen in Figure 3, major organic producers are India, producing 66.9%, followed by China, Turkey, Kyrgyzstan and USA. Other producer countries making up the remaining 8 % of the world production are mainly in Africa.

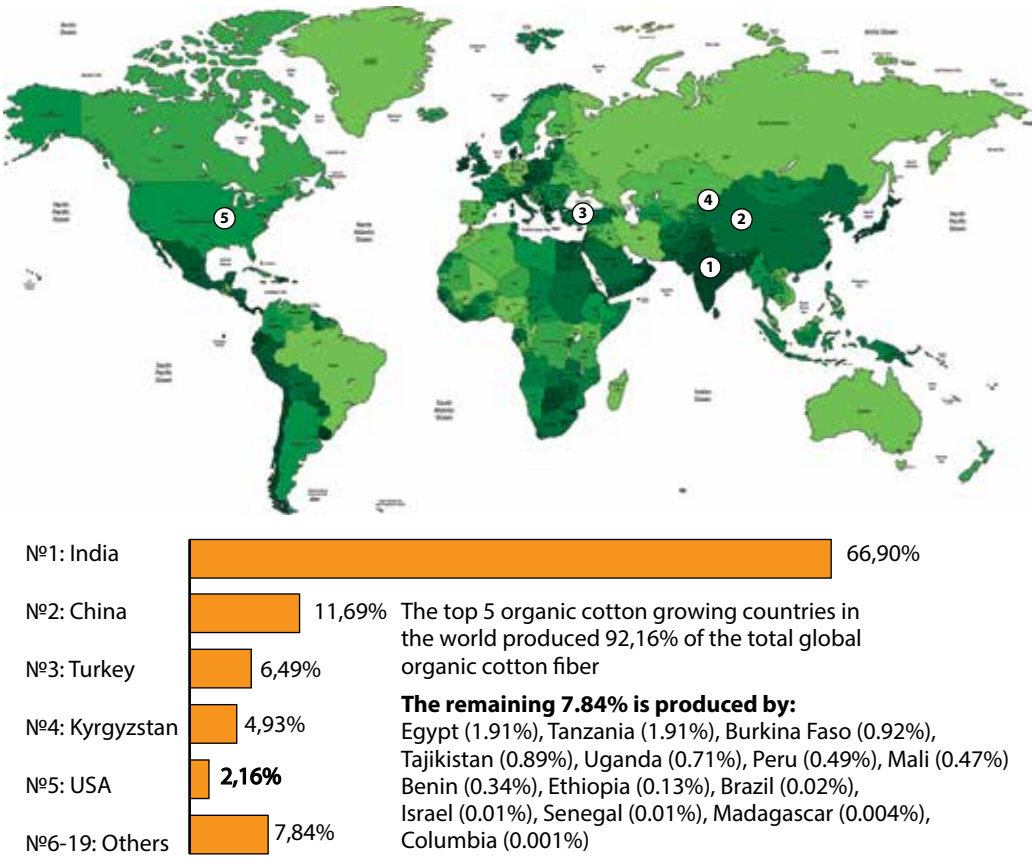

Figure 3. Top five organic cotton producers and other countries having a share in global production (Source: Textile Exchange)

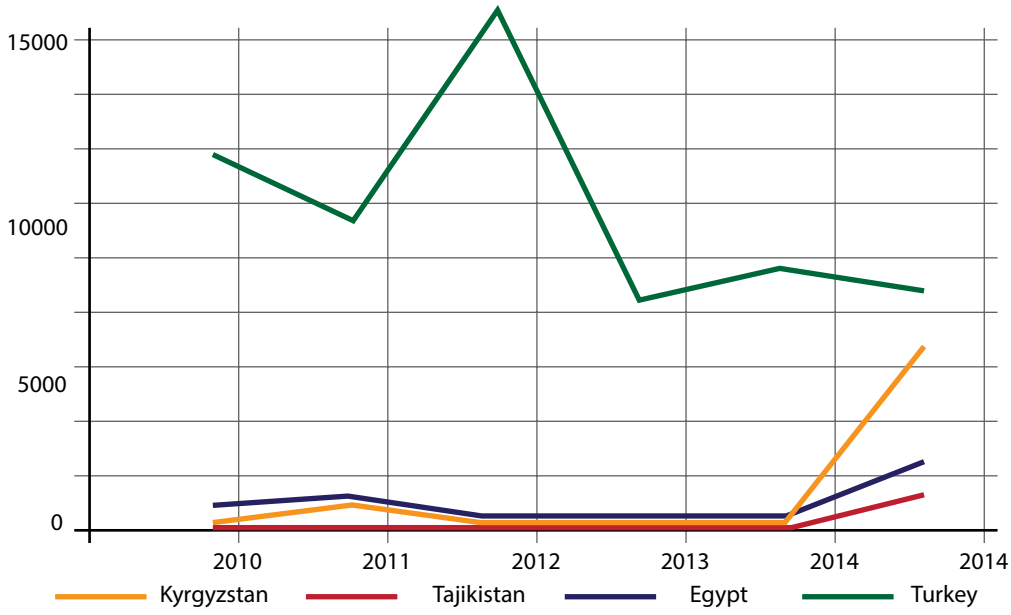

Figure 4. Organic cotton fiber production (metric tons) trends in Egypt, Kyrgyzstan, Tajikistan and Turkey between 2010 and 2015 (Source: Textile Exchange)

Since 2012, organic cotton production in Turkey slightly decreased and demand was supplied by imports. Egypt, Kyrgyzstan and Tajikistan display an increasing trend since 2014 (Figure 4).

Textile exchange

Textile Exchange is an umbrella organization embracing farms, fiber producers, suppliers, manufacturers, brands and retailers (Figure 5). Its mission is stated as "We envision a global textile industry that protects and restores the environment and enhances lives". Vision: Textile Exchange inspires and equips people to accelerate sustainable practices in the textile value chain. We focus on minimizing the harmful impacts of the global textile industry and maximizing its positive effects.

Goals are decided as: embed sustainability into evolving business and supply chain strategies; Make it easier for companies to adapt to changing opportunities and requirements in textile sustainability and Ensure that actions taken toward sustainability result in real and meaningful change.

Figure 5. Textile Exchange membership network extends across 25+ countries, from all points of the sustainability process (Source: Textile Exchange)

Textile Exchange identifies and shares best practices regarding farming, materials, processing, traceability and end-of-life in order to reduce the textile industry's impact on the world's water, soil and air, and the human population. To achieve these goals, Textile Exchange organizes meetings all over the world and develops standards.

Standards

In order to achieve a reliable and transparent set of criteria it is necessary to have an independent certification of the entire textile supply chain. Therefore, the Global Organic Textile Standard (GOTS) is developed for the worldwide leading textile-processing standard for organic fibers, including ecological and social criteria.

The aim of the standard is to define worldwide-recognized requirements that ensure organic status of textiles, from harvesting of the raw materials, through environmentally and socially responsible manufacturing up to labelling in order to provide a credible assurance to the end. The key criteria for fiber production can be identified as:

- Organic certification of fibers on basis of recognized international or national standards;
- Certification of fibers from conversion period is possible;
- A textile product carrying the GOTS label grade 'organic' must contain a minimum of 95% certified organic fibers whereas a product with the label grade 'made with organic' must contain a minimum of 70% certified organic fibers (Figure 6).

Key criteria for manufacturing include 4 components: quality assurance system, environmental criteria, social criteria and technical quality and human resources. Third party certification is required throughout the chain. In this regard, GOTS standard requires that:

- Fiber producers (farmers) must be certified according to a recognized international or national organic farming standard that is accepted in the country where the final product will be sold.
- Certifiers of fiber producers must be internationally recognized through ISO 65/17065, NOP and/or IFOAM accreditation. They also must be accredited to certify according to the applicable fiber standard.
- Operators from post-harvest handling up to garment making and traders have to undergo an onsite annual inspection cycle and must hold a valid GOTS scope certificate applicable for the production / trade of the textiles to be certified.

Using 95-100% organic fibres:

Organic
certified by *[certifier's ref.]*
Licence no *[1234]*

Using 70-94% organic fibres:

Made with [x] % organic materials
certified by *[certifier's ref.]*
Licence no *[4321]*

Figure 6. Labelling according to Global Organic Textiles Standard (GOTS)
(Source: Textile Exchange)

- Certifiers of processors, manufacturers and traders must be internationally accredited according to ISO 65/17065 and must hold a 'GOTS accreditation' in accordance with the rules as defined in the 'Approval Procedure and Requirements for Certification Bodies'.

Major reasons for certified organic cotton and fibers and products made thereof are:

- It is better for the environment: Organic fibers are grown without the use of synthetic fertilizers or toxic pesticides.
- It is better for workers: By avoiding toxic pesticides cotton workers, benefit by avoiding the associated health problems and deaths, common in non-organic cotton production.
- It is GM free: GM is banned in organic systems. GM cotton poses a potential risk to wildlife and human health, as well as exposing farmers to unnecessary expense.
- No harmful chemicals: GOTS standards ensure that the chemicals used in processing textiles meet strict requirements on toxicity and biodegradability.
- Factory conditions are better: Poor working conditions and rights in the garments industry are common place. Certified organic textiles must meet social criteria based on the International Labour Organization (ILO) conventions. These cover minimum wages, working hours, child labor, freedom of association, discrimination, harsh or inhumane treatment and more.
- It is residue free: By prohibiting and restricting harmful chemicals in organic textile production and processing, final products do not contain allergenic, carcinogenic or toxic chemical residues from them.

Conclusion

In the world market, there is a demand for organic cotton fiber since the supplies fell down during the last few years. Brands want to go deeper in to the supply chain, some with targets of 100% traceability. Turkey, Egypt, Greece, Kyrgyzstan and Tajikistan bear advantages by having non-GM cotton with high organic standards, physical advantages and proximity to European market, quality of cotton, skilled workforce and entrepreneurial mindset and strategic links to Asia. Today, however, production is not enough in domestic market in this region.

Uzbekistan as a major cotton producer can become a player in the organic world if all basic conditions for certification are fulfilled. If cotton is grown as

organic, it will prevent pollution of the soil and water resources. On one hand, synthetic chemicals are banned or severely limited in organic production, but additionally because organic management requires rotation, various additional problems as pests, diseases or salinity decreases. There are reports prepared on production and the market of organic cotton and bio based fibers and their markets, thus planning can be made based upon these statistical data. Textile Exchange meetings also enable to meet potential partners.

Literature

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Tree nut and dried fruit industry outlook

Pino Calcagni[3]

Abstract

The International Nut and Dried Fruit Council (INC) (www.nutfruit.org) is an international foundation with headquarters in Reus, Spain and founded in 1983 as an umbrella organization to stimulate and facilitate sustainable growth in the global nut and dried fruit industry. To achieve this aim, INC organizes annual Conferences, participates in the activities of national and international bodies and supports research work, conferences and training programs. The paper summarizes the structure and activities of INC and provides an overview on organic nut and dried fruit industry.

Key words: Nutrition, research, industry, quality, organic

International nut and dried fruit council overview

The International Nut and Dried Fruit Council (INC), is the global organization representing the interests of the whole nut and dried fruit industry, with +750 member companies from +80 countries with the following mission and vision.

INC's mission: To stimulate and facilitate sustainable growth in the global Nut and Dried Fruit Industry.

INC's Vision: To be the International source for information on Nuts and Dried Fruits for Health, Nutrition, Statistics, Food Safety, Government Standards and Regulations regarding Trade Barriers and Agricultural Quality.

The INC, as the international umbrella organization for the nut and dried fruit industry aims for:

- Promoting education and scientific research on the health benefits of nut and dried fruit consumption.
- Increasing the understanding about production, processing, marketing, distributions and consumption trends worldwide.

[3] INC Vice Chairman, Chairman of the Scientific and Government Affairs Committee and Chairman of the Statistics Committee, Italy (giuseppe.calcagni@besanagroup.com)

- Promoting goodwill and mutual understanding within the industry and cooperating with national and international public and private institutions (i.e. Codex Alimentarius and United Nations) to assure global quality standards, to support global trade of nuts and dried fruits and reinforce the sector's collective voice.

The major activities, services and the structures of INC as the umbrella organization is given in Figure 1.

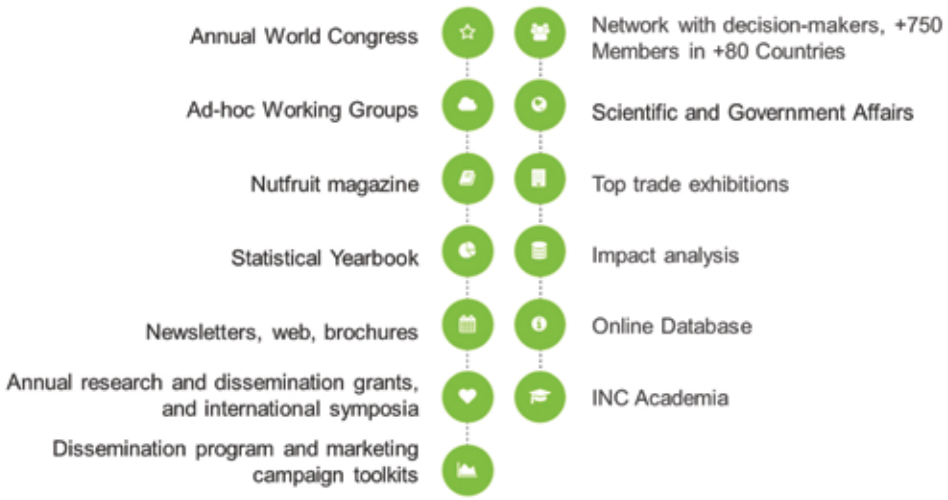

Figure 1. Main fields of activities and services provided by INC

Nutrition research and dissemination:

The INC, advised by its World Forum for Nutrition Research and Dissemination, has steadily been promoting nuts and dried fruits as an essential part of a healthy diet through its annual grants for nutrition research and dissemination. Moreover, special efforts have been dedicated to the Communication and Digital Marketing plan in order to divulge the nut and dried fruit properties and increase their popularity by means of international press releases and increased presence in social media.

Scientific and government affairs

The INC Scientific and Government Affairs Committee monitors scientific and technical issues related to international and supranational regulations, food safety,

pesticides, contaminants, import controls, quality standards, traceability, packaging and labeling, trade and duty barriers and climate change.

The INC monitors food safety alerts in Europe, USA, Australia and Japan, participates as Official Observer in different electronic working groups and sessions of the Codex Alimentarius and it collaborates with the United Nations Economic Commission for Europe (UNECE) in the review of Agricultural Quality Standers for tree nuts and dried fruits.

The UNECE standards define the minimum quality levels, providing a common language to facilitate fair trade, prevent technical barriers to trade and increase transparency in markets. Therefore, some very important aspects for a successful development of organic agriculture in Central Asian countries are i) to follow international quality standards and ii) appointing only certified and well recognized certification bodies in order to stimulate the interest of new farmers in Central Asia in organic agriculture.

Statistics

The INC's objective, with the support of its Statistics Committee, is to gather accurate statistical information in order to stay ahead of the nut and dried fruit industry. This statistical information is communicated through different means, such as the Annual Statistical Yearbook, the World Map of Trade Flows, the Global Statistical Review (published 3 times a year in the INC's Nutfruit Magazine) and an online Statistics Database.

Production

World tree nut production has been experiencing a sustained rise over the last decade, hence have its supply value (Figure 2). A similar trend has been observed for peanuts and dried fruit production, indicating their importance as very valuable agricultural commodities both from an economic and a nutritional stand point.

The significant overall nut and dried fruit growing demand (Table 1), and as seen in Figure 3, the trade flows are all over the world including Central Asia. Among organic nuts, dried fruit and seeds, the most consumed ones are in decreasing order almonds, cashews, walnut, hazelnut, pistachio nut, Brazil nut and peanut; for dried fruit apricots, raisins, dates, figs and gojiberries and for seeds sunflower seeds, pumpkin seeds and sesame seeds. Along with the increasing demand of nuts and

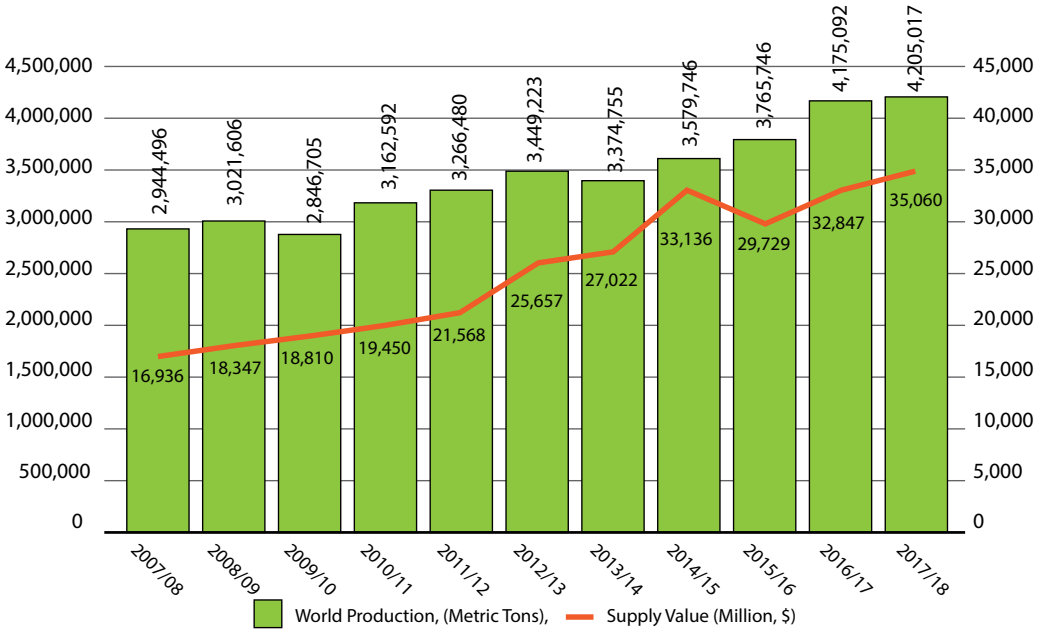

Figure 2. World Tree Nut Production (Metric Tons) and Supply Value (mln USD). Kernel basis, except pistachios expressed on in-shell basis (Source: INC)

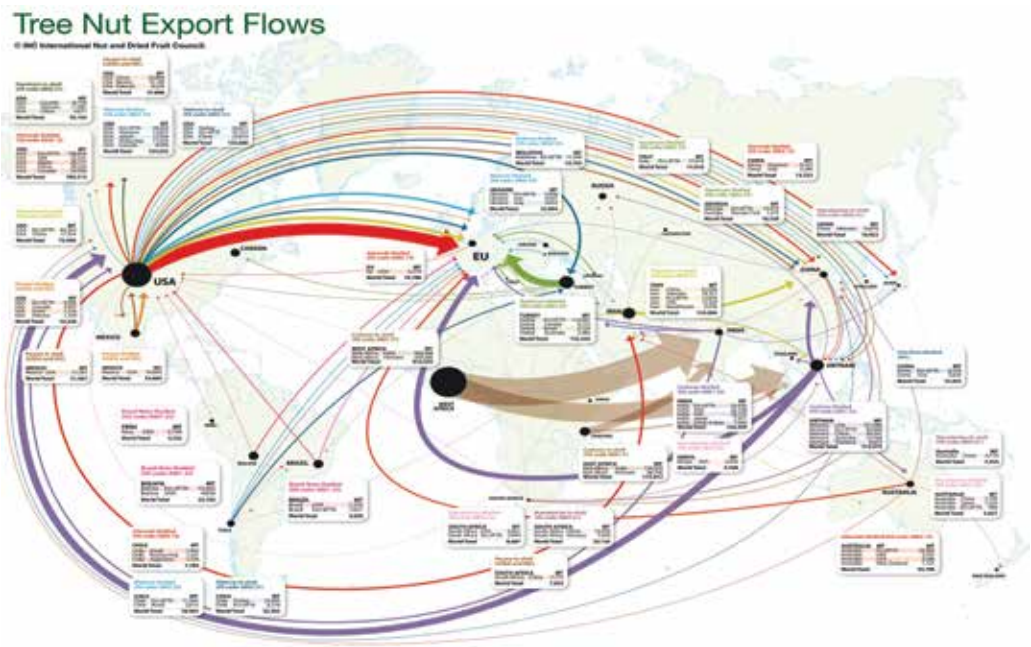

Figure 3. Trade flows in kernel basis, except cashews and pistachios in-shell (Source: INC)

Table 1. Estimated world tree nut, peanut and dried fruit consumption

Estimated World Consumption (Metric Tons). Source: INC						
Product	2010	2011	2012	2013	2014	2015
Almonds	800,962	908,026	1,095,299	1,101,162	1,054,231	1,078,021
Cashews	469,241	576,431	599,034	601,642	716,682	724,556
Walnuts	536,510	550,100	555,351	584,836	632,313	707,802
Pistachios	482,936	553,760	560,703	544,291	537,250	506,560
Hazelnuts	291,599	345,234	357,993	433,270	380,915	436,015
Pecans	110,766	81,594	99,412	110,760	135,506	117,064
Macadamians	29,271	30,053	41,50	37,092	46,617	47,306
Brail Nuts	29,586	23,977	26,675	27,270	29,100	29,150
Pine Nuts	18,099	20,744	28,789	20867	28,095	28,950
Total tree Nuts*	2,668,970	3,089,919	3,364,761	3,461,190	3,560,709	3,675,424
Dried Grapes	997,127	1,190,249	1,350,518	1,223,164	1,339,644	1,195,500
Table Dates	637,000	660,000	747,000	754,000	781,000	835,950
Prunes	275,158	271,815	311,479	232,894	220,468	245,202
Dried Apricots	199,371	181,960	184,487	174,945	133,249	147,846
Dried Figs	116,562	108,951	117,250	122,300	140,744	144,505
Total Dried Fruits	2,225,21	2,412,975	2,710,734	2,507,303	2,615,105	2,569,003
Peanuts	37,766,565	36,230,900	35,990,518	35,990,513	39,144,000	41,701,000

Source: INC

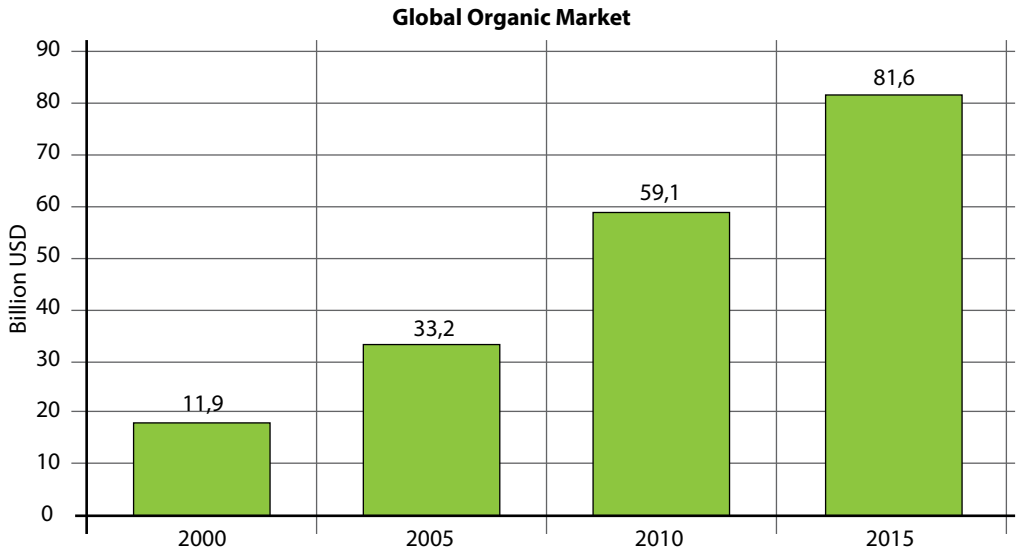

Figure 4. Development of the global organic market during 2000-2015
(Source: Organic Monitor in Willer and Lernoud, 2017)

dried fruit, organic produce market also rises (Figure 4), thus, it is necessary to foster nut and dried fruit organic production both in the traditional producing areas as well as to expand it to new regions with high organic production potential.

Conclusion

Demand for organic produce is rapidly increasing (worldwide by 3% each year), hence the necessity to stimulate its global production. Because of its agricultural tradition, manpower as well as adequate environmental conditions, Central Asian countries represent a huge opportunity to contribute to global agricultural production expansion.

However, some very important aspects still need to be addressed, such as international quality standards implementation, how to offset the higher cost, both for producers and consumers, of organic production and certification and how to effectively market organic production.

Literature

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2. www.nutfruit.org

CHAPTER II: STATUS OF ORGANIC AGRICULTURE IN COUNTRIES OF THE REGION

2

Development of organic agriculture in the Republic of Belarus

Natalia Ivanovna Parechina[4]

Abstract

This article comprises review of current situation with development of organic agriculture in the Republic of Belarus, along with providing brief statistical information, as well as analyzing problems and opportunities for developing the sector in the near future.

Key words: plant protection, farmers, certification.

Introduction

This article aims to review current situation and development of organic agriculture in the Republic of Belarus; to provide brief statistical information on producers and exporters; as well as to perform analysis of problems and opportunities for developing the sector in Belarus in the near future.

The first steps to develop organic agriculture in Belarus were initiated at the beginning of 2000s. Individual representatives of public organizations and scholars-activists organized free training workshops and lectures for interested farmers and cottage owners. At the same time, first editions of the following magazines and booklets were published: "In harmony with nature", "Plant protection in organic agriculture", and "Organic products: How to sell and where to buy in Belarus". The work was performed with financial assistance from foreign donors, but mainly in sporadic manner. Similar to majority of other countries in the world, organic movement started "from the bottom", i.e. from producers, as a response to public demand for clean produce.

The following phase of activities comprised organization of the "Week of ecological agriculture" at the Academy of Public Administration under the aegis of the President of the Republic of Belarus in 2012-2015. In the course of qualifications upgrading trainings for managing specialists of agro-industrial complex in Belarus, participants came across with main advantages of developing

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organic agriculture, international experience in developing this sector, as well as opportunities to apply organic production methods in agricultural practice. A study guide for management "Organic agriculture: sustainable perspective" and a study guide for students "Fundamentals of organic farming" were prepared for the abovementioned trainings.

First researches focused in the area of developing organic production techniques for Belarus conditions were conducted by K.I. Dovban, Doctor of Agricultural Science, in the Belarusian State University. Following the results of these researches, "Methodological guidelines for transition from traditional to organic agriculture" were developed. Concurrently, scientific researches were accomplished in the area of biological methods of protection of plants and animals in agriculture. This necessitated organization of a platform for discussions among producers, scientists and entrepreneurs. International scientific and practical conference, organized with active support of the Ministry of Natural Resources and Environmental Protection, became the first such platform in 2012. Four international scientific and practical conferences were organized during the period between 2012 and 2016, each involving more than 150 participants.

Interdepartmental working group under the Ministry of Agriculture and Food of the Republic of Belarus was formed in 2012 to develop the draft Law "On the production and circulation of organic products". The Working group comprised representatives of ministries and agencies, as well as representatives of NGOs operating in this field.

In recent years, the following events were organized in Belarus as related to developing organic agriculture:

- Study tours to Lithuania (2013), Poland (2009-2017), and Ukraine (2016) were organized for farmers;
- Round-table was organized during summer 2013 in the House of Representatives of the National Assembly of the Republic of Belarus;
- In 2013-2014 meetings with organic sector representatives from Baltic countries were organized in the Ministry of Agriculture and Food of the Republic of Belarus.

Full-time organic-school (5 two-day workshops-trainings with video recording) operates since 2016. The guide "Growing vegetables in organic agriculture", by Elisabeth Ögren and Pauliina Jonsson, was translated for farmers. Information

center for organic production was established on the basis of Peasant Farming Enterprise "DAK". Lectures, workshops and consultations by international experts for students and management of Agro-industrial complex (with support from the embassy of Czech Republic) were organized from January to June 2017 in Belarus. Moreover, in order to create consumer demand at the internal market of the Republic of Belarus, annual festivals of organic agriculture and large-scale awareness raising campaign in mass-media are organized.

Representatives of Belarusian public organizations participated in international exhibitions and conferences in Bishkek and Zhytomyr in 2013, Biofach in 2014, Kiev in 2014-2015, and in Moscow and Palanga in 2106, as well as in Kazan in 2017. They are members of the regional body of IFOAM Euro-Asia.

Promotion of organic agriculture in country strategic documents:

- "National Action Plan to Combat Desertification and Land Degradation";
- "National Strategy for Sustainable Development of the Republic of Belarus for the period up to 2030"; and
- "National Strategy for the Adaptation of Agriculture to Climate Change", 2017.

Key problems and challenges can be summarized as:

- Poor proficiency of farmers and absence of state training system;
- Absence of continuously operating consultancy system for producers;
- Lack of state support for farmers during transition period;
- Large gap between farmers-practitioners and science;
- Low interest demonstrated by trade sector;
- Lack of internal demand for organic produce;
- Difficulties related to entering international market, and
- Lack of cooperation between farmers.

Results of organic agriculture development and current state in Belarus in 2017:

- 6 large exporters (export of birch juice, wild berries and mushrooms); there are total 2 742 hectares of certified land to harvest wild crops according to FIBL and IFOAM data from 2015 (Willer and Lernoud, 2017);
- 11 producers (farmers, personal household farms, agricultural complex "Zhdanovichi" - production and sale of vegetables and berries, goat milk and yogurts, cereals and oil-plants) – 1 379.5 hectares;
- The draft law "On the production and circulation of organic products" was introduced to the House of Representatives of the National Assembly;

- "National System for Conformity Attestation of the Republic of Belarus. Certification of organic agricultural produce: Key provisions" was approved and enacted by the resolution of Gosstandart of the Republic of Belarus dated 21 July 2015 №36 TKP 567-2015 (33540);
- Four international scientific and practical conferences were organized; booklets and study materials are published; workshops and trainings are conducted;
- There are five operating foreign certification companies (Organic Standart LTD, Ekoagros, Kiwa BCS Oko-Garantie GmbH, Ecoglobe , Abcert AG).

Conclusion

As a conclusion, the following activities are planned for further development of organic agriculture:

- To develop self-financing organic-school;
- To establish information and consultation center for farmers (issues related to technologies, certification, marketing of products);
- To create consumer demand and positive image of organic produce
- To assist development of legislation related to organic agriculture;
- To create associations of organic operators to lobby and protect interests of organic production, as well as to develop farmers cooperatives; and
- To strengthen international cooperation (participation in conferences and workshops, study tours and invitation of foreign experts).

Acknowledgements

We express our gratitude to Swedish International Development Cooperation Agency (SIDA) and Coalition Clean Baltic for the granted opportunity to implement projects aiming to develop organic agriculture in the Republic of Belarus.

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Development of organic agriculture in Serbia

Maja S. Manojlović[5]

Abstract

This review provides an insight into the current situation of organic agriculture in Serbia highlighting the needs for further development of this sector. A high natural potential for organic farming, i.e. uncontaminated and fertile soils, favourable climate and wide biodiversity provided a good basis for the development of organic production. Areas under organic plant production was 15.298 ha (including meadows and pastures), arable 13.398 ha (without wild berries, mushrooms, herbs), within half fully certified in 2015. The National Action Plan for organic production was developed and fully integrated into the National Strategy for Rural Development, the law on organic production is in compliance with the EU regulations, an integrated control system including a EU approved domestic certification body was established. Total export of organic products was 19.6 mil EUR in 2015 primarily by export of fresh and frozen fruit (mainly raspberry); fruit products; mushrooms; vegetables and cereals. Challenges for the future development of organic sector in Serbia are the availability of investment funds for modernization of mechanization and technical devices and capital; and need for the strengthening interdisciplinary applied research, regional and international cooperation.

Key words: organic farming, natural resources, challenges, research

Introduction

The beginnings of organic production in Serbia were in 1990, and they are related to development of non-governmental sector and foundation of NGO Terra`s in Subotica, with the participation of representatives from Universities. As a member of the International Federation of Organic Agriculture Movements (IFOAM), Terra`s was a host of IFOAM conference on development of organic agriculture in Central East European countries in 1997. Later, formal and non-formal organizations which promoted organic agriculture were established in other parts of the country. The first Law on organic production in Serbia was passed in 2006, at the time of the Federal Republic of Yugoslavia. After the establishment of the new government, in 2000, foreign investments and projects arrived; this created an opportunity for improving the knowledge and export opportunities.

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Avalon, the Netherlands; SIDA, Sweden; and Diaconia, Germany; were the first foreign organizations to promote organic production in Serbia through regional projects. In 2003, GIZ supported Terra's organization in establishing cooperation with the German certification organization BCS, preparing the establishment the first certification body in Serbia. In the coming years, the Ministry of Agriculture, Forestry and Water Management (MAFWM) with the support of GIZ and SIPPO from Switzerland, the US Agency for International Development (USAID) supported the participation of Serbian producers and business people at the Biofach fair in Germany. After 2006, numerous projects oriented to development of organic sector have been approved such as: the project focusing its activities on regional development of rural areas in Vojvodina and Sandzak funded by The Austrian Development Agency (ADA); Swiss Development Corporation (SDC) was engaged in a big project to introduce food safety standards; GIZ concentrated on advisory policy, coordination of donors and creation of business associations. National Association for Organic Production "Serbia Organica" (NASO) was established in 2009 with the aim to connect all participants in the organic sector by stimulating interaction and promoting organic farming and processing. With the support of MAFWM, six centers for the development of organic production (Selenča, Leskovac, Svilajnac, Valjevo, and Negotin in 2011 (and in 2013, Užice)) were established.

The aim of this review paper is to give an overview on the current situation of organic agriculture in Serbia, natural potential and production, national legislation, with an emphasis on the needs for further development of this sector.

Material and methods

This review paper has been prepared on the basis of analysis of available relevant literatures, such as: scientific papers, reports and studies, as well as national and international legislation documents, related to organic agriculture. Used literature in this paper is cited at the end of it in the Reference part.

Results

Natural potential for organic farming in Serbia. Serbia is located in south-eastern Europe in the heart of the Balkan Peninsula. Large heterogeneity in geological substrate, climate, vegetation cover and soil fauna had resulted in the formation of a large variety of soil types (Vidojević and Manojlović, 2007). The area of Serbia was divided into nine edaphic-climatic regions. Generally, climate in Serbia is

moderate-continental with cold winters and hot summers; precipitation 600-1000 mm; and mean annual air temperature ranging between 11°C and 12°C. The lowest temperature was –39.5°C (Sjenica) and the highest 44,9°C (Smederevska Palanka). The mean total annual precipitation across Serbia are in a range from 557 mm in Kikinda up to 1,018 mm on Zlatibor Mountain.

Based on the statistical data for 2015, utilized agricultural area covers 3,468,519 ha or 39% of the total territory of the country (Stat.Yearb.Serb., 2016). In Vojvodina, located in the northern part of Serbia, in the Pannonian Plain, agricultural production is taking place on chernozem and similar soil types, which are predetermined for crop production, but some soils in the region with less favourable conditions i.e. salinized soils, are traditionally used for grazing. In the central part of Serbia, compared to Vojvodina, less intensive production takes place. Eutric and distric cambisols are suitable for fruit and vegetable production, while on the mountains meadows and pastures dominate with animal and cheese production. In the valleys of the rivers, fluvisols are present, which are used for vegetable production.

Several studies carried out on the territory of Serbia have shown that soils have high fertility and biological activity (Manojlovic et al., 2011) and generally are not contaminated with heavy metals, except individual cases of potential geochemical pollution near the metal mines and in the areas near industrial facilities (Vidojević and Manojlović, 2007; Manojlović and Singh, 2012). However, in areas with intensive agricultural agriculture and urban areas, control of potentially harmful substances, e.g. heavy metals and organic pollutants in soil, as well as the quality of water for irrigation, is needed prior to the establishment of organic production.

Serbia is known as an area with very wide natural biodiversity (Bosnjakovic et al., 2012; Amidžić et al., 2014). Intensive agricultural activities to increase the yield and profit impact on loss of biodiversity and decrease in soil quality. Besides that, land use, pollution and other human activities, led to loss of biodiversity. However, biodiversity can be increased by different agrotechnical measures that are common in organic farming such as: proper crop rotation, intercropping, cover crops, or establishing buffer zones (Mäder et al., 2002). Evaluation of the farming systems in Vojvodina on certified farms, showed significant differences between farms, but also the fact that improvement with the proper crop rotation, leguminous plants or cover crops were not fully utilized (Šeremešić et al., 2011).

In Republic of Serbia, the National action plan for development of organic agriculture integrates organic production and biodiversity conservation, and the National

research agenda for organic agricultural sector (2013) and sees conservation and improvement of biodiversity as one of the most important topics.

Current state of organic agriculture in Serbia. According to MAFWM (2016) the areas under organic plant production in 2015 was 15.298 ha (including meadows and pastures), and arable land 13.398 ha (without wild berries, mushrooms, herbs) (Table 1). Table 3 shows the increasing number of animals in organic farming in a period from 2012-2015.

Table 1. Organic farming in Republic of Serbia[1] – number of operators and area

Year	Number of operators[2]	Total area, ha	Fully converted area, ha	In the convesion period area, ha
2012	1,061	6,340	2,085	4,255
2013	1,280	8,228	3,187	5,041
2014	1,866	9,548	4,671	4,877
2015	2,000/334[3]	15,298	7,628	7,669

[1] Source: Stat. Yearbook of Serbia. 2016; NASO, 2017
[2] The number of operators includes the number of certificate holders and their associates
[3] The number of certificate holders

Table 2. Organic plant production in Republic of Serbia[1] in 2012-2015 (ha)

Year	Cereals	Industrial crops	Vegetables	Forage crops	Fruit	Herbs	Others
2012	2,522.4	541.0	113.7	663.1	1,415.7	28.4	79.8
2013	2,273.4	672.9	106.8	594.9	1,484.4	132.6	90.2
2014	2,818.3	1,227.8	153.6	1,204.1	2,202.1	60.9	214.5
2015	4,252.0	2,674.0	170.5	1,440.0	2,895.0	71,0	1,895.0

[1] Source: NASO, 2017

Table 3. Organic farming in Republic of Serbia[1] – livestock number

Year	Sheep	Pig	Cattle	Goat	Poultry	Donkey	Horse	Bee hives
2012	2,837	206	1,428	211	2,034	7	66	961
2013	4,031	175	2,176	946	1,390	21	210	1,940
2014	2,689	76	2,693	1,154	1,140	17	173	894
2015	4,848	232	2,746	1,686	1,380	20	218	2,504

[1] Source: NASO, 2017

National legislation on organic agriculture

In Serbia, the legislation on organic farming was developed as follows:

- The first Law on Organic Agriculture in Serbia was adopted in 2001 (Official Gazette SRY 28/2000). However, this law had not been fully implemented;

- Law on Organic Production and Organic Products (Official Gazette RS 62/2006) and subsequent legal acts were prepared according to Council Regulation (EEC), on organic production of agricultural products (№2092/91), referring to agricultural products and foodstuffs (OJ L 198, 22.7.1991);
- Law on Organic Agriculture (Official Gazette RS 30/2010) is in compliance with EU regulations on organic production (EC 834/07 and 889/08). It is in force since 1 January 2011;
- Rulebook on control and certification in organic production and on organic production methods (Official Gazette RS 48/2011) is in force since July 2011.
- Instruction laying down conditions for production, control and certification of organic products exported to the European Union, №320-10-1932/2013-13 of 14 August 2013;
- Rulebook to regulate import and sales of organic produce (Rulebook on conditions of import of organic products, recertification and distribution) is drafted and adoption is expected.

Data collection system at national level: As a part of the MAFWM, the Group for Organic Production (within the Directorate for National Reference Laboratories) is the competent body and authority in charge of the work of controlling organizations and organic production methods. One of the tasks of the Group is collection of annual statements of the controlling organizations and cumulative records on organic production.

The list of authorized certification bodies for performing control and certification on organic agriculture as of 2017 are: Organic Control System (OCS), Subotica; TMS CEE doo, Belgrade; Ecocert Balkan Beograd; Centre for food analysis ltd (CIN), Belgrade; Eco Vivendi doo, Belgrade (MAFWM, 2017). The list is published once a year.

Support to farmers: Producers in organic plant production contracted with some of authorised control organisations can get incentives as: basic incentives for plant production and regress for plant nutrition products (up to ~56 EUR/ha, limited to 20 ha) (Official Gazette RS 41/2017). Incentives for plant production are increased by 70% compared to conventional in 2017. In organic animal production incentives are premium for organic milk (~0.9 EUR/l), and incentives for livestock husbandry, depending on the type of animals (from 0.7 EUR for parent chicken to 300 EUR for cows, and e.i. for honey bees ~7 EUR per hive. Incentives for animal production are increased by 40% compared to conventional in 2017. Also, in Vojvodina (North Serbia) the costs of control and certification

(up to 70% of the cost) (up to 825 EUR/ha) is covered (Official Gazette APV 69/2016; 29/2017).

Availability of inputs: Organic certified seeds and plant material are not available or there are insufficient quantities on the market. Plant protection agents are available but not always appropriate and effective. Manure is in insufficient quantity as more than half farms are stockless. Commercial soil amendments and biofertilizers are available but not always cost-effective. Generally, there is not enough knowledge on how to select and apply plant protection agents, soil amendments and biofertilizers in proper amount and time.

National institutions and universities working on organic agriculture: Several associations systematically promote and develop the organic sector:

- Governmental institutions and ministries, spearheaded by the Ministry of Agriculture, Forestry and Water Management (MAFWM), monitor and take care of the sector's needs;
- About 20 academic institutes, faculties, R&D facilities and affiliated bodies help to design and propagate most appropriate farming and cropping systems;
- Six certification bodies make sure that national and international regulations governing organic certification are complied with.
- Agricultural Extension Service of Serbia; Agricultural Extension Service of Vojvodina
- National association on organic agriculture, Serbia Organica (NASO)

Education in organic agriculture is very important. Elementary agricultural education is offered in 33 state-funded secondary agricultural schools. Higher education is provided by accredited higher education institutions, the most important being the Belgrade University, Faculties of Agriculture and Forestry; the Faculty of Agriculture, University in Novi Sad; the Agronomy Faculty in Čačak; Faculty for Biofarming in Bačka Topola; the Faculty of Ecological Agriculture in Svilajnac. Bachelor program on Organic Agriculture at the Faculty of Novi Sad, had been developed with support of GIZ and University of Kassel in Germany and is available since 2010. Also, school curriculum for organic agricultural production was introduced into agriculture high schools starting from 2012/2013 as optional subject (organic vegetable and crop production, organic fruit production and organic livestock production) as part of school course for agricultural technicians.

Organic market: Domestic market of organic products is slowly developing and demand for these products is mostly in bigger towns. According to NASO (2017),

the investigation in six shops in Belgrade revealed that 50% of the consumers are buying organic products periodically. Supermarkets and green markets as well as organic shops are the main domestic markets in towns. Recently, online shopping is also available. The main products are fresh vegetables, fruit, cereals (flour), oil, fresh milk and yogurt, cold pressed sunflower and pumpkin oil. Export market has been developing much faster than the domestic market. Total Serbian export of organic products was 19,573,389 EUR with 70% of the total value to EU countries (Germany, the Netherlands, Belgium, Austria and Poland), in 2015. Trend is positive with a rapid increase (3.7 mil EUR in 2012 and 19.6 mil EUR in 2015). The main products are fresh and frozen fruits, with domination of raspberry (10.9 mil EUR in 2015); fruit products; mushrooms; vegetables; herbs and cereals (NASO, 2017).

Discussion

Serbia has a high natural potential for organic farming: fertile and an uncontaminated soils, favourable climate, and wide biodiversity. Most of the farms are small, 76% of family holdings have area of less than 5 ha (Stat.Yearb. Serb. 2016), and traditionally produce different crops without use of heavy mechanization and large amounts of pesticides and fertilizers.

Organic agriculture in Serbia is characterized with constant growth of areas under certified production; therefore increased marketable products, mainly fresh vegetables and fruits. Considerable expansion occurred in organic farming in Serbia during the period of 2012-2015; the number of operators doubled and fully converted area increased more than three times. The number of animals was also significantly increased, particularly sheep and cattle. Of the total areas under organic production in 2015, cereals and industrial crops are grown on 45.3%, fruit on 18.9 and other crops on 35.8% (NASO, 2017). Farmers in Serbia have become increasingly interested in organic agriculture, since harmonization of the national standard with EU certification process ensured access to EU market. Šeremešić et al. (2011) evaluated organic farms in Serbia and concluded that the cropping plan of organic farmers were strongly driven by market demands, while the inconsistency with design and structure of the rotation were compensated with intensified management practice or use of approved fertilizers.

Based on data from the MAFWM – the Department for Organic Production (NASO, 2017) that manages the database of areas, organic production in the

Republic of Serbia in 2015 was carried out on a total area of 15,298 ha (with meadows and pastures, but without collection of wild berries, mushrooms and medicinal herbs), including areas that are in organic status and in conversion period. The distribution of organic production in the total arable land in Serbia has increased to 0.4%, which is 57.14% more than in 2014. However, compared to other European countries, like Austria (21.3%) or Czech Republic (11.3%) (Willer and Lernoud, 2017), area under organic managemenment is still small in Serbia. Therefore, consistent support of relevant institutions in creating incentives and continuous payments is necessary. The farms need assistance to procure the appropriate machinery, other technical devices and capital, in order to raise production efficiency to levels that ensure their competitiveness on the national, regional, and EU markets. Also, the farmers and all participants in organic farming networks in Serbia need more knowledge and education. Close cooperation between farmers and researchers and exchange of ideas and knowledge between them, is important for getting new solutions and innovations, which will contribute to significant development of organic agriculture through increased production efficiency. This challenge has been recognized in Serbia, which resulted in preparation of the National action plan (NAP) for the development of organic agriculture in 2011 (waiting to be adopted) and National research agenda for organic production (Berenji et al., 2013).

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Organic agriculture in Slovenia – development and current situation

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Abstract

Development of „official" organic agriculture started with the first inspections and certifications according to European Union legislation in 1998 although a few organic farms as pioneers started organic even earlier. Several regional organic farmers associations were established and they created organic farmers markets in several cities. They gathered to umbrella association, established also their own organic standards and created label "Biodar" for their organic products. In 2000, organic farmers got the first payments per area as an agri-environmental measure, and the first national legislation was issued in 2001. In the next years, farmers' interest for organic farming started to increase and even more interest of consumers for organic products that caused high imports of organic food to Slovenia from several countries as only 20% of organic food consumed in Slovenia comes from domestic production. There are still several obstacles for better development – especially lack of advisors, and knowledge transfer in advisory service, lack of cooperation among farmers themselves and for marketing of domestic organic products. In the sector, an important quantity of organically produced meat and milk are sold as conventional. In the year 2016, there were 3,518 farms under inspection (or 5% of all farms are organic) with 43,579 ha or almost 10% of all agricultural area under organic production which is above the European average. An average organic farm has 12.3 ha of agricultural land and is twice bigger than the conventional. There are 324 operators involved with processing, distribution or trade of organic products and among them also 12 in organic gastronomy. On the other side, interest among consumers is still increasing, there is obligatory to use 10% organic food or from conversion in public green procurements. Due to natural, geographical and climate conditions, small sized organic farms should be the main orientation in Slovene agricultural policy in the future.

Key words: organic farming, payments, marketing

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Slovenia stands out in Europe due to its natural and historical assets. Slovenia is namely promoted as green, healthy and active destination in tourism, and thus organic should be important part of it in the future. It is a central European country (borders to Italy, Austria, Hungary and Croatia) with an average yearly temperature of 10°C and average precipitation of 800-1,000 mm mostly in the winter period, with three climatic regions: Mediterranean in the south west, Alpine in the north and Pannonian in the west. The total population is 2,064,188 and the area is 20,273 km^2, with 58.7% of the population living in rural regions. Nominal GDP at current prices is 39,769 million EUR and GDP per capita at current prices is 19,300 EUR. Unemployment rate is 8.0% of labour force. Agriculture, forestry and fishing means 2.3% of total gross value added and agriculture provides 5% of total employment. As a part of Common Agriculture Policy of the European Union (EU), total expenditure in agriculture was 266 million EUR and agricultural goods output was 1,166.8 million EUR in 2016 of which crops provided 55% and animals 45%. Total intermediate consumption was 724.1 million EUR. In 2016, there were 69,902 farms (3.4% less as in 2013) in Slovenia – out of them 231 agric. enterprises and all others are family farms (42% of them for market, others for their own consumption), 474,432 ha of agricultural area, with an average farm size of 6.9 ha/farm. Animal husbandry was on 80% of agricultural holdings and 6.0 GAU/farm is the average (DG Agri 2017)

Slovenian agriculture is just as specific, preserving settlements even in the most remote areas. Farming is not easy in a country where more than three – quarters of its surface (85%) belong to areas classified as less favoured (LFA) with factors that limit farming – either because of the altitude and sloping terrain or karst features or any other limiting factors. Slovenia is one of the most forested countries in Europe. A forest area of 1,186,104 ha covers more than a half of its territory (forestation amounts to 58.5%). 74% of forests are private property of 314,000 owners and 26% are public (DG Agri 2017).

By implementing the Government's agricultural policy and the Common Agricultural Policy (CAP), the Ministry of Agriculture, Forestry and Food is directing the development of the Slovenian agriculture and food-processing industry in order to boost the competitiveness of the sector, considering the diversity and distinctive features of the rural area and the multipurpose role of agriculture. Based on the experience acquired in the process of adapting to the CAP measures during and after the accession period, we have established regulations from the latest CAP reform and thus set up a reliable financial and legislative framework for the 2007-2013 period for our farmers that were in favour

also for organic farming as a measure of agri-environmental program. Much more attention was given to so called "environmentally friendly" agriculture practices like integrated production than for the organic (Bavec et al. 2009). Orientation towards higher self-sufficiency and more sustainability in agriculture and food sector brought new activities towards local food production and consumption (Government RS 2008) which brings also cases of "green washing".

Agricultural production has decreased in the last years. The most important branch is animal husbandry, especially dairy and fattening cattle. Pig and poultry breeding are also important. Sheep breeding has increased quickly in the last few years. Plant production corresponds to the needs of animal breeding, thus maize (corn and silage) is grown on over 40% of the arable land. Hop is an important industrial crop for export. Viticulture and orchards are traditional. The most important fruit is the apple. Slovenia is a net importer of agricultural and food products – mostly cereals, sugar and pork, but it exports hop, quality wine and beer, poultry, milk, quality beef and meat products. In 2016, exports of agricultural products totalled to 1,677 million EUR and imports to 2,524 million EUR with negative balance of 847 million EUR (DG Agri 2017).

Material and methods

Based on data from several sources especially official statistical data of Slovenia and EU, data and documents from the Ministry of Agriculture, Food and Forestry (MAFF), history, development of organic agriculture (OA) and current situation is presented describing development of national legislation on OA, inspection and certification, government support for OA, farmers' interest for OA, availability of inputs, national and international institutions and universities working on OA, domestic and export markets, main barriers for adoption or scaling of OA and main opportunities for adoption or scaling of OA.

Results

History of Organic Agriculture Development. The beginning of organic farming in Slovenia lies in the 1990s. The most important milestones are presented chronologically (Table 1) and could be accepted as an example to how to develop organic sector in a small state without financial and technical support from foreign countries or organisations. After 20 years with three stagnations/stops in this period, organic area reached to 10% of all agricultural land and 5% of all farms are organic.

Table 1. Some milestones in development of organic agriculture in Slovenia

Year/ Period	Events/activities
1988	Establishment of the "Mikrokozmos" Society
1991-1995	Establishment of the "Ajda" Biodynamic Society; First attempts of organic production promotion based on individual lectures by visiting professors from abroad; Establishing "healthy" stores with imported organic products.
1996-1997	First organised lectures and courses for agricultural advisors from Agricultural Advisory Service, non-governmental organisations and University of Maribor; Issuing of Recommendations on organic farming in Slovenia (Ministry of Agriculture, Forestry and Food); Establishment of the Slovenian Organic Farmers Association in Ljubljana; Establishment of the Organic Farmers Association of the north-eastern Slovenia in Maribor.
1998	Organisation of international training for organic farming supervisors (Institute for Sustainable Development); First inspections carried out: internally by the Slovenian Organic Farmers Association and by the ABG controllers (ABG – Austria Bio Garantie); Establishment of an inspection body under the Institute of Agriculture Maribor (PHARE Project CBC 1977: Biological production in agriculture and forestry).
1999	Establishment of the Union of Slovenian Organic Farmers Associations; Opening of farmer's organic market in Ljubljana; the first payments per area for OA.
2000	Opening of farmer's organic market in Maribor; organising Bio-symposium Alps-Adria in Maribor; OA mentioned in Agriculture Act (OJ RS No 54/2000); First contacts with organic fruit and vegetable producers from the biggest chain Mercator and the first deliveries.
2001	Rules on organic production and preparation of agricultural products and foodstuffs (OJ RS No 31/2001); Rules on technical and organizational conditions that must be fulfilled by inspection bodies for controlling organic agricultural products and foodstuffs (OJ RS No 56/2001); Designation of an inspection body (OJ RS No 82/2001); Publication of the Slovene book "Organic Farming" (Bavec M et al. 2001); Subsidies or environmental payments for environmentally friendly agriculture were introduced and organic area gained them too.
2002	Introduction of label "Biodar" based on higher standards compared to state legislation. First issue of Biodar – Magazine for Environmental Protection and Agriculture (Union of Slovenian Organic Farmers Associations).
2003	Rules on changes and supplements of the Rules on organic production and preparation of agricultural products and foodstuffs (OJ RS No 52/2003); Rules on identification of sites in the Republic Slovenia suitable for organic beekeeping and map preparation of non-suitable areas for organic beekeeping in the Republic Slovenia (OJ RS No 52/2003); Signing of cooperation document within the initiative ALPE-ADRIA Eco-Region; next to Slovenia the region comprises of Austrian provinces (Corinthia and Styria) and Italian regions (Friuli-Venezia-Giulia and Veneto).
2004	Decision on formation of working group for preparation of Slovenian action plan; Decision of the Government of the RS on the problem of the GMO coexistence (11 March 2004); Adoption of European Action Plan for Organic Food and Farming (10 June 2004); Since Slovenia's EU accession, Council Regulation (EEC) No 2092/91 24 June 1991 on organic production of agricultural products and foodstuffs (Regulation 2092/91), as amended, applies directly; Bio-symposium Alps-Adria in Ljubljana: Organic Farming and Genetically Modified Organisms; Active public farmers organic markets in Ljubljana, Maribor, Celje and Novo mesto; Designation of two inspection bodies (OJ RS No 138/2004);
2005	Participation in the Commission Standing Committee for Organic Farming – amendments to the EU provisions; Project initiation "Contribution of Slovenian NGOs to the action plan OA (Institute for Sustainable Development). Conference "Strategy of Organic Farming Development in Slovenia", National Assembly of the RS, 19 May – closing of the project "Contribution of Slovene NGOs to the action plan to organic farming; Preparation of amendments to the Slovenian Organic Farming Rules; "Action plan for OA development in Slovenia to 2015" was adopted by the government; The third inspection body started operating.
2006	Three certification bodies gained accreditation according to EN 45011. On the University of Maribor started B.Sc. study program "Organic agriculture" with possibilities to study also on M.Sc. and Ph.D. level.

2007-2014	Payment per area differed for conversion (higher) and organic. Organic farming development and support is an important part of Slovene Rural development program 2007-2013. Slovenia became a member of ERA-NET research programme CORE Organic and several international research activities started. Certification and labelling of organic food in gastronomy was legislated in 2010 (OJ RS No 71/2010) and in 2014 published new Rules on organic production and preparation of agricultural products and foodstuffs (OJ RS No 8/2014); OA is included in MAFF document Strategic development goals of Slovene agriculture.
2010	Obligation in law for green procurement of public institutions is to purchase 10% of organic (or from conversion) foods.
2015	OA is an independent measure in a new Rural development program 2014-2020 where a new goals were stated (55,000 ha under organic, 5,000 organic farms) – lower as in previous action plan. Decrease in organic grassland payment caused exit of around 300 mountain farms from organic inspection.
2017	The fourth certification body started working in the sector. Initiative for establishing a new umbrella organisation of organic farmers.

Source: Bavec 2004, AOPF 2005, Repič et al. 2008, Bavec et al. 2009, Bizjak 2017, Bavec et al. 2017)

Above described activities and measures resulted in increasing area and number of organic farms under organic management as shown in Figures 1 and 2. The average intensity of Slovenian farms is far lower than that in the countries in Western Europe. The production is still mainly traditional requiring more manual labour. Since the consumer requires food of better quality, organic farming has become more distinguished even the small and medium-sized farms have good possibilities for conversion to organic food production. Thus, many producers showed interest in organic farming, and the number thereof is increasing year by year although also some stagnations have happened (for three times after 2003, 2006 and in 2015). The consumer interest in these products and foodstuffs is also growing rapidly as consumers are more and more informed and demanding in regard of the food and foodstuffs quality and the feasibility thereof (Bavec, 2004).

Slovene Government accepted Slovenian Action Plan for Organic Farming in November 2005. Some goals of APOF were defined until 2015, as: 15% of all farms organic, 20% of utilized agriculture area organic, 10% share of organic food on market and increasing of organic tourist farms to 120 (APOF 2015), but due to several reasons it was not succeeded. But some other goals have been achieved – in late 2006 three certification bodies accredited by EN 45011 and now ISO 17065 (in 2017 four are operating in Slovenia), on the University of Maribor B.Sc. study programme "Organic agriculture" was established, and several national and international research projects were founded.

In the recent government document "Strategy for implementation of resolution on strategic goals of development of Slovene agriculture and food sector to 2020", new goals up to 2020 were defined also for OA which are below those in APOF. It

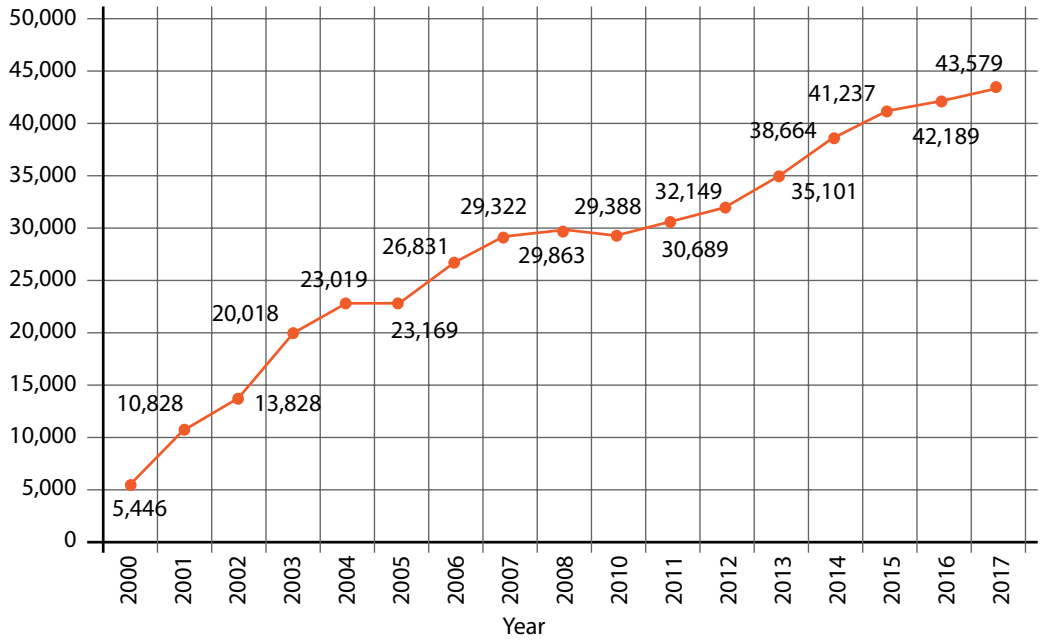

Figure 1. Development of organic area (ha) in the years (2000 to 2016) (Bizjak 2017)

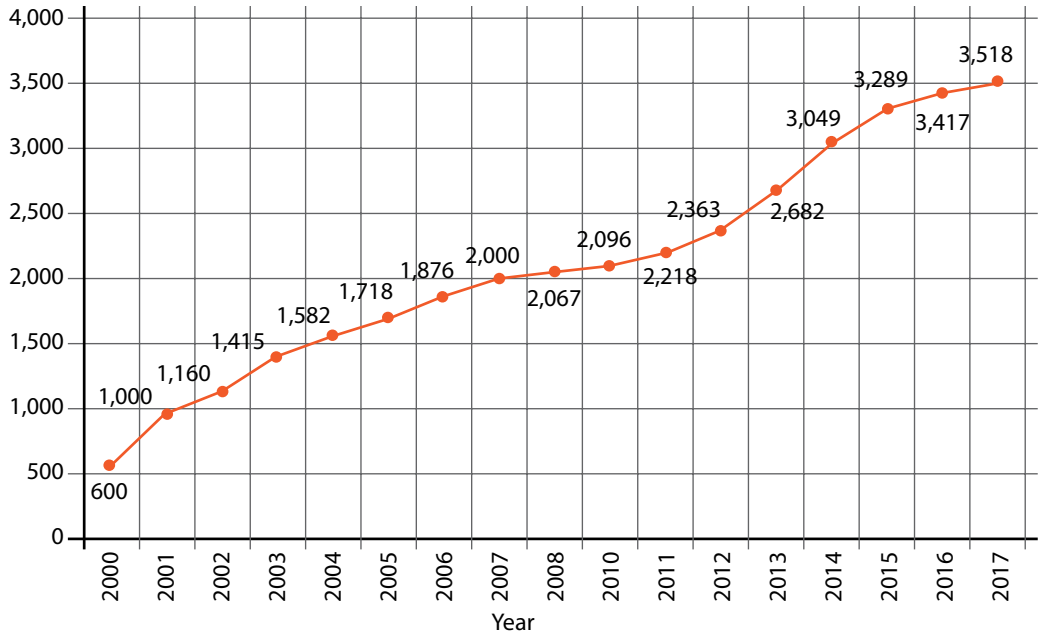

Figure 2. Development of organic farms under organic control in the period 2000 to 2015 (Bizjak 2017)

is expected that 55,000 ha will go under organic (now 43,589 ha), 5,000 organic farms (3,518), increasing of organic fruit production to 2,100 ha (1,617 ha), filed crops 5,900 ha (4,406 ha), vegetables 500 ha (293 ha), 280 processing enterprises (315), and 10 specialized advisors (3), 4% of bee hives (now only 1,1%). Goal is 5% of organic food on the market (in 2010 survey showed 1% of which only 20% was domestic) and there are some measures proposed to achieve them (Government RS, 2014). As shown in Figure 1, there is an increase of operators in processing, import and trade of organic food. From 105 operators in 2010 the number increased to 315 in 2016 (MAFF 2017), and goals for 2020 were already fulfilled in 2015.

Generally, there is an interest among farmers for conversion to organic, but as market organisation is not well, advisory service do not support it very much and there is lack of knowledge combined with several stereotypes, it is slowly. On the other side majority of big agricultural enterprises started with conversion of some parts of their areas and saw it as business opportunity and increasing image of company towards sustainability and circular economy.

Current situation

In 2016, 43,579 ha or almost 10% of all agricultural area is under organic production on 3,518 agricultural holdings (5% of all). Average size of organic farms is 12.4 ha which is twice bigger as general average in Slovenia. In conversion was in 2016 7,224 ha on 585 farms under conversion. Majority of organic LUA covers grassland covers 36,487 ha (85%), followed by field crops 4.404 ha (mostly cereals, oil and forage crops) and 1,617 ha orchards (565 ha high-density orchards), 565 ha vineyards, 293 ha vegetables, 240 olive plantations and 2 ha hop. In 2016 the area of organic arable land increased by 481 hectares (of which 5 hectares were new organic areas for the production of vegetables), orchards by 177 hectares, vineyards by 70 hectares and olive trees by 35 hectares. By far the largest share (83%) of all organic land in utilized agricultural area is still permanent meadows and pastures (SURS 2017). Comparison of organic area and total agricultural area (Table 2) showed that almost ¼ of all olive trees are organic, 16% of other fruit orchards and 13% of all grassland, which is in absolute numbers the most important providing base for organic animal husbandry especially ruminants which are the most important part of organic farming in Slovenia.

In 2016 compared to 2015 the number of animals of all species increased (SURS, 2017). On organic farms there were 31,174 animal livestock units (LU) or 11.1 LU per organic farm, which is twice more than the state average. Organic cattle for

Table 2. Main land uses under organic farming and comparison to the total production area

Land use	Organic area		Total production area	Organic share
	ha	%	ha	%
Grassland	36,487.41	84	276,244	13.2
Field crops	4,404	10	176,518	2.5
Vineyards	536	1	15,241	3.5
Olive orchards	240	1	1,037	23.2
Orchards Intensive	1,617 564	4	10,261 3,856	15.7 - 14.6
Vegetables	293	1	3,311	8.9
Hop	2	<1	1,480	0.1
Sum	43,579	100	476,682	9.1

Source: SURS 2017

meat is the most important part of animal husbandry followed by milk production and sheep. The number of animals in poultry increased the most (by 42% to 101,340). The hives followed by an increase of 30%, their number was 1,814 out of 167,000, which is the smallest share among all species. The number of rabbits increased by 16% to 1,849. The number of bovine animals and pigs increased by 9% (33,397 bovines and 3,648 pigs), the number of goats by 6% (there were 6,857) and the least increase is in the number of sheep (there were 35,841), by 2%, but the highest share of organic among all species. In 2016, the organic aquaculture increased by 104% compared to 2015; reaching to 65 tons. The weight of carps increased by 307% and the weight of mussels by 100% (SURS 2017).

In Slovenia, the certification of organic food in gastronomy is regulated in the currently applied Regulation on organic production and processing of agricultural products and foodstuffs (OJ RS 8/2014). In accordance with the rules, there are three ways of integrating organic products to the certified food (meal, dish, ingredient/s). The first certificate in Slovenia was issued in early 2010. In gastronomy, 2 operators are certified for the production of organic foods currently (Bavec et al. 2017).

Majority of Slovene organic products are sold directly on organic farms, organic markets and as box-schemes or as community supported agriculture, in public kitchens of schools and kindergartens (10% of organic purchase is obligatory), special organic/healthy shops. Lately more and more Slovene origin product are also in supermarkets as there is increase in looking for local among consumers

generally (for conventional and organic, too). Processing of organic products and trade including import (14 operators) are increasing for 20% yearly in the last years – in 2016 324 companies were active in the sector (MAFF 2017). There are not available data about volume of export, which is increasing too. There is substantial part of reexport – ie. organic durum wheat from Italy is imported and organic pasta exported, lately the same situation is in organic "superfoods". Export markets are Italy, Russia for organic cereals, EU for superfoods, and Switzerland for organic eggs. There are several importing countries and products – last estimation about import done in research project some years ago showed that only 20% of organic food is domestic and 80% is imported – majority of food in supermarkets and specialised organic shops is from import.

Government support for organic farming

Within the framework of the Reform of Agricultural Policy 1999 to 2002, financial support from the Ministry of Agriculture, Forestry and Food started first in 1999 with 41 farms, which converted to organic the previous year. About 600 organic farms were inspected in 2000, and the first group were certified and obtained permission to use the trademark 'Biodar' (Bavec 2004). From the year 2000, in Maribor, Ljubljana and Celje, farmers have been selling their organic products in organic green markets, but sales into supermarkets and via tourism activities have not been well organised yet, and this is still the problem in Slovenia. Since 2001, organic farming has also been measure in the Slovene agri-environmental programme (SAEP 2001). Farmers who applied for those payments were required to farm organically for four more years (a minimum of five years altogether) and there was the first stagnation in development (Figure 1). Farms got additional support for inspections and other costs in an amount of 110 EUR per farm and from today's perspective it has to be evaluated very positively as it is not available anymore.

Although the amount per ha increased from 2003 to 2004 by about 25% it didn't have an important impact on increasing conversion of farms to organic, but on the contrary after 5-years some organic farms stopped organic farming (Figure 2). It means that financial support alone is not enough for developing this sector, and that there are other more important factors as access to the market, promotion, development of food processing, and knowledge and advisory support (Repič et al. 2008) which are still not sufficiently developed in Slovenia. Only three advisers in the Chamber for Agriculture and Forestry are available as full time for 3,500 organic farmers (Bizjak 2017) compared to all 60.000 Slovene farms having contact with 300 available advisors in conventional agriculture (Government RS 2014).

Next stagnation was in the years 2007 and 2008 which resulted in providing two levels of support per ha – higher for conversion and grassland with higher LU density. It caused the next increase in the number of organic farms and area. New rural development program for 2020 has still two levels of payments per area for different crops for conversion (i.e.900 EUR/ha for all permanent crops, 600 EUR/ha vegetables, field crops 378 EUR/ha and grassland 312 EUR/ha) and less for organic production (ie. vineyards 676 EUR/ha, filed crops 326 EUR/ha , grassland 136 EUR/ha) and for the first time support is also foreseen for organic honey bees as 22.31 EUR per hive (MAFF 2017). Organic farmers have some additional opportunities by getting higher scores when applying to get different funds.

Discussion with final statement

Based on data presented above, we found several challenges for further development of OA in Slovenia:

- Improving farmer's cooperation in marketing.
- Increasing the number of properly trained advisors. They have to work in close cooperation with experienced organic farmers and researchers and develop demonstrative organic farms.
- Slovenia has a very attractive and well-preserved natural environment. Organic farming should be the main way of agricultural management in underground water protected areas, in Nature 2000 regions, and national and regional nature parks.
- Improving promotion, increasing number of organic tourist farms, new ways of selling of organic foods (public kitchens) and investments in food processing on organic farms.
- Slovene consumers are very sensitive towards the origin of food – slogan "BIO + REGIONAL = IDEAL" is proposed for future promotion of OA.
- Organic farming should be an important opportunity to produce high-quality food products primarily for the domestic market and for tourist consumption because Slovenian conventional agriculture is unable to compete with cheaper production from other countries, due to natural constrains and the specific agricultural structure.

Agriculture policy has a huge effect on development of the sector, but direct payments per area are not enough for increasing the area – knowledge and organizational support for marketing are essential.

Acknowledgement

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Iran: a land of high value organic products

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Abstract

Organic agriculture has a rapid development in Iran, with increasing interest from consumers, society private and governmental sectors as well as academia. Being as one of the centres of evolution of agriculture, organic agriculture represents an interesting alternative for a fruitful development of traditional farming methods in Iran.

Key words: Medical plants, Organic agricultutre, Pistachio, Pomegranate and Saffron

Iran, the second largest country in the Middle East, is located in the southwest of Asia with an area of 1.65 million km^2. Since people engaged in agriculture first settled here some 10,000 years ago, Iran is the origin of many domesticated plants and animals which are among the main sources of food for human beings all over the world and state the importance of Iran as a main center for the evolution of agriculture (Fertile Crescent). Iran has a diverse physiography, climate, vegetation and biological productivity (Koocheki and Ghorbani, 2005). Traditional small scale farming was the main structure of farming communities for centuries. Here, the land management was based on indigenous farming systems, practices and knowledge associated with self-sufficiency and family associated communities. About 86 percent of farmers in Iran are smallholders who manage close to 40 percent of arable lands in Iran (Koocheki, 2004; Mahmoudi et al, 2007), without access to agrochemicals, and traditional mixed farming systems remain prevalent. In small-scaled farming systems, ecological practices are still prevalent which include:

- Diversified crop, animal husbandry integrated;
- Use of animal manure, wastes and by-products for soil improvement;
- Biological pest and disease control;
- Community cooperation, family labor and local market orientation.

The future for organic agriculture in Iran is very positive. The growth rate, experienced over the last few years, suggests a fast and considerable development

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Table 1. Organic agricultural land, organic share of total agricultural land and number of producers in Iran, 2015

Area [ha]	Organic share [%]	Producers [no.]
14'574	0.03%	3'873

Source: FIBL survey 2017, based on information from the private sector, certifier, and governments.
Calculation of organic shares based on FAOSTAT, Eurostat and national sources.

of the sector. Iran may become a central area for producing high value organic products with a world-wide demand, such as Saffron, Pistachio, Pomegranate and Medical plants. Cultural studies have shown that Iranians always were interested in traditional products originating from the villages. Hence, organic products are favoured because they are considered free from toxic chemicals, additives, artificial flavourings and colourings, preservatives, and are perceived as having a higher quality.

As in many countries in the Mid-East, the domestic market for organic products in Iran is still relatively small. However, local demand for organic products has been growing parallel with consumer awareness as well as concerns related to a number of food safety issues. It is typical for developing countries that the domestic organic market starts in the capital city with small corners in the supermarkets. These shops are usually in residential areas that are inhibited by upper- and middle class citizens (Sirieix et al., 2011; Kledal et al., 2009, 2010, 2012) especially in northern part of (capital) Tehran.

The main problem for organic market growth is a consistent supply of products. Organic agriculture may enable Iranian smallholders to achieve household food security and gain better incomes while regenerating the land, enhancing biodiversity, and supplying quality food to local communities (Mahmoudi and

Table 2. All organic areas in Iran, 2015

Agriculture [ha]	Aquaculture [ha]	Forest [ha]	Grazed non agri. land [ha]	wild collection [ha]	Other non agri. land [ha]	Total [ha]
14'574	–	–	–	27'532	–	42'106

Source: FIBL survey 2017, based on information from the private sector, certifier, and governments.
Blank cells: No data available

Table 3. Development of organic agricultural land in Iran, 2012-2015

2012 [ha]	2013 [ha]	2014 [ha]	2015 [ha]	1 year growth [ha]	10 years growth [ha]
42'634	12'156	11'601	14'574	+2'973	+14'559

Source: FIBL survey 2017, based on information from the private sector, certifier, and governments.
For detailed data sources see the World of Organic Agriculture.

Table 4. Organic producers and other operator types in Iran, 2015

Producers	Processors	Importers	Exporters
3'873	16	–	33

Source: FIBL survey 2017, based on information from the private sector, certifier, and governments.
Blank cells: No data available

Mahdavi Damghani, 2009). At present, there is increased interest for organic products for export. The majority of the organic production in Iran is being exported (Kledal et al., 2012). The main importing countries of Iranian organic products are Germany, France, The UK, The Netherlands and some countries in East Asia (Mahmudi & Damghani, 2011).

The Ministry of Agriculture recently established a "Committee on Organic Agriculture" to make a policy and provide an action plan for the development of organic agriculture in Iran. An Agricultural Research, Education and Extension Organization has introduced a program to implement a new research department called "Farming Systems", where a research program for organic agriculture was included. Governmental subsidies on agrochemicals have been reduced dramatically since 2007, which may contribute to a positive development for organic agriculture.

An updated version of "Requirement of production, processing, inspection & certification, labelling and marketing of organic food (INSO-11000)" was published by the Institute of Standards and Industrial Research of Iran (ISIRI) in 2014, in cooperation with universities and private companies. In these standards,

Table 5. Organic crops production in Iran, 2015

Products	Organic area [ha]	Organic shares [%]	Area fully converted [ha]	Area under conversion [ha]
Cereals	167	0.002%	165	2
Citrus Fruit	2	0.001%	2	–
Temperate Fruits	2	0.001%	–	2
Tropical and subtropical fruit	2'281	1.2%	1'864	417
Grapes	1'954	0.9%	1'772	182
Oilseeds	1'250	0.3%	550	700
Olives	190	0.09%	100	90
Vegetables	89	0.01%	89	–

Source: FIBL survey 2017, based on information from the private sector, certifier, and governments.
Blank cells: No data available

a list of permitted organic inputs was included. The first draft of "Organic Wild Collection: Plant Collection Guideline" was released by ISIRI in 2009.

Research programs on organic agriculture production, processing and marketing are carried out by several institutions, including the Environmental Sciences Research Institute of Shahid Beheshti University in Tehran, Ferdowsi University of Mashhad and Islamic Azad University, Karaj Branch. Activities are carried out as students' theses, or research projects. A postgraduate course on agroecology has been extended to several of universities across the country. The Iranian Scientific Society of Agroecology (ISSA) has since 2008 conducted regular meetings on sustainable agriculture in which organic agriculture is one of the common topics.

NGO's play an important role to develop the organic movement in Iran, especially since a majority of people cannot define what organic means, and how it differs from non-organic products. The Iran Organic Association (IOA) is supported by the Iran Chamber of Commerce. IOA works with market development, and supports all people and organizations active in developing organic farming in Iran. Since 2011, IOA conducts an annual international congress and various workshops, and promotes organic business by international and national networking. IOA recently established a GMO debate committee. IOA also has a strong collaboration with the municipality of Tehran and conducts the annual "Tehran Organic Week Festival", which provides an opportunity for organic producers to introduce their products to consumers as well as increasing public awareness through media.

IFOAM-IRAN was established in May 2014, initiated by the IOA, and is also supported by Iran Chamber of Commerce.

In line with the increasing organic area, production of organic inputs such as fertilizers and bio-control agents such as parasitoids and predators insects is an increasing industry for private companies across the country.

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Organic market in Russia. Problems of development and possible solutions

Yavruyan David Edwardovich[10]

Abstract

Russia presents great interest as a country with the potential of lands for growing organic raw materials, feeds, cereals, legumes, oilseeds and, certainly, forests for collection of organic wild plants.

Organic market in Russia, despite statistical growth, is in its infancy. Most of the Russian organic products today are produced for sales abroad but not for domestic consumption.

No reliable quantitative research in local bio-market is conducted in Russia. However, the media and websites of so-called expert organizations are full of numbers and volumes. Due to lack of reliable information in Russia on organic production, the greenwashing has blossomed in the country that undermines the reputation and economic success of diligent producers of organics.

Upon analysis of the Russian organic legislation, it becomes clear that it allows corruptive mechanisms unlike international regulations, in which the risks of applying such schemes are minimized. Experts understand that such path of development of legislation in Russia will lead the organic-movement to reputation losses both inside and outside the country. And, the consequences of this can affect many countries.

Key words: greenwashing, legislation, accreditation, equivalency, integration, expert groups, educational projects, reputation losses, organic-movement, corruptive risks.

Over the past decade, Russia has undergone a series of rises and falls of the domestic organic market. Due to lack of domestic demand for organic products, as well as the organic market itself as a separately formed segment, several interesting projects were closed, particularly, the bio-store "Ryzhaya Tykva (Red Pumpkin)" (pioneer in sales of organic products in Russia, 2004-2005.), "Bio-market" (network of bio-stores of the corporation "Organic"). Russia has lost a line of dairy bio-products (the brand "Eto Leto (It's Summer)"),

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several types of organic chocolate (the Ozersky Souvenir factory), and organic tea ("Matsestin tea"). These were unique projects that were oriented, among other things, to imports of European organic products and raw materials. It is worth noting that before the economic crisis, it was more interesting for Europe to trade bio products with Russia. It can be confidently noted that in Russia until 2014, there was an increase in the organic market and the development of the trend of BIO. Unfortunately, this popularity in combination with an absolute lack of information and knowledge in organic products led to the appearance of an abundance of local players in the market acting often not completely clean. The social movements and expert groups, clubs and even local certifiers had emerged sometimes not even with an initial knowledge of organic production. Since 2010, the country has a number of self-proclaimed expert-certification groups and organizations that issue organic-certificates of their own type. Of these, you can identify "Eco-Control", "Svyatobor", "Organic Expert" and "Life Sheet of Ecosoyuz" ("Environmental Union"). What is common for them is that they position themselves as local bio-certifiers, and at the same time, not only none has gone through organic accreditation, but also has not even passed an appropriate audit. It should also be noted that:

1. As a rule, such "certifiers" are established or affiliated by commercial and/or public organizations. For example, "Eco-Control" (name of certification – BIO Chistye rosy (Clean Dews)) is a derivative of the Non-commercial partnership "Agrosofia", which promotes the interests of a number of commercial organizations – members of the partnership, "Organic Expert" is affiliated by the National Organic Union (NOU) a founder of group of companies "Agranta" established by the NOU (agriholding "AgriVolga", the product brand "Ugleche Pole").
2. While there are no specialists with at least a basic knowledge of the procedure for auditing and certification of organic production within the structure of "Svyatobor" as in numerous regional organizations that are ready to certify Russian products as ECO, the picture in the other listed organizations is different. The head of the "Agrosophia" took the initial courses of the GEN, the "Ecological Union" employs the staff that has been trained for inspections under the supervision of the Italian Control Body, ICEA, whereas the head of the "Organic Expert" is the former inspector and the Russian representative of ABCERT.

How did it happen that not only odious and ignorant adventurers, but also some people who knows "how to make organic" preferred to switch to

greenwashing instead of abiding by established organic norms? This article aims to answer this question and also to find ways on how Russia can exit from the current organic crisis.

Current state of the market

Consumption of organic products has been growing rapidly for the last years in developed countries. Accordingly, the demand for raw materials is growing, as well. Russia is of interest to Europe as a country with a large potential of territories for ecological agriculture.

According to the FIBL's survey published in 2017, in 2015 there were 82 organic producers and 37 processors in Russia. In our opinion, these figures are not entirely correct, due to the data sources. In addition, the researchers state in the report that the data for Russia may not be complete, since they failed to obtain information from all bodies that certify Russian operators in the organic system.

It is worth noting that, despite the lack of reliable quantitative research in the organic market in Russia, the local media and websites of so-called expert organizations over-abound with unjustified figures and volumes designed to

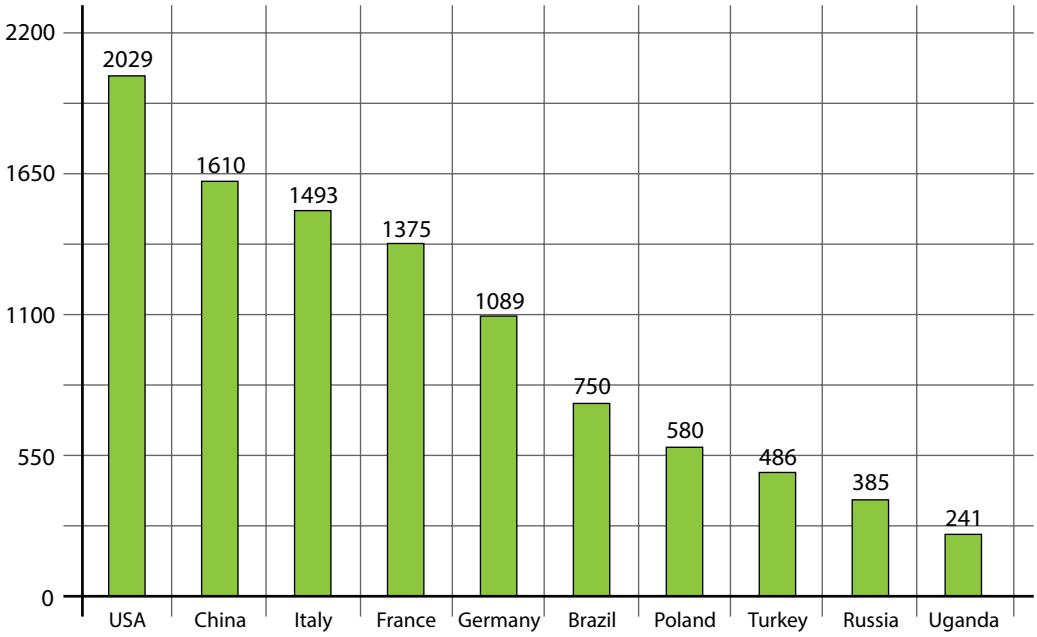

Figure 1. Organic agricultural lands ('000 ha) (Willer and Lernoud, 2017)

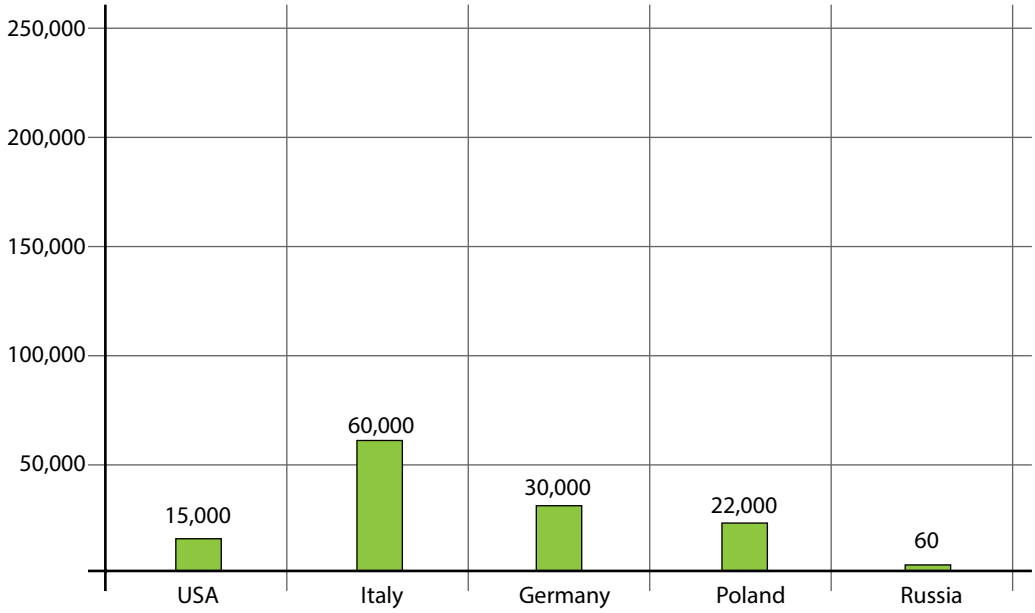

Figure 2. Number of certified organic operators in selected countries (Willer and Lernoud, 2017)

demonstrate the stratospheric rates of growth and development. Year by year we monitor Russian manufacturers of organic products and regularly communicate with leading players of the market. As noted above, until 2014 an increase in the organic market in Russia was observed. However, starting from mid-2014 until 2017, it declined significantly. According to our estimates, there are only about 60 manufacturers of organic products today in Russia. As for processors, there are about 20 of them. That is, the figures for such a large country are very modest.

It is interesting that, according to the mentioned FIBL survey (Willer and Lernoud, 2017), there are about 385,000 hectares of organic lands in Russia. We consider this figure excessive for the reasons indicated above. For comparison, in Turkey, there are about 486,000 hectares of organic lands, i.e. for 100,000 hectares more (see Picture 1). At the same time, the number of producers of organic products there is approximately 70,000 vs 60 in Russia (see Figure 2). The difference is more than 1000 times. Based on calculations resulted from this statistics, we can conclude that most of the organic products produced in Russia today are by large landowners.

What kind of organic produce is grown and produced in Russia? About 50% of operators grow cereals, legumes and oilseeds (very few of them also produce

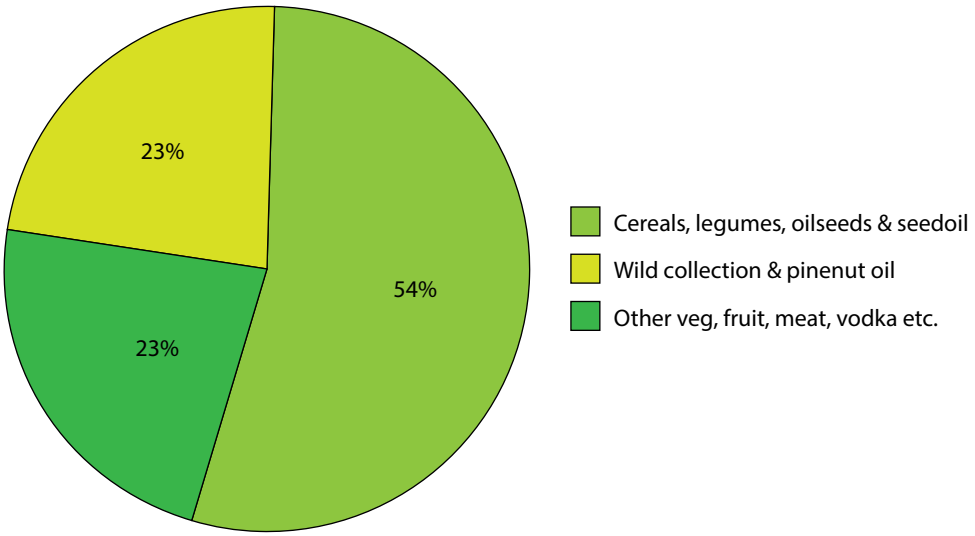

Figure 3. Certified products by type of production

vegetable oil). Approximately 20% of the operators are engaged in collection of wild plants, mainly pine nuts (see Figure 3). Almost all companies that collect pine nuts produce cedar oil. Among nearly ten Russian organic nut producers, there is only one brand of pine nut bio that is represented in the domestic market.

The bulk of Russian organic products is sold abroad. According to our observations, a large percentage of exports goes to Asia for processing and re-exportation, mainly to Turkey and China. This is evidenced by growing of our traditional Asian crops by our farmers, such as adzuki beans, soybeans, chickpeas. Some of the products are exported to Europe.

Which organic products are sold in Russian stores? Bio-products of Russian production are cereals, flour, honey, willow-tea, and pine nuts. You can also find some seasonal organic vegetables and fruits in online stores from Russian farmers. Dairy products are represented by only one farm, and their prices are excessively high since the farm itself and the volumes of its products are small, whereas their investment costs for the construction and equipment of the farm, as well as the certification, are high. In Russia, there are only 3 organic livestock farms.

Assortment of organic products on Russian market shelves is complemented by imported bio-products. Imported bio products are basically, sweet and salty

snacks, for example, fruit and cereal bars, vegetable preserves, juices, cereals, spaghetti, tea, coffee, cocoa, chocolate, superfoods.

In Russia, the certified non-agricultural areas where organic produce (wild plants) are grown or collected are quite scattered. Regions where more than one producer of bio products are present are Saratov, Tomsk, Kaliningrad, Kaluga and Moscow regions, Primorsky and Krasnodar territories, as well as the Republic of Mordovia.

Main consumers of organic products in Russia are the residents of large cities, primarily Moscow and St. Petersburg. Russians buy the organic products mainly in premium supermarkets of major cities and online stores. Bio-products in a more affordable price option are presented in the network of hypermarkets "ASHAN".

Due to the fact that the price of imported bio-products has almost doubled because of the crisis, organic products from Europe have become almost inaccessible to the average consumer even in large cities. Therefore, today the middle class prefers natural products against organic, which is, without synthetic additives in ingredients, but without an organic certificate.

The choice of such products is much wider, and it is much more affordable price-wise. Thus, the main trend in Russia in the development of organic-movement has inclined more towards the mainstream of natural products rather than bio.

Problems and tendencies of development

Greenwashing

In 2012 and 2013, the Russian media wrote that retailers were planning to open "organic-sectors" in their networks. Actually, such sector today operates only in "ASHAN" hypermarkets, because of many reasons but mainly due to availability of assortment of bio-products under its own brand. The rest of the supermarkets began to open amorphous sectors of so-called healthy food products, where one can find rather large selection of natural products. Many of them, in favor of the trend, started to be labeled with all sorts of green labels, including "eco", "bio" and "organic". Only just few Russians had heard the word "organic" five years ago, today it is increasingly used on packaging for marketing purposes. In other words, greenwashing has flourished in Russia.

Initially, incorrect labelling was used rather by those who tried to get such products to their market shelves. Afterwards, the use of green labels became a

mechanism for justifying the price policy of producers. Today, unfortunately, even those producers who already has a clear idea of what certified bio-products still continue to use green labels for marketing purposes. The wholesale greenwashing in Russia started undermining the reputation and economic success of small number of local producers of bio products.

Let us give some examples. Prices for some products are presented in Table 1. The price difference between organic and traditional high quality products (we are talking about high quality and safe or at least natural products, and their price is certainly higher than the average price in the market) may be insignificant. Organic honey is slightly more expensive than the conventional one. And the price for pine nuts may be the same; the prices listed in the table may vary depending on the purchased volume (upon purchase of several kilograms, the price for 300 g can be 2.5 times lower than buying a small package weighing 300 g in branded packaging). Organic cottage cheese price is more than the double of the conventional cheese mainly because. There is only producer in Russia with a small production capacity. At the same time, there are already cases when an organic product may cost less than a similar inorganic, for example, oat flakes (Table 1).

Main cause of greenwashing is the lack of information and food culture among the population, combined with the historical habit of producing and consuming counterfeits. The producer "follows the market" and labels its products as BIO, since the Russian consumer shows an increased interest in bio-products and at the same time does not want to understand the nuances and difference between certified bio products and all the rest. This is how the picture looks in Moscow and nearest regions.

As for the regions, firstly, there is practically no reliable information about bio-products and, secondly, people do not have the money to buy quality products. Additionally, there are local certification bodies in the regions that simply sell their own eco/bio certificates, which also distorts information

Table 1. Competition between organic and greenwashing (price comparison as of 2017)

Products	Certified Organic	Greenwashing (Natural)
Oat flakes – 0,5 kg	140 rubles	200 rubles
Pine nut – 300 g	300-800 rubles	300-800 rubles
Honey – 280 g	350 rubles	200-300 rubles
Cottage cheese – 1 kg	1200 rubles	500-600 rubles

on bio-products and undermines the reputation of organic in the country. This is called "voluntary certification," when any certification agency under state norms (for example, Sanitary Rules and Regulations) with a license may come up with its own eco-standard and certify the producers according to this standard.

Legislation

The organizations on organic have emerged in Russia and are multiplying, which, on a patriotic wave, are encouraging to create own national system of organic certification in Russia, different from the international one. With no sufficient knowledge and training, they are participating in creation of state GOSTs (All Union State standards) and laws.

Currently Russia has 3 GOST standards for organic and one more for interstate GOST of the Eurasian Union that will take effect as of 2018:

1. GOST R 56104-2014 "Organic food products. Terminologies and Definitions";
2. GOST R 56508-2015 "Products of organic production. Rules of production, storage, transportation ";
3. GOST R 57022-2016 "Products of organic production. Procedure for voluntary certification of organic production";
4. GOST 33980-2016 Interstate Standard "Products of organic production. Rules for production, processing, marking and sale".

Also a draft federal law "On production and circulation of organic products (products of organic production) and on amendments in certain legislative acts of the Russian Federation" is under consideration by the State Duma. However, it is inappropriate to refer as organic-legislation the above-mentioned documents in the complex. Any specialist getting familiarized with the Russian legislation on organic, the following will immediately become clear:

1. These documents unsuccessfully copy European standards, at the same time, by distorting their essence.
2. They contain awkward, illiterate and blatantly incorrect language.
3. Changes in meanings in these documents are mainly related to the requirements and interests of those or other "concerned groups" and create obvious corruptive risks at all stages of the system, from certification procedures to accreditation of certification body.

At the same time, the authors of these acts declare with full confidence that upon creation the proposals of international expert groups and organizations were taken into consideration that not a single remark was ignored and that all documents were integrated at maximum level with international norms. These statements are exclusively declarative, because the principles of organic upon management of these acts are in fact not feasible. This is evidenced by the received feedback from experts from Russia and other countries.

Let us give examples on non-conformity in the mentioned normative acts. Despite the recommendations of experts, GOST R 56104-2014 includes outdated concept of "food product with organic ingredients" with allowable content of organic raw materials in amount above 70%. According to GOST R 57022-2016, the inspection process has been brought to the procedure of visiting the producer by a large commission that is not popular in international practice, which can equate organic certification with the usual Soviet "purchase of licenses for activities". Legislation also states that "wild plant foods are not organic". This is not only incorrect, but absurd as well, given that more than 20% of the country's certified products are wild plants.

It wouldn't make sense to continue this list, not only because it is too big, but also because the purpose of the legislation was not to comply with the norms adopted in the civilized world. Correcting mistakes is worth only in the presence of motivation of not to commit them, whereas in the current case, this motivation did not exist originally. A crowd of unprepared people had concentrated and tensely created a pile of documents for several years that were unsuccessful specifically du to the fact that people were initially unprepared, and there was no task of creating the current organic legislation. The goal was rather to report on the performed work in creating something "unique of its own". That is why the opinions of specialists, international experts and professional organizations were of secondary importance while editing the legislation. Most of its editors and authors simply could not understand the expert recommendations and those who understood could not change the general trend.

According to experts, the Russian system of organic must be truly integrated and equivalent to the international one, otherwise it will not be recognized in the world and will not be legalized. If a non-harmonized law starts working in Russia, producers of organic products who want to sell it abroad will have to follow two different standards and receive two certificates – Russian and

international (according to GOST 33980-2016), which will greatly increase the costs for producers. This can also cause problems for importers who will also have to receive a local "organic certification". At the same time, there is a high probability that acquisition of the Russian organic certificate will be reduced to obtaining a formal paper for money. At the same time, the local organic products produced by global bio-standards and exported abroad with double certification as well as on the shelves of Russia will become even less competitive.

Forming of organic legal field in the territory of Russia which is the most important risk being not harmonized and equivalent to international norms can serve for significant damage to reputation and image of organic movement inside and outside the country.

All of the above is in the sphere of interest of the international organics community. Due to greenwashing being legalized and principles of organic distorted in Russia, it will not be only Russia to lose. This problem can affect many countries, since reputation losses cannot be a framework, they will affect everyone who is in the organic theme.

In summary, the main problems hampering the development of organic market in Russia are corruption and ignorance. Unfortunately, ignorance is not overcome in this sphere, it is being planted. There are neither state educational programs for the population nor research institutes. Main information flows about the organics in the media pose either unprofessional interpretations of the Codex Alimentarius, or outright disinformation and absurd fictions. Information resources that provide more or less correct information can be counted on fingers of one hand. For example, the website of the mentioned "Ecological Union" from St. Petersburg can be referred.

Significant aspect of weak progress of organics in Russia is, of course, a tangible decline in well-being of the population due to economic crisis and the rise in prices of food products almost by twofold. Also, the food sanctions from Russia that limit the range of imported organic products on the shelves of Russian stores can also be noted. For example, organic cheese and yogurts from the Baltic countries such as Estonia, Lithuania and Latvia could have appeared in those stores, and they would have been accessible to consumers with medium incomes. Finally, the lack of protection and support of producers of bio-products by the state: subsidies and other privileges for eco-farmers and processors could make domestic organic more accessible to Russians.

Conclusions

What conclusions do we come to as a result?

1. Domestic organic market in Russia is in its infancy. It has started developing but is destroyed by crisis and active work of counterfeiters. Its growth is impeded by the lack of competent organic legislation and promotion of standards that may allow for corruption mechanisms, as well as the lack of support of organic market by the government.
2. Reliable information on principles and mechanisms of organics, on real bio-products on the scale of the country is absent, that contributes to development of greenwashing. Prices for organic in Russia, in contrast to European countries, are greatly overstated. Therefore, organic products are in demand only by a small number of residents of large cities with high incomes. That is, domestic demand for organic, as well as domestic organic market in Russia has not yet been formed.
3. Export market for bio-products in Russia is growing due to growing demand and prices for organic raw materials in the global organic market. Due to fall in the exchange rate of Rubles, buying organic raw materials from Russia has become very profitable; this has spurred the growth in the number of farmers growing cereals and legumes for export.
4. Thus, Russia is perceived today as likely as not a full-fledged or potential participant of the global organic market, but as a raw material appendage for countries where the organic is already sufficiently developed.

How can we see the ways of Russia's exit from the organic development crisis?

1. Educational projects are necessary to oppose ignorance. It is necessary to disseminate objective information in mass media and among officials about how the organics are produced, starting from ideology to accreditation procedures.
2. Imposed unharmonized legislation should be countered by active interference and mass criticism of international expert community in order to exclude risk of corruption.
3. Audit of the draft of the Russian organic law is required by international auditors.
4. Support and development of the national certification system is necessary.

5. General tampering and greenwashing should be countered with ensuring transparency of information about certifiers and forgers. It is necessary to replicate and provide the consumer and producers with analytical information about the activities of those who position themselves as organic certifiers. Consumer should be aware of the lack of independent control and audit of forgers.
6. Considering the above-mentioned statements, it is extremely important to establish an international group of experts, if necessary, supervising and advising local organizations focused on the equivalent development path of organic in the country. This requires more active work of offices of international organizations in Russia.

Initiative of changes must come from all members of the organics-movement. Because, if we don't start changing the current situation on the Russian organic market today, we will have to do it later, when the conditions may become less favorable.

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Organic farming activities in Turkey

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Abstract

Among the rapidly growing organic agricultural products all over the world; the traditional products of the countries such as tea, rice and spices in India; Milk, dairy products in Denmark; meat and meat products in Argentina, banana in Central America and African countries; dates in Tunisia; olive oil, dried and hard-shell fruits in Turkey, have stood up as top organically produced products. The number of producers engaged in organic production reached 2.4 million in the world. About 35% of these producers are in Asia, 30% in Africa and 19% in Latin America. India is leading with 585,200 producers followed by 203,602 producers in Ethiopia and 200,039 producers in Mexico.

In 179 countries, in terms of the production area, Turkey is in the 18th place with a cultivation area of 486 thousand ha. According to the data of 2015, organic markets are also growing rapidly, and the world organic farming market, which was $ 18 billion in 2000, increased by 353%, reaching $ 81.6 million. Compared to the previous year, it also showed an increase of about 2%. The largest organic product markets are in North America and Europe. In the world organic product market, the United States is leading with € 35.8 billion, accounting for 47% of the world organic produce trade, which is followed by the EU with € 27.1 billion, accounting for 35% and China covering 6% of the world produce trade with € 4.7 billion.

Key words: Legislation, control bodies, data collection, training.

Development and current status of organic farming in Turkey

According to the figures of 2016, 2% of the total agricultural area in Turkey is certified as organic. However, there is a chance for Turkey to obtain a good market share from the increase in consumption of organic products, which is becoming widespread in the world and especially in Europe. In recent years, while products such as dairy products, meat and meat products, other

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processed foods including convenience foods, baby food, chocolate etc. gained importance, the organic fresh fruit and vegetable sector still has a big demand in the Western European organic market. In this context, Turkey has an important potential in terms of organic fresh fruit and vegetable sector as well as conventional fresh fruit and vegetables.

At the initial stage, in 1990, only 8 products were organically produced in our country. Today, this number has reached up to 225 products on rawmaterial basis. Wheat, olive, hazelnut, walnut, pistachio, dried fig, dried apricot, raisins, legumes, medical aromatic plants, cotton, grape-like fruits and fresh fruits and vegetables are produced in accordance with the organic farming standards. As for the processed products, various fruit juices and concentrates, frozen fruits and vegetables, and olive oil are among the main organic processed products. In recent years, organic animal production started to develop and meat, honey, milk, yoghurt, cheese and eggs have begun to take place in the domestic market as animal products.

Organic farming in Turkey is performed by 67.878 producers in a total area of 523,778 hectares according to the 2016 data. 34,106 hectares of this area is natural harvesting area and 489,671 hectares are cultivated. According to the 2016 data, Turkey has reached to a total of 8.340 bovine animals, 7.234 of which are totally organic, a total of 26,326 ovine animals, 24,356 of which are totally organic; a total of 1,212,542 poultries, 1,184.02 of which are totally organic and a total of 76.242 beehives, 40,371 of which is totally organic.

If we look at the improvements in organic farming in Turkey, we see that it has been based on traditional agriculture implemented in many regions especially in small sized holdings, mostly without or with very little chemical inputs. However, after 1984-85, the organic farming in the real meaning started but it had no legislation which regulated control, certification, labelling, storage, transportation and so on.

Table 1. Organic plant production (including the transition process)

Years	Number of Products	Number of Farmers	Cultivation Area (ha)	Natural Harvesting Field (ha)	Total Production Area (ha)	Production Amount (tone)
2002	150	12,428	57,365	32,462	89,827	310,125
2016	225	67,878	489,671	34,106	523,778	2,473,600
% change (2002-2016)	50	446	754	5	483	698

Source: Turkish Ministry of Food, Agriculture and Livestock

In other words, organic farming in Turkey started in the mid 80's with the demands of European importers. It can be said organic agriculture was initiated in Izmir which is located in the Aegean region, in 1985 with dried grapes and figs. Today, organic agricultural production has expanded to all regions. The number of organic farmers in Turkey is also increasing year by year.Turkish organic products which are produced in accordance with the by-law on organic farming increased into various categories, such as dried fruits, fresh or processed fruits and vegetables, pulses, edible nuts, cereals, spices and herbs, and industrial crops (Table 2). Some of the processed organic products are frozen fruits and vegetables, and fruit juice concentrates. Most of them are exported. Number of operators, quantity of production, production areas and product diversity have increased by the years. Number of operators was around 2000 in 1996, then it reached to almost 13,000 in 2002, and it was 12,428 in 2016.

Generally there has been an increase in organic animal production sector.The number of bovine animal, ovine animal and poultry increasing year by year as it seems at Table 3.

Table 2. Top 15 crops according to production amount in 2016 (organic + in transition)

Product Name	Total Number of Farmers	Total Production Area (ha) (2)	Total Amount of Production (tonne)*
Clover	9106	42,106	338,569
Wheat	16614	124,285	334,352
Grapes	5826	13,198	301,903
Olive	21635	81,048	261,814
Apple	2779	3,748	123,896
Apricot	2283	7,437	122,032
Trefoil	6004	29,257	113,565
Fig	7472	15,783	111,035
Barley	5920	30,452	84,263
Vetch	4603	29,815	78,948
Tea	10060	4,149	73,085
Meadow Grass	4188	15,478	49,934
Maize	609	3,183	39,571
Pomegranate	567	1,265	29,708
Cotton	421	6,585	29,476

*Amount of production is calculated on fresh basis
Source: Ministry of Food, Agriculture and Livestock

On the other hand organic beekeeping data is presented at Table 4. This table shows that the number of producers and bee hives increased while the amount of production decreased. As is known, changes in production quantity depend on many variables.

The number of countries where Turkish organic products are exported are estimated as 44 in 2016 and among those, the US and the members of the European Union are the countries where we export the most. Except the European Union countries and the United States; the United Kingdom, Japan, Canada, Australia and the Turkish Republic of Northern Cyprus are other countries that Turkish organic products are exported. The data on exports display some problems however to give a rough idea, some export data as amount and value are given in Table 5.

Table 3. Organic livestock existence (Including the transition process)

Year	Number of Farmers	Bovine (number)	Ovine (number)	Poultry (number)
2005	6	1.953	10.066	890
2016	207	8.340	26.329	1.212,542
% Change (2005-2016)	3.350	327	162	136,141

Source: Ministry of Food, Agriculture and Livestock

Table 4. Organic bee-keeping Indicators

Year	Number of Farmers	Hive (number)	Amount of Production (tone)
2005	370	50,486	573
2016	640	76,242	349
% Change (2005-2016)	73	51	-40

Source: Ministry of Food, Agriculture and Livestock

Table 5. Top ranking organic products exported from Turkey in 2016

Product	Amount (tonnes)	Total ($)	% In total exported amount	% in total export value
Hazelnut and Hazelnut Products	2,466	24,975,616.46	14.7	32.1
Fig and Fig products	3,676	18,665,594.94	21.9	24.0
Dried Grape	3,393	12,456,025.53	20.2	16.0
Apricot an apricot products	1,845	10,996,054.17	11.0	14.1
Fruit and Fruit Products	1,758	6,222,986.33	10.5	8.0
Spices	91	765,829.65	0.5	1.0
Soy Bean	1,600	680,000.00	9.5	0.9

Vegetables and Vegetable Products	246	587,259.96	1.5	0.8
Pistachio	22	492,932.44	0.1	0.6
Cotton and Cotton Products	46	357,066.67	0.3	0.5
Lentil and Lentil Products	134	310,644.12	0.8	0.4
Sesame	52	229,930.00	0.3	0.3
Wheat and wheat products	610	186,877.47	3.6	0.2
Chickpeas	61	144,176.38	0.4	0.2
Total	16,001	77,070,994.12	95.1	99.0
Grand total (Including Others)	16,819	77,831,368.00	100	100

Legislation

The major institutional (corporate) and legal developments and their dates in Turkish organic agriculture is summarized in Figure 1.

Control and certification bodies operating in Turkey

Organic farming is a type of production where all stages of production are controlled and in case of conformity to the reference standard, the final product is certified. In Turkey, this process is carried out under the supervision of the control and certification bodies authorized by the Ministry of Food, Agriculture and Livestock (MFAL) and under a contract. There are 31 Control and Certification bodies operating in Turkey. The names of these bodies are as follows; ECOCERT IMO, BCS, ETKO, EKOTAR, ICEA, CERES, ORSER, ANADOLU, TURKGAP, NİSSERT, CCPB IMC, EGE TAR, BIO INSPECTA, Control Union, ECAS, Biobel, Mehmet BIYIK-TUSCERT, KAYOS, Başak, CTR, LİKYA, NAVİGA, ORFARM, Magenta, De Control, CASCERT, ORTA ASYA, BİOTEAM, MET, GENSA, BIOMEL. Further information and updated list can be obtained from the MFAL website.

Projects and subsidies

The MFAL has carried out and today still implements various projects for widespreading organic farming practices. The framework project entitled "Project on Expansion and Control of Organic Farming" is implemented by MFAL since 2011 under the coordination of the Department of Good Agricultural Practices and Organic Farming of the Directorate General of Plant Production of the Ministry.

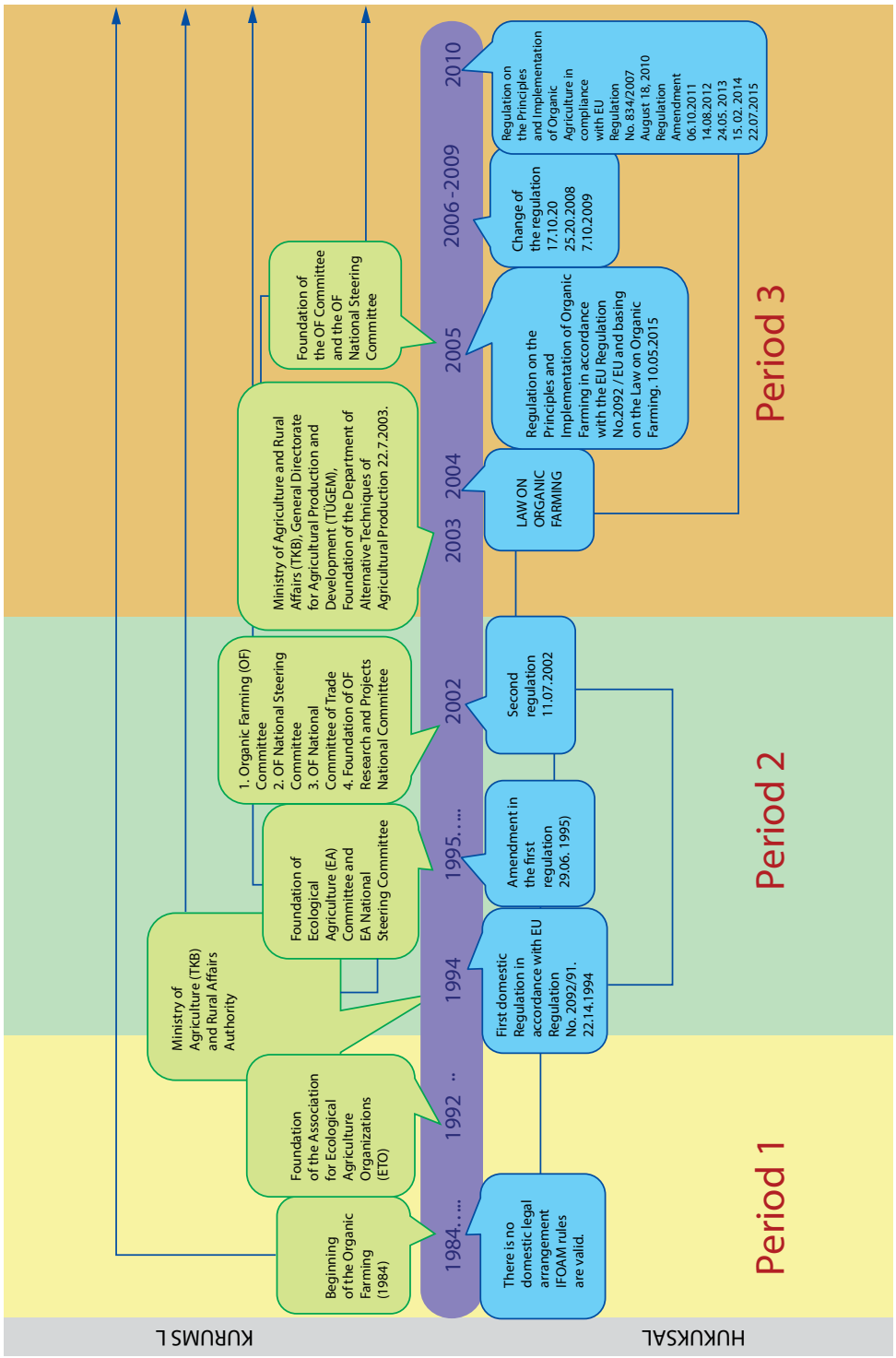

Figure 1. Organic agricultural lands ('000 ha) (Willer and Lernoud, 2017)

Within the scope of this project, as of 2017, research, development, training and awareness raising activities and studies on organic vegetable, animal and wild products are being carried out both at the Central Organization of the Ministry and at 54 Provincial Directorates and 12 research instititues

International projects

1. In the framework of the cooperation of the Turkish Cooperation and Coordination Agency (TIKA) and our Ministry, technical support was provided for the Development of Organic Farming and Institutional Capacity Building in Albania and Azerbaijan in 2012.
2. The Project "Proposal for the Development of Organic Agriculture and Institutional Capacity Building in Azerbaijan" submitted within the framework of the Turkey Partnership Program of the United Nations Food and Agriculture Organization Central Asia Sub-Regional Office (FAO-SEC) has been accepted and project activities are continuing.
3. A representative of our Ministry involved in the Steering Committee of the "Turkish-German Ecological Cooperation Project" carried out by the Federal Ministry of Food, Agriculture and Consumer Protection and ETO. The project has been finalized. The aim of the project is to strengthen the organic farming activities in Turkey as well as the widening the opportunities and enhancing quality of exported organic products in the European market. The Ecological Agriculture Research Institute (FIBL) has been coordinating the implementation of the project supported by the German Federal Ministry of Food and Agriculture.
4. Within the scope of the FAO-SEC Turkey Partnership Program, the activities on certification and inspection of the organic products in Uzbekistan were supported between 15 January 2017 and 21 January 2017 within the scope of "Project on Developing the Organic Farming and Building Institutional Capacity and Supporting the Good Agricultural Practices in Uzbekistan". Project activities are on-going.

Training

A special Department on Organic Agriculture was established on 22.08.2003, and since then organic farming related work has been carried out by this Department. In this sense, the personnel who are assigned to work at the Provincial directorates are regularly trained. Organic Farming Units were formed in each of the 81 provinces and training was provided to 108 people in 2003. These trainers in the

Organic Farming Units conducted 5 713 trainings between 2004 and June, 2017 and 132 110 farmers have been trained. In 2016, 467 trainings were organized and 14 728 farmers were trained. As of June 2017, 148 trainings have been organized and 3 640 farmers have been trained. Trainings are ongoing. In addition, banners and brochures were printed in order to develop organic farming and raise awareness of the society about the organic farming. In order to train inspectors and certifiers, Organic Farming Controller trainings on the ISO 17024 Personnel Standards are organized within the framework of the protocol made with TSE (Turkish Standards Institution). In this sense, the first training was organized in 2006. A total of 591 people participated in the these trainings between 2006-2017.

The Decision of the Council of Ministers dated February 25, 2004, which allows selective lending of low interest credits to our farmers, provided the opportunity to use a 3-year term investment and a one-year term business credits at a discount of 60% on the current interest rate applied to agricultural lending to entrepreneurs who produce organic agricultural products and inputs. This decision, which was issued for one year, continued in the following years by availing an opportunity to use 5-year term investment and 1,5 year maturity business credits. Starting from 2011, the farmers are provided with investment and business credits at a discount of 50% on the current interest rate.

In addition to the "Communiqué Regarding the Direct Income Support Payment for Plant Production" published in the Official Gazette dated 30.04.2005 and numbered 25801, an additional support of 3 TRY/da was provided to the organic producers in addition to the Direct Income Support. These supporting payments continue with the decree of the Council of Ministers and Communiqués issued annually.

Organic product marketing channels

In Turkish domestic market, there are various channels through which organic products are sold. Among them, open specialized markets generally held once a week is increasing in number. Currently, there are 18 organic open markets available in major cities as İstanbul, İzmir, and Kayseri. Almost all super/hypermarkets have organic products sold especially in their central stores in big cities or in holiday sites as Çeşme, Bodrum or Marmaris. The other channels are: Specialized stores, bakery product stores (mainly for organic bread), pharmacies (organic cosmetics or supplements), direct sales in the producer's garden or through 'Food Communities' that function as Community Supported Agriculture, on-line sales, and direct consumption at the dining halls or restaurants.

Strategic plan

The Ministry, as the competent authority, has been kept responsible for preparation of the strategic plan on development and expansion of organic farming. In this sense, the Organic Farming Strategy Plan of Turkey, prepared and submitted for approval of the Directorate General was revised due to the restructuring of our Ministry and the sectoral demands and re-enacted with the approval of the Directorate General dated 8 March 2012 dated 047.The National Organic Agriculture Action Plan (2012-2016) was prepared to increase consumer awareness on organic products, to increase demand for organic products, to activate control and inspection services, to strengthen institutional capacity and to contribute to the integration of organic farming with other sectors. In addition, the aim was to use public resources efficiently and appropriately by ensuring the coordination among institutions.

Organic farming information system (OTBIS)

The Ministry aims to establish a complete network of information exchange between the Control and Certification Bodies, the Ministry and the Provincial Directorates. A data base program has been prepared for this purpose and it has been operating since 2005 and data was uploaded by the Control and Certification Bodies. Data flow started between Central and provincial Organic Farming Units also as of 2005. Within the scope of Agricultural Information System (TBS) software related functions are carried out by the General Directorate of Agricultural Reform of the Ministry, OTBIS was developed and updated and recently integrated into Agriculture Information System. OTBIS system is used to reach provincial and country-based statistical data related to organic farming activities, to keep track of entrepreneurs in organic farming activities, to register plant production activities and animal production activities of entrepreneurs (land/product information, production quantities, certificate information etc.), to follow the developments regarding the organic farming and keep records of the changes, to keep records of the activities of the organizations authorized by the Ministry and to monitor them.

With the updates on OTBIS, in addition to the organizations authorized by the Ministry of Food, Agriculture and Livestock, organic farming unit personnel have been allowed to enter data so that all the controls, control reports and sanctions on organic farming activities are registered. Therefore, this system also ensures the traceability. Additionally all organic farming statistics are reached through

OTBİS and all work and transactions related to support, are carried out through the OTBIS records.

The SWOT analysis

SWOT analysis carried out revealed the following points as opportunities and threats for organic farming in Turkey.

Opportunities

- EU-funded Organic Farming Project started in 2006
- Producers Union Law has been enacted
- Organic products sell at higher prices
- Increase in demand for organic products in the world
- Increased employment in the organic farming sector
- Increase in demand for agro-ecotourism and health tourism
- Increasing demand for healthy and quality organic products with the development of consumer consciousness
- Closeness to the main markets due to the geographical location
- Stronger access to foreign markets

Threats

- Small scale of the organic farming enterprises
- Relatively inadequate upports
- High level of dependency on external organic inputs
- Increased state supports in the competing countries
- Organic food prices are higher than conventional products
- Increase in technical barriers against entrance to export markets
- Even if GM production is not allowed in Turkey, the risk of GMO seeds mixing with organic inputs

Results and lessons learned

The duties and responsibilities of institutions and organizations related to organic farming and their fields of activity should be clearly and precisely indicated.While preparing the legal framework, it should be clearly stated which institutions are in charge of the authorization, accreditation control and certification services. In accordance with the general principles of organic farming, administrative and legal arrangements should be made for non-conformities or violations and the

measures to be taken in such cases should be clarified.Traceability is important in organic farming. For this purpose, the Organic Farming Information System should be established under the roof of the competent authority and all data necessary for traceability should be recorded. This issue is crucial for the development of strategies and policies in the field of organic farming. Once a sufficient set of national and international data has been provided, it will be possible to utilize these data from a centre to perform necessary activities.The institution, which will be in charge of operating the organic farming system and which will authorize the control and certification bodies, must have enough trained technical personnel to provide information support to the producers who will engage in organic farming. In organic farming, it is essential that the controllers and certifiers are knowledgeable about organic farming, competent enough for performance of control and certification duties and well educated in quality and organic farming practices.

In addition, the support for organic farming is one of the conditions for successful planning to develop organic farming. While preparing the organic farming strategy the facts and potential of the country should be taken into account and it should be ensured that the strategy is feasible with action plans in short, medium and long term. Turkey is a country with significant potential in terms of organic production and exports, considering the advantages of not using very intensive inputs in its territory, product diversity in terms of agricultural production, existence of different ecosystems, and the surplus of agricultural population in terms of labour required for organic agriculture. With the solution of current problems, it is possible to increase both production, domestic consumption and exports of our country.Increasing organic farming leads to increased economic power of the farmer while creating various employment opportunities for rural development. Organic farming increases the soil fertility, natural biodiversity and water quality. It also promotes animal health and well-being.

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Organic production in Georgia

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Abstract

According to the Organic Agriculture Research Institute (FiBL) and the International Federation of Organic Agriculture Movements (IFOAM) land for organic production in the world is continuously growing. Today, organic production is the only reasonable alternative to agriculture, as the global ecosystem will no longer be able to withstand the increasing strain. Georgia, as well as other countries, showed great interest in the development of bio-agroproduction, especially since it has great potential for this.

Georgia is known for its rich agrarian traditions. The products produced here have always stood out for high quality and excellent taste. Agriculture development prerequisite for our country should be the uniqueness and high quality of the products produced here. Ecosystem stability directly depends on biodiversity, which is the main principle of organic production successful development.

That is why Georgia has great potential and prospects for organic farms creation and development. With such unique natural resources Georgia can enter the world market and take its place in the production and sale of bio-products. All over the world organic products market remains virtually the only unceasingly growing and in high demand even against the backdrop of the global economic crisis. The Government of Georgia encourages support and assistance to farmers interested in creating bio-farms. From 2005 to the present day only one biocertification body, accredited by the European Union – "Kavkazsert", operates in Georgia. The Ministry of Agriculture of Georgia is also considering a proposal to create an alternative certification body for bioproducts. Today more than 50 farms and biopreparation manufacturers in Georgia have organic agriculture certificates. The great achievement of Georgia's government in organic agriculture development in the country is that the whole region of Mtskheta-Mtianeti became an IFOAM member and officially was declared as a green zone.

Keywords: ecosystem, organic agriculture, potential

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Introduction

According to the Organic Agriculture Research Institute (FiBL) and the International Federation of Organic Agriculture Movements (IFOAM) land for organic production in the world is continuously growing. For sixteen years their size has increased almost 4 times and in 2014 it amounted to 43.7 million hectares. Today, organic production is the only reasonable alternative to agriculture, as the global ecosystem will no longer be able to withstand the increasing burden.

Today, organic production is the only reasonable alternative to agriculture, as the global ecosystem will no longer be able to withstand the increasing burden.

Georgia is a small country with an area of 69,700 square meters, with a population of 4.3 million people (the capital is Tbilisi with 1.2 million inhabitants).

The landscape of Georgia is quite diverse. In the Western part, starting from the marshy lands, it reaches the eternal glaciers of the Caucasian mountain range, in the eastern part of it - a small segment with a semi-arid flat terrain. 40% of Georgia's territory is covered with forests, and 40% is agricultural land

Due to landscape diversity, Georgia is home to more than 30,000 living organisms, with the exception of bacteria and viruses; there are 576 species of vertebrates, of which 60 species are Georgia's endemic. Flora has about 900 endemic species, 600 of which are the endemic of the Caucasus, and 300 are the endemic of Georgia.

Georgia is also rich in water resources, there are 26,060 rivers on its territory, the total length of which is 60 thousand km. There are 18 109 rivers of the Black Sea basin, of the Caspian – 7 951.

Georgia is an agrarian country and has a long history of agricultural development.

Georgia, as well as other countries, showed great interest in organic farming development, especially since it has great potential for this.

Georgia is known for its rich agrarian traditions. The products produced here have always stood out for high quality and excellent taste. Agriculture development prerequisite for our country should be the uniqueness and high quality of the products produced here.

Having a relatively small land area Georgia cannot compete with countries that produce a large quantity of cheap products, but with respect to biodiversity, Georgia is absolutely unique.

It is well known that ecosystem stability directly depends on biodiversity, which is the main principle of organic production successful development

That is why Georgia has great potential and prospects for organic farms creation and development. With such unique natural resources Georgia can enter the world market and take its place in the production and sale of bio-products.

Results of organic production in Georgia

Potential for organic agricultural production development in Georgia

Establishment of a developed organic farm network in Georgia as the best form of agricultural practice is not only a prerequisite for healthy environment creation, production of healthy food products and the guarantee of future generations' health, but it also has a growing economic potential

Georgia was one of the first in post-Soviet countries to be able to regulate organic production issues. In 2013-15, in connection with the policy change, the law "On safety and quality of products" was adopted, prohibiting the labeling of products to use the words "bio", "eco", "organic" in any variation, if this product do not have biocertificate. On July 30, 2013, the government of Georgia adopted Resolution "On bio-production" 198/2013.

Recently, the government of the republic has declared organic products local market development as one of the priority directions with subsequent export:

- Globally, organic products market remains virtually the only unceasingly growing and in high demand even against the backdrop of the global economic crisis when a decline in other markets is noted;
- World demand for bioproducts is much higher than the supply
- Bioproducts production and sale is a very important and promising segment for Georgia;

Sticking to this direction Georgia can enter the world market and successfully compete with other producers

A brief overview of organic agriculture history in Georgia

The beginning of organic agriculture development in Georgia can be considered 1994, when the Organic Farms Association "Elkana" was established and which is still successfully operating in the country.

Aim of this farm association is to improve socioeconomic status of Georgia's population, organic farms development, growth of rural population activity, environmental protection.

Fundamental principle of the Organic Farms Association "Elkana" is mentality development based on traditions, active involvement of the rural population in the country's development, environmental protection ethics and professionalism.

To date, "Elkana" unites about 900 farmers and farms, including farmer groups, cooperatives, associations, small businesses. "Elkana" regularly conducts training courses for farmers, students, non-profit organizations and other stakeholders from all agricultural sectors, including viticulture and winemaking, horticulture, cereals cultivation, vegetables, animal husbandry.

Concrete steps taken to develop bio-production

Since the Government of Georgia has declared organic agriculture development to be a priority and organic products local market establishment, concrete steps have already been taken to successfully solve this issue:

The Ministry of Agriculture established a bio commission consisting of 20 specialists who, in accordance with the country's legislation, developed a concept for bio agriculture development.

"Bio-Agro-Production" department was established in the Agriculture Research Center, which conducts scientific work both in bio production model development and in testing produced in Georgia and imported bio preparations. The work is carried out both on cereals and on vegetable crops, which are cultivated by means of organic methods.

Moreover, Bio-Agro-Production Department in cooperation with the Department of animal production, health and fodder production which is also a part of Agriculture Research Center, has begun work on organic pond farming model creation in Western Georgia. Here, a unique work is carried out to intercross local carp populations of Paravani Lake (Mountainous part of Southern Georgia) and carp of the Rioni River (Flat part of Western Georgia). Comprehensive work consists in the fact that the Bio-Agro-Production Department, along with its field of work, produces bio fish fodder for carp (grains-barley, wheat, corn), and the Department of animal production, along with zoo and phytoplankton, conducts breeding work with carp in organic pond farming.

Both breeding work of this scale, and the creation of a pond biomodel in Georgia, are being conducted for the first time.

Conclusion

Prospects for organic agriculture development in Georgia

As mentioned above, Georgia has great potential and prospects for organic agriculture development.

The Government of Georgia encourages support and assistance to farmers interested in creating bio-farms. This is facilitated by various programs designed by the Government of Georgia that promote organic agriculture development, especially in highly-mountainous regions of Georgia, where pesticides and herbicides have not been used for many years.

Cooperative farms establishment can be considered as an extremely successful example of sustainable organic agriculture development. These farms are able to more easily obtain a biocertificate of manufactured products.

Since 2005, only one biocertification body, accredited by the European Union - "Kavkazsert", has been working in Georgia. It conducts inspections and issues the appropriate biocertificate in accordance with the norms of the "Green Caucasus" developed by the legislation of the Euroregulation.

The Ministry of Agriculture of Georgia is also considering a proposal to create an alternative certification body for bioproducts.

Today more than 50 farms and biopreparation manufacturers in Georgia have organic agriculture certificates. Mainly, these are vineyards and winemaking, as biovine enjoys broad success and is in high demand abroad.

Also, wild plants collection primary production (blackberries, raspberries, nuts, medicinal plants) is also in great demand.

Limited liability companies (LLCs) – Geoflauers, Gealogos, Geoplant, Levinsen and Abies, cooperatives Someji, Sharakhevi 1, Nichbura 2015, Liakhvi 2015; bio tea production cooperative "Velvet Tea", "Bio universal Georgia" LLC, primary plums, peaches, fruits production – "Eleniksta" LLC, "MNK Group" – primary production of blackberry, production of ether-oil crops – "Essential Oils of Georgia" LLC and many others were established. All of them are holders of biocertificates.

There are already several companies in the country that possess biocertificate and produce biopreparations for plant protection, such as "Bioagro" LLC, "Geofert", "Agrovita", "Farmer of the Future". Microbiological studies are underway to create biopreparations both for plants protection and nutrition. More than 40 biopreparations have been registered in Georgia, that are successfully used by farmers interested in developing their bio-farms. One of the biopreparations of "Bioagro" – "Organica" company has already been exported to Azerbaijan. Research works are also conducted in the field of animal husbandry – a biopreparation (prebiotic) was created, which will be tested by our Research Center in organic poultry.

Great achievement of Georgia's government in organic agriculture development in the country is that the whole region of Mtskheta-Mtianeti became an IFOAM member and officially was declared as a green zone. This region includes both highlands and lowlands. At present, projects for creation of bio farms of a specific direction including aquaculture (especially in the highlands) is already being developed.

In addition to the above, there is a designed program "Biofarmer" for vocational education development in the country, which will soon be approved by the Ministry of Education. Under this program, everyone, including farmers, regardless of age and profession, will be trained in the course of bio agriculture in all of its branches.

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National profile on organic agriculture in Azerbaijan

Hazi Eynalov[14]

1	Total organic certified area (fully organic and in transition) (ha)	24 391 ha
2	Main crops (ha)	937 ha
3	Certified wild harvest area (ha)	919 ha
4	Organic animal husbandry (including bee-keeping and aquaculture)	Only organic certified animal product is honey and 932 beehives.
5	Certification bodies (national and/or foreign)	Despite the existing Law and its bylaws, the organic system is not complete and/or not fully implemented at national level. This further hinders institutional set-up, registry or supervision of the inspection and certification bodies. Due to this gap, all inspection and certification functions are taken over by foreign control bodies (CBs) in reference to the standard(s) demanded by the importing country. ECOCERT SA (France), ETKO (Turkey) and Lacon Gmbh (Germany)
6	Is there a national legislation on organic agriculture	In Azerbaijan, there is a specific legislation on organic production since 2008.
7	Is there a data collection system at national level?	There is not special a data collection system at national level
8	Government support for OA	There are not types of Government supports for OA
9	Farmer interest for OA	There is not any survey results for fermer interest for OA. But last few years same regions fermer has more interest for OA
10	Availability of inputs	Today not big potential for availability of inputs
11	National institutions and universities working on organic agriculture	1. University of Agrarian Sciences 2. Center on Organic Agriculture of the Academy of Sciences Institute of Botany 3. Vegetable Research Institute in Absheron
12	International organizations working on organic agriculture	Food and Agriculture Organization of the United Nations
13	Domestic market	Main domestic markets are rural areas and big cities. Major market channels are supermarket and specialized markets.
14	Export market	Export of organic products in Azerbaijan is driven by the private sector. There are several companies that initiated organic production of pomegranate and some other fruits. Companies easily export products to the Russian Federation, Germany, Ukraine, Belarus, Estonia, and UAE. It plans to expand its markets to Islamic Republic Iran, USA, Europe, Turkey, China, Japan and Australia.
15	Main barriers for adoption or scaling of organic in the country	1. Lack of functional mechanism in the implementation of legislation on OA 2. Weakness of communication among related government bodies. 3. Lack of public awareness

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16	Main opportunities for adoption or scaling of organic agriculture	1. Azerbaijan has potational OA 2. Some large companies started to produce in the field of OA. 3. Demand for natural products increases steadily
17	Lessons learned	–
18	Websites to get additional information	1. www.gaba.az 2. http://www.worldsrichestcountries.com/top-azerbaijan-exports.html. 3. www.stat.gov.az/source/agriculture/indexen.php.1.2
19	Other comments	–

National profile on organic agriculture in Azerbaijan

Vugar Babayev[15]

1	Total organic certified area (fully organic and in transition) (ha)	37 630 ha
2	Main crops (ha)	17 309 ha
3	Certified wild harvest area (ha)	n/a
4	Organic animal husbandry (including bee-keeping and aquaculture)	n/a
5	Certification bodies (national and/or foreign)	
6	Is there a national legislation on organic agriculture	Yes
7	Is there a data collection system at national level?	Organic Farming: Regional Experimental and Resource Center (www.etkt.az) collecting data in local and national level through farms and markets
8	Government support for OA	Provide subsidies for organic fertilizer – 70%
9	Farmer interest for OA	Mainly big companies and organic farmer unions are interested
10	Availability of inputs	Only plant protection agents, soil amendments are providing by company Agribioekotech and knowledge and skills are providing by Organic Farming: Regional Experimental and Resource Center – www.etkt.az
11	National institutions and universities working on organic agriculture	Organic Farming: Regional Experimental and Resource Center under National Academy of Sciences directed by prof. Amin Babayev – winner of OWA 2017
12	International organizations working on organic agriculture	FAO project GCP/AZE/006/TUR and SEC Crop Regular Program USAID Smart Azerbaijani Farm (SAF) project in Azerbaijan
13	Domestic market	Mainly fresh fruit and vegetables, honey, hazelnut, buffalo cream, dried wild fruits in open farmer's market and home delivery network system
14	Export market	Mainly produced and also processed pomegranate, oriental persimmon, hazelnut, and wild berries
15	Main barriers for adoption or scaling of organic in the country	Luck of government support, absent of national standards and certification system, week high and vocational education
16	Main opportunities for adoption or scaling of organic agriculture	Big advantage of geographical and climatic conditions, huge labour capacity and luck of chemicals and fertilizers
17	Lessons learned	IFOAM and Eurasia FOAM networking
18	Websites to get additional information	www.organic-world.net/yearbook/yearbook-2017.html
19	Other comments	There are big demands for international and regional multidisciplinary projects with different components like policy dialogue, certification, production, marketing and education…

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National profile on organic agriculture in Belarus

Natalia Parechina

1	Total organic certified area (fully organic and in transition) (ha)	The total area is 1 379.5 ha Fully organic – 972.5 ha In the transition period – 407 ha
2	Main crops (ha)	Cereals (oats, spring barley), oilseeds, fodder crops, vegetables, berries (cranberries, blueberries), fruits.
3	Certified wild harvest area (ha)	Wild-growing – 2 742 ha (data IFOAM 2015): mushrooms, blueberries, birch sap.
4	Organic animal husbandry (including bee-keeping and aquaculture)	Goat breeding (transitional period)
5	Certification bodies (national and/or foreign)	Organic Standart LTD, Ukraine Ekoagros, Lithuania Kiwa BCS Oko-Garantie GmbH, Germany Ecoglobe, Armenia Abcert AG, Germany
6	Is there a national legislation on organic agriculture	The draft law «On the production and circulation of organic products» is under development. Approved and put into effect by the Decree of the State Standard of the Republic of Belarus of July 21, 2015, No. 36 TCH 567-2015 (33540) «National system of conformity assessment of the Republic of Belarus. Certification of organic production. Basic provisions».
7	Is there a data collection system at national level?	No
8	Government support for OA	No
9	Farmer interest for OA	Not very high level of interest
10	Availability of inputs	▪ seeds – no ▪ plant protection products – there are: biopesticides ▪ Soil auxiliary substances – biofertilizers and humates ▪ biopreparations for animal husbandry ▪ knowledge is not enough
11	National institutions and universities working on organic agriculture	RUE «Institute of Plant Protection of the National Academy of Sciences of Belarus» RUE «Institute of Microbiology of NAS of Belarus» RUE «The Institute of Experimental Botany of. V.F. Kuprevich National Academy of Sciences of Belarus State Institute of Genetics and Cytology, National Academy of Sciences of Belarus BSTU – Belarusian State Technological University BSTU – Belorussian State Agrarian Technical University BSU – Belarusian State University State Enterprise «Institute for System Studies in the Agroindustrial Complex of the National Academy of Sciences of Belarus» Research Economic Institute of the Ministry of Economy

12	International organizations working on organic agriculture	There are no international ones, there are national ones: ▪ The establishment of the Center for Environmental Solutions (CER) ▪ Establishment of «AgroEcoCulture» ▪ Public Association «Ecodom»
13	Domestic market	Address delivery and online stores (EkaEzha, Tuk-tuk, Letuk, Biomarket)
14	Export market	USA, Japan, EU (birch sap, mushrooms and berries) Russia (goat cheese, milk and yogurt)
15	Main barriers for adoption or scaling of organic in the country	▪ Insufficient number of farms in the whole country ▪ lack of private ownership of land, ▪ lack of national legislation, ▪ lack of state support measures, ▪ insufficient knowledge in this field
16	Main opportunities for adoption or scaling of organic agriculture	▪ Availability of a sufficient number of agricultural and forestry land; ▪ There are public organizations interested in promoting organic organizations, the process of developing national legislation is underway, ▪ there are first attempts to introduce training courses in organic
17	Lessons learned	▪ It is necessary to actively involve external resources to support the development of the OCS in the country. ▪ At the heart of everything is a system of training and exchange of experience. ▪ It is important to develop national science in the field of OCS.
18	Websites to get additional information	www.ecoidea.by http://agracultura.org
19	Other comments	Looking for partners for cooperation

National profile on organic agriculture in Iran

Reza Ardakani[16]

1	Total organic certified area (fully organic and in transition) (ha)	43 000 ha certified agricultural land
2	Main crops (ha)	Pistachio, Pomegranate, Saffron, Date, Fig, etc.
3	Certified wild harvest area (ha)	38 510 ha
4	Organic animal husbandry (including bee-keeping and aquaculture)	Only a few number of beekeeping
5	Certification bodies (national and/or foreign)	1. Biosun Certifier (national IB and exclusive representative of international CB, bio-inspecta Switzerland) 2. Pars Govah Gostar (national IB and partner of international CB, BCS Germany) 3. Ceres Parsi (national IB and partner of international CB, Cerescert Germany) 4. Govah Sabz Ferdos (national IB) 5. Talashgaran Ertegha Keifiet (TAK) – (national IB) 6. Giti Ajhan Pardis (GAP) – (national IB)
6	Is there a national legislation on organic agriculture	INSO-11000 (Iranian National Standardization Organization) – National Iranian standard for Requirement of production, processing, inspection & certification, labeling and marketing of organic food
7	Is there a data collection system at national level?	▪ Iran Organic Association (IOA) ▪ Institute of Environmental Science, Shahid Beheshti University
8	Government support for OA	Research institutes for biological pests control, biofertilizers and testing organic inputs.
9	Farmer interest for OA	Improved farmers are most interested (specially for export)
10	Availability of inputs	By private companies: bio-pesticiedes and biofertilizers Not sufficient for all types of pests but available.
11	National institutions and universities working on organic agriculture	▪ Iran Organic Association ▪ IFOAM-IRAN ▪ Islamic Azad University- Karaj ▪ Institute of Environmental Science, ▪ Shahid Beheshti University Ferdowsi University of Mashad ▪ Research Institute of Plant Protection- Ministry of Agriculture ▪ Research Institute of Soil and Water- Ministry of Agriculture
12	International organizations working on organic agriculture	▪ IFOAM-IRAN
13	Domestic market	▪ 67 organic shops under supervision of IOA in different provinces. ▪ Corners/ shelves of organic products in hypermakets
14	Export market	Mainly export to EU countries

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15	Main barriers for adoption or scaling of organic in the country	▪ It's not among top priorities of ministry of agriculture ▪ Low knowledge for the consumers ▪ High price ▪ Lacking of local markets
16	Main opportunities for adoption or scaling of organic agriculture	▪ Iran is the land of high value organic products ▪ Different climatic conditions across the country can provide the opportunity of production of varied products
17	Lessons learned	Organic must be started from local products and varieties with considering indigenous knowledge plus modern technologies
18	Websites to get additional information	1. IFOAM-IRAN 2. Iran Organic Association
19	Other comments	Regional supports for initiative activities

National profile on organic in Kazakhstan

Vladimir Grigoruk[17] and Evgeniy Klimov[18]

1	Total organic certified area (fully organic and in transition) (ha)	Official statistics are not kept. According to KAZFOAM, in 2015 in Kazakhstan there are 300 thousand hectares.
2	Main crops (ha)	Cereals, Oilseeds, Legumes, Medicinal Herbs
3	Certified wild harvest area (ha)	No
4	Organic animal husbandry (including bee-keeping and aquaculture)	No
5	Certification bodies (national and/or foreign)	1. Austria Bio Garantie GmbH; 2. CERES Certification of Environmental Standards GmbH; 3. Ecocert SA; 4. Institute for Marketecology (IMO); 5. Istituto Certificazione Etica e Ambientale; 6. LACON GmbH; 7. SGS Austria Controll-Co. GmbH; 8. Ecoglobe; 9. Organic standard
6	Is there a national legislation on organic agriculture	The Law of the Republic of Kazakhstan «On the production of organic products»
7	Is there a data collection system at national level?	No
8	Government support for OA	No
9	Farmer interest for OA	Among Kazakh farmers, a very low level of awareness of organic production. Motives of interest of farmers who practice organic production are as follows: ▪ Possibility to sell products at higher prices; ▪ Increasing the competitiveness of products through improved quality; ▪ Increased export potential, due to increased demand for organic products in foreign markets; ▪ Care for the environment and health, is also one of the factors, albeit for a small group of farmers; ▪ High cost of mineral fertilizers and pesticides.

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[18] Chairman, Kazakhstan Federation of Organic Agriculture Movements (KAZFOAM), Kazakhstan (fiec@mail.ru)

10	Availability of inputs	Seeds, plant protection products, soil auxiliaries, knowledge, The use of new technologies in organic production, processing and storage is difficult at the moment due to the lack of a high-quality raw material, technological, scientific and research base. There are also problems of practical implementation of scientific developments, this is due to the weak mechanism of interaction between producers of organic products. In the research environment there is no integrated approach to research in the field of organic production. Significant problems are the absence in the region of laboratories (for research on pesticides, GMOs, etc.) accredited in accordance with international standards, the absence of seed farms.
11	National institutions and universities working on organic agriculture	▪ Kazakhstan Federation of Organic Agriculture Movements – KAZFOAM ▪ Kazakh Research Institute of Agro-Industrial Complex Economy and Rural Development
12	International organizations working on organic agriculture	FAO, OSCE, UNDP, SGP GEF, Kazakh-German agrarian and political dialogue.
13	Domestic market	Wholesale. In Kazakhstan there are no organic wholesale markets, auctions and exchanges. Retail. At present, there are about 20 organic stores in Kazakhstan that sell food, cosmetics, food supplements, home care products. In retail chains, at present, while there are no specialized shelves of organic products, they practically do not stand out. Specialty stores. In the cities of Almaty and Astana, since 2012, specialized stores have started to be created that sell imported organic products. Products presented on the shelves of these stores are positioned as beneficial to health. If at first the assortment consisted of exotic fruits and berries, products that are not found in conventional retail chains, now the assortment is expanded by farm products, which they select according to the results of laboratory research. Internet sales. Virtually all sellers of imported products have online stores and deliver products. Currently, online shopping is the most common channel for the sale of organic products. Also, social networks are actively used for direct sales (Facebook, VKontakte), excluding intermediaries. Direct sales in the market, directly from the farmstead, from production sites. Often, a certain vendor-seller is assigned a permanent client base, which has the opportunity to personally inspect the conditions for growing crops and keeping animals and to make sure that the products obtained are harmless to health. This distribution channel is most common among «uncertified biofermenters». The most popular now is the creation of a client base through the Façebook network. State procurements. In Kazakhstan, the state does not allocate organic producers for public procurements.
14	Export market	As for exports, official statistics are not kept. According to the data received from the exporting companies, Kazakhstani certified organic products are exported to Russia, Ukraine, Germany, Poland, the Netherlands and Italy.

15	Main barriers for adoption or scaling of organic in the country	▪ Imperfection of the legislative framework for producers of organic products; ▪ Absence of any state support for the development of the organic products market (information, financial, marketing); ▪ Lack of support for research on the issues of production, processing and sale of organic products; ▪ Instability of the economic situation in the agricultural sector due to the economic crisis; ▪ Low availability of financial resources; ▪ Poor development of traditional agriculture.
16	Main opportunities for adoption or scaling of organic agriculture	▪ Low competition in the domestic market of organic products; ▪ Increased media interest; ▪ Dissemination of experience of Western producers of organic products after accession to the WTO; ▪ Demand for organic products on the international market.
17	Lessons learned	Given the interdepartmental «cross-cutting» nature of interaction in the organic sector, which covers a wide range of applications, including the production and processing of agricultural products, their certification, relocation, marketing, trade, etc., it is necessary to create a coordinated interaction of all stakeholders. There must be a permanent an institutional structure that implements the national policy in the field of organic market development and responds promptly to the needs of interested parties and the market. This structure should ensure cross-sectoral interaction, its creation is possible on the basis of the current profile association.
18	Websites to get additional information	https://www.facebook.com/Kazfoam-150363428492785/
19	Other comments	

National profile on organic agriculture in Kyrgyzstan

Ministry of Agriculture, Food, Industry and Melioration of the Kyrgyz Republic

1	Total organic certified area (fully organic and in transition) (ha)	About 2 800 ha
2	Main crops (ha)	Cotton, tobacco, potato, red beetroot, carrots, garlic, cabbage, apricot, apples, pears, berries, medicinal herbs (plants}, feed, dairy products, meat products – around 5 000 ha
3	Certified wild harvest area (ha)	Not certified
4	Organic animal husbandry (including bee-keeping and aquaculture)	
5	Certification bodies (national and/or foreign)	
6	Is there a national legislation on organic agriculture	By order of the Ministry of Agriculture and Melioration of the Kyrgyz Republic No. 280 dated 02.11.2012, an interdepartmental working group was established to develop a National Action Plan for the transition to production in the agriculture Kyrgyz Republic. This part of the Kyrgyz government's program on the transition of the KR to sustainable development for 2013-2017. At this time, the document is being considered by the Government of the Kyrgyz Republic.
7	Is there a data collection system at national level?	At the moment there is no data collection at the national level, except for the Public national level? Association «Bio KG» at the level of ayil aimaks.
8	Government support for OA	Kyrgyzagrobiocente as department of ministry agriculture, food industry and melioration of the Kyrgyz Republic responsible for policy in this field: ▪ Large-scale production of biological control agents for plants protection and animals; ▪ Systematic monitoring of the need for the application of biological control agents in the regions and in the whole country; ▪ Training of population and specialists on progressive methods and technology of biological control technology for plant protection; ▪ Development of legalizations acts in this field, providing the creation of optimal conditions to improve the environmental, phytosanitary and cpizootic situation in the country.
9	Farmer interest for OA	Interested, but the survey was not conducted.
10	Availability of inputs	
11	National institutions and universities working on organic agriculture	1. Kyrgyz-Turkish University «Manas» 2. Ksyrgyz National Agricultural University named after K.I. Scriabin

12	International organizations working on organic agriculture	1. Kyrgyz-Swiss Agrarian Programm; 2. Helvetas Swiss Intercooperation; 3. ICCO Co-operation Fund; 4. The German Society for International; 5. Cooperation (GIZ); 6. UN FAO; 7. The Aga Khan Foundation; 8. IFOAM organic international; 9. Bio Suiss; 10. National Organic Programm (NOP).
13	Domestic market	Several onlinc store (www.ecoland.kg, www.oa.kg and other), shops. Type of products are: vegetables, fruit, food production
14	Export market	Apricot – 60 000 tons in 1 year, Tajikistan. Apple – 30 000 tons in 1 year, Russian Federation, Republic of Kazakhstan. Cotton – 5 000 tons in l year
15	Main barriers for adoption or scaling of organic in the country	With the collapse of the Soviet Union, farmers are accustomed to using chemicals in their cultures. And also many inhabitants of the depths and rural areas are little educated and this is lead to the fact that farmers use chemical preparations to solve problems quickly, without knowing the organic approach to agricultural crops
16	Main opportunities for adoption or scaling of organic agriculture	First of all, it is environmentally friendly products. Secondly, new opportunities associated with the export and production of high-quality products.
17	Websites to get additional information	1. www.ifoam.bio 2. www.agro.kg/ru/plant_growing/898 3. www.biokg.org, www .kyrgyzkorm.kg 4. https://maan.ifoam.bio/display/KYR 5. www.bioservicc.kg, www .caincentralasia.org
18	Other comments	–

National profile on organic agriculture in Kyrgyzstan

Asan Alymkulov[19]

1	Total organic certified area (fully organic and in transition) (ha)	Total: organic – 4 819 ha In transition – 2 028 ha Federation of Organic Development BIO-KG: Fully organic – 1 123 ha In transition – 1 626 ha Cooperative Bio Farmer: Organic – 3 041 ha Cooperative Alysh Dan: Organic – 133 ha Cooperative Issyk-Kul Organic: Organic – 522 ha In transition – 402 ha *in 2016 VegaPlus certified 8 tons of wild walnuts in Jalal-Abad oblast 133 ha – Collect 1425 farmers Organic – 3041 ra Alysh Dan – 63 farms, 133 ha Issyk-Kul Organic – 223 (Org-118 farms; C-1 – 105 farmers); 930 ha (org-522 ha; C-1 – 402 ha)
2	Main crops (ha)	FOD BIO-KG – vegetables, fruits, wild collection Bio Farmer –cotton Alysh Dan – apricot Issyk-Kul Organic – medical and aromatic plants vegetables
3	Certified wild harvest area (ha)	Bio Farmer – 3 040 ha
4	Organic animal husbandry (including bee-keeping and aquaculture)	
5	Certification bodies (national and/or foreign)	Federation of Organic Development BIO-KG – PGS Certification (Participatory Guarantee System) Bio Farmer – IMO Turkey Issyk Kul Organic & Alysh Dan – Organic Standard Ukraine
6	Is there a national legislation on organic agriculture	No
7	Is there a data collection system at national level?	There is no national data collection system. Federation of Organic Development BIO-KG – has internal data base of organic farmers Bio Farmer – Internal Control System, regional and local inspectors
8	Government support for OA	No support to organic agriculture

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9	Farmer interest for OA	Please provide survey results if available According to the survey done by FOD BIO-KG in September 2016 in Issyk-Kul and Chui oblasts, 74% of farmers are interested in organic agriculture. They need awareness rising in organic agritechnologies and requirements.
10	Availability of inputs	Seeds, plant protection agents, soil amendments, knowledge FOD BIO-KG – plant protection means, seeds (vegetables) local and imported. Links the farmers with the producers and importers. Facilitates to promotion and marketing of organic products produced in the country; Bio Farmer – cotton and rotational crops seeds, supports the farmers with organic seeds, interest-free basis, the farmers pay off due to harvest in autumn, supports with marketing, acts as a guarantor for its farmers and promotes in obtaining a loan, and prepayments for cotton. This is achieved through cooperation with credit companies, both local and international; Issyk-Kul Organic – seeds and inputs, local and imported.
11	National institutions and universities working on organic agriculture	No
12	International organizations working on organic agriculture	Please provide both acronyms and the full names GIZ (German Community for economic development) supporting organic cooperatives as Bio Farmer, Issyk-Kul Organic and Alysh Dan. The Christensen Fund – supporting FOD BIO-KG establishing organic villages.
13	Domestic market	Please shortly mention where the main domestic markets are and what are the major market channels, (supermarkets, shops etc.) and type of products Local oblast and regional markets. We must keep in mind, that there is no difference in price between organic and traditional products. Since 2016 there are seasonal organic corners in 3 supermarkets of Bishkek.
14	Export market	Please shortly mention the volume, trend, importing countries and products Bio Farmer – cotton to Germany
15	Main barriers for adoption or scaling of organic in the country	Lack of national organic regulations Lack of support to organic farmers
16	Main opportunities for adoption or scaling of organic agriculture	Interest of farmers Service provider as Bio Service No plants producing chemical /mineral fertilizers Demand from customers
17	Websites to get additional information	1. www.biokg.org 2. www.bioservice.kg
18	Other comments	

National profile on organic agriculture in Russian Federation

David Yavruyan[20]

1	Total organic certified area (fully organic and in transition) (ha)	It's about 385 000 ha (2015, FIBL & IFOAM – ORGANICS INTERNATIONAL the World of organic agriculture STATISTICS & EMERGING TRENDS 2017). There is reason to believe that in reality these areas are much smaller.
2	Main crops (ha)	Cereals and legumes. There isn't survey about size of land by sorts. These farmers are about 50% of all organic certified producers.
3	Certified wild harvest area (ha)	About 35000 ha (2015, FIBL & IFOAM – ORGANICS INTERNATIONAL the World of organic agriculture STATISTICS & EMERGING TRENDS 2017) They are about 25-30% of of all organic certified producers.
4	Organic animal husbandry (including bee-keeping and aquaculture)	They are only 3 organic producers from animal husbandry.
5	Certification bodies (national and/or foreign)	There isn't national certification body. There are many self-declared certifiers without international accreditation. Abundance of falsification. The foreign certification bodies are ECOCERT (IMO), CERES, KIWA, BIO INSPECTA, ECOGLOBE, ORGANIC STANDARD. In the past they also were ABCERT and ICEA.
6	Is there a national legislation on organic agriculture?	There is no organic law in Russia. But there are 3 GOST standards. Without harmonization and not equivalent to international standards
7	Is there a data collection system at national level?	No
8	Government support for OA	No
9	Farmer interest for OA	There isn't reliable surveys about it.
10	Availability of inputs	Not enough
11	National institutions and universities working on organic agriculture	There are no special institutions and universities that professionally work on organic farming. Unfortunately, in Russia there is no organic specialists, skilled enough, because there is the most cost-effective to produce greenwashing.
12	International organizations working on organic agriculture	No
13	Domestic market	Cities: Moscow and St. Petersburg Channels of sales: online-shops, a few supermarkets Type of products: cereals, flour, pine nuts, fruit, vegetables, baby food, import snacks, juices, canned vegetables, cereals, flour, spaghetti, tea, cacao, chocolate
14	Export market	Main export crops: cereals, legumes and pine nuts. Volume of export: 4 million euro (2009, FIBL & IFOAM – ORGANICS INTERNATIONAL the World of organic agriculture STATISTICS & EMERGING TRENDS 2017) Now by rough estimate volume of export of organic products from Russia amounts about 50 million euro.

[20] Doctor of Biological Scences, Russia (yavdav@yahoo.com)

15	Main barriers for adoption or scaling of organic in the country	The most important problem is a high level of corruption. As a result: ignorance of consumers, unscrupulous and greed of producers, unpunished falsification and greenshooting from «pseudo certifiers». We can also note: 1. Low levels of living; 2. New economic crisis 2014 -2017; 3. Absence of an organic law equivalent to international regulations; 4. Lack of knowledge about organic products among the population; 5. Food sanctions from the Russian side.
16	Main opportunities for adoption or scaling of organic agriculture	1. Educational programs with reliable information for consumers and officials. 2. Ensuring transparency of information about the certifiers and falsifiers. 3. Exclusion of corruption schemes in the legislation and GOSTs 4. Adoption of an organic law equivalent to international regulations; 5. State support of organic production: subsidies for farmers and processors.
17	Lessons learned	Over the past 10 years, the situation in the country with the organic market has only worsened. Without intervention and support from international experts and specialists, there is a risk of adopting a corrupt law and total legitimization of greenwashing.
18	Websites to get additional information	The links to GOSTs 1. http://files.stroyinf.ru/Data2/1/4293749/4293749716.pdf 2. http://docs.cntd.ru/document/1200113488 3. http://docs.cntd.ru/document/1200121688
	Other comments	Dr. David Yavruyan Consultant of Organic Farming +7 916 425 19 69 yavdav@yahoo.com yavdav@gmail.com skype: david.yavruyan

National profile on organic agriculture in Slovenia

Martina Bavec[21]

1	Total organic certified area (fully organic and in transition) (ha)	In 2016 43,579 ha or almost 10% of all agricultural area is under organic production on 3,518 agricultural holdings (5% of all). In transition was in 2016 7,224 ha on 585 farms under conversion.
2	Main crops (ha)	Grassland 36,487 ha, field crops 4.404 ha (mostly cereals, oil and forage crops), 1,617 ha orchards (565 ha high-density orchards), 565 ha vineyards, 293 ha vegetables, 240 olive plantations and 2 ha hop. In 2016 the area of organic arable land increased by 481 hectares (of which 5 hectares were new organic areas for the production of vegetables), orchards by 177 hectares, vineyards by 70 hectares and olive trees by 35 hectares. By far the largest share (83%) of all organic land in utilized agricultural area is still permanent meadows and pastures.
3	Certified wild harvest area (ha)	
4	Organic animal husbandry (including bee-keeping and aquaculture)	In 2016 compared to 2015 the number of animals of all species increased. Organic cattle for meat is the most important part of animal husbandry followed by milk production and sheep. The number of animals in poultry increased the most (by 42% to 101,340). The hives followed by an increase of 30%, their number was 1,814 out of 150,000 which is the smallest share among all species. The number of rabbits increased by 16% to 1,849. The number of bovine animals and pigs increased by 9% (33,397 bovines and 3,648 pigs), the number of goats by 6% (there were 6,857) and the least, by 2%, increased the number of sheep (there were 35,841) but the highest share in organic among all species. The organic aquaculture in 2016 increased by 104% compared to 2015; it was 65 tons. The weight of carps increased by 307% and the weight of mussels by 100%.
5	Certification bodies (national and/or foreign)	Inštitut za kontrolo in certifikacijo v kmetijstvu in gozdarstvu (short name: KON-CERT) Vinarska u. 14 , 2000 MARIBOR Code: SI-EKO-001, Tel.: 02 228 49 31/32/33, Faks: 02 251 94 82 Inštitut za kontrolo in certifikacijo Univerze v Mariboru za tehnično preizkušanje in analiziranje (short in EN: IKC – Institute for inspection and certification UM), Pivola 8 2311 HOČE Code: SI-EKO-002, Tel.: 02 613 08 31, -32, Faks: 02 613 08 33 Bureau Veritas d. o. o. Linhartova 49a, 1000 LJUBLJANA Code: SI-EKO-003, Tel.: 01 475 76 61, Faks: 01 475 76 01 TÜV SÜD Sava Stoženska ulica 2, 1000 Ljubljana Code: SI-EKO-004, Tel. + (0)1 300 61 30, Faks + (0)1 231 37 52 info(at)tuv-sud.si
6	Is there a national legislation on organic agriculture	Yes. Last one printed in Official gazette Republic of Slovenia No 8/2014.
7	Is there a data collection system at national level?	MAFF collects data from inspection bodies – about area, animals and also quantity of organic products. There are not good data for the situation on the market to distinguish domestic and imported production from EU and third countries.

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8	Government support for OA	Per area for different crops are available payments for conversion (900 EUR/ha for all permanent crops, 600 EUR/ha vegetables, field crops 378 EUR/ha and grassland 312 EUR/ha) and for organic production (less) and also for organic honey bees 22.31 EUR per hive.
9	Farmer interest for OA	There is interest among them, but as market organisation is not well and also advisory service do not support it very much and there is lack of knowledge combined with several stereotypes – these are obstacles. On the other side majority of big agricultural enterprises started with conversion of some parts of their areas and see it as business opportunity and increasing image of company towards sustainability and circular economy. There is increase in number of operators in organic processing, distribution (import) and trade – over 300 companies are in the organic business.
10	Availability of inputs	There is lack in organic seeds spatially for local (Slovene) varieties. Plant protection agents and soil amendments are available, but knowledge is still a problem.
11	National institutions and universities working on organic agriculture	University of Maribor Faculty of Agriculture and Life Sciences Institute of organic farming, Pivola 10, 2312 Hoče/Maribor (study programme B.Sc. Organic agriculture since 2006) Institute for Sustainable development, Trubarjeva 40, 1000 Ljubljana Regional associations of organic farmers Demeter – association of biodynamic farmers Agricultural and forestry chamber is payed from the state for advising to farmers
12	International organizations working on organic agriculture	Not present now and in the past there were no international organisations much active. From time to time as collaborates in some projects like ABG, BioErnte Austria, AIAB, Avalon, FiBL. Slovenia is member of Core organic ERA-NET and several international research project were funded with collaborators from Slovene research institutions – below the first two mentioned here also National Institute of agriculture and Biotechnical faculty University of Ljubljana are active lately in research projects.
13	Domestic market	Majority of Slovene organic products are sold directly on organic farms, organic markets and as box-schemes (CSA), in public kitchens of schools and kindergartens., special organic/healthy shops. Lately more and more Slovene origin product are also in supermarkets as there is increase in looking for local among consumers generally (for conventional and organic).
14	Export market	There are not available data about volume of export, which is increasing too. There is substantial part of reexport – fi. organic durum wheat from Italy is imported and organic pasta exported, lately the same situation is in organic "superfoods". Export markets are Italy, Russia for organic cereals, EU for superfoods, Switzerland for organic eggs. There are several importing countries and products – last estimation about import was done in research project some years ago where it was stated that only 20% of organic food is domestic and 80% is imported – majority of food in supermarkets and specialised organic shops is from import.
15	Main barriers for adoption or scaling of organic in the country	Weak farmers (and also organic farmers) organisation for marketing. Farmers are not willing to collaborate among themselves for selling and also not through cooperatives due to bad experiences from the past. Advisory service for organic farming is not organised. Lack of knowledge about organic agricultural practices. Lack of available agriculture land for increasing organic farms.

16	Main opportunities for adoption or scaling of organic agriculture	Interest among consumers is still increasing, there is obligatory to use 10 % organic food or from conversion in public procurements (in schools, kindergartens etc.) and is proposed to be higher in the future. Slowly also in gastronomy in tourism interest for organic food is increasing. Due to geography, natural and climate conditions, small farms, 85% of agriculture area is less favourable for agriculture production due to different obstacles, 37% of the Slovenia is protected under Nature 2000, 17% is protected due to underground drinking water reserves and also market development in Slovenia and internationally, organic agriculture should be a main orientation in Slovene agriculture policy in the future.
17	Lessons learned	Agriculture policy has a huge effect on development of the sector, but payments are not enough for increasing the area – knowledge and organizational support for marketing are essential.
18	Websites to get additional information	1. http://www.mkgp.gov.si/si/delovna_podrocja/kmetijstvo/ekolosko_kmetovanje/ 2. http://itr.green-smoothie.org/
19	Other comments	

National profile on organic agriculture in Tajikistan

Ministry of Agriculture of the Republic of Tajikistan

1	Total organic certified area (fully organic and in transition) (ha)	3 500 ha
2	Main crops (ha)	Cotton, apricot, nuts etc.
3	Certified wild harvest area (ha)	No
4	Organic animal husbandry (including bee-keeping and aquaculture)	No
5	Certification bodies (national and/or foreign)	Please give the names that are already functioning or give the official source of information in case numbers are high National – not yet Foreign – IMO Control, KIVA, Bioinspect
6	Is there a national legislation on organic agriculture	Yes. The law of Republic of Tajikistan From 22 July 2013 №1001
7	Is there a data collection system at national level?	Please explain who collects data, how and at which level, farm and/or market Not developed
8	Government support for OA	Please explain what types of support is given to OA specifically The Ministry of agriculture and its sublattice
9	Farmer interest for OA	Please provide survey results if available There are, the crop field increase of year by year
10	Availability of inputs	Seeds, plant protection agents, soil amendments, knowledge Yes, it is needed to improve and increase
11	National institutions and universities working on organic agriculture	Please provide both acronyms and the full names Academy of Agriculture Science Tajikistan The University of agriculture of Tajikistan
12	International organizations working on organic agriculture	Please provide both acronyms and the full names HELVETAS, GIZ
13	Domestic market	Please shortly mention where the main domestic markets are and what are the major market channels, (supermarkets, shops etc.) and type of products supermarkets, shops
14	Export market	Please shortly mention the volume, trend, importing countries and products Europe
15	Main barriers for adoption or scaling of organic in the country	
16	Main opportunities for adoption or scaling of organic agriculture	
17	Lessons learned	
18	Websites to get additional information	
19	Other comments	

National profile on organic agriculture in Tajikistan

Sherzod Abdurakhmanov[22]

1	Total organic certified area (fully organic and in transition) (ha)	4 000 ha
2	Main crops (ha)	Cotton and rotational crops – 3 500 ha Out of it cotton – 1 600 ha Peanuts – 500 ha Alfa-alfa – 700 ha Beans – 200 ha Tomato – 100 ha Wheat – 200 ha Maize – 200 ha Apricots – 500 ha
3	Certified wild harvest area (ha)	Upcoming – 300 ha
4	Organic animal husbandry (including bee-keeping and aquaculture)	n/a
5	Certification bodies (national and/or foreign)	KIWA BCS – Germany
6	Is there a national legislation on organic agriculture	Yes. Law of Republic of Tajikistan on "Organic farming" from 22 July 2013
7	Is there a data collection system at national level?	n/a
8	Government support for OA	n/a
9	Farmer interest for OA	Reduced production cost, better market price (organic premium)
10	Availability of inputs	GMO free seeds, bio-humus and entomophagues
11	National institutions and universities working on organic agriculture	n/a
12	International organizations working on organic agriculture	GIZ, Helvetas Swiss Intercooperation
13	Domestic market	n/a
14	Export market	EU countries. Germany and Switzerland. 500 tons of cotton and 100 tons of peanuts
15	Main barriers for adoption or scaling of organic in the country	Availability of GMO free seeds, certification cost and lack of market for rotational crops
16	Main opportunities for adoption or scaling of organic agriculture	Opportunities with upscaling organic cotton, peanuts and apricots production in Tajikistan. Demand in EU and Chinese markets
17	Lessons learned	GMO contamination.
18	Websites to get additional information	www.biokishovarz.tj
19	Other comments	n/a

[22] Cotton and other organic products advisor, GIZ, Tajikistan (sherzod.abdurakhmanov@giz.de, sabdurakhamanov@gmail.com)

National profile on organic agriculture in Ukraine

Eugene Mylovanov[23]

1	Total organic certified area (fully organic and in transition) (ha)	According to the Federation of Organic Movement of Ukraine, as of 31.12. 2015 – 410 550 ha
2	Main crops (ha)	According to the Federation of Organic Movement of Ukraine, as of 31.12. 2015: Wheat – 69 600 ha, Corn – 33 940 ha, Barley – 35 120 ha, Rye – 9 400 ha, Polba – 5 500 ha, Sunflower – 33 900 ha, Rape – 16 825 ha, Peas – 9 100 ha, Soybean – 6 300 ha, Len – 5 990 ha, Millet – 6 300 ha, Buckwheat – 5 240 ha, Oats – 4 780 ha.
3	Certified wild harvest area (ha)	According to the Federation of Organic Movement of Ukraine, as of 31.12. 2015 – 540 000 ha
4	Organic animal husbandry (including bee-keeping and aquaculture)	Organic production is developing: ▪ cattle, ▪ pigs, ▪ sheep, ▪ goats, ▪ chickens and other birds, ▪ organic beekeeping is expanding, ▪ there were the first three farms for organic fish farming.
5	Certification bodies (national and/or foreign)	Organic Standard (Ukraine), Bio.inspecta AG (Switzerland), Ecocert SA (France), Control Union Certifications (Netherlands), Ekolojik Tarim Kontrol Organizasyon (Turkey), ECOCERT IMO Denetim ve (Turkey), CERES GmbH (Germany), ACSert AG (Germany), Lacon GmbH (Germany), QC & I GmbH (Germany), Kiwa BCS Oko-Garantie (Germany), Agreco R.F. Göderz GmbH (Germany), Bioagricert S.r.l. (Italy), ICEA (Italy), Suolo e Salute srl. (Italy), Ecoglobe (Armenia), Ekoagros (Lithuania), A CERT (Greece), Biokontroll Hungaria Nonprofit Kft. (Hungary).
6	Is there a national legislation on organic agriculture	Since January 2014 in Ukraine, the Law of Ukraine No. 425-VII «On the Production and Turnover of Organic Agricultural Products and Raw Materials» signed on October 3, 2013 by the President of Ukraine entered into force.
7	Is there a data collection system at national level?	The system of data collection at the state level has not yet been established. On a voluntary basis, this function from 2005 on itself was taken by the Federation of Organic Movement of Ukraine. This information is used at the national and international (including IFOAM and FAO).
8	Government support for OA	According to the Decree of the Cabinet of Ministers of Ukraine of 25.08.2004 No. 1102 «On Approving the Procedure for Using Funds Provided in the State Budget to Provide Support to Farms,» financial support is provided to farms on a competitive, refundable basis in an amount not exceeding UAH 500,000 for assessment of the conformity of production of organic products (raw materials) with ensuring fulfillment of obligations to return budget funds. Under equal conditions, farms that have applied for the transition to the production of organic products (raw materials) have an advantage over other farms that claim to receive financial support.

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9	Farmer interest for OA	Interest in organic production among farmers is growing, as evidenced by statistics: Certified organic producers in 2002 were 31, in 2003 – 69, 2004 – 70, 2005 – 72, 2006 – 80, 2007 – 92, 2008 – 118, 2009 – 121, 2010 – 142, 2011 – 155, 2012 – 164, 2013 –175, 2014 – 182, 2015 – 210. According to preliminary data, in 2016 – 390 farms.
10	Availability of inputs	In Ukraine, a growing number of farms engaged in organic seed production. As of June 2017, 74 companies registered in Ukraine engaged in the production of fertilizers, inoculants, growth stimulants, plant protection products that are permissible in the conduct of organic production.
11	National institutions and universities working on organic agriculture	Zhytomyr National Agroecological University (city of Zhitomir), National University of Bioresources and Nature Management of Ukraine (Kiev), Belotserkovsky National Agrarian University (Belaya Tserkov, the Kiev region) The Poltava State Agrarian Academy (Poltava), Lviv National Agrarian University (Lviv), Kherson State Agrarian University (Kherson), Institute of Soil Science and Agrochemistry. ON Sokolovsky (Kharkov), Ilyinets State Agrarian College (city of Ilyinets, Vinnytsia region), Lipkovatovsky Agrarian College (Lipkovatovka village, Novovodolazsky district, Kharkiv region).
12	International organizations working on organic agriculture	▪ FAO (Food and Agriculture Organization of the United Nations), EBRD (European Bank for Reconstruction and Development); ▪ The project «Development of organic market in Ukraine», which is being implemented by the Research Institute of Organic Agriculture (FiBL, Switzerland), with the support of the Swiss State Secretariat for Economic Affairs (SECO); ▪ The project «Support to Agrarian and Rural Development», implemented by the United States Agency for International Development (USAID); ▪ Project «German-Ukrainian cooperation in the field of organic farming» with the support of the Federal Ministry of Food and Agriculture of Germany (BMEL).
13	Domestic market	The research of the Federation of Organic Movement of Ukraine shows that the modern domestic consumer market of organic products in Ukraine began to develop since the early 2000s, amounting to: in 2006, 400 thousand euros, in 2007 – 500 thousand euros, in 2008 – 600 thousand euros, in 2009 – 1.2 million euros, in 2010 – 2.4 million euros, in 2011 this figure rose to 5.1 million euros, in 2012 – up to 7.9 million euros, in 2013 – up to 12.2 million euros, in 2014 – up to 14.5 million euros, in 2015 – up to 17.5 million euros, and in 2016 – already up to 21.2 million euros.The main sales markets in Ukraine itself are Kiev and other regional centers of the country. The main buyers are young parents, middle-aged people, with higher education, with medium or high incomes, almost all those who are seriously worried about their health. The main market channels of sales are supermarkets, specialized, online stores, etc. The targeted delivery of organic products from farms is actively developing. The greatest demand is for organic vegetables, fruits, honey, juices, cereals, dairy and meat products.

14	Export market	According to the Federation of Organic Movement of Ukraine, the annual export of organic products from Ukraine is at the level of 50 million Euro. The main export of organic products is to Germany, the Netherlands, France, Italy, Poland, Switzerland, USA. The main export positions are cereals, legumes, oilseeds, wild plants (berries, mushrooms). In recent years, exports of cultivated berries have expanded, as well as processed, including ready-to-consume products.
15	Main barriers for adoption or scaling of organic in the country	The incompleteness of the formation of the national regulatory framework and, as a consequence, in fact, the lack of financial support for organic producers, restrains the pace of expansion of organic production.
16	Main opportunities for adoption or scaling of organic agriculture	In Ukraine, only 1% of the total area of agricultural land is certified as organic, i.e. there is a potential for subsequent growth of organic matter. Prices for organic products are higher than for conventional products, the market for organic food consumption in Ukraine and the world is growing, which is an incentive for expansion of production.
17	Lessons learned	▪ It is necessary to increase the level of consumer awareness, constantly and actively work with them, by holding fairs, publishing relevant literature, magazines, because a low level of awareness of organic products and organic production leads to unfair competition, the appearance of pseudo-organic products in the market and buyer's distrust. ▪ State support is needed (both financial and non-financial), without it the organic sector will develop slowly, one-sided, with an orientation to export from Ukraine more organic raw materials, rather than finished products. ▪ Lack of current legal regulation and control of organic agricultural production by the state, can lead to acute, controversial situations, both nationally and internationally. It is necessary to establish a regulatory system in the organic sector. ▪ Despite the active development of the organic sector in Ukraine, until now, most organic producers have limited opportunities for conservation, product logistics. And also there is no direct connection with science for development and introduction of the newest technologies!
18	Websites to get additional information	1. www.organic.com.ua 2. www.organic.ua 3. www.ifoam.bio
19	Other comments	We forecast the continued growth in consumption of organic products in the world in the coming years. Therefore, it is expedient for agrarians of Ukraine, Central and Eastern Europe, and Central Asia to expand organic production in their countries, as a promising direction.

CHAPTER III: ORGANIC AGRICULTURE LEGISLATION

3

The main issues of aligning the national legislations in Central Asia and Azerbaijan with international reference standards

Raushan Zhazykbayeva[24]

Abstract

FAO has been supporting the improvement of the organic production legislation and strengthening the institutional set up under the TCP projects in Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. It is widely accepted in these countries that the national regulatory framework should be aligned with the main international reference standards such as IFOAM norms and Codex Alimentarius Guidelines. Nevertheless, all the countries are experiencing similar problems in developing new organic legislation. The regulatory objectives of the new organic legislations are often confused with those of environmental and food safety legislation. Concepts and definitions are not always consistent with internationally accepted ones. A number of public institutions are entitled to govern the organic sector however their responsibilities are not always clearly specified and sometimes overlap. Mechanisms of institutional coordination are not established. A periodic update of the production rules is not provided. A registry of organic producers that is crucial for regulation of the organic sector is not always envisaged in the national legislations. The organic certification system is being built upon the existing general certification and standardization system that is based on the technical regulation legislation focused on the final product control and therefore not suited for organic sector where the control is required at all stages of organic processing and production. National legislations lack the rules on import and export. The activities of foreign certification bodies operating in the countries are not regulated; as a result, no exact statistical information on organic products certified by them is available.

Key words: Certification, statistical data, institutional set up, definitions

Introduction

1. FAO has been supporting the improvement of the organic production legislation and strengthening the institutional set up under the TCP projects in Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, and

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Uzbekistan. It is widely accepted in these countries that the national regulatory framework should be aligned with the main international reference standards such as IFOAM norms and Codex Alimentarius Guidelines. The regulations and standards of target export markets are also taken into consideration, in particular those of EU and China.

2. These countries are at a very early stage of development of organic production system where the national stakeholders have very little experience in organic production.
3. Specialized organic laws have been adopted only recently (Azerbaijan, Tajikistan, Kazakhstan) or are still under development (Kyrgyzstan, Uzbekistan). Implementing regulations are still to be developed. No comprehensive national plans for developing of organic production system are in place in these countries.
4. The latest agricultural policies in these countries are aimed at promotion of environment friendly production systems offering high quality products with better access to the markets. In this regard, development of organic agriculture is accepted as promising direction for improving competitiveness of domestic products and the development of export potential.
5. There is a number of local organic producers that have their products certified with foreign certification bodies and successfully export their products. However the activities of foreign CBs are not regulated, no exact statistical information on organic products certified by these CBs is available.
6. Ecologically clean products are widely marketed in the countries and these products are confused with the organic products. National legislations do not provide for a clear distinction between the two labels.
7. The Eurasian Economic Union was established by the treaty signed on 29 May 2014 by Belarus, Kazakhstan and Russia (came into force on 1 January 2015) and joined by Armenia and Kyrgyzstan in 2015. All these countries are in the process of establishing the organic production systems however no regional coordination has been initiated so far.

Summary of main legal issues

1. The regulatory objectives of the new legislations are often confused with those of environmental and food safety legislation. Although the requirements of the food safety and environmental legislation are mandatory for organic producers however the specific regulatory purpose of the organic legislation is to facilitate the marketing of organic products and to avoid fraudulent labelling of products as organic. This objective has to be strengthened in the national legislation.

2. The confusion in formulating the regulatory objectives entail a confusion in the governance base by giving the responsibilities to the institutions that do not have sufficient technical capacities for guiding the organic sector. (E.g. the Ministry of Ecology and Natural Resources in Azerbaijan and the consumer right protection agency in Kazakhstan are given an excessive role in controlling the organic quality of products.)
3. Concepts and definitions of the new legislation are not always consistent with those of the internationally standards. This firstly concerns the definitions of 'organic', 'organic production', 'organic producers', 'parallel production' etc. The definitions should be aligned with the international rules.
4. The legislations do not provide for a periodic update of the production rules (approved in the form of a regulation or a standard). Such an update is crucial in order to:
   - ensure the compliance with international standards if they change;
   - align the rules with new circumstances and other changes (new products, emerging risks, etc.);

Legislation should further provide for reducing the transition period under certain circumstances and the introduction of temporary exclusions from the rules by decision of the competent authority. Temporary exclusions must be time-limited, based on objective circumstances and under constant monitoring by the competent authority.

5. One of the main instruments of regulating the organic sector is the registration of organic producers. National legislations do not always provide for a registry of organic producers (Tajikistan) or do not set up the procedure for maintaining such a registry (Kazakhstan).
6. Defining a competent authority and its functions is at the core of the organic legislation. The leading role of the Ministry of Agriculture (MoA) is recognised in most of the countries. The MoA has, in fact, the closest link with the production of organic primary and food products. However many important issues go beyond the mandate of MoA (processing, trade etc.) thus limiting the capacity of MoA to work alone. Therefore the functions of other ministries with a role in organic sector should be defined in the legislation. A number of ministries and agencies are entitled by the legislation of the countries in question to govern the organic sector however their responsibilities are not always clearly specified and sometimes overlap.
7. Since the governance in organic requires the involvement of different institutions the coordination between them is crucial. Mechanisms of institutional

coordination are not set up by the national systems. Public participation in decision-making is not regulated. In international practice some countries set up an Organic Agriculture Committee/Council that facilitates the governance of the organic sector under the leading role of MoA but at the same time involving in governance other ministries with a role in organic sector. In this case, the legislation has to define the role and competence of the committee and responsibilities of participating ministries or other parties.

8. Certification of organic products is one of the key elements of the organic production system. Important issues related to organic certification to be addressed by organic legislation include: defining a public institution that authorizes the inspection and certification bodies (CBs); defining procedure and criteria for authorization and registration of CB; monitoring and inspection of CB; setting up minimum requirements for inspection and certification programmes; and admitting foreign CBs.
9. In the countries in question the certification system for organic is being built up on the existing general certification and standardization system governed by the state standardization agencies. Organic CBs are expected to operate under the general procedures set up for certifications bodies acting in non-organic sectors. However the general certification system is based on the technical regulation legislation focused on the final product control and not suited for organic sector where the control is required at all stages of organic processing and production. Moreover the standardization agencies do not have the technical capacities in agriculture and are not in the position to provide a sufficient guidance and control over organic producers. A special procedure for the authorisation of CBs as well as special requirements for their activities should be recommended for development in the countries. The MoA's participation in such authorisation and controlling the CBs activities should be re-examined.
10. National legislations lack the rules on import and export. The organic law should provide a basis for import and export to address such important issues as recognition of the equivalence of foreign countries' organic systems, admission of control authorities and CBs in the national territory, import from other countries if the product complies with the requirements of the national legislation and specify the use of the logo in imported products.
11. The new legislation should not create obstacles for activities of foreign certification bodies already successfully operating in the countries. However, it is important that the competent authorities are aware of the activities of foreign certification bodies. It first serves for statistics and export-control purposes, and can also facilitate developing the state support programs.

Conclusions

The regulatory objectives of the new organic legislations should be strengthened in the national legislation so to facilitate the marketing of organic products and to avoid fraudulent labeling of products as organic. The concepts and definitions should be revised and aligned with the international rules. The functions of the ministries and agencies with a role in organic sector should be further specified to avoid confusion and overlapping. Mechanisms of institutional coordination should be established in the legislation providing for public participation in decision-making. The organic certification system should be regulated further by legislation to define a public institution that authorizes, monitors and controls the inspection and certification bodies as well as activities of foreign certification bodies. The organic laws should provide a basis for import and export of organic products and address such important issues as recognition of the equivalence of foreign countries' organic systems, admission of control authorities and CBs in the national territory, import from other countries if the product complies with the requirements of the national legislation and specify the use of the logo in imported products.

Challenges of aligning a regulatory framework for organic agriculture in Azerbaijan to international standards

Mahammad Guluzade[25]

Abstract

The present manuscript analyzes main challenges of aligning regulatory framework for organic agriculture in Azerbaijan to international standards. It intends to identify the shortcomings of the national legislation and to provide concrete recommendations for adjusting it to international reference standards. In particular, the paper recommends to: (1) replace the term "Environmentally sound agriculture" in the legislation with "organic production"; (2) include in the Law a reference to international legal standards, such as Codex Alimentarius Guidelines, the International Basic Standards for Organic Production and Processing; (3) Align definitions and principles of organic standards to IFOAM and Codex standards; (4) Align rules on organic production with IFOAM; (5)Together with the organic standards, the law should establish the approval of a list of permitted inputs; (6) Include a registry for organic producers in the Law; (7) The Law should establish a clearer system for the authorization, monitoring and control of organic certification bodies, under the supervision of the authority in charge of operational decisions; (8) Provide for more detailed rules for group certification specifying the conditions for application for group certification, list of documents to be submitted for obtaining such certificate, the rights and obligations of the group members etc.; (9) Include a provision on the labelling of organic products, align with IFOAM standards; (10) Include a provision on the approval and use of the National Organic Logo; and (11) Address recognition of the equivalence of foreign countries' organic systems whose principles, production rules and certification systems are equivalent to those laid down in the national legislation.

Key words: organic legislation, organic production, certification body, ecologically clean agriculture, ecologically sound agriculture.

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Introduction

Organic legislation of Azerbaijan is not working at the present due to number of reasons which are analyzed in the present paper. The regulatory framework governing organic production in Azerbaijan is composed of the following legal instruments:

- Law "On Ecologically Clean Agriculture" dated 13 June 2008 that sets up a legal and institutional basis for organic production, processing, storage, transportation, packaging, labelling and marketing of organic products.
- Decision of the Cabinet of Ministers "On Adoption of Some Legal Acts Relevant to the Law on Organic Agriculture" ("2009 Decision of Cabinet of Ministers") that approved following implementing regulations:
  - Regulations on Parallel Production of Organic and Traditional Products;
  - Regulations on production of organic agricultural and food products and the list of natural and artificial substances allowed in organic agriculture;
  - Rules on Issuing a Certificate for Organic Producers and a Template of the Certificate;
  - Regulations on Ecological Inspection (Observation) and Certification in Organic Farming and functions of Accredited Bodies;
  - Regulations on Certification of organic agricultural and food products and Template of the Certificate;
  - Rules on Circulation of Organic Farming and Food Products;
  - Regulations on Labelling Organic Farming and Food Products;
  - Regulations on Storage and Transportation of Organic Agricultural and Food Products.

Presidential Decree "On Additional Measures for Ensuring the Implementation of the Law on Organic Agriculture ("The 2010 Presidential Decree"). This Decree specifies the ministries and other public institution(s) responsible for implementation of specific tasks defined by the Law.

Results

The legal analysis suggests that the current legislation is not sufficient to ensure the effective governance and development of the organic sector in Azerbaijan. The absence of coordination has been an obstacle for the efficient implementation of the law and development of organic sector. To date, two initiatives in the organic domain deserve attention: first, the Ministry of Agriculture (MoA) has taken the lead in proposing a Commission to coordinate the various line Ministers in the

implementation of the law; second, AZSTAND has prepared draft organic standards updating the existing rules for organic production. It is advisable that a Cabinet of Ministers or a Presidential Decree is adopted to empower the Commission, including the roles and responsibilities of participating ministries. This decree may also determine which institution will undertake the coordination function in organic agriculture. With regards to the organic standards, the draft standards prepared by AZSTAND may need to be adapted to the national agroecological conditions and to the priorities of the national organic sector. Furthermore, it would be important to revise the regulations on certification bodies (CB) to ensure that (a) there is a clear procedure for CBs to be authorized to certify organic products and (b) CBs are monitored by an institution with technical capacity to assess organic production procedures.Legislation should also address the recognition of other countries' organic production systems and facilitate the trade of organic products.

Discussion

The Law "On Ecologically Clean Agriculture" (hereinafter "the Law") regulates "environmentally sound agriculture", defined as "the cultivation of agricultural plants and breeding of agricultural animals without the application of chemical and synthetic (artificial) substances, as well as the production, processing, turnover and certification of environmentally sound agricultural and food products".

While organic production certainly contributes to agricultural sustainability, it is not, by itself, sufficient to cover the whole regulatory purpose recognized to "environmentally sound agriculture" in this Law.

Article 1.2. seems to recognize this difference when if affirms that "The notion of «environmentally sound» used in the present Law has the same meaning as «biological», «organic» and «natural» used in international legislation". This paragraph has two weaknesses: first, it assimilates the international concept of organic production to the concept of "environmentally sound agriculture" defined in the Law, even when these two concepts are arguably very different. Second, the difficulty of identifying "international legislation" regulating organic production in the framework and scope of this law. Codex standards could be considered as a soft law internationally recognized non-binding legal instruments (soft law)[26].

[26] In the framework of the WTO Tariff Barriers to Trade (TBT) Agreement, Codex standards have been recognized as international reference standards by the Dispute Settlement Body. European Communities – Trade Description of Sardines, DS231. The Panel report, paragraph 7.70, recognizes that Codex Stan 94 is a "relevant international standard" under Article 2.4 of the TBT Agreement

Codex standards provide guidance for the labelling of food products as "organic" or "bio"[27]. The focus of these standards is the labelling and marketing of food products according to technical specifications provided in the standard. The purpose and scope is therefore far from the purpose and scope in Article 1.1 of the Law to apply the use of the term "organic" by analogy.

Following Codex, it is important to note that the legal impact of organic production legislation is primarily, regulating the marketing of organic products and to avoid fraudulent labelling of products as organic. Ecological sustainability and clean production are the result of the implementation of such system, rather than direct objectives pursued by the legislation.

As conclusion, the title and scope of the Law, as defined by the Preamble and definitions, do not meet with the regulatory objective of regulating organic production. This inconsistency between the scope of the Law, its purpose and elements, makes the implementation of the Law most challenging. In fact, following the title and purpose of the Law, the Ministry of Ecology and Natural Resources (MoENR) is given an important role in the monitoring and authorization of organic producers, when in practice this Ministry is not in a technical position to verify agricultural production practices and the status of the agricultural land devoted to organic production (see footnote 5 on inspection and certification).

It would therefore be advisable that the Law on Ecologically Clean Agriculture is repealed and that a new Law on Organic Agriculture is enacted. This law will differ from the existing law in its title, scope and elements.

The Law does not identify for a public institution responsible for the coordination of organic production. More the contrary, it lines up different functions which are allocated in the 2010 Presidential Decree among various ministries. The distribution of functions is arguably based on the scope of the Law (ecological sustainability), as defined by the title and the definition of organic agriculture in

[27] Codex standard "A product will be regarded as bearing indications referring to organic production methods where, in the labelling or claims, including advertising material or commercial documents, the product, or its ingredients, is described by the terms «organic», "biodynamic", «biological», «ecological», or words of similar intent including diminutives which, in the country where the product is placed on the market, suggests to the purchaser that the product or its ingredients were obtained according to organic production methods" "Foods should only refer to organic production methods if they come from an organic farm system employing management practices which seek to nurture ecosystems which achieve sustainable productivity, and provide weed, pest and disease control through a diverse mix of mutually dependent life forms, recycling plant and animal residues, crop selection and rotation, water management, tillage and cultivation"

Article 1.2[28], more than on the distribution of duties in an organic production system, based on the mandates and technical capacities of each Ministry.

Conversely, the distribution of responsibilities in the organic production domain should take into consideration (i) the technical capacities of the different institutions and (ii) their current role in the production chain. One example is the verification and authorization of ecological areas to produce organic. This verification is based on compliance with agricultural production practices and would need to be verified by the authority with technical capacity on agricultural production.

The existing subsidiary legislation is not sufficient for the effective implementation of the Law. The implementing regulations adopted by the 2009 Cabinet of Ministers Decree are not complete and have not been updated since their adoption.

It is advisable to prepare and adopt the new standards/rules for organic production in line with internationally recognized standards (particularly IFOAM and the Codex Alimentarius standards). To this purpose, the "Regulation for production of organic agricultural and food products and the list of natural and artificial substances allowed in organic agriculture" approved by Decree of 2009 should be repealed and new standards be approved, ideally by a new Regulation.

Such regulation should additionally regulate the procedure for the approval and update of the organic production rules and the list of allowed substances. The regulation should further define the temporary exceptions to the rules, which should be limited in time, based on objective circumstances and closely monitored by a competent authority.

The existing legislation does not provide sufficient legal basis to set up a system for organic certification. Under the 2010 Presidential Decree, MoENR is responsible to authorize ecological inspection bodies and AZSTAND is responsible for authorisation of organic certification bodies. To date, the rules for authorisation and supervision of certification bodies in the organic sector have not been adopted. Such rules should be developed in order to provide for effective third party certification.

The current legislation seems to confuse the two types of inspections: third party certification (by private or public CBs), and the regular monitoring by the state

[28] "Article 1.2 of the Law: "1.1.1. growth of agriculture plants and breeding of animals, processing, circulation and certification of organic agriculture and food products without applying chemical-synthetic (artificial) substances;
1.1.2. organic agriculture and food products – produced, processed, as well as sold products pursuant to requirements of organic agriculture

authorised body. To certify an organic product, a CB must provide for organic producers' activities a monitoring system for compliance with the organic rules/ standards. It appears from the current allocation of responsibilities in organic certification[29] that the ecological inspection bodies accredited by MoENR are responsible for initial inspection and authorization of organic operators. However, the ecological inspection by the MoENR's entities is likely to be carried out within the parameters of environmental legislation, which has different objectives and procedures from the procedures of organic production legislation. Organic inspection is based on a specialized system of agricultural production standards and control procedures whereas environmental inspection ensures the compliance with environmental norms/standards that has a different scope.

It is advisable to enact new legislation in order to improve the regulation of organic inspection and certification systems. The new legislation should introduce rules on: (a) authorization of CBs; (b) monitoring and inspection of CBs; (c) minimum requirements for certification programmes; (d) admission of foreign CBs, and (e) mutual recognition and equivalence of certification systems.

The role of MoENR in the inspection of organic producers has to be re-examined. Inspections under this legislation should serve to verify organic production practices rather than more general environmental support.

In the development of these rules, coordination between AZSTAND and MoA is essential to guarantee that the technical capacity of CBs is appropriately assessed, and that the rules are not too strict for local certification companies to initiate their activity as private certifiers. The MoA should also be involved in monitoring and controlling CBs as it has necessary expertise for conducting such control with respect to primary production.

Finally, it would be positive that MoA has a role in the inspection of organic producers in consideration of the fact that the MoA has the closest relation to primary producers and is in a better position to assess their technical needs and performance.

The subsidiary legislation should also provide for more detailed rules for group certification specifying the conditions for application for group certification, list of documents to be submitted for obtaining such certificate, the rights and obligations of the group members and the rules for self-certifying their organic products.

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[29] Article 12 of the Law, sec.1.2. of the 2010 Presidential Decree.

Finally, legislation should be revised to address the following issues related to import and export:

(i) Recognition of the equivalence of foreign countries' organic systems whose principles, production rules and certification systems are equivalent to those laid down in the national legislation.
(ii) Recognition of control authorities and certification bodies competent for the task of verifying the compliance of the systems of production, labelling and certification of countries with which there is no equivalence agreement.
(iii) Production/importing of organic goods produced in other countries according to Azerbaijan regulation.

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Literature

1. "Analysis of the Legal Framework for Organic Agriculture of the Republic of Azerbaijan" prepared within the framework of the FAO project "GCP/AZE/006/TUR, 2016.

CHAPTER IV: ORGANIC PRODUCTION TECHNIQUES

4

Organic plant protection: requirements base

Mohammadreza Rezapanah[30,31]

Abstract

Nowadays, plant protection not only is mega matrix of compounds and techniques for protecting crops and plants, but also is complexes of rules, standards, acts and conventions. The International Plant Protection Convention (IPPC) is a main international agreement on plant health and phytosanitary. It aims to protect cultivated and wild plants by preventing the introduction and spread of pests. The IPPC secretariat is provided by Food and Agriculture Organization of the United Nations (FAO). During the century, the approaches of plant protection have changed and modified step by step. Despite of synthetic chemical inputs impacts, the primary approach, pest eradication by chemical pesticides, has not been eradicated. The requirements of recent approaches of pest control, biological control, integrated pest management (IPM) and integrated production and protection (IP), are mostly considered in the natural plant protection measures acceptable for organic agriculture (OA) too. The requirements bases of OA, such as traceable recording and conversion period, are still main differences among requirements of organic plant protection with other approaches. It seems the world of organic need an innovation and/or a leadership to synchronize regulation, requirements and measures of plant protection in different regions to facilitate and boosting OA development especially via participatory guaranty system (PGS).

Key words: Organic plant protection, requirements.

Introduction

Organic Agriculture (OA) according to the International Federation for Organic Agriculture Movements – Organic International (IFOAM) is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. Also the Codex Alimentarius Commission defines it as "a holistic production management

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system that avoids use of synthetic fertilizer, pesticides and genetically modified organisms, minimizes pollution of air, soil and water and optimizes the health and productivity of interdependent communities of plants, animals and people". Biodynamic is a version of OA with more consideration. Participatory guaranty system (PGS) is an innovative system that may boost OA in world. Figure 1 simply shows the relationship among sustainable agriculture (SA), OA, biodynamic, integrated crop management (ICM), integrated farming systems (IFS) and also integrated pest management (IPM) as a plant protection approach. The distance between IPM and OA in figure 1 should be considered, despite their common control measures. The biological control agents (BCAs) have been used in different farming systems, even conventional agriculture; but in OA and high level IPM have been encouraged. OA's practices are categorized in biodiversity, diversification and integration of enterprise, sustainability, natural plant feeding, natural pest management and integrity (Figure 2).

The comparison of different farming systems facilitates comparison of their plant protection techniques, approaches and their requirements base. Morris and Winter (1999) compared conventional agriculture, ICM and OA in particular aspects such as techniques, knowledge requirements, idea and food chain relation (Table 1).

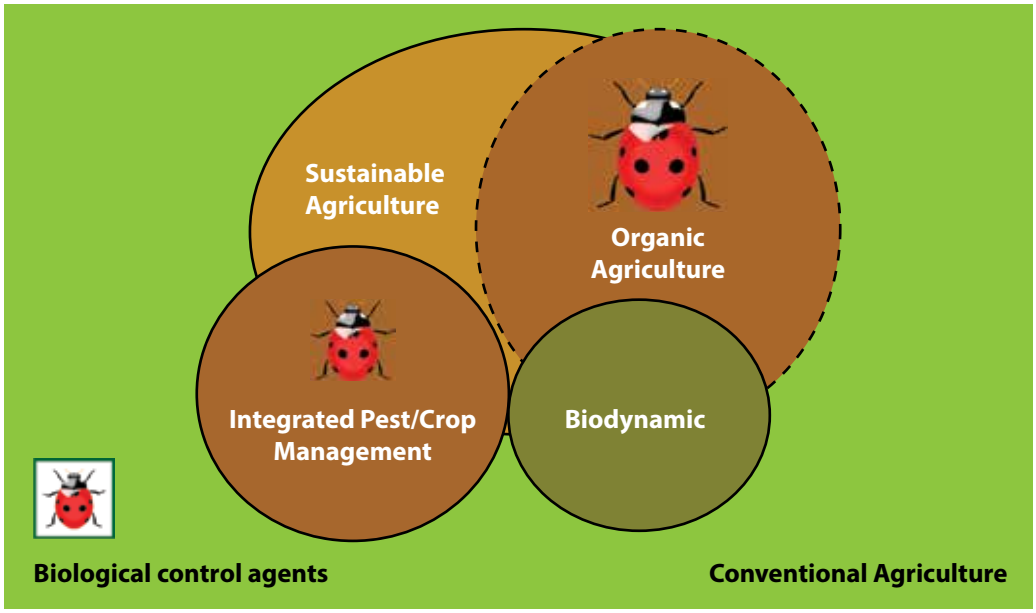

Figure 1. Growing role of biological control among OA, biodynamic, SA, ICM and IPM (Rezapanah, 2011b)

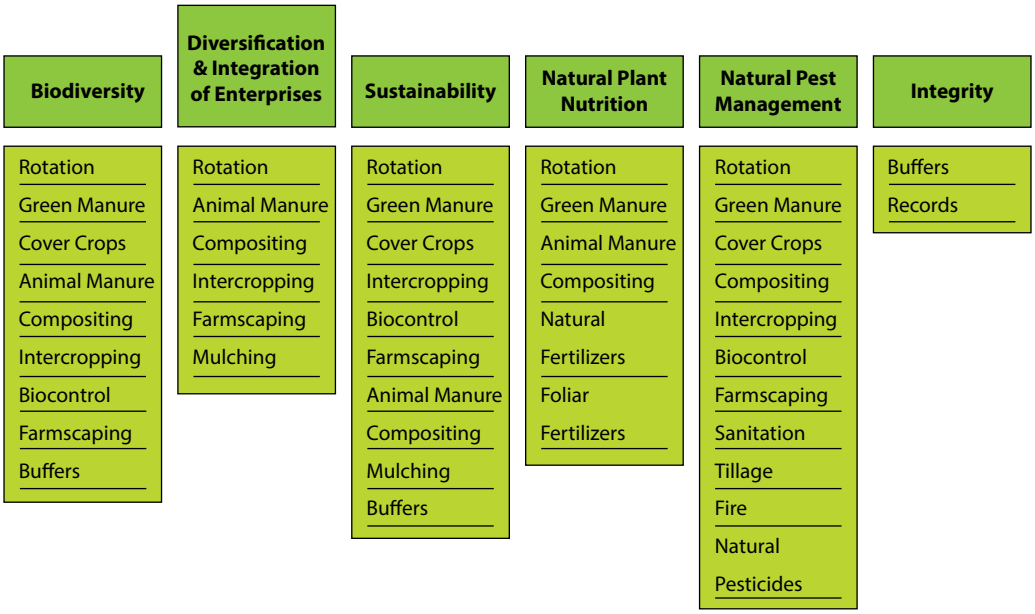

Figure 2. Foundational practices in Organic agriculture

Table 1. A particular comparison on OA, ICM and conventional agriculture

Particular issues	Organic Agriculture	ICM Systems	Conventional Agriculture
Techniques	Non-use of synthetic chemical inputs. Emphasis on the sustainable use of resources and farm animal welfare.	Technologically intensive set of production techniques which emphasize equally environment, farm incomes and food quality.	Emphasis on the application of technology to increase yields, productivity and profits.
Knowledge requirement	Radical break with conventional farming knowledge networks. Requires the development of a new R&D and advisory system. Local/tacit knowledge base.	Demands new developments within the existing advisory system and more targeted R&D. Possible re-training needed if enterprise mix alters. Mix of local and external knowledge.	Traditional R&D and advice (public and private sectors). Standardized knowledge base.
Ideas	Initially a deliberate and radical critique of conventional methods of food production, marketing and consumption. Sustainable resource use for food production is key aim.	Environmental considerations given greater emphasis within food production. A relatively more sustainable use of resources for producing food than conventional agriculture.	Productivism through intensification, specialization and concentration.
Relationships Within the food chain	Aims to draw consumers closer to producers. Potential for producers to exert more control within the food supply chain through alternative methods of marketing, price premiums.	IFS is in part a response to consumer concerns about production methods. Potential for consumers to be brought slightly closer to producers through labelling schemes based on IFS. Producers position in food supply chain slightly improved e.g. through quality assurance schemes.	Consumers distant from producers. Producers occupy a potentially more marginal position within the food supply chain.

Source: Morris and Winter, 1999, with a modification

Organic agriculture principles are health, ecology, fairness and care that cover not only human being, animal, livestock, crop, plant and diversity but also energy, environment, water. IFOAM website and also scientific institutes and associations have published and released information about "why OA movements?". Also, Porter et al. (1999) shows how synthetic chemicals cause instability from molecular level to a tissue, individual and community (Figure 3). Further information on impacts of synthetic chemical inputs has been reviewed in Zala and Penn (2004). But, OA with about 1% of agricultural lands after decades just shows an ideal level and a horizon for food risk management (Rezapanah, 2011a). Of course, sharing in development of organic agriculture in European Union (Anonymous, 2014) is more (Figure 4). The different Asian regions and countries should participate in the mega projects to increase their sharing in development of organic agriculture via harmonized food risk management and setting harmonized plant protection measures.

An evolution for plant protection approaches

Plant protection techniques and approaches have been developed via farming system requirements. During the century, the approaches of plant protection have changed. The primary approach, pest eradication, based on extra hope to

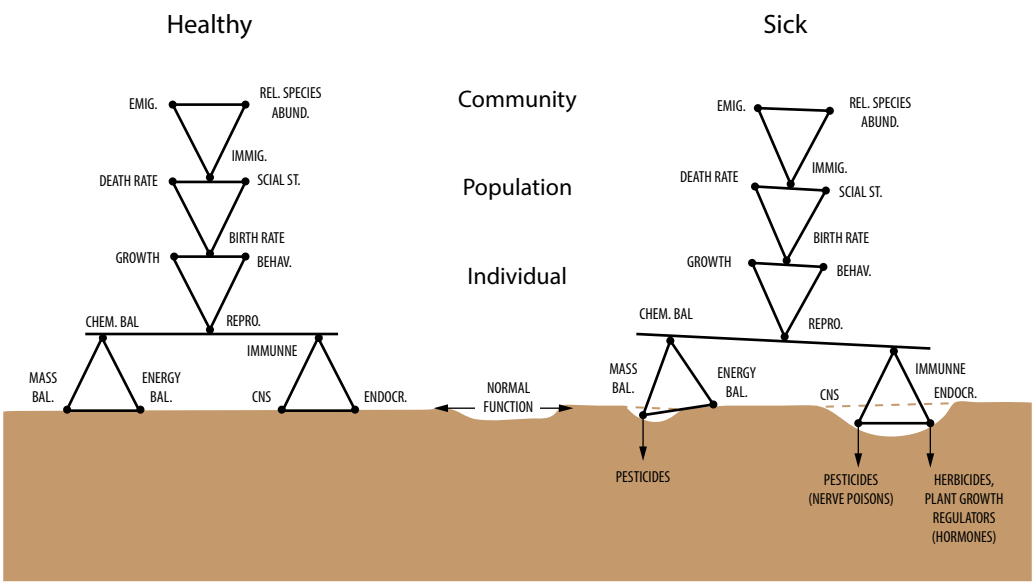

Figure 3. Pesticide impact on health tissue, individual and communities (Porter et al., 1999)

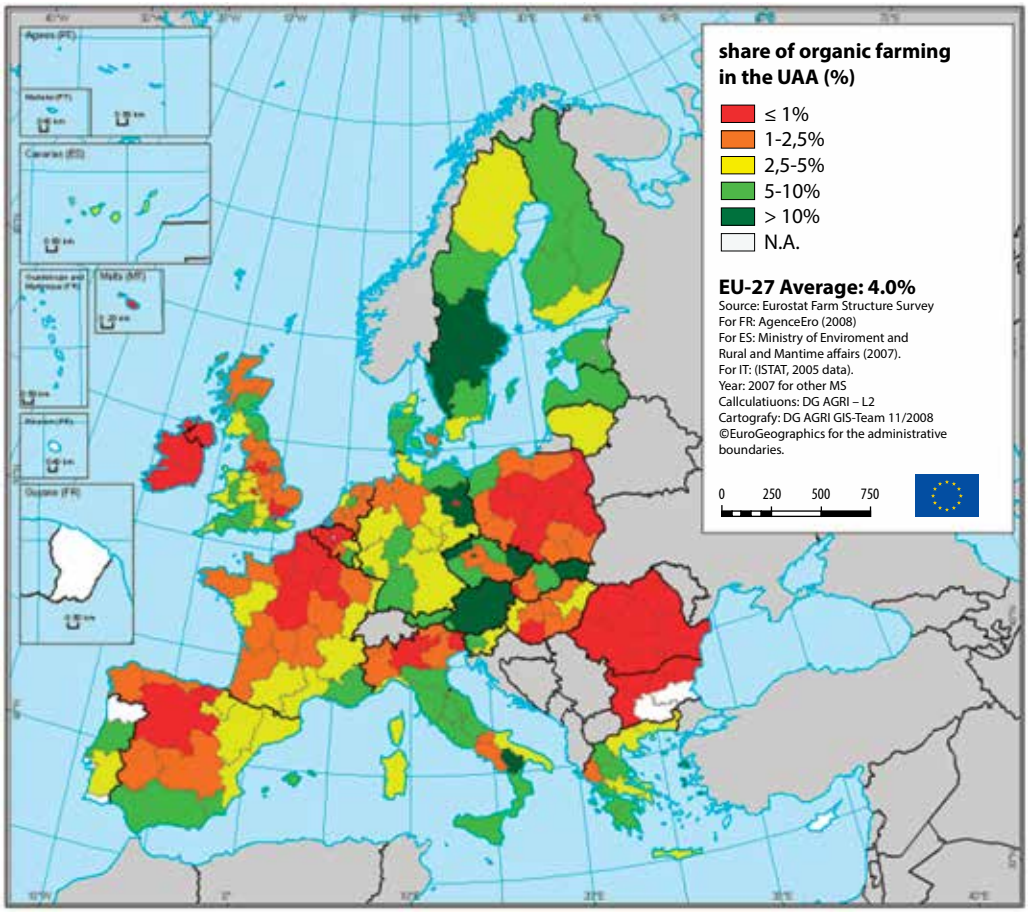

Figure 4. Europe sharing on OA development (Anonymous, 2012)

chemical pesticides, has changed to pest control, integrated pest management (IPM), integrated production and protection (IP) and the natural plant protection measures acceptable for organic agriculture. Letourneau and van Bruggen (2006) compared relative reliance on different crop protection practices in organic and conventional agriculture (Table 2). Further information about plant protection there is in IPPC website. The IPPC is one of the three sisters of international standards setting recognized by the WTO-SPS agreement as Codex and World Organization for Animal Health (OIE). It seems the world of organic need an innovation and/or a leadership to synchronize regulation, requirements and measures of plant protection in different regions to facilitate and boosting OA development. Also, plant protection needs the requirements of OA for its approach evolution.

Table 2. Relative reliance on different crop protection practices in organic and conventional agriculture

Invasion stage/ approach	Specific practices	Organic	Conventional
Colonisation prevention			
Sanitation	Pathogen-free seed, debris destruction, flaming, steaming (fumigation in conventional farming)	Common	Common
Temporal asynchrony	Late or early planting or harvest with respect to pathogen, vector or pest arrivals	Common	Common
Inconducive conditions	Crop rotation, repellent cultivars, soil suppressiveness by organic amendments, temperature control and repellents in storage facilities and greenhouses.	Common	Common
Synthetic chemical barrier	Preventive foliar sprays with synthetic insecticides, nematicides, acaricides, anticoagulants, fumigants, fungicides or bactericides, botanical pesticides containing petroleum derivatives.	Absent	Common
Spatial isolation	Crops sown distant from pest or pathogen hosts, weeds, non-crop hosts removed, barrier crops or natural strips, physically distant from all coloniser pools	Occasional	Rare
Disrupt colonisers	Mating confusion, trap cropping, sterile male releases, and low voltage 'soft electrons' for insects, fences, trapping, netting for birds and mammals, sealant, reflective tape and startling sound for birds and rodents	Occasional	Occasional
Population regulation			
Host plant resistance	Suboptimal plant quality (low fertilisation), resistant cultivars, crop spacing, plant extracts or other repellents or hormones applied to stored products	Common	Common
Genetically modified resistance	Genetically modified crops with Bacillus thuringiensis toxins, proteinase inhibitors, various forms of resistance against diseases	Absent	Common in some countries
Intercropping	Mixed cultivars, mixed cropping, strip cropping, green manures, incorporation of repellent plants	Common	Occasional
Competition	Enhanced herbivore and microbial diversity to reduce the proportional representation of injurious taxa	Common	Rare
Insectary vegetation or predator resources	Flowering plants in field margins, strips, islands, hedgerows, cover crops, bat and owl nesting sites, bird perches to attract and retain natural enemies in the crop field	Common	Occasional
Conservation	Avoid use of biocides that disrupt natural enemies and competitors	Common	Occasional
Unsuitable environment	Ventilation, humidity, and temperature control (greenhouses and storage facilities), humidity control by irrigation, irradiation	Common	Common
Curatives (at population level)			
Synthetic pesticides	Various systemic and contact insecticides, molluscicides, acaricides and fungicides, pyrethroids	Absent Exceptional	Common Common
Organics	Soaps, oils, compost teas	Common	Rare

Inorganics	Sulfur dust and sprays, diatomaceous earth, micronutrients (Si or Zn), iron phosphate, CO_2, N_2, copper hydroxide, Bordeaux mixture	Common in some countries	Common
Botanicals	Plant extracts without petroleum-based synergists (pyrethrum, rotenone, nicotine, neem, horsetail)	Rare	Rare
Inundative biological control	Predators (e.g. ladybirds, predatory mites), parasitoids (e.g. egg parasitoids, larval parasitic wasps and flies), bacteria (e.g. Bacillus thuringiensis, B. subtilis), entomopathic and nematopathic fungi (e.g. Entomophthora, Trichoderma and Beauveria), viruses (e.g. Baculoviruses)	Occasional	Occasional
Physical removal	Trapping, vacuuming, handpicking, hunting	Occasional	Rare

Source: Letourneau and van Bruggen, 2006 with a modification)

Biological control requirements

The control of pests by interference with their ecological status, as by introducing a natural enemy or a pathogen into the environment is a simply definition of Biological control (Sharifi et al., 2014 and Ashtari et al., 2011). Also, control of pests by disrupting their ecological status, as through the use of organisms that are natural predators, parasites, or pathogens. Which DeBach (1964) defined as 'the study and uses of parasites, predators and pathogens for the regulation of host (pest) densities'. Plant protection approaches based on biological control methods (classical or Importation, conservation and augmentation) have been developed (van Lenteren, 1997) via farming system requirements especially in medium and high level IPM and in organic agriculture (Rezapanah, 2011b). Further information is accessible via the International Organization for Biological Control (IOBC) that promotes environmentally safe methods of pest and disease control.

It seems biological control requirements have been studied, recognized and concerned in different farming systems nowadays. For requirements setting of organic plant protection, Biological control requirements should be concerned as well as OA requirements, such as recording and conversion period as requirements base.

Discussion

It seems the requirements of recent approaches of pest control, Biological control, IPM and IP, are mostly considered in the natural plant protection measures acceptable for organic agriculture (OA). The requirements bases of OA, such as traceable recording and conversion period, are still main

differences among requirements of organic plant protection with other approaches. In most cases, food grown using IPM practices is not identified in the market place like organic food. Since IPM is a complex pest control process, not merely a series of practices, it is close to impossible 'use one IPM definition for all foods and all areas'. Many individual commodity growers are working to define what IPM means for their crop and region. Their IPM-labelled foods are available in limited areas as IPM-Grown, IPM food. But, there is no considerable national certification for growers using IPM. But, OA has capacity to keep environment sustainability and supply food and economy as well as especially via participatory guaranty system (PGS). Also, OA facilitate a harmonized movements based on food risk analysis. Due to, OA shows without synthetic chemical inputs, a productive result is possible. Of course, near 1% of agricultural lands after decades is not enough for OA movements. The participatory guaranty system (PGS) may increase their sharing in development of organic agriculture via harmonized food risk management and setting harmonized plant protection measures.

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The basics of organic management

Alisher Ubaydullaevich Saydaliev[32]

Abstract

This work is devoted to a very important and underreported in modern scientific publications topic in terms of using international experience in the agrarian sphere of republic economy. Uzbekistan's authorities are interested in organic agriculture introduction and development, in safe food cultivation. Organic agriculture development will not only produce healthy food of high quality, but also will contribute to environment preservation and environmental and social economic development sustainability improvement in the regions of the country. Economic prosperity, achieved through environmental degradation, threatens the existence of human beings as a species, human's physical and mental health, and especially the health of future generations.

Key words: organic agriculture, farming technique

Introduction

Market global volume for environmentally friendly food is tens of billions of dollars, the annual growth rates in developed countries range from 20 to 30%.

According to the "Organic Monitor" -organization, engaged in marketing research, ecological food world market turnover in 2005 amounted to 25.5 billion euros, increasing rapidly every year. Thus, in 1999 it was estimated at $ 15 billion a year, in 2006 it amounted to about 30 billion, in 2014 it reached 80 billion dollars, and in 2015 – 81.6 billion dollars. In comparison with 1999 organic products turnover increased more than 5 times. Today 179 countries use organic agriculture, 32 countries have fully approved standards for organic environmentally friendly products, 9 countries are engaged in the implementation of standardization, 15 countries are developing such standards. But world experience shows that the State supports any project only when it starts making a profit and becomes a part of the economy.

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Motivation to consume organic products is:

- Nutrition security;
- High quality and freshness of products;
- Best taste of organic products;
- Natural environment preservation in the production process;
- No genetically modified organisms.

History of agriculture goes back 6000 of years. Currently, there are two types of agricultural technology: Traditional and natural.

Traditional agricultural technology has only one goal to grow as much as possible harvest and has been used for 200 years.

Traditional agricultural technique uses mineral fertilizer, soil is worked to a depth of about 30-40 cm by means of digging and plowing with soil overturning. For plant protection toxic chemicals pesticides, herbicides to eliminate weeds, fungicides against diseases, insecticides against insects are used fungicides from diseases, insecticides from insects, zoocide against rodents.

Although using traditional agricultural technology, soil cultivation, mineral fertilizers, and toxic chemicals can produce high yields, there are a number of shortcomings.

The negative consequences of growing agricultural products with existing agricultural methods are as follows:

- Health problems, toxin build-up and poisoning;
- Decline in yields, poor taste
- Accumulation of toxic and carcinogenic compounds in the soil;
- Groundwater, wells, rivers pollution;
- Humus mineralization, its constant decrease;
- Overconsolidated soil;
- Soil disturbance;
- Need for frequent irrigation;
- Continuous pest managegement;
- Destruction of good fauna;
- Constant weed management;
- High labor costs;
- Financial expenses

With traditional farming, soil fertility declines, plant immunity decreases, crop quality deteriorates, toxic chemicals and pesticides harm not only human health but also the environment, disrupting the ecology and fauna biodiversity.

Agricultural technology of organic agriculture has several goals:

1. Grow environmentally friendly yield;
2. Maintain and improve soil fertility;
3. Improve yield of agricultural crops
4. Reduce labor intensity of tillage and plant care;
5. Protect ecology and biodiversity

As a result, an increasing number of countries in the world are rearranged for natural tillage without applying or minimizing the use of mineral fertilizers, chemical compounds for protecting from pesticides in growing agricultural products.

Organic agriculture agricultural technology uses only natural fertilizers such as potassium salts and phosphate raw materials, composted waste products of plant and animal origin.

The soil is cultivated to a depth of no more than 10 cm by cultivators, subsurface cultivator, disc harrows without soil overturning.

Crop protection is carried out with the help of natural preparations (sulfur, lime, copper sulfate) and agricultural techniques. At the present time, biological preparations made on the basis of microorganisms are used, and which are harmless to humans and nature.

With the application of organic farming techniques, minimal tillage, mulching, green manuring, composting, companion planting, using natural products against pests and diseases, safe agricultural products of high-quality are sold at a higher price.

Moreover, world experience shows that in this case labor input and costs are reduced, whereas yield quality is growing.

It takes 10-15 years of phased implementation, as well as a deep understanding of natural processes to fully switch over to the natural system of agriculture

Organic fertilizers and safe crop protection agents such as natural compounds and bio preparations are ultimate for this gradual changing.

Natural organic agriculture sets the following goals:

- Grow as much as possible yields at minimum costs;
- Grow an environmentally friendly yield, positively affecting the environment;
- Increase soil fertility;
- Make working process be easy, enjoyable.

Advantages of use:

- yields increase;
- improve taste;
- environmentally friendly harvest;
- constant increase in humus;
- 100% plants diet
- reduction of weed growth;
- the need for watering is reduced;
- efforts and time saving;
- cost savings.

Plants organic mass consists of (50%) carbon, air contains a small amount of carbon dioxide (0.03%).

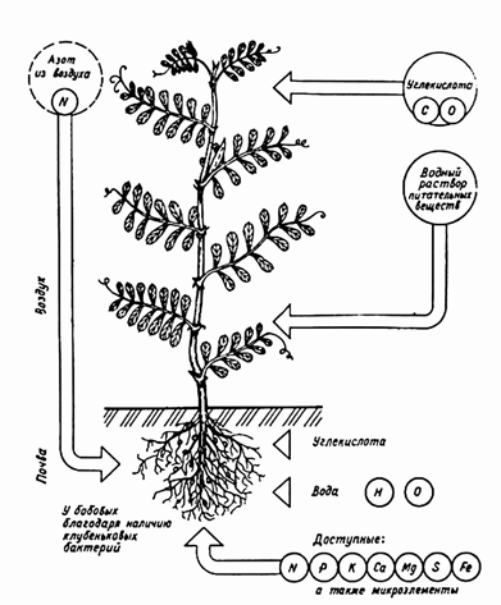

Figure 1. Necessary elements for plant life

On average, 50% of carbon, 20% of oxygen, 15% of nitrogen, 8% of hydrogen, and 7% of mineral elements need to be obtained for normal plant life.

Main carbon suppliers for plants are soil microorganisms that, during organics reprocessing, release carbon dioxide CO_2, thus creating humus.

Roots consume this gas through microscopic pores. Photosynthesis captures sunlight; as a result of this process plant emerges as organic mass.

At the stage of vegetation plants release oxygen which is used by human and animals for breathing.

Traditional farming with the help of mineral fertilizers provides plants with only 22% of the required nutrition (nitrogen 15% + mineral 7%).

The shortcoming of nutrition is partly compensated from old soil reserves.

Chemical mineral fertilizers massive use and organic fertilizers minimum application, continuously contributes to the decrease in humus and soil fertility

According to the environmental specialist B. Grzhimek, up to 2 kg of bacteria, actinomycetes and fungi (microflora), up to 100 g of infusoria and other protozoaires (microfauna), up to 50 g of nematodes, mites, and rotifers up to 100 wood louse, spiders, millipedes and insects (macrofauna), up to 500 g of worms and vertebrates (megafauna) are found in a layer of 30 cm on one square meter of the European steppe.

All these organisms are alive by eating up to 10 kg of plants growing here in the season, processing them into humus.

Plants require proper nutrition to grow and develop. In the process of photosynthesis plants capturing solar energy from simple inorganic substances create complex organic compounds.

Inorganic compounds are taken up from the environment.

These substances are called nutrients. Their absorption and use in the process of photosynthesis to create organic molecules defines the concept of "plant nutrition".

The term "plant nutrients" in the narrow sense of this word means chemical elements or compounds that are necessary for the growth and normal development of plants functions of which couldn't be replaced by any other element.

Plants consume some elements in a larger quantity and they are called –major-nutrient element, others consumed in small amounts are called – minor nutrient elements.

In addition, it is necessary to keep in mind planting and sowing rotation, compatibility of crops with each other, for example, the favorable neighborhood of plants, especially the favorable neighborhood of the following plants:

- Carrots – onions, Tomatoes – onions, Tomatoes – parsley, Salad – radish, Peas – celery, Potatoes – cabbage of different kinds.
- Cucumbers are well adjacent to: onions, curling beans, celery, beets, parsley, cabbage salad, various kinds of cabbage, bush beans.
- Potatoes are well adjacent to bush beans, kohlrabi, dill, spinach.
- Celery is well adjacent to bush beans, spinach, onions, curling beans, tomatoes, leeks, cabbage (various kinds) of cucumbers.
- Parsley is well adjacent to tomatoes, onions, radish, cucumbers.
- Tomatoes well adjacent to celery, spinach, onion, parsley, cabbage, kohlrabi, cabbage salad, leek, bush beans, carrots.
- Spinach is well adjacent to tomatoes, curling beans, strawberries, carrots, potatoes, cabbage (of various kinds).
- Onions well co-exist with tomatoes, strawberries, cucumbers, parsley, cabbage salad, kohlrabi.
- Strawberries are well adjacent to carrots, leek, cabbage (different types), radish, garden radish, cabbage salad, spinach.

There are also unfavorable neighborhoods of plants, for example:

- Beans-Onions, Cabbage-Onions, Potato-Onions;
- Red cabbage-Tomatoes, Parsley-Cabbage lettuce;
- Beets-Tomatoes, Tomatoes-peas, Peas-Beans.

All these factors are taken into account when growing agricultural products.

There are micro-zones favorable to a particular plant in each region, using these agricultural technology skills and techniques for centuries local population grows particular product using traditional natural substances.

Organic agriculture applies methods that:

- Exclude the use of GMOs, derivatives of GMOs and products made with GMOs;

- Exclude the use of chemically synthesized substances, antibiotics, stabilizers, growth stimulants;
- Exclude hydroponic production;
- Feed plants mainly through the soil ecosystem.

The general rules for products of plant origin organic production are:

1. Use of methods that optimize soils biological activity, ensure plant nutrients balanced supply while preserving land and natural resources;
2. Introduction of soil protection technologies for crops cultivation, which prevent the soil erosion or degradation processes;
3. Maintenance of plant resistance by preventive measures to select appropriate species and varieties resistant to pests and diseases, appropriate mechanical and biological methods of protection;
4. An increase in the population of beneficial insects, microorganisms and natural parasites for the biological control of pests and plant diseases;
5. Use as fertilizer materials of microbiological, plant or animal origin, which decompose biologically;
6. Use only certified organic seeds and planting material;
7. Fertilizers and soil-improving substances can be used only if their use is confirmed by permitting documents, while it is forbidden to use mineral nitrogen fertilizers.

Use of preparations obtained from microorganisms is allowed to improve soil conditions or increase nutrients in the soil or in the crop. Use of herbal preparations or preparations from microorganisms is allowed to activate compost. Mandatory crop rotations, use of seeds and breeds adapted to local conditions, renewal of functional biodiversity contribute to ecological balance reestablishment and strengthening.

An integrated production management system that stimulates and enhances agrarian ecosystem well-being, including biological diversity, biological cycles is achieved through the use of all possible agronomic, biological and mechanical methods

Organic agriculture combines traditional farming methods, innovative technologies and modern scientific technological advances with a beneficial effect on the environment and favorable development guarantee.

Significant land and other natural resources, as well as traditional culture of land cultivation without the use of synthetic fertilizers, assume great opportunities

for market development. In addition, the centuries-old values of Uzbek people, historically living in harmony with nature, have created public relations adequate to the system of ecological farming and animal husbandry.

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Review and case study: minor cereals in Hungary

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Abstract

The objective of the study is the cultivation, research of minor cereals (einkorn, emmer) and the production of einkorn, emmer based products in Hungary. The Institute carries out practice-centered research on organic growing fields within the framework of international projects and its own on-farm network, which included raising cereal crops of einkorn wheat, emmer and spelled chaff, as well as the possible role of remote sensing in organic growing and breeding. Besides field researches, interviews were conducted focusing on the market and consumer relations of minor cereals with the contribution of 19 actors who had first-hand experience with einkorn and emmer. On our research fields, 14 varieties of einkorn and emmer were compared and tested complying with the regulations of organic production.

These easy to grow, low maintenance cereals have better resistance, they present a good alternative to organic farmers who have low quality lands. Also, they offer a niche and quality-product market with very few stakeholders and products at any early phase. The case study wishes to present the main challenges and opportunities of minor cereals in the organic sector focusing on research and market positioning. It urges the need for more sufficient and reliable development projects emphasizing minor cereals and medical research works to reach out for a wider range of consumers.

This complex work aims to facilitate agrobiodiversity, sustainability, eco-marketing and a solid strategy for coping with climate change which are paramount for the actors of Hungarian organic production.

Key words: biodiversity, grain market, minor cereals, organic plant production, organic research.

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Effects of different floor management methods applied for three years in an organic olive grove

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Abstract

According to latest figures, around 10% of the olive orchards are managed organically in Turkey. But production efficiency of Turkish olive orchards are very limited compared to other important olive producer countries like Italy and Spain. This limited production efficiency is mostly related to the inefficient management methods used at the primary production stage. A field experiment was designed in organic olive orchard at Atatürk Horticultural Central Research Institute (Yalova, TURKEY) in which 4 different floor management methods were implemented. The methods tested were traditional tillage, no-till management, organic mulch (straw) and cover crops (vetch + oats). The trial aimed to find a sustainable olive orchard management system that could be recommended to the producers. Tested floor management methods did not show any statistically significant effects on yields or on olive fruit quality. Even though some positive effects of cover crops on the soil properties have started to appear as confirmed by the significant differences obtained at the final sampling date, the effects of tested floor management methods on soil properties did not differentiate clearly for most parameters. Based on these results, it is possible to propose using cover crops – under conditions where there is no strong competition – instead of traditional tillage which has additional costs and possible negative effects on environment. It is expected that maintaining the same research plan for longer terms will further differentiate the effects of floor management methods over the years, and significant impacts of applications will also be seen.

Key words: no-till, mulch, cover crop, tillage.

Introduction

Nitrogen content of the soil is one of the important limiting factor in organic agricultural production. Intensive tillage contributes to the leaching of nitrogen. The use of alternative soil management strategies as no-tillage,

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mulching and cover cropping could limit the leaching. Cover crops increase soil organic matter content and, consequently, improve soil quality (Nieto et al., 2012).

Most of the modern olive orchards in Turkey are created in flat fields, but traditional olive orchards are located in sloping lands. Erosion is an important issue if frequent ploughing is done in sloping lands (Gómez et al., 2014). Choosing cover crops, no-till and mulch to manage the soil reduce the chance to lose the rain water as runoff (Espejo-Pérez et al., 2013).

Mulch and cover crops can be used to control natural vegetation development. Weed suppression by mulch or cover crops can be due to a mechanical action (i.e. the thickness of the layer) and, in some cases, to the release of allelochemicals (Alcántara et al., 2011).

Cover crops represent an opportunity to deliver multiple ecosystem services in the same crop and growing season as several species can be grown together (Storkey et al., 2015). Soil micro-organisms (bacterial and fungal communities) respond positively to sustainable orchard management systems as no-till, organic mulch and cover crops. These communities consequently influence soil fertility and plant growth by regulating nutrient availability and turnover (Sofo et al., 2014).

Material and methods

A field experiment was designed using randomized block design with four replicates and four treatments in organic olive orchard at Atatürk Horticultural Central Research Institute (Yalova, TURKEY) in which 4 different floor management methods were implemented. The methods tested were traditional tillage, no-till management, organic mulch (straw) and cover crops (vetch (Vicia sativa) + oats (Avena sativa L.) with a 3:2 ratio). Each replicate is 260m2 and one treatment is applied on 1040m2 in total. Experimental field is managed organically, all the soil management; pest and disease management applications are allowed under Turkish organic agriculture regulation (Ministry of Food, Agriculture and Livestock, 2015).

At the beginning of the experiment olive trees were 22 years of age with an average tree trunk length of 90 cm and diameter of 20 cm. Each experimental replicate has 6 trees.

To evaluate the effects of treatments on soil, samples are taken from 0-30 cm and 30-60 cm using a hand auger (Chapman and Pratt, 1961) on T1: 14/12/2011, T2: 17/05/2012, T3: 29/11/2012, T4: 05/08/2013, T5: 23/12/2013, T6: 13/08/2014, T7: 29/12/2014.

Soil organic matter content (%) is analysed using modified Walkley-Black method (Anonim, 1985). Total nitrogen content (%) is analysed using modified Kjeldahl method (Kacar, 1994). Available phosphorus (ppm) is analysed using Olsen's $NaHCO_3$ method (Olsen et al., 1954). Available potassium (ppm) is analysed using 1N Ammonium acetate extraction (pH: 7.0) with Varian 720 ICP OES (Anonim, 1980).

Fruits are harvested using mechanical shaker for analysis. Parameters like yield, pulp percentage, fruit size, fruit volume and fruit weight are calculated.

Results

Soil

Organic matter content regulates physical, chemical and biological properties of soils. It is one of the most important soil component because of its ability to prevent erosion and increase the quality of the soil (Bot and Benites, 2005). The organic matter content (%) results of soil samples taken from the depth of 0-30 cm and 30-60 cm are given in Table 1. The findings show that the experimental field soil can be regarded as "humusous" according to Schlichling and Blume (1966). Statistically there were no significant effect of the treatments on soil organic matter.

The total nitrogen results for the samples taken from 0-30 and 30-60 cm depth are given in Table 2. By the fact that nitrogen constitutes the building block

Table 1. Organic matter (%) content of soil samples that are taken from 0-30 cm and 30-60 cm

Depth	Treatment	T1	T2	T3	T4	T5	T6	T7
0-30	No-till	2.80	2.55	2.74	2.83	3.17	3.03	2.51
	Tra. till	3.66	3.10	2.85	2.80	3.14	3.05	2.78
	Mulch	3.68	2.96	2.79	3.11	3.01	2.88	2.68
	Cover crop	3.10	2.71	2.79	3.32	2.73	3.07	2.63
	LSD	NS	NS	NS	NS	NS	NS	NS
30-60	No-till	1.31	1.35	1.18	1.07	1.44	1.45	1.04
	Tra. till	1.63	1.56	1.13	0.79	1.57	1.39	0.74
	Mulch	1.17	1.41	0.95	1.05	1.49	1.44	1.12
	Cover crop	1.28	1.27	1.27	1.15	1.33	1.21	1.01
	LSD	NS	NS	NS	NS	NS	NS	NS

NS not significant

Table 2. Total nitrogen (%) content of soil samples that are taken from 0-30 cm and 30-60 cm

Depth	Treatment	T1	T2	T3	T4	T5	T6	T7
0-30	Tra. till	0.223	0.188	0.290	0.254	0.205	0.412	0.172
	No-till	0.215	0.177	0.268	0.158	0.222	0.371	0.156
	Mulch	0.308	0.261	0.295	0.176	0.203	0.375	0.171
	Cover crop	0.205	0.216	0.216	0.192	0.184	0.432	0.176
	LSD	NS	NS	NS	NS	NS	NS	NS
30-60	Tra. till	0.174	0.216	0.275	0.096	0.174	0.306	0.117b
	No-till	0.185	0.156	0.341	0.114	0.176	0.300	0.142a
	Mulch	0.177	0.300	0.305	0.118	0.176	0.290	0.145a
	Cover crop	0.176	0.154	0.280	0.130	0.160	0.289	0.132ab
	LSD	NS	NS	NS	NS	NS	NS	0.024*

NS not significant,* significant at P<0.05

of proteins which makes it absolutely necessary for the plants growth, it is an important parameter for the research. In the experiment, no additional nitrogen or other fertilizer applications were used other than the floor management methods that were applied as treatments. The effect of treatments on soil total nitrogen in samples taken from 0-30 cm depth at different times were not statistically significant. Treatments have statistically significant effect only on soil total nitrogen for the samples taken from 30-60 cm depth on the last sampling date.

Phosphorus, which is an important nutrient is taken from the soil by plants in the form of primary and secondary orthophosphate ions. Due to the fixation of the phosphorus to the soil only a small fraction (10-30%) of it can be used in the soil or from fertilization (Eryuce, 2010). Statistically there were no significant effect of the treatments on phosphorus availability for the samples taken from 0-30 cm depth. Treatments have statistically significant effect on soil phosphorus for the samples taken from 30-60 cm depth on the last sampling date (Table 3).

Potassium, is an important plant nutrient that can be fixated in the soil. This attribute prevents potassium to wash away and that way plants can benefit from the mineral for a longer time (Eryüce, 2010). Potassium contents of the samples taken from 0-30 cm and 30-60 cm depth are shown in Table 4. Treatments have statistically significant effect on soil potassium only for the samples taken from 30-60 cm depth on the last sampling date.

Table 3. Phosphorus (ppm) content of soil samples that are taken from 0-30 cm and 30-60 cm

Depth	Treatment	T1	T2	T3	T4	T5	T6	T7
0-30	Tra. till	15.08	13.48	8.50	10.32	8.25	9.92	5.27
	No-till	9.53	9.49	11.65	18.27	7.50	9.01	6.83
	Mulch	13.71	16.27	8.59	22.68	6.75	8.22	7.43
	Cover crop	6.85	7.39	9.29	18.31	6.50	10.12	7.29
	LSD	NS	NS	NS	NS	NS	NS	NS
30-60	Tra. till	13.04	9.97	3.83	2.49	5.50	7.59	1.51b
	No-till	3.80	8.88	6.59	9.75	4.75	6.70	2.80ab
	Mulch	4.05	8.09	3.11	10.74	4.25	7.35	3.76a
	Cover crop	3.43	7.35	4.79	5.33	4.00	5.82	3.12a
	LSD	NS	NS	NS	NS	NS	NS	1.59*

NS not significant,* significant at P<0.05

Table 4. Potassium (ppm) content of soil samples that are taken from 0-30 cm and 30-60 cm

Depth	Treatment	T1	T2	T3	T4	T5	T6	T7
0-30	Tra. till	233	198	215	154	174	253	212
	No-till	200	186	219	166	224	211	180
	Mulch	217	213	228	147	203	204	244
	Cover crop	174	161	178	209	170	249	201
	LSD	NS	NS	NS	NS	NS	NS	NS
30-60	Tra. till	153	170	136	95	160	170	81b
	No-till	145	172	133	105	161	158	171a
	Mulch	110	176	140	95	167	169	153ab
	Cover crop	127	148	151	117	149	132	118ab
	LSD	NS	NS	NS	NS	NS	NS	83.8*

NS not significant, * significant at P<0.05

Olive Fruit

The average yield values obtained from the experimental field was between 2096 ± 662 kg / ha and 2763 ± 893 kg / ha in 2012. Olive fruit yields were far below the average values especially due to the negative effects of rain during the flowering period in 2013 and 2014 (Figure 1). It is believed that temperature and wind speeds were not the reason for the limited yield.

It was determined that there were no statistically significant effect of the treatments on fruit width in 2012 and 2014 but in 2013 treatments had a significant effect on fruit width. Fruit width was between 1.73 cm and 1.88 cm in 2012 and between 1.87 cm and 1.96 cm in 2014.

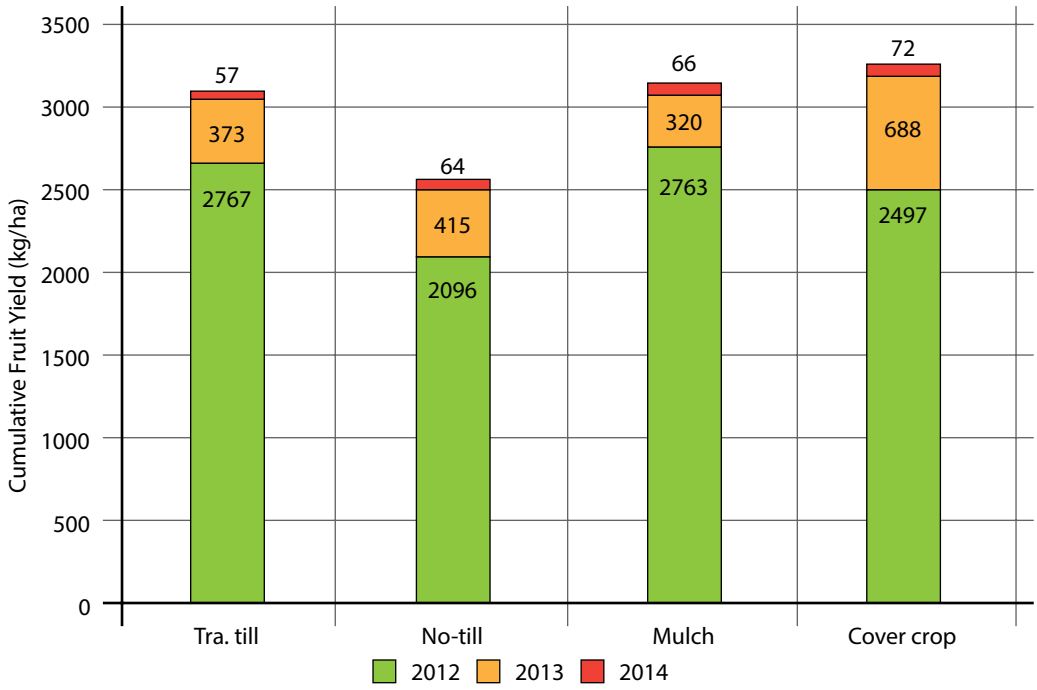

Figure 1. Cumulative fruit yield (kg/ha)

In 2013 smallest fruit width (1.73 cm) was received from mulch treated fields and biggest fruits were from cover crop treatment with 1.91 cm and traditionally tilled field with 1.95 cm. No-till treatment was between this two treatments with 1.80 cm average fruit width (Figure 2).

It was determined that there were no statistically significant effect of the treatments on fruit length for all 3 years. In 2012 fruit length was between 2.15 cm and 2.32 cm; in 2013 it was between 2.19 cm and 2.26 cm; in 2014 it was between 2.34 cm and 2.43 cm (Figure 2a and b).

The average fruit volume values for treatments were 4.54 cm3 to 4.78 cm^3 in 2012; 4.68 cm^3 to 4.8 cm^3 in 2013 and 4.71 cm^3 to 4.91 cm^3 in 2014 (Figure 3). Treatments have statistically no significant effect on the fruit volume for 3 years during the study.

The effect of treatments on the average fruit weight was not statistically significant for 3 years. The average fruit weight for treatments were between 3.45 g and 3.88 g in 2012; between 3.83 g and 3.99 g for 2013; and in 2014 fruit weight values were between 4.05 g and 4.69 g. (Figure 3a and b).

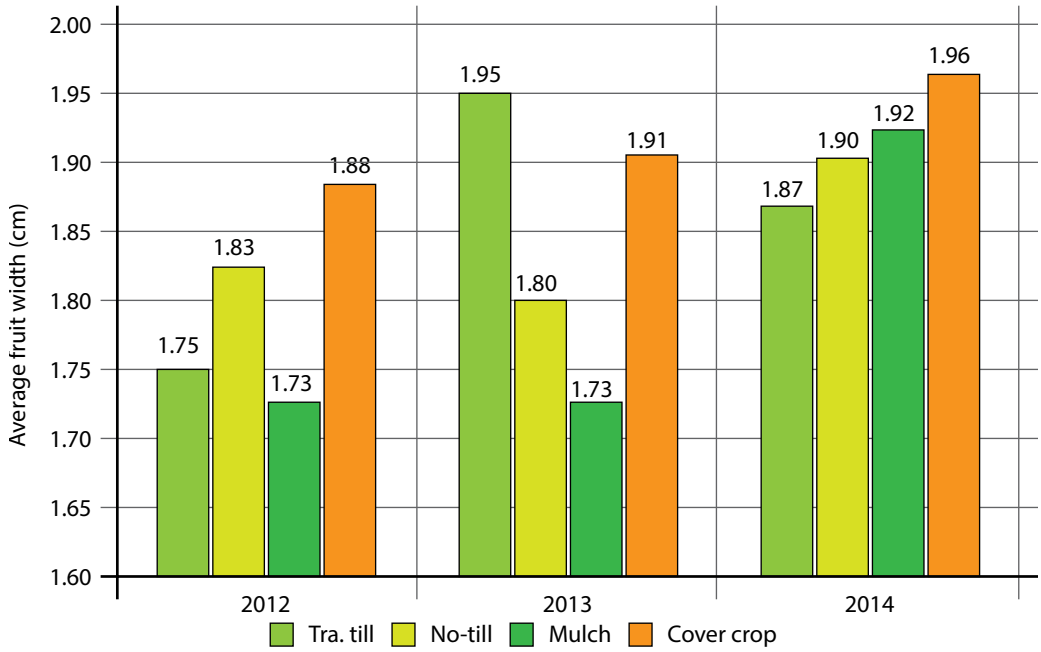

Figure 2a. Average fruit width (cm)

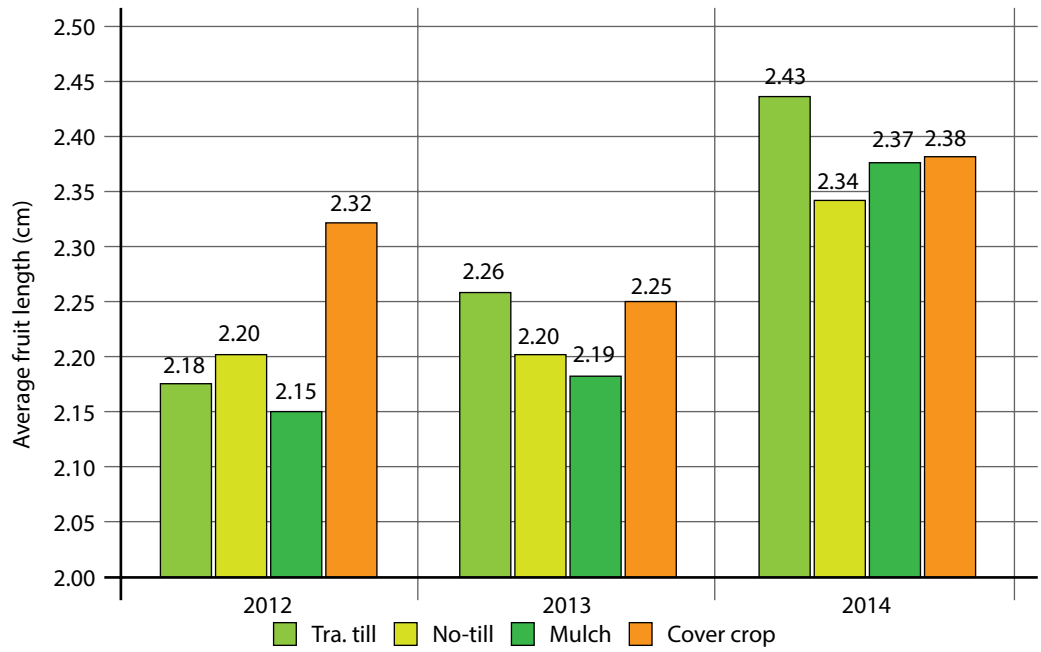

Figure 2b. Average fruit length (cm)

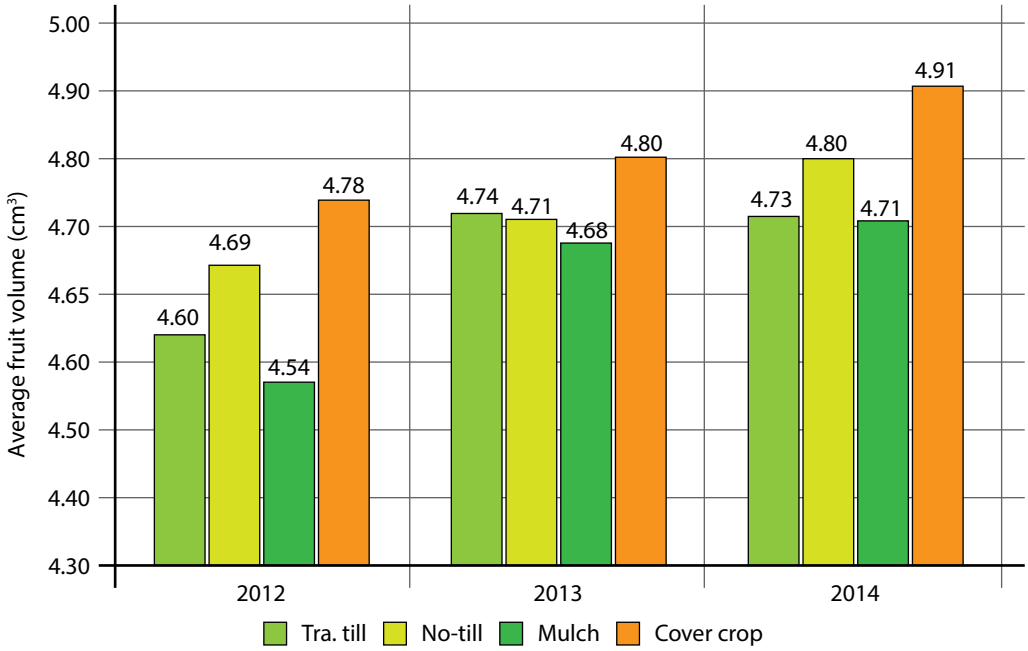

Figure 3a. Average fruit volume (cm³)

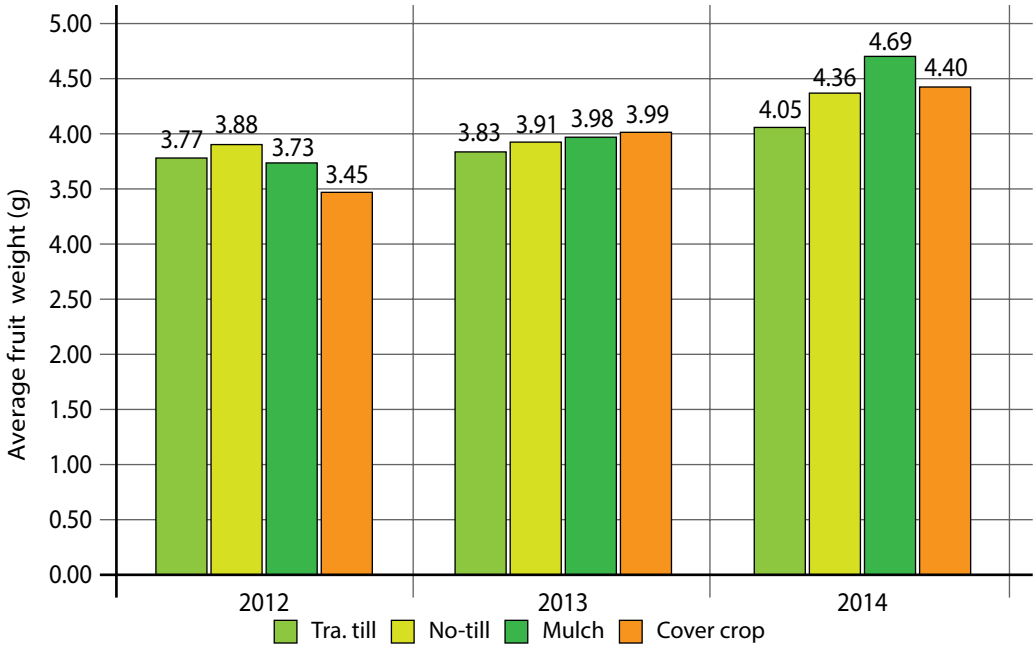

Figure 3b. Average fruit weight (g)

Discussion

In the experimental field, organic methods we used were successful enough to have yields comparable to low input conventional methods. Yield reduction in the second and third years were as a result of climatic events. Similar yield reductions have been experienced in the region from organic and conventional olive orchards.

Statistically, significant differences have emerged in terms of soil properties especially during the last sampling. One of the floor management method preferred by farmers is traditional tillage. No positive effects of traditional tillage has been seen. It would be possible to recommend the use of cover crops in olive orchards instead of traditional tillage, which has additional costs and environmentally adverse effects.

The effects of the treatments on fruit yield and quality didn't become statistically significant. This was predicted due to the fact that the effects of the treatments on the soil have not yet been sufficiently differentiated. It is expected that the continuation of the study will lead to the differentiation of the effects of the treatments on the soil over the years, and the effects on fruit yield and quality will reach statistically significant levels.

Acknowledgement

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Effect of inoculation with bio-fertilizer on growth and yield of chickpea (*Cicer arietinum* L.) in saline condition

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Abstract

Chickpea (Cicer arietinum L.) is one of the most important food legumes and it is mostly grown for exceptionally high nutritional value of seeds. Beneficial bacteria in the root of legumes are a key agent for changes in soil ecosystems and affects crop health, yield and soil quality. As a legume crop, chickpea requires less fertilizer, however fertilization is crucial factor for crop growth and yield production. Field experiments were conducted during 2012-2013 in Tashkent, Uzbekistan to evaluate the inoculation effect on chickpea growth and yield under moderate saline (5.6±0.6 dSm^{-1}) soil condition. The studied treatments were control and Rhizobium inoculation (R4) in three chickpea varieties Uzbekistan-32, Jakhongir and Khalima. Seed inoculation with selected Rhizobium strain was significantly superior over no inoculation treatments. Bio-fertilizer inoculation had of superior effect on Khalima chickpea variety, producing 15.2% more yield (19.7 $dT\ ha^{-1}$), protein and oil content performed 28.1% and 20% higher values respectively in comparison to control. The application of bio-fertilizer provided higher yield than without inoculation. Results clearly show that the application of bio-fertilizer is required to achieve optimal chickpea growth and yield, and that the application of bio-inoculant can compensate for the reduction in chemical fertilizers, offering a more sustainable agricultural production. Thus, it is suggested to use of bio-inoculants to get the highest yield in chickpea production as well as reducing negative effects of chemicals to the environment.

Keywords: bio-fertilizer, chickpea, saline soil, yield.

Introduction

Chickpea is an important legume crop worldwide because it is a N_2 fixing leguminous plant, offering high quality protein, capable of returning N_2 to the soil. Although chickpea is considered a soil nutrient scavenger and has shown excellent nitrogen (N) use efficiency, the application of N fertilizer is critical for its optimum production. Chickpea is an annual crop with the ability

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utilising water and nutrients more efficiently than other crops, and can be grown on marginal lands (Norman, 1978).

As a consequence of excessive use of mineral fertilizers in continuous cotton cultivation during Soviet Empire, agricultural lands in Uzbekistan suffer from problems such as pollution of soil, water resources and soil salinization. Increased soil salinity also reduces the activities of soil microbes, and inhibits N-fixation process, thus disrupts soil biochemical transformation processes and availability of essential nutrients to plants (Ashraf et al, 2016). Therefore, effective, low-cost, applicable and suitable soil management practices are needed to over-come these problems for sustainable crop production with minimum yield losses. Nowadays, it is nearly impossible to cultivate agricultural crops without irrigation, fertilization and plant protection.

In order to reduce these chemical inputs and to increase soil quality and sustainability, new biotechnological practices, such as the application of bacterial inoculates have been investigated to improve crop production in Uzbekistan. Nearly all of the plants in the nature have developed a symbiotic relationship with some of the micro-organisms (like Mycorrhiza and Rhizobium bacteria) living on their roots as co-habit. Due to being an alternative solution to chemical fertilizers and pesticides, the use of micro-organisms in organic agriculture has been spread out extensively. These types of micro-organisms that can increase the soil productivity and support plant cultivation are called "bio-fertilizers" or "bio-inoculants" (Vessey, 2003).

The use of bio-inoculants such as Rhizobium bacteria for agricultural practices garnered much attention as a source of nodulation for legumes as well as enhancing plant growth and productivity of many other crops (Smith, 1992; Elkosa et al, 2007). Several inoculation field experiments set up on different soil types showed a positive effect of inoculation with certain strains of Rhizobium on crop plant growth, including chickpea (Molla et al, 2012; Wani et al, 2002). Beneficial bacteria based bio-inoculants, with its properties such as symbioses with fixing N atmospheric plants had been considered as an effective way to improve soil quality.

The factors affecting inoculum success include soil type, soil N content, soil moisture, salinity level and etc. In tropical agriculture, the potential for improvement chickpea productivity from rhizobial inoculation is generally much higher than for temperate systems. Many legumes will not be nodulated by Rhizobia in harsh soil conditions (Taylor et al., 1991) and low soil temperature during the

early growth stages is a potential limiting factor to chickpea production in regions with short growing seasons (Rokhzadi et al, 2008). Kantar (2007) reported an effective symbiosis between chickpea and Rhizobium species symbiotic bacteria in N-deficient soils but the effect of Rhizobium R4 strains on chickpea growth in N deficient middle saline soils under conditions in Uzbekistan has not been investigated. Therefore, the aim of this research was to evaluate the effect of Rhizobium R4 strain on growth and yield of chickpea grown in middle saline soils of Uzbekistan.

Material and methods

The study site is located at the experimental station of the Tashkent State Agrarian University in the north-eastern part of Uzbekistan, and represents a continuously cultivated field (calcareous soil). The soil chemical characteristics were as follows: ~1% organic matter, 0.8 mg N 100 g^{-1} soil; 3.0 mg P 100 g^{-1}; 23 mg K 100 g^{-1}; 6 mg Mg 100 g^{-1} soil (Table 1). The total N content (N_{tot}) was determined by the Kjeldahl method (Keeney and Nelson 1982). The molybdenum blue method was used to determine total phosphorus content (P_{tot}) in the soil and potassium (K) was determined using the flame photometric method (Rhiem, 1985). An atomic absorption spectrophotometer was used to measure calcium chloride ($CaCl_2$) and extractable magnesium (Schachtschnabel and Heinemann, 1974).

The 2-year (2013 and 2014) experiments were set up as randomized complete block designs with three replicates. Plots (6 × 2.5 m) were divided into rows spaced 0.6 m apart and a space of 1 m was allowed between plots. The mean temperature during growing season in 2012 and 2013 was 15-17° C (April, May) and 28-30°C (June, July), respectively. Chickpea seeds (*Cicer arietinum* L) Uzbekistan-32, Jakhongir and Khalima were obtained from the Plant Science Department of Tashkent State Agrarian University. The Rhizobium R4 was provided by the Biotechnology Department of Tashkent State Agrarian University. Chickpea seeds were sterilised in 0.1% $HgCl_2$ solution for 3 min followed by repeated washing with sterilised water. Bacterial inoculants were prepared following the method described by Mirza et al. (2007). Sterilized seeds

Table 1. Soil chemical analysis

Soil horizons, cm	The total content, %				Mobile forms, mg/kg		
	Humus	N	P	K	$N\text{-}NO_3$	P_2O_5	K_2O
0-30	0.934	0.082	0.313	2.30	4.3	31.8	163.5
30-50	0.802	0.066	0.139	1.80	3.1	17.1	124.0

were dipped in the inocula of Rhizobium R4 bacterial strain that had 108 cell g^{-1} peat (10 g of peat-based inocula for 1 kg seed) for 30 min. Non-inoculated chickpea plants were used as controls. Chickpea seeds were planted manually in each plot in the beginning of April and were irrigated by furrow irrigation. Two months after sowing, the number of nodules per chickpea plant was estimated. At the end of the growing season, plants were harvested to determine chickpea seed yield as well as protein and oil contents. Shoot and root dry weights were recorded after drying at 100°C. Protein was assayed according to Bradford (1976) using bovine serum albumin (BSA, fraction V) to standardize the assay. The essential oil content in the seeds was determined by a hydrodistillation method on a Clevenger type apparatus (Charles and Simon 1990). Statistical analysis was performed using ANOVA and means were calculated and their differences were tested for significance by using the Student Newman test ($P<0.05$).

Results and discussion

The results of the experiments revealed that inoculation with Rhizobium R4 strain increased dry weight, height, nodulation and chickpea yield. The level of increases was proportional to the application of Rhizobium inoculant. The inoculation increased shoot dry weight in all inoculated treatments by 25-81% compared to the control. Maximum shoot dry weight and plant height were recorded much higher with Rhizobium inoculation. Bacterial inoculation increased the yield of all varieties of chickpea in both years (Table 3). Inoculation significantly increased chickpea height (not shown), plant biomass and nodule numbers. A greater proportion of nodules developed on the main root in the Khalima chickpea variety after inoculation (Table 2). Chickpea yield values ranged from 12.8 to 19.7 dT ha^{-1}, with Rhizobium inoculation Khalima exhibiting highest value of 19.7 dT ha^{-1}, followed by Uzbekistan-32 and Jakhongir. Correlation of nodules per plant and root dry weight with grains per plant and correlation of pods per plant, grains per plant, biological yield and harvest index with each other and with grain yield were positive and significant (Table 2 and 3).

These results could be explained by symbiosis efficiency between chickpea and Rhizobium R4 strains that increased the uptake of nutrients under low levels of available soil N reported by Kantar et al. (2007). Mirza et al. (2007) and Elkosa et al. (2007) have reported similar results, suggesting that inoculation of legume plants with Rhizobium strains increased nodule numbers, plant weight and seed yields in field conditions.

Table 2. The effect of Rhizobium R4 on dry matter plant weight and nodulation of chickpea

Chickpea varieties	Shoot dry matter (g. per plant)		Root dry matter (g. per plant)		Nodule number (per plant)	
	2012	2013	2012	2013	2012	2013
Control, Jahongir	5.0	5.6	1.43	1.67	10.8	10.2
Inoculated, Jahongir	6.2*	6.7*	1.89*	1.98*	28.1*	31.7*
Control, Uzbekistan	4.8	4.9	1.56	1.69	8.4	9.4
Inoculated, Uzbekistan	5.2*	5.8*	1.98*	2.09*	29.1*	29.6*
Control, Khalima	4.2	4.8	2.01	2.08	8.8	11.2
Inoculated, Khalima	5.7	5.9*	2.22	2.34	22.0	23.4*

* Data are means of 3 replicates/plot. Asterisks indicate significant differences between treatments according to the LSD test ($P \leq 0.05$)

Table 3. The effect of Rhizobium R4 on yield, protein and oil content of seeds of chickpea

Chickpea varieties	Yield (dT ha^{-1})		Protein content (%)		Oil content (%)	
	2012	2013	2012	2013	2012	2013
Control, Jahongir	12.8	13.2	25.7	25.9	7.2	7.9
Inoculated, Jahongir	14.1	15.5*	28.8	29.2	8.9*	9.2
Control, Uzbekistan	14.6	15.1	22.6	22.9	7.0	7.5
Inoculated, Uzbekistan	18.3*	19.2*	27.2*	26.6*	8.4*	8.5*
Control, Khalima	16.2	17.1	22.1	22.8	7.6	8.0
Inoculated, Khalima	18.0	19.7*	24.4*	25.2*	8.7	9.4

* Data are means of 3 replicates/plot. Asterisks indicate significant differences between treatments according to the LSD test ($P \leq 0.05$)

Wani et al. (2007) found that Rhizobium R4 inoculation of chickpea increased nodule weight by 33%, root weight by 32%, and shoot weight by 26%, respectively.

Results demonstrated that inoculation with Rhizobia improved plant physiological and morphological traits of chickpea. Seed-applied inoculant must be applied to the seed immediately prior to planting. Large populations of introduced Rhizobia bacteria must survive in the harsh soil environment for 2-3 weeks in order to effectively form nodules on the roots of pulse crop seedlings (McConnell et al, 2002).

The effect of bacteria inoculation was higher than that of without inoculation, in accordance with Hafees et al (2002) reporting 20, 15 and 60-80% increase in yield of paddy, wheat and legumes, respectively.

The protein and oil contents in seeds also responded positively to inoculation with Rhizobium R4. Protein content increased by 10.5-16.2% and oil content by 13.3-17.5% in inoculated chickpea compared to the control (Table 3).

Bacterial stimulation of chickpea growth and yield was higher in the second year of cultivation, as experimental plots were the same in both years. The first year of cultivation of plants was probably affected by soil composition and fertility.

Conclusion

Adding the beneficial micro-organisms into the soil through microbial fertilizers enhances chickpea yield and quality. These results are important because the use of Rhizobium strains as a bacterial fertilizer provides a new technological approach that may reduce chemical fertilizers and help producing healthy foods in Uzbekistan under N-poor soil conditions.

This study showed the advantages of bio-fertilizers in the chickpea cultivation, and identified its success in terms of yield, quality and mineral nutrients, especially for bio-fertilizers that are environment-friendly and licensed for the organic cultivation.

Natural manipulation of plant growth and nutrient uptake by bacterial inoculation would be potential useful technology for sustainable agricultural production without harmful effect to natural resources. Further efforts are needed to widely use the soil beneficial bacteria as bio-inoculant for sustainable crop production in saline affected soils of Uzbekistan.

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Organic livestock in Turkey: today and in the future

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Abstract

Organic agriculture began with the request of the EU countries for organic products in Turkey. The first organic production started with exports of dried grapes and figs in 1984, which are traditional export products. The production area of organic products, the number of producers and the amount of production have increased considerably day by day. In 2015, a total of 1,164,202 tons of organic products were produced on 349,063 hectares of land by 36,732 producers. Since consumer awareness and purchasing power are low in Turkey, a significant part of the organic plant products are exported to mainly to the EU and other countries. Organic agriculture has developed based on crop production and exports. However, due to problems faced in the export of animal products, high prices and inadequate demand in the domestic market, organic livestock production has developed later. Nowadays, total of 14.2 million heads of cattle, 41.3 million of small ruminants, 109 million hens, and 220 million broilers are present in Turkey and 7.9 million beehives produce honey. Annual national milk production is 18.6 million tons, red meat production is 1.2 million tons, chicken meat production is 1.9 million tons, egg production is 16.8 billion pieces and honey production is 108 000 tons. However, the number of organic livestock farms is only 179. There are 7,618 heads of cattle, 41,272 small ruminants, 227,066 hens, 725,544 broilers and 38,296 hives involved with organic animal production. Annual organic milk production is 19,739 tons, red meat production is 475 tons, chicken meat production is 2,130 tons, egg production is 59 million pieces, and organic honey and other bee products' production is 674 tons. Despite the high potential for organic livestock in the country, organic livestock has not developed yet in Turkey due to existing problems and low domestic demand. For this reason, significant support is needed to increase the production and consumption of organic animal products. This article provides general information about animal husbandry in Turkey, the current situation of organic animal husbandry, problems and suggestions to bring solutions to the existing problems.

Key words: Organic farming, organic milk, organic meat, organic eggs, human health.

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Introduction

Agriculture is a science concerned with plant and animal husbandry, obtaining products from plants and animals and manufacturing or semi-manufacturing of these products. Therefore, plant and animal production are two important complementary components in agriculture. Use of intensive production techniques in plant and animal production to compensate the food requirement of the increasing world population in last century have provided significant increase in yields. However, separation of plant and animal production in conventional agriculture led to some important agricultural production and environmental problems. Chemical agents used to increase yield have led to environmental pollution of soil, air and water and chemical residues in foods caused to disrupt human health, thus the sector is on the verge of unsustainable development. In intensive animal husbandry, disengagement of animals both with soil and plant production led to environmental pollution caused by animal manure. Also residues in animal products caused by feed additives such as hormones, antibiotics etc. led to significant health problems in consumers of these products. Mad cow disease is a significant example to the relation between applied intensive animal husbandry systems and new health problems arising in animals. Housing of animals in congested places, inadequate elbow room, heavy metal and agricultural pesticides also causes stress hormones to increase weakening of the immune system, thus resulting in more health problems in animals. Mastitis, ketosis, acidosis, respiratory tract diseases, urinary tract stones and foot diseases can be presented as examples for the health problems caused by intensification of animal husbandry.

Antibiotic containing milk is hazardous to human health and important problems occur in processing steps of these kind of milk. Agricultural pesticides taken in with contaminated feed are accumulated in adipose tissue, transferred to newborn infant through milk and causes several diseases, foremost cancer. Heavy metals such as mercury, nickel, lead, arsenic and cadmium can be found in animal products produced by intense production techniques. If these heavy metals are taken into human body even in limited levels, they can accumulate in tissues, cause allergies, genetic mutations and changes in metabolic functions and even cause intoxication if taken at higher dosages. Beside all the problems in intensive animal husbandry, animal welfare is becoming more important socially and ethically due to increasing interest of animal rights in developed countries.

Problems caused by intensive agriculture have led to searching of new methods and practices. As a result of this search, a new organic agricultural method has come to the fore which is environment-friendly and does not pollute air, water and soil. Organic agriculture aims to produce healthier plant and animal products without causing environmental pollution, and provide sustainability in agriculture and thus protect human health and environment. For this purpose, significant progress has been obtained in organic plant and animal production and consumption, especially in countries with higher consumer awareness and income levels.

Ecologic agriculture in Turkey commenced in 1984, mostly intended for exportation to meet the organic food demand of European countries. First organic products are dried fig and grape which are Turkey's traditional exportation products. Product quantity and variety have increased year by year and reached to 225 kinds of raw products. However, major part of organic products consist of plant products and exported mostly to EU, U.S.A and Japan. Due to problems in exportation of organic animal products, lack of consumer awareness and low purchasing power causes slower development of organic animal husbandry compared to plant production.

General situation of animal husbandry in Turkey

In Turkey, approximately 22.3 million ha forest land, 38.4 million ha agricultural land and 14.6 million ha pasture land are present. Forage crop planting rate amongst arable agriculture lands is approximately 9.2%. Out of the total, 35% of pasture land is within Eastern Anatolia region and followed by Central Anatolia region with 25%. Grass yield and pasturage capacity of Black Sea and Eastern Anatolia regions are better compared to other regions. Total grass production capacity of pasture lands are equal to 4 million cattle units. In Turkey, ruminant animals are equivalent to 15 million cattle units. Despite the subventions for forage crops by the state and increase in forage crops, inefficacy in high class roughage is still one of the biggest problems encountered in animal husbandry of Turkey.

In Turkey, intensive dairy farming and poultry husbandry are mostly performed in Western Anatolia, sheep husbandry in Central Anatolia and Western Anatolia, goat husbandry in Mediterranean, Eastern and Southeastern Anatolia, livestock raising in Eastern Anatolia and bee breeding is performed countrywide. 97% of animal production enterprises have plant and animal production together, yet 3% of companies are involved with animal production only.

According to the Turkish Statistical Institute (TUİK) 2016 data, there are 14,080,155 heads of cattle, 142,073 heads buffalo, 30,983,933 heads sheep, 10,345,299 heads goat, thereby a total of 55,551,460 heads of ruminants are present in Turkey. Turkey's cattle population consists of 47% culture breeds (Holstein, Brown Swiss, Jersey etc.), 41% culture-domestic crossbreeds and 12% domestic breeds. Almost all sheep and goat population consists of domestic breeds which have poor yield but resistant to harsh environmental conditions. 76% of cattle enterprises are family-run enterprises with 10 or less cattle stock. Similarly, 72% of sheep enterprises are family-run enterprises with 50 or less sheep stock. Essential part of cattle husbandry and sheep-goat husbandry are performed intensively. 90.8% of milk production out of total 18,489,161 tons and 90.4% of red meat production out of total 1,173,042 tons are obtained from cattle. For this reason, cattle are the dominant animals for red meat and milk production in Turkey.

Poultry sector in Turkey is considerably developed and stands in the 8th place in the world rankings with 18.1 billion egg production and in the 9th place with 1,879,018 tonnes of poultry meat production. 25% of eggs produced and 14% of poultry meat is exported. Turkey's total meat production is approximately 3 million tonnes and 38% obtained from ruminants, 62% obtained from poultry. Red meat consumption is relatively low and the price is high compared to poultry meat, therefore consumption share of poultry meat is high within meat production and increases year by year.

Beekeeping is an important sector countrywide in Turkey. Turkey stands in the 3rd place after India and China with 7.9 million bee hives but stands in the 2nd place after China with 105,727 tonnes of honey production.

Organic livestock farming in Turkey

Organic agriculture in Turkey has commenced in 1984 with exportation of dried figs and dried grapes and increased year by year and reached to 225 kinds of raw products. However, almost all of organic products are exported mostly to developed countries like EU countries, U.S.A. and Japan. All exported organic products are plant products, except honey.

Turkey has a great potential in respect to the numbers of animals. Production in the animal sector is performed under intensive conditions, except poultry husbandry and a part of dairy farming. Because of the low input use in many animal farmers, the income level of the breeders and yield per animal are low. Sheep and goat

breeding are mostly conducted on pasture lands. In most regions of Turkey, 80% of feed requirement of sheep and goat are supplied from pastures, grasslands and plateaus. Breeding process is generally conducted with domestic breeds with low yields but resistant to diseases. Turkey's organic animal husbandry potential is quite high, however Turkey cannot benefit from this potential sufficiently.

Regions, which have surplus pasture and grassland and not polluted by intensive agriculture and industrial activities have greater importance in terms of organic cattle, sheep, goat and bee husbandry. Yet problems in exportation of animal products due to certain animal diseases, high prices versus low purchasing power of consumers in the domestic market, insufficient demand related to lack of consumer awareness and inadequate supports given to the farmers, create negative effects on organic animal husbandry development. For this reason, enterprises in organic animal husbandry sector are still very few in number. In addition to this, a limited increase is present in organic food production, consumption and organic markets countrywide during the recent years. Information about organic animal husbandry production in Turkey is given in Table 1.

As seen in Table 1, an increase is presented in terms of breeder and animal numbers, and organic milk, meat and egg production during the last 10 years. In recent years, negative opinions of consumers against conventional poultry

Table 1. Organic animal production in Turkey distributed by years (2006-2016)

Years	Number of producers	Number of animals	Milk production (ton)	Meat production (ton)	Egg production (pcs)
2006	6	14.407	2.875	12	241.940
2007	16	42.192	–	–	–
2008	31	38.942	8.711	554	4.424.000
2009	38	129.737	12.994	377	11.767.400
2010	105	387.984	11.604	6.803	17.889.808
2011	137	453.513	14.794	1.359	26.236.920
2012	151	253.783	17.627	481	36.105.556
2013	163	1.021.382	54.781	4.970	48.040.778
2014	216	1.121.159	15.510	2.107	64.898.912
2015	179	997.707	19.739	2.606	58.938.769
2016	188	1.215.632	21.431	1.609	147.600.367
Change	+ 31 times	+ 84 times	+ 7 times	+ 134 times	+ 610 times

Source: TÜİK 2017

products due to intensive use of feed additives resulted in a significant increase in demand and thus in production of organic poultry meat and eggs.

Information about honey production in Turkey during the last 10 years is given in Table 2.

As seen in Table 2, fluctuations are present in production but in general, number of breeders and bee hives and honey production has increased significantly. Organic honey production in Turkey has a particular importance in terms of organic production because it is the only organic animal product exported.

Information on organic animal production in Turkey in 2016 and its share in total animal production is given in Table 3.

As seen in Table 3, in Turkey, totally there are 188 farms conducting organic animal husbandry. Half of these farms are raising ruminants, and the other half are poultry husbandry enterprises. 95% of organic milk is obtained from cattle, whereas 92% of organic meat is obtained from poultry. In addition to this, share of organic animal production within total is 0.12% in milk and less than 0.1% in red and chicken meat within total production. Share of organic egg production is relatively high with a percentage of 0.82% within the total production. These data show that consumers in Turkey prefer organic eggs more than the other animal products. Because of decreasing trust in conventional poultry products,

Table 2. Organic beekeeping and honey production in Turkey in last 10 years

Years	Number of producers	Number of hives	Honey production (ton)
2006	122	26 596	640
2007	149	23 308	497
2008	93	11 207	181
2009	147	14 917	206
2010	191	14 699	208
2011	205	19 105	221
2012	355	47 065	517
2013	279	32 342	344
2014	321	36 931	280
2015	322	38 296	674
2016	276	40 371	349
Change	+ % 126	+ % 51	-% 54

Source: TÜİK 2017

Table 3. Organic animal production according to the species in Turkey (2016)

Animal species	Number of farms	Number of animals	Milk (ton)	Red meat (ton)	Chicken meat (ton)	Egg (pcs)	Honey (ton)
Cattle	65	7 234	20 298	74	–	–	–
Sheep	16	17 334	232	45	–	–	–
Goat	15	7 022	901	2	–	–	–
Laying hens	66	575 180	–	–	–	147 600 367	–
Broiler chick	26	608 862	–	–	1 488		–
Total	188	1 215 632	21 431	121	1 488	147 600 367	–
In the total %	–	–	0.12%	0.01%	0.08%	0.82 %	–
Apiculture	276	40 371 hives	–		–	349	349
In the total %							0.33%

Source: TÜİK 2017

consumers' interest and demand is much higher for organic egg and chicken meat compared to the other organic animal products.

Although beekeeping in Turkey is rather developed and chance for exporting of organic honey exists, share of organic honey production is low with a percentage of 0.33 within total honey production. In Turkey, a regular increase is present in organic animal husbandry every year but share of organic animal production is still very low and not sufficient when compared to total animal husbandry production. For this reason, more support and subsidies are needed to increase organic animal production and consumption.

Problems of organic animal production in Turkey

In Turkey, demand in organic animal products are low because of various reasons such as problems in exportation of organic animal products, low purchasing power, higher prices and consumer awareness within the domestic market and distrust for organic products. Production rate of organic animal products are still low and their prices are high. Low production levels causes certification services, product processing and marketing costs to increase. Because the number of mediators are high, it causes low farm-gate prices but the prices at the retail level are very high. Producer organizations and control services are inadequate. There are major problems in organic husbandry in terms of input supply, foremost in organic feed. Lack of informed and experienced technical staff is present in many husbandry enterprises. Transition to organic husbandry create negative opinions of some sectors (e.g. agricultural pesticides, veterinary

medicines, chemical fertilizer, compound feed and additives, meat and milk integrations). Researches about organic husbandry are insufficient. Importance of financial support is crucial for a rapid and successful development of organic agriculture and organic animal husbandry in Turkey as it has been experienced in other countries as in the EU.

Solution proposals for organic husbandry in Turkey

Due to the limitations in exportation of animal products, the main aim of organic husbandry in Turkey should be domestic markets especially in the short term. Consumption adjuvant adjustments and supports are needed to increase organic animal products. To avoid marketing problems, production should be increased correspondingly with consumption. Important pasture land should be protected and improved and formation of new pasture lands should be encouraged. Researches about organic husbandry should be supported. Production and consumption of animal products such as organic milk and egg, which are vital for infant and children nutrition, should be increased as a priority. Sheep and goat breeding should be encouraged in suitable regions, foremost Eastern Anatolia region of Turkey which has higher potential for organic husbandry. Consumers should be informed about the benefits of organic animal products and trust should be built in consumers. Domestic and foreign market researches should be conducted for organic animal products.

Conclusion

Turkey has a significant potential for plant and animal production in organic agriculture. However, production and consumption of organic animal products are very low due to problems emerged in exportation of animal products, lack of consumer awareness and low purchasing power. Nutrition with organic products should be important for healthier generations especially infants and children. In the comparing conventional and organic production costs, societal services that organic provides such as health, clean environment, contributions to environment and preservation of gene pool should not be ignored. Besides, it should not be forgotten that organic husbandry is an important and inseparable part of plant production in organic agriculture. Dissemination of organic agriculture allows protection of nature and ecosystem, increasing income level of small farmers, agro-tourism and rural development, to prevent rural-urban migration and feeding with healthier nutrition for people, especially infants and children.

As mentioned in Turkey Organic Husbandry Congress final report, adjustments below are needed to provide reliable development in organic agriculture and husbandry.

1. Suitable basins for organic agriculture should be determined and supports should be provided on basin basis, not on farm basis.
2. Since one of the main objectives of organic agriculture is to provide rural development, family-run enterprises should be supported rather than the big enterprises.
3. Because closed system and sustainability are taken as basis for organic agriculture, enterprises conduct plant and animal production together should be supported more.
4. Due to consumer distrust of organic products, controls and supervisions directed at production, process and marketing steps should be conducted effectively, sale of inorganic products under the name of organic and unfair competition should be prevented, and sanctions should be discouraging.
5. To protect gene resources of domestic animals, local breds should be preferably supported.
6. Consumers should be informed about the benefits of organic products.
7. Unfair competition of marketing of organic products should be prevented
8. Especially 0-6 aged child diet should be based on organic products.
9. Promotional activities to increase organic consumption to be carried out and to encourage production, organic products must be compulsory totally or at certain shares in primary school canteens and hospitals.
10. Organic milk should be used in "National Schools Milk Project"
11. Local "Organic Product Markets" which ensure direct delivery of organic products to consumers with lower prices without mediators should be supported by local government.
12. Organizations and breeders working collectively as cooperatives or unions should be supported.
13. Agrotourism should be supported due to its contribution to the development of organic agriculture.
14. "Organic Agriculture Education and Research Center" which provides research and education services in national level should be established.
15. Sustainability and regular adjustments in organic agriculture should be secured by legal regulations.
16. Domestic market should have the priority in terms of protection of public health and surplus production should be used in exportation.

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Assessment of organic agriculture potential in the territory of the Republic of Uzbekistan

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Abstract

This article presents research results,scientific recommendations and conclusions on assessment of organic agriculture establishment potential in the territory of the Republic of Uzbekistan, ways and opportunities of farm business development and transfer to organic production. There is also a generalization and scientific substantiation of the main activities in organic agriculture establishment.

Key words: agriculture, legislation, standart, traditional agriculture.

Introduction

Organic agricultural production system development in the regions of the Republic of Uzbekistan has real opportunities to introduce significant changes in the sphere of agricultural production, in a manner that does not contradict the basic legislation of our country, at the level of production entities in conditions with unequal natural and economic factors. The practical importance of land resources aimed at agriculture is evident not only in total area reduction, but also in quality deterioration, in decline of soil-biological and economic fertility of the land.

Studies show that eliminating complexities and shortcomings in the agricultural sector at a large-scale level and on an urgent basis is not an easy task. In this regard, to organize organic production at the state level, it is required to define precisely the step-by-step development strategy and activities for agriculture development, to substantiate advanced methods aimed at this goal, to determine the logical steps in reforming system of land relations, and to precisely determine government support programs.

Special mention should be made of the fact that the organization and development of farm land use will provide an opportunity to solve not only problems of environmentally safe food products and environmental issues, but

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also to find solutions to social problems in rural areas by increasing employment of village population.

Material and methods

At the moment, in order to make a good explain of organic agriculture directions and its production development, it will be expedient to express factors contributing to the development of organic products market in the following Table 1.

To date under difficult conditions for industrial agriculture development we can single out the following reasons that hamper organic production development in a short time: no interest in organic production trends or lack of important information about the desire for innovation and partial integration with past

Table 1. Organic agriculture organization and development factors

Organizational level	Factors that determine organic agriculture organization and development
National scale	Preparation and adoption of regulatory legal acts and state programs that regulate the concept of «organic, ecologically clean (safe) product», «organic (ecological) products»
	Development of state standards in organic agriculture harmonized with international organic standards
	Economic mechanisms development to stimulate farmers and processors producing organic products through systems of subsidy and dotation, soft loans, optimization of tax payments intended for increasing investment attractiveness and innovation activity aimed at the production of organic agricultural products
Regional scale	Development and implementation of regional measures to support the organization and development of agriculture and organic land management focused on the production of organic products; adoption of legal documents on production of organic agricultural products not contradicting the legislation of the Republic of Uzbekistan
	Carrying out research on identifying opportunities for organic land use in agroareas; Expanding range of information sources that highlight the importance of organic production
	Development of Education Program for training and retraining of specialists and personnel in the field of agricultural and organic land management aimed at the organic production
	Creation of Agroecological Zones and mobilization of favorable land relevant resources in the production turnover of organic products
	Development of regional organic products market. Participation in international and national trade fairs to promote regional organic (ecologically clean) products
At farming enterprise level	To organize the use of organic land and to determine way of transition to organic production due to demand and existing resources of organic production
	Use land resources in products processing by switching to the use of ecological lands and engaging unused land in agricultural sector; rejection to use chemical agents and to restore soil fertility by crop rotation and to extend practice of biological soil fertilization and use of biopesticides.
	Increasing agricultural production efficiency through the sale of organic products at relatively high prices
	To organize regional agro-ecological structure; train personnel and enhance their skills; certify organic production system

achievements; there are difficulties in attracting investment projects in production and processing of organic products; there are no special markets to sale organic products; there is a lack of qualified specialists in certification and use of ecological lands; organic lands use profitability; no cooperation with sectors interested in organic agriculture expanding.

It is possible to steadily expand agricultural sector building on world experience study in farm management using only land and other productive resources to the optimum, especially biofertilizers and biopesticides.

According to indicators of land fund analysis, a number of regions of our republic have necessary land and natural conditions for organic agriculture (together with traditional agricultural production) and plays an important role in increasing competition for producers of traditional agricultural products, in particular for farm business (Table 2)

In our country, according to the land fund, there is an opportunity to organize organic agriculture on lands intended for agriculture, on forest fund lands, and on reserve lands. For example, fruit of caper plant, which grows wild in the forest fund lands and reserve lands, was collected, certified and exported as an organic product. The annual capers harvest volume in Uzbekistan is more than 6,000 tons. Types of fruits and plants that can be certified as an organic product of forest fund are the following: dog rose (Crateagus); caper (Capparis); barberry (Bérberis);

Table 2. Land allocation by categories of the Land Fund of the Republic of Uzbekistan (in thousand hectares)

№	Categories of Land Fund	Total land area		Including irrigated land	
		Total	%	Total	%
1.	Agricultural land	20417,0	45,48	4204,9	9,36
2.	Land of settlements	219,6	0,49	50,2	0,11
3.	Lands intended for industrial, transport, communication and defense purposes	905,1	2,02	12,4	0,03
4.	Lands designated for nature protection, health improvement and recreational purposes	76,0	0,17	0,9	0,002
5.	Historical and cultural heritage	9,7	0,02	–	–
6.	Forest Fund Lands	9752,3	21,72	32,9	0,07
7.	Water fund lands	832,4	1,85	4,6	0,01
8.	Reserve Fund Lands	12680,3	28,25	2,2	0,004
	Total amount of lands:	44892,4	100,0	4308,1	9,6

geerah (Cumīnum cymīnum); licorice (Glycyrrhíza glábra); walnuts and other medicinal plants.

In addition, the Republic of Uzbekistan has various great opportunities to development organic agriculture, in particular: 755,400 hectares of rainfed lands, 21125.6 thousand hectares of natural hayfields and dzheylau, 156 thousand hectares of protected river areas, where influence of intensive agricultural production is very low, the use of chemical fertilizers, pollution and anthropogenic influences and cultivation of genetically modified plants are prohibited. Organic farming in these areas is profitable from economic point of view, but in fact organic activity here is insufficient.

In 2016 more than 1,000 tons of organic raisins, more than 500 tons of organic dried plums, more than 3,000 tons of organic apricots were exported from

Table 3. Idealogic differences between organic agriculture and traditional agriculture organization

Organic agriculture	Traditional (chemical) agriculture
Unified approach: No imbalance in any technology used in the system, which is viewed as a whole.	Split approach: A targeted approach to one product or one pest or one missing nutrient element can lead to an imbalance in the system.
Decentralized production: Bulk of goods imported from the outside (seeds, fertilizers, biopesticides, etc.) are produced at the level of farm / dehkan farms, which in turn matches local environment, creates new jobs and reduces the cost of the product.	Centralized production: In traditional production basic goods (seeds, fertilizers, pesticides, etc.) are imported from abroad and from far away, what hinders the possibility of local resources efficient use, leads to loss of employment and an increase in the cost of goods.
Harmony with nature: Advantages of natural resources, flora and fauna use or by means of creating comfortable conditions for them, ensuring a stable fertility of resources.	Domination of nature: Icreased production is an induced measure in traditional agriculture that leads to decline of ability to restore natural resources and loss of long-term fertility.
Diversity: It includes all possible organisms in one system. To manage nutrients and pests used as interrelated services. The owners of the system require a minimum cost and time.	Specialization: Specializes only on one plant, one tree or one type of livestock. All material and time costs for nutrients and pests management should be covered by farmer or owner of the system
Optimization of input: Rational use, efficient processing of available resources. At the same time possibility of processing system remains, and economic potential of the owner is improved.	Maximum disruption of activity: Excessive use of resources leads to disruption of resources and systems fertility in the long term.
Speed of knowledge: A number of resources will always require timely and maximum integration. Relative attachment to experts and imported technologies. For example, one farmer can study in a relatively far-located region.	Input Intensity: Extensive list of chemical elements including time and methods. There is a demand for experts for timely updates. Only resources can be sufficient for fields.
Preventive, protective and active approach: In the course of all actions import of raw materials from abroad is reduced and is carried out according to system requirements.	Causes and approaches in management: Most input actions from abroad are carried out with the aim of managing risks of damage in systemic use
Reducing inputs use: System improvement involves creation and preservation of own resources stability, for example, consumption of inputs for food and protection is reduced	Increasing the export: Consumption will increase for foreign products and decreases the ability of recovery by focusing one purpose orientation

our Republic to the USA and Germany. In addition, in our Republic, Austrian certification agency "Austria Bio Garantie GMBH" certifies and such products as organic beans, dried mulberry fruits, dried cherries and almonds that are further exported.

3 enterprises in the field of plant growing and horticulture from the regions of the Republic of Uzbekistan in 2017 filed an application to transfer to organic agriculture and to get a certificate (total 653.7 hectares of land) in the state "Center for Certification and Testing" LLC of the Republic of Latvia. This example serves as increase indicator in the number of stakeholders in organic agriculture among producers.

Agricultural land use organization for organic production can, undoubtedly, be improved only by taking into account the traditions, everyday life and village population way of life complexities. From the logical point of view, this is a social and economic phenomenon and is of great importance at the national and international level.

Unfortunately, today, underestimated land potentials cause a negative impact on natural agricultural production for most regions.

We believe that agriculture revolution processes should be fully explained, since this is an important scientific task of modern agrarian economy. Agriculture as a new type of economy is singled out as an important part of national economy, aimed at production of relatively lucrative organic products.

It is expedient to use world experience in solving problems of new type agricultural economy formation, and within transition process it is necessary to pay special attention to conscious and effective use of regions land resources of the republic and farms.

To develop absolutely new system of agricultural production in leading agricultural regions of our country, it is necessary to attract all required opportunities, including organizing organic agriculture based on development of alternative activities, production and processing of environmentally friendly products; in order to increase competitiveness and high profitability of agrarian economy, attention should be given to involve production resources opportunities corresponding to socio-economic systems of rural regions development.

The possibility of expanding land area proper for organic production in the Republic of Uzbekistan, availability of labor resources in rural areas gives an

impetus to development of a new level of country's agricultural movement and opportunity to find its place in the world market of organic food products.

Along with abovementioned a set of issues arising from determination of organic (environmentally friendly) products nomenclature, as well as from developing state mechanisms for land use and agriculture organization, aimed at organic production, at sale in domestic and foreign markets of organic (environmentally friendly) products should be timely resolved.

We believe that with development of farms aimed at organic production, we should base on solution of the following interrelated primary tasks:

Conducting land monitoring in the main agricultural territories of the Republic with the aim of determining potential and usability of lands for organic production:

- Definition of production basic methods, establishment and development at state, regional and local level of agriculture directed on organic production;
- To identify opportunities for transfer to organic production and to determine methods for organic land use in order to increase activity of diversified farms;
- Development of additional financing program aimed at preserving and restoring soils fertility of lands for agriculture;
- In order to eliminate shortcomings of economic thinking and bring to equality at scientific level it is necessary to implement programs aimed at increasing knowledge on generation of news about shifting of various forms of ownership, organic land tenure systems to the disposal of producers;
- Creating convenient conditions for development of national standards for organic agricultural products certification, as well as organic products international environmental certification.

We consider it important to involve interested ministries, departments, state and private enterprises, international environmental movements in determining the share in the process of developing systems for managing organic dehqan farms as components of agriculture. Tasks, which are the basis of organic dehqan farming system, require increased development, organic (environmentally safe) production realization and promotion procedures. Organic agriculture systems should cover the following activities:

- Organic agriculture production control systems; to develop and adopt regulatory and legal frameworks necessary for organic land use and that ensure profitability and stability of markets for sale of organic (environmentally friendly) products;

- Amendments to relevant laws of the Republic of Uzbekistan, in particular, to tax legislation, the land code, provisions on dehkan farms, on agricultural production structure development, changes relating to economic incentives;
- Development and adoption of comprehensive measures to provide state support for farmers, dehkan farms and other entrepreneurs producing organic products;
- To provide consumers and producers with necessary information and advice on organic product;
- Participation of international organizations and auditors in quality assessment in solving issues in the field of organic products certification and labeling;
- Organization of organic management procedure in national agricultural production;
- Creating conditions for processors and farmers register that produce organic products and meet international environmental standards;
- creating conditions under which organic farm production can be certified as an organic product or according to environmental standards is indicated in declaration as an "organic" ("environmentally friendly") product;
- Promotion of "organic product" concept through publications about national and foreign organic producers activities in Internet, advertising in media, holding business meetings, exhibitions, fairs and competitions;
- Development of centralized marketing system that will work to promote local organic product in the domestic and foreign markets.

The main condition for effective launch of mentioned here systems, i.e. farms, dehkan farm or a large entrepreneurial enterprise, is launch of a module for organic agriculture production.

To ensure stable and effective activity of organic agriculture it is expedient to pass through a series of interrelated stages. The basic principles of organic agriculture development can be considered in 7 stages. Stages reflect adopted decrees implementation at organic dehkan and organic farms level. (Table 4.).

Development of agriculture aimed at production of organic products for national economy will become not only a solution to problems of food products environmental and ecological safety, but will also have a significant impact on 60% of the population living in rural areas, 32% of which is able-bodied population, whose social problems can be resolved with the development of organic agriculture. If we compare technologies of organic agricultural production and industrial agriculture, the share of manual labor in organics is 50% higher, which will allow increasing the employment of the population of rural regions in production.

Table 4. Stages of organic agriculture production transfer to production systems of farm business

Stages	Measures
1st	Conducting monitoring on natural environment and agricultural lands quality assessment to identify opportunities for organic agricultural products
2nd	Creation of processors and farmers register that produce organic products and meet international environmental standards
3rd	Organization of land use based on organic production system on farms. Training (advanced training) for heads of farm and dehkan farms on the topic of transition to organic agriculture and sale of organic goods.
4th	Using the right to product ecological labeling, farms producing products that comply with international agricultural standards can unite in group certification, and unifying body should be certified for quality management.
5th	In order to optimize organic agriculture production system, to receive logistic support, urgent information and explanatory assistance, it is necessary to be included in the logistics centers established in agroecological territories, where organic agriculture will have privileges.
6th	Granting preferences in obtaining state subsidies and grants to farmers producing organic products. Designing business projects for organic agriculture development in order to attract investors
7th	Conclusion of contracts on sale of produced organic products in foreign and domestic markets

For organic farming production unused lands of business entities, as well as virgin lands, are fully applied for agriculture due to optimal land use structure development, multi-field farms as a result of land use for organic production will contribute to increasing agriculture efficiency.

Conclusions

1. According to explanations on development of agriculture aimed at organic production, organic agriculture through the principles of production and land use can become a phenomenon designed to ensure stable agriculture development. Organizational issues implementation is a step-by-step path closely connected with organizational, economic, innovation and technological and managerial activities.
2. To organize organic production on organic farms, the following directions are proposed
   - groups of farms that have completely rejected the use of chemicals, in accordance with the requirements of organic agriculture production standards, will jointly specialize in the production of organic goods in holding companies or agro-firms;
   - it would be better for small farms that have reduced level of chemicals in plants processing to a minimum to switch to organic production.

In both directions, farmers will be given freedom to choose activities from two sectors – traditional or organic agriculture. Attention should be paid not only to

production, but also to processing, drying, primary processing, allocation of land for refrigerators, establishing effective linkages of products sale system.

3. Organizational and economic mechanism of transferring farms to organic production is a defined order of interconnected measures and processes aimed at increasing ecological and economic efficiency and sustainability of agricultural production.
4. As a result of a comprehensive analysis of land and other opportunities for optimal implementation of organic production processes on farms at the level of farms and at the regional level, the real possibilities for switching to organic production will be assessed. On the basis of information received effectiveness of transition to organic for agricultural production economy development will be defined.
5. Taking into account world experience of greening agriculture when organizing organic agriculture production, it is necessary to completely abandon the use of chemicals, only in strict accordance with organic standards it is allowed to use natural mineral organic substances for protection of plants and application as fertilizers.
6. When switching to organic agriculture production farm management solves complex problems: selecting organic product that will be produced in accordance with market demand; definition of optimal option for switching to organic production – today it is the transfer of agriculture entirely to the principles of organic production or transfer to a separate production line or to an organic production by replacing crop rotation system in an internal unit. In this case, organization system will be modified, specialists will be trained, assimilation of innovative production technologies, certification systems development and implementation of organic products will take place.
7. The importance of farmer's organic production certification system is that not only the final product, but also all organic production processes should be fully certified, only in this case farmer's product is safe and organic (ecologically clean) for the consumer.

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Organic biostimulants, agricultural commodities and their classification

Mukhamatdin Mamarakhmonov, Ibrahim Askarov[39]

Abstract

Important role of organic biostimulants application in agriculture, their importance in increasing yield and products quality are analyzed. Proper method of agricultural products and various organic biostimulnts classification and certification while their export and import is described.

Keywords: organic biostimulants, classification, chemical composition.

Introduction

Many organic biostimulants, widely used in agriculture, serve for plants, root system growth and development and increase their productivity, and biostimulants use prevents their rotting in moist soils at low spring temperatures and humidity.

Some biostimulants serve for the development of various parts: stems, leaves, fruits of plants. Recently, organic biostimulants have been increasingly used in agriculture: from sowing seeds to growing them and harvesting. For example, primary cotton seeds treatment is carried out with the help of biostimulants: Russian preparation MIVAL is widely used, as well as developed by Uzbek scientists S. Iskandarov and S.Rashidova preparation A1, and also suggested by H. Isakov ferrostimulator P4. Moreover, intensive scientific research is conducted in Chemistry Department of Andijan State University on new effective biostimulants synthesis on the basis of ferrocene derivatives (dicyclopentadienyliron Fc) for agriculture. These preparations help to increase immunity, accelerate flowering time, ripening, increase cotton fertility and yield.

Therefore, it is obvious that all organic biostimulants have different chemical composition and structure, what is the base for their classification. Chemical composition of both biostimulants and plant products determines their properties and qualities in dressed market quality. It is necessary to note the role

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of a new chemistry subject 02.00.09. – "Chemistry of commodities" in organic biostimulants certification and classification, as well as the role of agricultural products as a specific commodity. By means of various physical and chemical analysis methods, the exact chemical composition of the commodity is defined and respective commodity code is assigned to the product, on the basis of which product could be certified and recognized as a specific type of commodity in digital format. Based on such commodity codes, you can determine chemical composition, product properties and qualities.

Currently food market is increasingly in need of environmentally friendly, harmless agricultural products. Numerous methods, technologies have been proposed for such products production, ranging from land cultivation, seeding methods, appropriate plants chemical treatment in the growing season, new pollination methods, plant protection from various pests, products collection, storage, primary and industrial products processing, etc.

According to UN projections, by 2050 planet population can reach nine billion people. World food production should increase by at least 50%, in order to provide all inhabitants with food products in the required amount [1]. Naturally, with increased yields, there is a need for exporting them to other countries. When exporting and importing goods, for commodity classification and certification, Foreign Economic Activity Commodity Nomenclature is widely used, the basic rules of which are determined through the methods of Chemistry of commodities subject.

Subject 02.00.09. – «Chemistry of commodities» in the service of agriculture

Today world science has 20 chemical subjects. Many chemical subjects are mainly developed by leading Russian, European and American scientists, except for a new subject 02.00.09. – "Chemistry of commodities". This subject was initiated by Uzbek scientists: Doctor of chemical sciences, prof. I.R. Askarov and Doctor of technical sciences, acad. T.T Ryskiev in 1997 and this proposal was approved by the State commission for academic degrees and titles of Uzbekistan. At present scientific research in this branch of study is conducted in the Republic; academic titles of associate professor and professors, academic degrees of Doctor of Philosophy (PhD) and Doctor of Science (DSc) in chemistry and technology are bestowed.

The essence of this subject is that, using nomenclature system, exported and imported goods coding according to the Foreign Economic Activity Commodity Nomenclature, one can accurately determine their quality in digital format. Based on chemical composition study, it is possible to give exact corresponding codes for any product, including agricultural products. It is known that commodity price is determined primarily by its composition and quality. Hence, by means of this subject it is possible to determine the exact quality and cost price of any product, as well as its ecological safety [2]. In particular, in agriculture, through this subject, it is possible to control each organic biostimulant quality and application range, to monitor produced in the country and exported abroad agricultural products or agricultural products imported from abroad.

All countries of the world use different codes during customs clearance when exporting and importing goods. For example, USA, Europe, Asia and African countries use specific codes to determine the quality and apply commodity codes for agricultural products.

With the help of a created in Uzbekistan new branch of study, relevant codes and commodity qualities are determined on the basis of chemical composition analysis. In order to assign codes correctly spatial structure of the compounds that make up the product should be accurately determined. For determination the following physicochemical analysis methods are widely applied (IR, UV, MASS, SAR, nuclear magnetic resonance-spectroscopy).

A lot of books, manuals, monographs and articles on chemistry of commodities subject application in the process of training, customs system practice, in environmental studies and scientific work in general have been published. There is still much to be done to make this subject universally recognized around the globe. To date, many international conferences have been held in Andijan State University (2009, 2011, 2013, 2015) on the new subject methodology. On the basis of chemistry of commodity subject methods all agricultural products are classified: fruits of trees, shrubs and plants, as well as products of their primary and industrial processing.

Several Candidate's dissertations and Doctoral theses were presented in the new branch of study. Many scientists continue their scientific research in this field of science. Neighboring countries including Russia, Kazakhstan, Tajikistan, and Turkmenistan have already launched intensive scientific research in this area.

Role of chemistry of commodities subject in strengthening the economy of the Republic of Uzbekistan.

All material goods exported and imported to the territory of the Republic are subject to customs clearance. It is necessary to note subject's high role in preventing poor-quality food products entry and exit within the territory of the Republic. Practical application of the subject shows its effectiveness in imported and exported agricultural, food, medical, industrial goods control, as well as supports health of the population. Some cases of inaccurate coding while classifying certain goods took place, but specialists of the Central customs laboratory at the State Customs Committee in a timely manner reclassified those goods according to the accurate codes corresponding to the Foreign Economic Activity Commodity Nomenclature of the Republic of Uzbekistan.

Results

As a result of imported and exported commodities control and reclassification procedures (including agricultural products), state treasury received an additional income:

2008-2009 an additional income around the country amounted to 958.4 million UZS. Approximately 6 cases of incorrect goods classification according to the Foreign Economic Activity Commodity Nomenclature of the Republic of Uzbekistan were revealed. Goods reclassification in compliance with the accurate codes resulted in additional income of the state treasury in the amount of 1 billion 150.58 million UZS.

For example, in 2010, documents of imported American cigarettes concluded that "cigarette filters are paper-based." Customs examination in the central chemical laboratory showed that the filters were made of non-natural paper based on acetate fibers. As a result of these products reclassification according to the Foreign Economic Activity Commodity Nomenclature of the Republic of Uzbekistan, additional customs duties of 30.1 billion UZS were paid to the state treasury. Since 2010, as a result of new subject's achievements application, additional state fees have been received in the state budget of the Republic:

- in 2010 – 34.7 billion UZS;
- in 2011 – 9 billion UZS;
- in 2013 – 5.2 billion UZS;
- in 2014 – 5 billion 614.8 million UZS;
- in 2015 – 6.8 billion UZS;
- by the end of 2016 – 29 billion 634 million 600,000 UZS.

These and other facts can confirm financial effectiveness of the new subject Chemistry of commodities for country's economy. The total profit received by the country due to new subject application for the period 2008-2016 exceeds 100 billion UZS.

Conclusion

1. Organic biostimulants application is one of the main factors for increasing agricultural plants yield in the regions of Central Asia.
2. Developed in Uzbekistan new chemical subject 02.00.09 – Chemistry of commodities is successfully applied for organic biostimulants, imported and exported agricultural products and products of their processing composition and quality control.
3. Many of organic biostimulants synthesized by scientists of the Andijan State University on a ferrocene basis show high biological activity.
4. On the basis of Chemistry of commodities subject an effective control of tannic agents, narcotic substances, extracted from plant materials tobacco and alcohol products illegal crossing is carried out.

Acknowledgments

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State of agricultural production and organic agriculture in the Republic of Uzbekistan

Anvar Djumanov, Oybek Soatov[40]

Abstract

Article provides analysis of organic agriculture and its production current state, organic standardization and certification systems, regulatory legal acts on organic agriculture development in the Republic of Uzbekistan. The authors concluded that it is necessary to draft a law on organic agriculture and to develop state standards harmonized with foreign ones.

Key words: bacterial fertilizers, biopreparations, product quality, soil fertility, crop of crops.

Introduction

To date, agricultural market globalization has led to the need to address agricultural products safety problems and to reduce the risks of their negative impact on human health. Conventionally developed agricultural products do not always meet high-quality organoleptic and nutritional values required by European standards. Due to problem gravity and enormity governments of the countries and food producers leading associations are increasingly concerned with food safety and are looking for ways to solve and control it.

President of the Republic of Uzbekistan Islam Karimov at an international conference stressed that: "Centuries-old culture of conventional vegetable growing and gardening in Uzbekistan was originally based on biological farming principles with the use of organic fertilizers, allowing growing organic vegetables and fruits with unique taste and nutritional qualities avoiding application of genetically modified technologies".

One of such high-quality products sustainable production direction is organic agriculture, based on biological processes, diversity, cyclicality and adaptation of local conditions to environmentally friendly products production without the use of resources with negative consequences. Organic agriculture is construed as

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environmental and biological production while deliberately minimizing the use of mineral fertilizers, pesticides and plant growth regulators. The effect of crop rotations, organic fertilizers (manure, composts, stubble residues, leies, etc.), soil treatment various methods are applied to increase crop yield, provide crop plants with mineral nutrition elements, and control pests and weeds.

Main characteristics and research

Agrobussines of the Republic of Uzbekistan is currently focused on traditional methods of agricultural products cultivation, the main direction of which is intensive crop sector chemicalization. This allows republic to collect a sufficiently high yield of the main crops. In 2015, fruit and vegetable gross harvest amounted to about 19,118 million tons, including 10.13 million tons of vegetables, 1.86 million tons of gourds, 2.75 million tons of fruit and berry crops, grapes – 1.58 million tons, potatoes – 2.70 million tons, oil crops – 0.098 million tons. In 2016 Uzbekistan plans to increase agricultural production by 6.9 percent compared to 2015.

The main activities in the field of organic agriculture in the country are connected with scientific research on agricultural production alternative systems, propaganda organization and sustainable agricultural production ideas agitation, harmonious with the environment organic production principles promotion, development of methodological recommendations for organic agriculture, learning about developed countries' organic agricultural and food production experience.

The Center for Agriculture and Water Resources under the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan is the coordinator for organic agriculture development in the Republic of Uzbekistan.

In 2015-2016 three seminars on organic agriculture development were held in the center with the technical assistance of Food and Agriculture Organization of the United Nations (FAO) Subregional Office, with the participation of Tashkent State Agrarian University, "Uzbekoziq-ovqatholding" Holding Company, "Uzbekoziqovqatzahira" Assosiation, Center for study and research on Horticulture, Viticulture and Wine-making named after Academician M.Mahmudov, Center for study and research on Soil Science, Republican Agrochemical Station and other interested organizations. Specialists of the Center developed state standard O'z DSt 3084: 2016 "Organic agricultural and food products. Terms and definitions» which contains 50 definitions of the relevant terms that are approved and implemented by the Decree of the Uzbek Agency

for Standardization, Metrology and Certification ("Uzstandard" Agency) from 31.05.2016 №05-765. Also state standard of the Republic of Uzbekistan "Organic agriculture and food production products" is under development. Production, storage, transportation rules".

A Methodological and Practical Handbook "Implementing the Global G.A.P. Standard in agricultural organizations" was developed, Practical guideline "On agricultural farms and a training plan for farmers in the field of organic agriculture".

In order to coordinate activities in the field of organic agriculture of the Republic of Uzbekistan in 2016, Department for Organic Agriculture Development was established on the basis of the State Unitary Enterprise "Agriculture and Water Management Standardization Center" under the Ministry of Agriculture and Water Management of the Republic of Uzbekistan.

A package of documents is being prepared to drop the application for joining this center to the International Federation of Organic Agriculture Movements (IFOAM). In 2020, it is planned to accept the Center as an associate member in this reputable international organization. This will allow scientists and practitioners to take part in seminars, conferences, symposiums on experience exchange conducted by this association.

Producers associate hopes for organic agriculture management international norms incorporation with mentioned above event. These norms allow producers to obtain the status of "organic" and to enter organic products world markets; make certification procedure open and transparent allowing control of products conformity to organic parameters; specialists training in the field of organic agriculture, involved in both production and control; participation of farmer and dehqan farms, agrofirms and other agricultural producers in organic agricultural production development.

Thus, there are objective natural and economic prerequisites for organic agriculture development in the Republic of Uzbekistan.

The most important activity in the field of organic agriculture is direct organic (environmentally friendly) products cultivation and its certification. Republic has such experience.

In 2014-2015 three farms were certified in the Republic of Uzbekistan for obtaining organic (ecologically friendly) status and two agricultural enterprises for the requirement of good agricultural practice standard - Global G.A.P. These

are the following companies: "Sanny Fruit Prodaction" LLC in Tashkent city, "Sieb Sahovati" LLC in Taylak district and agrofirm "Agro Gumush Jomboy" in Zhambai district of Samarkand region.

Organic certification of farms was carried out by the representatives of ICEA Turkey, Ethical and Environmental Certification Institute (Istituto per la Certificazione Etica ed Ambientale) – ICEA, which is the leading certifying body in Italy for determining natural cosmetics quality and CERES – Certification of Environmental Standards GmbH, Germany Certificate № 43027 dated 03.11.2015), which has an international license for this kind of works, and GlobalG.AP. Farm certification was carried out by the representatives of SGS Tashkent Ltd, which is a Swiss company SGS, providing services for independent examination, control, testing and certification.

The following agricultural organic products were involved: raisins, capers and wild medicinal herbs. However, due to the lack of demand for organic products, they were sold as regular products, except for 500 tons of raisins. There is a huge potential for the production of organic products in mountainous areas of the republic, for example, ground apples, apricot, walnut, peas (chickpeas), capers and other products on the territory of the Gissar mountain system of the Kamashinsky district in Kashkadarya region.

In this area, farmers and dehkans have gardens in the territory of about 1000 hectares, where they mainly grow apples, apricots and walnuts. They do not use chemical fertilizers or pesticides at all. For example, to prevent disease and harm from pests, local dehkans and farmers plant a wild plant under the local name "pig's onion" around fruit trees, thus solving these problems with the help of biological methods. Currently, the local community is trying to expand its gardens area. Farms and dehkan mechanization degree is very low due to difficult natural conditions that hamper the use of agricultural or other equipment. For example, apricots are dried directly on the roof of the houses, and chickpeas are cleaned by the traditional method using a horse or donkey. In addition to chickpeas, region grows rain-fed wheat, capers and collects wild geerah. In addition they grow gourds for family ration needs. Various organic products are produced in the republic as in other mountainous areas.

At present, organic agriculture development in the Republic of Uzbekistan is associated with considerable difficulties and requires a resolution at the legislative level. Organic agriculture development is an ultimate issue.

President Islam Karimov in his speech at International Conference "On the most important reserves of implementing Food Program in Uzbekistan" opening ceremony on June 4, 2014 noted that: "Centuries-old culture of conventional vegetable growing and gardening in Uzbekistan was originally based on biological farming principles with the use of organic fertilizers, allowing growing organic vegetables and fruits with unique taste and nutritional qualities avoiding application of genetically modified technologies". This is confirmed by large quantities of organic agricultural products cultivation in the country.

Thanks to a combination of rare natural and soil-climatic conditions, many of the most delicious and healthy fruits and vegetables in the world can be produced only in our region. Unique soil and climatic conditions of our country, namely an average of 320 sunny days per year, continuity between exceptionally favorable cultivating opportunities of various high-quality fresh fruits and vegetables in a wide range.

At the same time, inadequate certification system development for organic agriculture production in our country is conditioned by technical barriers when our agricultural products enter the international market.

Due to the fact that a significant part of agricultural production in the Republic of Uzbekistan is produced on lands of private subsidiary farming, where the use of chemical remedies is very limited, a certain amount of this product could be classified as "organic". However, it is necessary to create an independent certification system for such products in order to solve this issue.

However it is not possible to completely switch to organic agriculture in the conditions of the republic. This is also confirmed by the experience of Western European countries, Turkey, Thailand and others, where this direction is developing quite successfully. In these countries, from 3 to 7% of agricultural enterprises are engaged in the cultivation of organic (environmentally friendly) products.

Table 1. Private husbandry ratio, including farms, in total agricultural production in the Republic of Uzbekistan, %.

Product	2014		2015	
	Dehqan farms	Farms	Dehqan farms	Farms
Vegetables	64,11	35,04	65,01	34,15
Gourds	48,69	49,60	49,39	48,96
Fruits and berries	52,34	45,06	52,05	45,89
Grapes	45,32	53,17	45,03	53,44

The same trend can be traced in more developed countries – in Germany, Latvia, Lithuania, Turkey, etc. However, the development of this direction in the Republic of Uzbekistan has the right to exist and, above all, the production of products for children, pregnant women and nursing women, elderly people, for medical and dietary nutrition, and also on lands of special ecological significance (bordering with water protection areas, river basins, etc.). Pricing, certification issues resolution at the legislative level, state support of this direction will undoubtedly lead to more rapid growth and development of enterprises engaged in the production of organic products in the conditions of the Republic of Uzbekistan.

Organic agriculture introduction contributes to: independence of agriculture from chemical resources supply; cluster production development and cooperation in a closed cycle of production and products processing, improvement of depressed regions, rural households and rural agro-ecotourism, small and medium-sized businesses in the organic products market; organic agricultural products export growth and farming and dehkan farms income increase; creation of conditions for attracting investments in the organic products production; expansion of fallow lands use; decrease in the amount of energy for land cultivation, overall nature pollution and annual economic damage from agriculture intensification, rural population flow-out; suspension of rural settlements reduction.

Conclusion and suggestions

Sustainable production of high-quality organic food requires:

- to develop and introduce measures to support organic agriculture on the issue of rearranging areas from traditional farming to organic farming, organic production and its products certification, training farmers and their consulting in government advisory services, conducting marketing research, collecting and disseminating information on organic agriculture development;
- to develop and introduce a unified national system of organic products certification that allows the producer to enter national and foreign organic products markets, and the consumer to trust the high quality of natural products, increase demand for organic products, change preferences in favor of healthy nutrition;
- to adopt a law on organic agriculture that provides solutions to the two above-mentioned problems, as well as to create conditions for organic agriculture

development as a mechanism to increase incomes and living standards in rural areas and, consequently, sustainable development of rural areas; determine the powers of certification, registration, control, and the sustainable operation of a particular area of management bodies.

Organic agriculture development will solve the following problems of the country:

- employment – will reduce local residents' level of poverty, and agroecotourism development will promote communication and intellectual development of rural population;
- decline in import – provides an incentive to producers, and local organic products retail trade network development will contribute to the sustainable development of domestic rural commodity producer;
- organic production export – boosts total sales, income increase, reinforces domestic commodity producer's image;
- use of organic products will improve nation's health; use of labor resources will reduce costs of human performance maintaining and loss from disease;
- natural farming development – will reduce environmental pollution, soil erosion and compaction, improve its fertility and yield, preserve its natural potential for future generations.

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We ourselves make and actively use compost

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Abstract

Article provides analysis of organic agriculture and its production current state, organic standardization and certification systems, regulatory legal acts on organic agriculture development in the Republic of Uzbekistan. The authors concluded that it is necessary to draft a law on organic agriculture and to develop state standards harmonized with foreign ones.

Key words: bacterial fertilizers, biopreparations, product quality, soil fertility, crop of crops.

Introduction

In the past half a century, in the pursuit of agricultural crops yields, heavy norms of mineral fertilizers were introduced that on one hand increased yields and on the other hand these heavy norms of mineral fertilizers destroyed soil humus thus consequently breaking the law return" It is true, we annually took a lot from the soil to grow the crop, and almost nothing was given in return. Due to such farming practices, crop yields and soil fertility declined from year to year, and accordingly a negative balance of nutrients occurred.

All experts know that poor soils will not produce aimed crop yield. Therefore you should embrace wholeheartedly the opportunities to grow planned quantity of crops.

Inputs and methods

We applied inputs that we use every year at home according to our own experience and get a guaranteed result. Everyone has an opportunity to receive cheap, even free organic fertilizer that does not contaminate soil and agricultural harvest, and also maintains a positive balance of humus and other nutrients. The soil of the experimental site is medium-loamy in texture, with medium salinity

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degree, and chloride-sulfate salinity type. Groundwater occurrence depth is in the range of 1.3-2 m.

Research results

One way to maintain soil fertility is to create and use ordinary compost as an organic reserve, which can easily be prepared within household or private farms.

We ourselves at home can prepare ordinary compost from plant residues and various food wastes. Compost preparation is very useful for private households. Firstly, a useful amount of organic residues is generated free of charge and guaranteed; secondly you can easily dispose of different solid, liquid and free-running organic residues and waste, thirdly when preparing pit for compost, negative influence of plow soles located at 30-50 cm deep is destroyed; fourthly, soils with different mechanical compositions are well mixed, fifthly – when preparing pit various harmful gases accumulated under the plow soles disappear, sixthly – soil structure improves, seventhly – soil accumulates various nutrients, moisture is well retained, and thus the fertility of the soil improves.

Conclusions

Compost can be prepared any time of the year; however the best time of the year are spring and autumn days.

The best place for compost will be a shaded place, 2-2.5 meters from the tree or from another shaded object.

To prepare compost, the selected site is dug up to 30-100 cm deep and at the bottom of the pit, at first, coarse branches are laid vertically, useless large pieces of wood and other small parts of organic substances that will rot and ferment, then up to 40 cm household and production waste (food waste, seed husks, vegetable residue of gourds and wild plants, remains of gypsum and mineral fertilizers are laid, then straw and sheets are placed up to 40 cm from the ground.) After that, the pit is watered or strongly moistened. In the layer at the level of 20-40 cm green plant remains, food remains are placed and moistened, then everything is dug into fertile soil layer up to 3-10 cm and watered. At regular intervals it is necessary to moisten (water) the pit.

Prepared compost fertilizer can be used for mixing with clean, fertile soil in a 1:1 ratio and can be introduced where seeds are sown or young agricultural plants

are planted. In this case, seeds or seedlings of agricultural crops grow rapidly and intensively and the fruit will be delicious.

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Classification of stimulating agents – plant growth regulators applied in agriculture

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Abstract

The article is devoted to used in agriculture and based on ferrocene stimulating agents – plant growth regulators classification. Four new codes of the Foreign Economic Activity Commodity Nomenclature were proposed for the classification of the stimulating agents – plant growth regulators used in agriculture.

Key words: commodity nomenclature, group, heading, subheading, sub-subheading.

Introduction

Exactly 26 years ago, Uzbekistan declared its independence. After that, research began to develop rapidly in all sectors, and in the field of chemical agents used in agriculture, as well as comprehensive work began in the field of used in agriculture biostimulants – plant growth regulators synthesis.

Scientists of Andijan State University continue to carry out work in the field of environmentally friendly, water-soluble, cost-effective biostimulants synthesis. The source of these syntheses is the ferrocene derivative which contains DicyclopentadienylIron. As starting material o-, m-, p-ferrocenylphenol, acetylferrocene, ferrocene carboxylic acids and other water-soluble derivatives of ferrocene were used.

In recent years, the topic of ongoing scientific work is compound of ferrocene with methylol urea. Resulted substances were tested for biological activity in laboratory and field conditions. Particular interest raised substances with positive results.

Usually, chemical agents used in agriculture are also classified as goods listed in the Foreign Economic Activity Commodity Nomenclature.

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Information and methods

Adopted on 14 June 1983 in Brussels Convention on Harmonized Commodity Description and Coding System states that "each State has the right to establish its own commodity nomenclature (CN) based on the international Convention on the Harmonized System and to classify commodities." Foreign Economic Activity Commodity Nomenclature of the Republic of Uzbekistan was created on the basis of CIS Foreign Economic Activity Commodity Nomenclature, but it does not fully cover the interests of the republic. There are some missing codes for many industrial and agricultural products of Uzbekistan. This process requires a lot of research work. So far, there is no such Commodity Nomenclature, which fully covers the products of industry and agriculture, as well as goods for them. This leads, in many cases, to obtaining unreliable statistics. Hence, we would like to briefly dwell on used in agriculture stimulating agents-plant growth regulators classification.

On the basis of the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan from February 2, 2001, No.66, a "Customs tariff council" was established, and one of the Council's main tasks is to amend and vary the Foreign Economic Activity Commodity Nomenclature of the Republic of Uzbekistan. This is of great importance for codes verifying and classification of commodities produced in Uzbekistan. And one of these primary products is chemical agents used in agriculture to produce agricultural products.

Some goods are in high demand in the world market. When it comes to such commodities, we immediately think about the producer's country. For example, among Central Asian states – Uzbekistan is famous for its silk, cotton, karakul, and vegetable; France: cosmetics, perfumes and champagne; Japan: office machines and equipment; European countries are known for machine building and other goods of industry; Brazil for coffee; India for tea and dates; Georgia for tea; Armenia for brandy and a shoes.

Results

Of great importance are the chemical agents used in cotton growing, especially plant growth regulators. Their classification is: group 38, heading 3808. This heading classifies insecticides, rodenticides, fungicides, herbicides, anti-sprouting agents and plant growth regulators, disinfectants and their analogues, packaged in forms or packages for retail sale or in a form of finished products or preparations. Sub-subheading classification: 3808 91 – insecticides,

3808 92 – fungicides, 3808 93 – herbicides, anti-sprouting agents and plant growth regulators, 3808 94 – disinfectants and their analogues, 3808 99 – others.

Herbicides are classified on the basis of their chemical composition. For example, sub-subheadings 3808 93 110 0 based on phenoxythylhormones, sub-subheadings 3808 93 130 0 on the basis of triazines, sub-subheadings 3808 93 150 0 based on amides, sub-subheadings 3808 93 170 0 based on carbamates, sub-subheadings 3808 93 210 0 based on dinitroaniline derivatives, sub-subheadings 3808 93 230 0 based on uracil or sulfonylureas derivatives, sub-subheadings 3808 93 270 0 – other. Sub-subheadings 3908 93 300 0 – anti-sprouting agents, sub-subheadings 3808 93 900 – plant growth regulators.

Existing Foreign Economic Activity Commodity Nomenclature allotted for insecticides 5 sub-subheadings, for fungicides – 7, for herbicides – 7, for disinfectants and their analogues – 3 subheadings, and for anti-sprouting agents and plant growth regulators only one subheading for each.

And therefore, proceeding from the above and on the basis of the chemical composition and prices, we would like to show specification and classification of stimulating agents, i.e. plant growth regulators in Table 1.

Conclusion

Therefore, classification of stimulating agents in Foreign Economic Activity Commodity Nomenclature of the Republic of Uzbekistan should be detailed. At present, Agencies of the State Customs Committee and Higher Educational

Table 1. Classification of some chemical agents used in agriculture according to the Foreign Economic Activity Commodity Nomenclature

Foreign Economic Activity Commodity Nomenclature, 2017 version		Proposed codes of Foreign Economic Activity Commodity Nomenclature	
3808 91	insecticides	3808 93 900	plant growth regulators
3808 92	fungicides	3808 93 900 1	on the basis of inorganic substances
3808 93	herbicides, anti-sprouting agents and plant growth regulators	3808 93 900 2	on the basis of organic substances
3808 93 270 0	herbicides	3808 93 900 3	on the basis of metallocene salts
3908 93 300 0	anti-sprouting agents	3808 93 900 9	other
3808 93 900 0	plant growth regulators		
3808 94	disinfectants and their analogues		
3808 99	other		

Institutions of Uzbekistan are carrying out the work on resolving this issue. They are developing proposals for the State Customs Committee and the Ministry of Foreign Economic Relations.

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Environmentally safe, resource-saving biotechnology for increasing fertility of soils and organic production

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Abstract

To improve soil fertility and produce high-quality organic products of vegetable crops, potatoes, sugar beets and wheat, we have developed a new environmentally friendly, resource-saving biotechnology based on the integrated use of new biofertilizers: for seed treatment – bacterial fertilizers FOSSTIM and RIZOKOM-2 biopreparation, for plants foliar dressing – biolpreparation SERHOSIL and for soil dressing – biocompost BIOKOM. New biotechnology use in crops cultivation increases the yield of vegetable crops and potatoes by 20-25% (profitability of 399-1027%), sugar beet by 45 c/ha (profitability of 1181%), wheat – by 5.9-8 c/ha (profitability of 65-72.6%) and improves the quality of the products.

Key words: bacterial fertilizers, biopreparations, product quality, soil fertility, agricultural harvest crops.

Introduction

Problems of rational nature management and providing population with safe food are especially relevant in modern society.

In developed countries, where consumer has financial resources and is willing to pay for his health and environmental safety of the planet, a new direction called "organic agriculture" commenced to develop, which can solve a number of problems that have arisen to date in the field of agriculture.

Organic agriculture is a production system that maintains and improves health of soil, plants, animals and humans, and is safe and environmentally

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friendly, i.e. in fact, it limits the use of pesticides, some types of land cultivation, excludes the use of easily soluble mineral fertilizers, restricts organic fertilizers application, etc.Organic agriculture is practiced in many countries around the world. Leaders in terms of this indicator are the countries of Western Europe. In the first place, by a wide margin, is Liechtenstein, where every third hectare in agriculture is "organic" (31%), followed by Austria (19.4%), Switzerland (12%), Estonia (10.8%), Czech Republic (10.6%), Latvia (10.0%), Italy (9%), Greece (7.6%), Portugal (7.3%), Sweden (7.1%). The bulk of organic products is sold in highly developed industrial countries of the world. In particular, about 78% of the total consumption falls on Western Europe and North America countries. Countries with the largest organic products markets include the United States.

Germany and France. Accordingly, over the past three decades, organic food production has increased significantly, both throughout the world and in Europe in particular. 84 countries have their own laws on organic agriculture. The relevant regulatory framework exists in Russia, there is a regulatory framework in the EU countries, there are model laws drafts in the CIS countries (Kazakhstan, Tajikistan, Azerbaijan and Kyrgyzstan) [1].

Transition to organic agriculture for the Republic of Uzbekistan is realistic. However, for organic agriculture implementation agricultural lands should meet certain requirements regarding the level of their contamination with harmful substances: pesticides, heavy metals, radionuclides, pathogens, etc. It should be clearly understood that the transition from conventional (intensive) agroproduction technologies to organic agriculture is a fairly long process (3 to 5 years).

But to date there are biotechnologies that are able to improve the entire environment in the shortest possible time and solve global problems of preserving the gene pool of animals, plants and humans – these are EM technologies (Effective microorganisms)! In recent years 50 developed countries of the world particularly Europe, USA, Canada, Germany, Holland, Japan, France, Korea, India, Pakistan, Brazil, China, Russia, Ukraine, Belarus, Latvia, Lithuania, Kazakhstan, Kyrgyzstan, etc., started using cheap methods of agricultural production with EM technologies application – technologies of effective microorganisms involvement, yielding a high effect at very low costs. EM-TECHNOLOGIES's goal is to create optimal soil conditions for healthy soil micro flora development that increases introduced fertilizers efficiency and agricultural crops productivity, destroys pathogenic micro flora and revitalizes soil and plants. Therefore organic agriculture on the basis of microbian biotechnologies within the shortest possible

period (1,5-2 years) is able to solve improving environment problem, in which soil becomes healthy and its productivity significantly increases.

EM technologies around the world today are called the "Hope of the Planet"!

In this regard, a gradual agriculture transfer to organic with the active introduction of new microbian biotechnologies is required. It is necessary to exert maximum efforts to make agriculture organic, which simultaneously provides the solution of three fundamental issues: soil fertility increase, agricultural production volume growth, improving its quality and reducing the negative consequences for environmental situatuation. To date, only agriculture biologization will be an effective step in the subsequent agricultural productivity potential increase and gradual transition to organic farming.

One of agriculture ecological management components is the use of new biotechnologies based on biofertilizers application (bacterial fertilizers, biopreparations, biocomposts, biofungicides, etc.). Soil fertility essence lies in the feeding of bacteria and other living things that inhabit soil in a huge amount. Neither minerals nor organic matter alone are converted into available form. This function is performed by soil inhabitants, of which we should take care first. Now there are new opportunities for regulating soil fertility through microbiological fertilizers. The use of effective microorganisms increases water infiltration, optimum density, aerating, erosion resistance and generally contributes to soil fertility restoration, crops improvement, production of environmentally friendly products.

To improve soil fertility, it is necessary, first of all, to harmonize their phosphate regime, because main indicator of soil fertility degree is the content of labile phosphorus compounds that are assimilable for plants. Soils phosphate regime and plants phosphorous nutrition improvement is extremely necessary due to the fact that the efficiency of all other nutrients decreases markedly in phosphorus deficiency – absorption of nitrogen, potassium, introduced with fertilizers, and macro- and microelements by plant roots is inhibited and hampers their movement to aboveground organs [2]. According to O.F. Tuyeva [3] phosphorus deficiency in the initial development period adversely affects the growth and development of plants throughout the growing season, and, ultimately, yield and product quality, even if during subsequent growth periods plants were well supplied with phosphorus. If there is phosphorus deficiency nitrogen is not fully included in the composition of proteins, nucleic acids and other compounds, and is partly contained in plants in the form of nitrates and nitrites affecting products

quality [4]. Extremely slow mobilization of phosphorus from the soil and its low application rate from mineral fertilizers is considered as a significant obstacle in solving increasing farming productivity problem. It should also be taken into account that in the case of phosphorus deficiency, it is difficult to ensure the realization of agrophytocenosis nitrogen-fixing potential, effectiveness of which is in direct connection with the level of phosphorus nutrition. The solution to this problem largely depends on the processes of phosphorus transformation from soil and fertilizers sparingly soluble phosphorus-based minerals with the help of phosphor-mobilizing microorganisms. Microbial biomass assimilates soluble phosphorus, prevents its absorption or demobilization [5].

Results

Use of biopreparates based on effective microorganisms that would help regulate processes of phosphorus and nitrogen fertilizers non-productive losses, as well as mobilization of soil reserves nutrients, is very relevant for solving problems associated with increasing the level of soil fertility. In connection with the foregoing, we were faced with the task of developing biologically balanced farming systems based on the maximum utilization of soils biological potential and the production of ecologically clean products on this basis. The use of such systems should be accompanied by an environmental and economic assessment of changes in the natural environment. Among the environmental indicators of these changes, the leading place is occupied by soil microorganisms, which play an extremely important role in building of soil fertility and, thus, are considered as its indicators.

In Uzbekistan for the first time since 1999, in the laboratory of soil microbiology of the Institute of Microbiology under the Academy of Sciences of the Republic of Uzbekistan, study has been carried out to search for and isolate local strains of phosphomobilizing bacteria from cotton, sugar beet, winter wheat, vegetable and melon crops and potatoes rhizosphere [6-12]. To improve soils fertility and agricultural crops productivity we have created and tested a number of EM technologies:

- bacterial fertilizers based on new local strains of phosphomobilizing rhizobacteria p. Bacillus:

  FOSSTIM-1 – for seedbed treatment of industrial crops seeds (cotton, sugar beet) (patents No. IAP 02787, IAP 02788, IAP 04712)

FOSSTIM-3 – for seedbed treatment of vegetable crops and potato tubers (patent No. IAP 04712)

- Biopreparations of comprehensive effect based on new local strains of salt-tolerant phosphorus and potassium-mobilizing rhizobacteria with polyfunctional properties p. Bacillus and Paenibacillus:

  RIZOKOM-1 – for seedbed treatment of cotton seeds cultivated on saline soils

  RIZOKOM-2 – for seedbed treatment of wheat seeds cultivated on saline soils

- Biopreparation of comprehensive effect based on green microalgae p.Scenedesmus

  SERHOSIL – for foliar dressing of all kinds of crops (patent № IAP 04933)

- Bio compost based on plant debris and phosphorus-mobilizing bacteria

  BIOKOM – for soil dressing of all agricultural corps types (patent № IDP 04343)

FOSSTIM and RIZOKOM biopreparates bacterial fertilizers mechanism of action pertains to increased symbiosis of plants and soil microbial community through the growth in number of beneficiary microorganisms, in particular, groups of non-symbiotic nitrogen fixers, phosphorus-mobilizing, cellulose-decomposing, nitrate-producing and other microorganisms that are functionally necessary for soils and plants. This mechanism practically steadily increases the level of available phosphorus, potassium and nitrogen in the soil, crop yields, product quality indicators, and several times reduces the level of content in the production of nitrates and the incidence of plants.

Bacteria seeped into the soil together with seeds develop as the root system develops; discharging antibiotic substances and destroying pathogenic microflora, and therefore they can also be used as bio fungicides. Bacteria also destroy chlororganic pesticides in the soil, cleanse and revitalize the soil. In addition, RIZOKOM biopreparates reduce soil salinity and increase fertility. Biopreparations act selectively – they increase abundance and biodiversity of soil microflora and fauna. SERHOSIL biopreparation mechanism of action is explained by the increase in photosynthetic surface of leaves, photosynthetic processes improvement by feeding them with extracellular physiologically active substances (amino acids, lipids, extracellular polysaccharides, vitamins,

available forms of macro-microelements) discharged by green microalgae during cultivation. BIOKOM bio compost's beneficial action mechanism is explained by humus content increase in the soil, and also by the ability of the introduced organic substance to chelate calcium, preventing its reaction with phosphates.

New bio-agrotechnologies were developed within the framework of 6 state practical projects and passed scientific and production state tests and were introduced at the head institutions of the Ministry of Agriculture and Water Management of the Republic of Uzbekistan: Research Institute of vegetable and cucurbitaceous plants and potatoes, the Gallaaral branch of the Research Institute of grain and grain legumes on irrigated lands, on saline soils of the Syrdarya branch of the Research Institute of grain and grain legumes and in farms within the framework of practical and innovative projects during 2005-2016.

As a result of long-term studies we have developed and tested in practice a new bio-agrotechnology based on the integrated application of bacterial fertilizers, biopreparates and bio-compost. Science-based bio-technology of ecologically oriented agriculture has been developed. Multi-year field experiments resulted in comprehensive studies by means of which effective influence of new bio-agrotechnology condition of soil microbial community, organic content, labile forms of nitrogen, phosphorus and potassium, intensity and direction of biological processes in soils, yields and quality of agricultural products were proved

With the application of new bio-fertilizers in crops cultivation optimal soil conditions are created for the development of beneficial soil microorganisms involved in the nutritional cycle. At the same time, plants absorption of phosphorus, nitrogen, potassium and bio-compost soil reserves is improved, pathogenic microflora is destroyed, and as a result soil and plants revitalize, immune system strengthens and they become resistant to diseases, pests and to various stressful situations – severe weather conditions (drought, frost, heavy rains, wind) and soil (salinity, erosion, pH, temperature drops) conditions, field germination rate increases, root formation, plant growth and development are boosted what leads to productivity and product quality are increasing.

Numerous studies and experiments have shown that at microbian biopreparations application rates of 30-50 ml/ha (for sugar beet), 200-250 ml (for wheat), 1 l/ha (for potatoes) they are guaranteed to replace about 50-70 kg by mineral fertilizers active ingredient

When FOSSTIM-1 was used sugar beet yield increased to 80 t/ha in case with bio-fertilizer application compared to the traditional beet sowing against the backdrop of complete minerals (34.7 t/ha). The yield increase was 45.3 t/ha. As a result, sugar increase in root crops was 3.0-3.9%, and total sugar harvest rose by 3.2-10.2 t/ha. Since vegetables are the main source of vitamins, enzymes, microelements, mineral salts, other biologically active substances and are included in human nutrition essential products, the requirements for their quality are quite high.

A study of new biofertilizers complex effect on the yield and quality of cucumbers showed that the highest yield of cucumber (22.0 t/ha) was received using 2 biofertilizers (FOSSTIM-3 + SERHOSIL) against the backdrop of NPK-50% that 3,1 ton significantly exceeded control (NPK-100%). The use of 3 biofertilizers types (FOSSTIM-3 + SERHOSIL + BIOKOM), even though it contributed to a decrease in yield of cucumbers by 1.2 t/ha in comparison with the control, significantly increased soil fertility (humus content increased by 0.07%) and above all considerably improved quality of cucumbers – content of ascorbic acid increased by 2.87%, and nitrates decreased by 10.58 mg/kg compared to the control and by 3.3 mg/kg compared to situation where 2 types of biofertilizers against the backdrop of NPK-50%. Cucumbers yield reducing can be explained by the low dose of biocompost application (1 ton/ha).

A study of new biofertilizers complex effect on potato yields and quality showed that the highest yield was received using FOSSTIM-3 + SERHOSIL against the backdrop of bio-compost BIOKOM (41.2 t/ha) and manure (41.9 t/ha) with Sante variety (in control – 36 t/ha) and 24.6 t/ha with the use of 3 biofertilizers complex on the Diyora variety (in control 18.5 t/ha). Humus content in the arable layer of gray soil under potatoes increased significantly only in the experimental version with the use of 3 types of biofertilizers (FOSSTIM-3 + SERHOSIL + BIOKOM), dry solids content in potato tubers increased by 0.25%, starch content by 0.9-1.1%; ascorbic acid by 0.42-2.5 mg%, disacchar by 0.06%, content of nitrates in potato tubers decreased by 4.47 mg/kg, respectively, compared with control (traditional seeding with the use of complete minerals – NPK – 100%). Economic efficiency analysis of the new bio-agrotechnology of potato cultivation showed that the highest effect was obtained from the use of 3 biofertilizers complex.

Application of the biofertilizer complex on winter wheat increased soil fertility and yield of wheat grain by 5.9-8 c/ha, total protein by 1.3%, phosphorus by 0.20%, iron by 36.0 mg/kg, gluten did not wash out.

Thus, application of new biotechnology in agriculture based on the use of 2 or 3 types of biofertilizers on the studied agricultural crops gives a tangible economic effect:

- sugar beet – with a yield of 80 t/ha – additional net income
- amounted to 21 823 820 UZS/ha (profitability of 1181%);
- cucumbers – with a yield of 22 t/ha, additional net income – 1,675,195 UZS/ha (profitability of 399%);
- potatoes with a yield of 41.2 t/ha, additional net income – 3,624,700 UZS/ha (profitability of 1027%).
- wheat – with a yield of 45.1 c/ha, additional net income – 859,100 UZS/ha (profitability of 72.6%).

Taking into account low prices of biofertilizers, their use in growing agricultural crops and reducing the costs of chemical fungicides and mineral fertilizers leads to an increase in economic efficiency and profitability of production and will allow us to move to a new stage – the biologization of agriculture and will bring powerful not only economic, but also resource-saving, environmental and social effects!

Advantages of new biotechnology:

- replaces chemical fungicides with biofungicides;
- replaces mineral fertilizers with biofertilizers;
- increase field germination of seeds;
- normalizes soil microflora and nutrients balance;
- transfers soil macro-microelements into forms assimilable for plants;
- increases efficiency of introduced fertilizers;
- reduces irrigation water consumption by 20-30%;
- restores and improves fertility of degraded and saline soils, accelerates humus formation, improves soil microbiota;
- reduces root rot, fusariosis incidence of crops;
- alternaria blight and wilt;
- reduces root rot, rust incidence of winter wheat;
- smut, wilting;
- reduces overphosphating and salinity of soils degree;
- reduces soil contamination with microtoxins and organochlorine pesticides;
- increases resistance of crops to diseases and weather conditions;
- increases drought hardness and frost tolerance of plants;
- increases yield, taste and livability of agricultural products;

- sugar beet by 45 t/ha, cucumbers – by 3.6-4 t/ha, tomatoes by 12 t/ha;
- potatoes – by 5.2-5.9 t/ha, wheat – by 5.9-8 c/ha and quality of agricultural products
- with minimal expenditure of material and labor resources
- gives an opportunity to reorient a number of farms to more profitable production of new types of products, including ecologically safe (10.3% reduction of nitrates in cucumbers and 2.9% increase in vitamin C, 10.6% decrease in nitrates and increase in vitamin C by 1.2% in potatoes, starch content by 2% during one season compared to traditional technology of vegetable growing)
- increases content of vitamins and carotene in fruits;
- Accelerates harvest maturing for 10-15 days;
- increases agricultural production profitability: sugar beet to 1181%;
- vegetable crops to 339%, potatoes to 1027%, wheat to 65-72.6%.

Conclusion

Thus, developed microbian biotechnologies may well be used to manage soil fertility and plant nutrition processes. Soil becomes healthy, its productivity considerably increases. The transition to biological principles of agriculture and production of environmentally friendly products for our Republic is realistic. At present, it is necessary to strive for the introduction of new energy-efficient biotechnologies on an industrial scale, which will help to improve the entire environment and solve global issues of preserving the gene pool of animals, plants, humans.

Agriculture, which does not deplete, but restores soils fertility, is called natural, regenerative, organic, biological and ecological. At present, it is the only true, effective, environmentally friendly way of restoring soil fertility, increasing crop yields and quality, protecting plants from diseases and pests! It is agriculture of future, as it will be possible to grow cultivated plants without challenges and problems, because other methods of farming continue becoming expensive and depleting lands.

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Rizokom-1 and Serhosil bio preparation of comprehensive effect for organic cotton production

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Abstract

Cotton is considered to be one of the important industrial crops in Uzbekistan. Developed by Uzbek scientists (Battalov AM, etc.) cultivar Bukhara-9 is seen as potential and promising for organic cotton (bio-cotton) cultivation, because it does not contain gossypol carcinogen. We have created a new environmentally safe biotechnology for cultivating cotton on saline soils, based on the combined use of Rizokom-1 and Serhosil bio preparation of comprehensive effect.

Bio preparation Rizokom-1 includes cotton salt-tolerant rhizobacteria, which have polyfunctional properties and increase saline soils fertility and cotton productivity. Bio preparation Serhosil on the basis of green microalgae improves photosynthetic activity and leaf nutrition of plants. As a result of Rizokom-1 and Serhosil bio preparation use, yield has increased and cotton fibre quality has improved. Average yield within 3 harvests using Rizokom-1 and Serhosil bio preparation was 39.6±3.8 c/ha (under control – 19.5±1.7), what is 20.1 c/ha higher than under control. Obtained results indicate that the use of Rizokom-1 and Serhosil bio preparation of comprehensive effect on Bukhara-9 cotton without gossypol on saline soils has increased cotton yield, cotton fibre quantity and seeds oil content.

Key words: Biocotton, cotton without gossypol, salinification, organic agriculture.

Introduction

Cotton is the most famous and beloved textile fiber of vegetable origin and covers about 40% of the world demand for natural fibers. Every year demand for cotton fiber increases. In order to receive a high yield, farmers use a high amount of chemical fertilizers and pesticides. Excessive

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chemicalization of agriculture and improper irrigation have resulted in salinization, soil phosphate contamination and environmental contamination with ecotoxicants, reduced soil fertility, lowering quantity and quality of cotton fiber, environmental biodiversity, increased cotton diseases, pests, and allergy among population.

Globally, in order to reduce chemical load on the environment and improve health of the world's population, organic agriculture is used. The demand for organic products is high, both for food products and for textiles.

Organic cotton is cotton, which is grown without the use of any chemical fertilizers or pesticides. In order to grow organic cotton fiber, genetically modified varieties of cotton are not used and fibers are not treated with chemicals (washing, bleaching agents, colors or odors) during its processing and packaging. The advantages of organic cotton is that its fiber is less allergenic, and its production is more safe.

Organic cotton production requires the use of biological methods of cotton growing, which will contribute to high yields of cotton, without the use of pesticides and chemical fertilizers.

The cultivar Bukhara-9, developed by Uzbek scientists (Battalov AM and others), is considered potential and promising for organic cotton cultivation (bio-cotton). According to SIFAT Center, Bukhara-9 fiber type is II type, fiber length is 40.0-40.5 mm, fiber yield is 36-38%, micronaire is 3.7-7.8 microns. Gossypol-free variety Bukhara-9 has advantage not only of fiber quality indicator, but also composition of seeds, seeds do not contain poisonous alkaloid gossypol, which makes it possible to obtain from seeds "protein flour" and other food products, both for humans and animals , which can not only replace imported, but also increase the export potential [1].

As a result of many years of research within the framework of state applied projects (2006-2014) in laboratory of soil microbiology of the Institute of Microbiology under the Academy of Sciences of Uzbekistan, a new ecologically safe resource-efficient biotechnology for cotton cultivation on saline soils based on joint application of new ecologically safe biopreparations of comprehensive effect Rizokom-1 and Serhosil was developed.

Biopreparation Rizokom-1 includes cotton rhizobacteria having the following polyfunctional properties: resistance to high concentrations (15-20%) of toxic chloride and sulfate; phosphorus mobilizing activity (dissolution of tricalcium phosphate and mineralization of phytin); destructive activity against

organochlorine (HCCH and PCB) pesticides, antagonistic activity against phytopathogens of cotton Verticillium dahliae, Fusarium oxysporum, Fusarium solani, Rhizoctonia solani, Alternaria alternata; plant hormone, root-forming and growth-stimulating activity.

Biopreparation Serhosil was created on the basis of green microalgae, which improve photosynthetic activity and leaf nutrition of plants. Earlier, in the studies, we observed an increase in biodiversity and an improvement in the balance of soil microbial community in favor of useful microflora when Rizokom-1 and Serhosil biopreparations were applied on cotton plants on saline soils, against the backdrop of NPK 100%. Some agrochemical indicators of saline soils have improved, such as phosphate regime of soils; pH of soil solution has decreased from 8.8 to 7.4 compared to traditional sowing against the backdrop of NPK 100%. Content of available nutrients labile forms increased during the growing season [2-6].

Based on the mentioned above, aim of research was to study influence of new biotechnology on productivity and quality of gossypol-free cotton Bukhara-9 variety without fertilizers in the field.

Material and methods

Field experiments with Bukhara-9 cotton were carried out on highly saline soil of the Bukhara Scientific Experimental Station of the Research Institute of Selection, Seed Growing and Agrotechnology of Cotton Growing. Biopreparation Rizokom-1 with a titer of 1011 cfu/ml was diluted with water to a titer of 106 cfu/ml and used for presowing treatment of cotton seeds for 12 hours. As the main nil treatment absolute control was used without application of fertilizers, for comparison, traditional seeding of against the backdrop of NPK mineral fertilizer 100% was also used. Experiments repeated 3 times. Serhosil biopreparation was used for foliar (leaf-feeding dressing) of cotton in phases of vegetation. Biometric and quality indicators of cotton were carried out according to generally accepted methods. Statistical processing of obtained data was carried out using statistical criteria of Student [7].

Results

As a result of Rizokom-1 and Serhosil biopreparations application, yields have increased and quality of cotton fiber has improved.

There was an improvement in biometric characteristics of cotton Bukhara-9 variety against the backdrop of Rizokom-1 and Serhosil biopreparations application. Average green weight of one plant's roots in version with application was higher than absolute control versions by 23 g, average dry weight – by 19 g. Average green weight of bolls from one plant increased by 930 g, average dry weight of bolls – by 181 g. Average green weight of raw cotton from one plant is more by 199 g, average cotton dry weight from one plant is 139. Average green total weight of one plant is 1511 grams more, and average dry total weight is 483 grams in comparison with absolute control.

Average cotton growth in absolute control version was 62 ± 3.2 cm, average number of fruit spur was 8 ± 1.5 pieces, average number of fruit elements was 12 ± 1.6 pieces, of which 5 ± 1.1 bolls turned out to be full-bodied, in version with traditional sowing – average growth was 82.9 ± 3.4 cm, average number of fruit spur 14 ± 1.2 cs, fruit elements 17.3 ± 2.1 pcs, of which 13.2 ± 1.2 pcs full bolls , version with Rizokom-1 and Serhosil biopreparation application: average growth was 83.5 ± 2.2 cm, average number of fruit spur – 13.6 ± 2.4 pcs, average number of fruit elements – 18 ± 1.2 pcs, of which 14.2 ± 3.5 bolls turned out to be full-bodied.

Average number of bolls per cotton plant with biopreparations was 9.2 pcs more in comparison with control versions. In experimental versions, average fiber weight from one boll was 1.1 g higher, average weight of 1000 seeds was 8.5 g higher than control. Average seed oil content in control version was 21.6 ± 1.0%, and in version with use of biopreparations – 23.1 ± 2.3%. Version with use of a new bio-agrotechnology showed average yield – 39.6 ± 3.8 c/ha, in absolute in control – 19.5 ± 1.7 c/ha. Increase of full-bodied bolls on each bush in versions using biopreparations Rizokom-1 and Serhosil contributed to an increase in the average yield for 3 harvests by 20.1 c/ha in comparison with absolute control version (Tables 1 and 2, Figure 1).

Table 1. Influence of Rizokom-1 and Serhosil biopreparations of comprehensive effect on quality indicators of Bukhara-9 gossypol-free cotton fiber

#	Experiment versions	Average number of bolls per plant, PC	Average weight of cotton from one box, g	Average yield for three harvests, centner / ha
1	Absolute control (without fertilizers)	5.0±0,6	6.3±1,0	19.5±1,7
2	Traditional sowing – Bukhara-9 + N200P140K100 kg/ha	13.2±1,6*	7.0±1,2*	33.5±2,0*
3	Bukhara-9 + Rizokom-1+ Serhosil	14.2±1,7*	7.2±1,6*	39.6±3,8*

*P<0,05 significant with respect to absolute control

Table 2. Influence of Rizokom-1 and Serhosil biopreparations of comprehensive effect on Bukhara-9 gossypol-free cotton yield

#	Experiment versions	average fiber length, mm	average fiber yield, %	average weight of 1000 seeds	average oil content, %
1	Absolute control (without fertilizers)	38.6±2,1	37.8±0,7	129.5±0,3	21.6±1,0
2	Traditional sowing - Bukhara-9 + N200P140K100 kg/ha	39.6±3,8	38.2±2,0*	138.0±2,3*	22.5±0,2
3	Bukhara-9 + Rizokom-1 + Serhosil	39.0±3,5*	38.2±2,0*	138.0±2,3*	23.1±2,3*

*P<0,05 significant with respect to absolute control

Figure 1. Influence of Rizokom-1 and Serhosil biopreparations of comprehensive effect on growth and development of Bukhara-9 gossypol-free cotton variety, maturing phase

Conclusion

Cotton rhizobacteria from biopreparation Rizokom-1 possessing a multifunctional action promoted active development of root system, put in order root nutrition, reduced cotton diseases; Serhosil biopreparation improved nutrition of plant through leaves. Nutrition improvement: both root nutrition and leaf-feeding had a positive effect on plant's aboveground organs development, and as a result contributed to an increase in productivity and quality of fiber.

Obtained results consist in the fact that use of Rizokom-1 and Serhosil biopreparations of comprehensive effect on Bukhara-9 gossypol-free cotton on saline soils increased yield of cotton, yield of cotton fiber and oil content of seeds.

Thus, competent use of biopreparations based on polyfunctional rhizobacteria and green microalgae as an element of organic agriculture in technologies for growing organic cotton makes it possible to significantly limit chemical load on ecosystems due to elimination of applied mineral fertilizers and chemical plant protection products, what will lead to increase in fertility, and improving quality of cotton fiber and organic agricultural products harvest.

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Transition to organic agriculture is a requirement of our times

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Abstract

The article contains the results of field experiments conducted in the Republic of Karakalpakstan, where an attempt was made to fulfill the requirements of the Law on «return» on the deficit-free humus balance, as well as extended reproduction with the predominant use of organic substances, manure, various crop rotation schemes and strengthening, consolidation of their links. The soil of the Republic of Karakalpakstan is very poor in nutrient elements, therefore, a complex measure should be applied here that includes planned manure management, crop rotation soil protection schemes, repeated and betweencrop sowing of sideral, legumes and intercrops. Transition to biological system of agriculture, introduction of effective and applicable crop rotations soil protection schemes with obligatory inclusion of alfalfa, sainfoin, sweet clover or other crop rotation legumes for the first action, and green manure and annual fodder crops with rich aboveground masses for the second action. It is necessary to adopt Law on "Soil Fertility" to increase the responsibility of land users to preserve soil fertility.

Key words: rotation, soil protection, salinity, alfalfa, winter wheat.

Introduction

Soils of Republic of Karakalpakstan due to peculiarities and extreme climate, sparse vegetation and hydrogeological conditions are characterized by a low content of humus and a high tendency to salinity. Currently, in the Republic export of nutrients from irrigated land significantly exceeds the returned amount. Much is taken from the soil by agricultural yields, but little is given in return, which is due to single-direction application of mineral fertilizers in insufficient effective dose, inadequate introduction of biological farming system, crop rotation soil protection system and manure management, sparse foresting and vegetation. The Republic itself is located at the very end of the Amu Darya River and in the northernmost of world cotton growing, and there is often a lack of water here.

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With the increase in grain crops in farms there was a significant decrease in the production of alfalfa – the most valuable crop rotation and forage crop. Sharp decrease in alfalfa sowing, which accumulates biological nitrogen and humus in soil, necessitates development of such a scientifically based system of agriculture, which under our conditions, with a radical change in the structure of crops on irrigated land, would ensure the conservation of soil fertility and growth of crop yields.

In this case the basis for irrigated farm field intensive use is scientifically based rotation and compaction of agricultural crops, ensuring the maximum yield of the necessary high quality crop production, increasing yield and increasing soil fertility and preserving the almost year-round green landscape.

Material and methods

For a more detailed study of the question posed we used a field method. For effective land use we conducted a series of studies on sowing of alfalfa in late summer and early autumn, using the summer period to grow more productive crops and combining alfalfa and wheat in autumn and spring sowing, et al

Winter and spring sowing of alfalfa combined with wheat by means of compacting their crops with maize in Karakalpakstan makes intensive land use and increase in green landscape possible.

In addition, for many years, in several field experiments, we were studying biological system of agriculture that without any ecological contamination applies biological humus, chlorella, green manure, manure, and crop rotation, which together with their predecessors as alfalfa, sainfoin, fully maintain humus deficit-free balance, in case of proper combination an extended reproduction of soil fertility takes place.

The soil of the experimental site is medium-loamy in texture, with medium salinity degree, and salinity type is chloride-sulfate. Groundwater occurrence depth is within 1.2-2.1 m.

Research results

Obtained results show that ecological safe fertilizers like biohumus, chlorella and green manure do not poison the soil, but enriche it with nutrients. For example, biohumus contains 10-12% of humus, 40-60% of dry organic matter, 0.8-3% of nitrogen, 1.3-2.5% of phosphorus, 1.2-3% of potassium,

4.5-8 % of calcium, 0.6-2.3% of magnesium, 0.6-2.5% of iron, 3.5-5.1% of honey, 60-80 mg/kg of manganese, 210 / k of bacterial flora, 2.8-3.5% of sugar, 45-50% moisture and its reaction equals to 6.8-7.2 pH.

Chlorella importance is very high for soil fertility increase and effective plant pests management. Proteins, fat, carbonate waters, phosphoric acid, mineral salts, amino acids and other useful elements in its composition improve micro aggregate composition of the soil and positively affect soil microorganisms.

Planned manure management in irrigated lands of the Republic maintains balance of nutrients in soil. Of course, today state and quantity of livestock cannot fully provide the entire irrigated lands of the Republic with conditioned semi-fire-fang manure; to maintain humus deficit-free balance each irrigated hectare of arable land will need 13-14 t/ha conditioned semi-fire-fang manure.

Conclusions

Summarizing the results of our studies, we have made the following conclusions;

The soil of the Republic of Karakalpakstan is very poor in nutrient elements, therefore, it is advisable to apply a complex of agricultural activities i.e. crop rotation, manure management, inter-planting with inclusion of legumes, green manure, and ecologically safe fertilizers like biohumus, chlorella which do not poison the soil, but enrich with nutrients, create humus deficit-free balance, and also an expanded reproduction of soil fertility.

It is desirable to cultivate varieties of alfalfa Karakalpak-15 for fodder and Karakalpak-41 grain purposes.

Taking into account feed value and avoiding sparseness of subsequent crops after mowing alfalfa it is advisable to cultivate maize for green fodder;

To maintain consistency and efficiency of crops rotation 10 to 15 days before the crops mowing it will be helpful to conduct water supply irrigation;

Prior to summer-autumn season of alfalfa sowing, it is expedient to cultivate maize for green feed with a yield of green mass of 542-749 c/ha, against 84 c/ha of alfalfa in spring sowing;

Pressed use of the alfalfa field due to sowing during the summer-autumn period contributes to the greatest gross collection of fodder, feed units and digested protein noted during alfalfa sowing after harvesting corn for silage – 20 August-1 September, at the rate of sowing crop cover – 60 kg/ha;

High ameliorative efficiency of the combined crops was achieved, since chlorion accumulation coefficient was within the range of 0.62-0.63;

When alfalfa is combined with wheat in its spring sowing, the first mowing is made with spring wheat harvesting, and after wheat the wheat field turns to alfalfa field. Spring wheat gives yield of grain amounted to 30 c/h;

When pressed use of combined alfalfa and wheat takes place the wheat sowing rate should not exceed 160 kg/ha and alfalfa 12 kg/ha;

Optimal period for sowing combined crops with winter wheat is from August 25 to September 5.

passes on to the biological system of agriculture, to introduce effective and acceptable and soil protection schemes of crop rotations with obligatory inclusion of alfalfa, sainfoin, sweet clover or other crop rotation legumes on the first link, and to the second link of siderates and annual fodder crops with succulent aboveground masses.

Transition to biological system of agriculture, introduction of effective and applicable crop rotations soil protection schemes with obligatory inclusion of alfalfa, sainfoin, sweet clover or other crop rotation legumes for the first action, and green manure and annual fodder crops with rich aboveground masses for the second action.

It is necessary to adopt Law on "Soil Fertility" to increase the responsibility of land users to preserve soil fertility.

If we are involved in farming taking into account the above stated, it is also possible to use land appropriately in the Republic of Karakalpakstan by meeting agroecological requirements of agriculture, by maintaining comfortable and cost-effective biological farming systems without poisoning the soil; to sharply increase the yield and range of feeds from one irrigated hectare and create precondition for year-round use of irrigated lands and green landscape and thereby improve the state of the biosphere.

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CHAPTER V: ECONOMICS AND MARKETING

5

The effects of local bazaars on marketing of organic products: the cases of Turkey and Uzbekistan

Ismet Boz[49], Aziz Rasulov[50]

Abstract

In order to develop organic agriculture and provide consumers with healthy food, all stakeholders involved in pre-production, production, harvesting, post-harvest, and marketing processes must serve their duties and responsibilities properly. Once a strong value chain is developed for organic products, every link of the chain will make contributions to agricultural subsectors, and consequently to the economy as a whole. One of the most important factors of developing organic agriculture in a country is to distribute organic products to every segment of markets and sell them at reasonable prices. Establishment of local organic bazaars is one of the preferred marketing methods of organic products. The primary purpose of this study is to examine the effect of local organic bazars on marketing of organic products in Turkey and Uzbekistan. This study mostly used qualitative methods reviewing previous work, secondary data, governmental reports, and points of views and opinions of subject matter experts. Main subjects covered in this study include the place and importance of organic bazaars in developing organic sector in Turkey and Uzbekistan, the types of organic products supplied in these bazaars, basic marketing strategies applied, and possibilities of developing these bazaars in a sustainable way. Results of this study are expected to provide useful information for scientists, policy makers, suppliers, consumer organizations, and extension practitioners in Turkey and Uzbekistan.

Keywords: Organic bazaars, Ecological products, Marketing of organic product.

Introduction

Developing local organic bazaars is one of the key elements of developing organic agriculture. To provide sustainable agricultural production in a region and enable farmers to generate enough income, it is necessary to have adequate number of customers who are willing to purchase these products. Many consumers are willing to pay higher prices for organic commodities. They probably make this decision only if they believe that the organic commodity

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will provide additional utility in comparison with conventional food items. In every country, there are more conscious consumers who are relatively more concerned about their health and seek out ways of purchasing healthier food. Local organic bazaars are one of the means of making organic products available to consumers. Although mainstream retailers may play a major role in marketing of organic products, particularly in the beginning period, local organic bazaars also make significant contributions to the development of a sustainable organic value chain by broadening the diversity and providing continuity.

Local organic bazaars, where producers and consumers have one-to-one communication, are one of the ways of providing customers with organic products. Most of the products sold in these bazaars are produced by farmers who are also the sellers of their products. Therefore, marketing margin gets smaller and majority of prices paid by customers goes to producers. The benefits of local organic bazaars include the following (Ekolojikpazar.org, 2017; Ayan et al., 2017):

(a) Consumers receive reliable information, directly or in the shortest way, about the products, not just the products but other related attributes as well.
(b) Opens the road for the fair trade.
(c) Provides assurance without any documents and certificates.
(d) Allows cultural exchange, protects local culture and makes local differences worldwide.
(e) Makes it possible for consumers to buy the products according to their regions and religious belief.
(f) Protects biodiversity and ensures that local species, varieties, and tastes get an opportunity in the local markets.
(g) Adds social, cultural, and ecological values to the commercial values (such as taste and durability) of agricultural products.
(h) Disseminates information between producers and consumers.
(i) Makes it possible for producers to arrange their production considering the demand of consumers.
(j) Makes it possible for consumers to shop by touching, selecting, and even tasting the products.
(k) Allows consumers to access the fresh products.
(l) Provides opportunities to small producers who are unable to meet the large demand to enter the market.

The primary purpose of this study was to examine the effect of local organic bazaars on developing organic sector in Turkey and in Uzbekistan. The specific objectives

include determining (1) the numbers and places of the organic bazaars, and the main food items sold in the organic bazaars, (2) the founders and supporters of these bazaars, and (3) basic characteristics of the suppliers and customers of organic bazaars in both countries. It is aimed by this study to provide useful information for all stakeholders involved in organic production and marketing as well as for scientists.

Material and methods

The main material for this study was information provided from secondary data sources including research and review papers, websites, governmental reports, statistics, and personal experiences in the field. First, the benefits and importance of organic bazaars for the development of a sustainable organic value chain for different agricultural commodities were explained. Then the structures and developments of organic bazars both in Turkey and in Uzbekistan were examined. The study ends-up with a set of key factors to strengthen the status of organic bazaars for the benefits of producers and consumers in both countries.

Results

Organic bazaars in Turkey

The number of local organic bazaars are continuously increasing in Turkey. As shown in Table 1, there are 9 local organic bazaars in Istanbul and it is followed by Izmir with 4 organic bazaars, and Kayseri with 3 organic bazaars. Since the population of Istanbul has reached to 14 million, it is expected that the number of organic bazaars will go up in the future. The same situation will apply for Ankara and Izmir since their population exceeded 5 million and 4 million, respectively. However, development of local organic bazaars depends not only on population growth but also upon many other factors such as production and processing possibilities, marketing channels, and availability of consumers.

Organic Bazaars in Turkey are supported by NGOs, municipalities, and governmental institutions. The Bugday Ecological Life Supporting Association is one of the main supporter of organic farming and marketing in Turkey. As of 2017 it operates 9 100% ecological markets. These are Sisli, Kartal, Beylikduzu, Bakirkoy, Kucukcekmece, Izmit, Kayseri Kocasinan, and Kayseri Talas. In these markets, there are 426 producers of fresh vegetables and fruits. The number of customers who purchased organic products form these bazaars exceeded 5 thousand (Ekolojikpazar.org., 2017).

Table 1. Organic Bazaars in Turkey

City	Name of Organic Bazaar
Ankara (2)	Ankara-Umitkoy Bazaar
	Ankara-Ayranci Bazaar
Balikesir (1)	Burhaniye Vegetable Bazaar
Bursa (1)	Nilufer Organic Bazaar
Diyarbakir (1)	Diyarbakir Municipality Organic Bazaar
Eskisehir (1)	Tepebasi Municipality Organic Bazaar
Istanbul (9)	İstanbul-Beylikduzu Organic Bazaar
	Istanbul-Sisli Organic Bazaar
	Istanbul-Zeytinburnu Public Organic Bazaar
	İstanbul-Ferikoy Organic Bazaar
	İstanbul-Kadikoy Municipality Public Organic Bazaar
	Istanbul-Bakirkoy Public Organic Bazaar
	Kartal Municipality Ecological Bazaar
	Kucukcekmece 100% Ecological Bazaar
	Maltepe Municipality Bazaar
Izmir (4)	İzmir Bornova Market
	Ecomarket Izmir - Karsiyaka Organic Bazaar
	İzmir Ecomarket Urla Organic Bazaar
	Ecomarket Balcova Organic Bazaar
İzmit (1)	Izmit 100% Ecological Bazaar
Kayseri (3)	Erciyesevler Bazaar
	Kayseri Kocasinan 100% Ecological Bazaar
	Kayseri Talas 100% Ecological Bazaar
Mugla (1)	Ula Organic Bazaar
Samsun (1)	Surmeli Village Organic Bazaar
Sanlıurfa (1)	Eyyubiye Municipality Organic Bazaar

Source: http://www.gaporganik.org/tr/anasayfa

Rules of organic bazaars

To broaden the number of customers and provide them with high quality and healthy food, suppliers must obey the rules and ethics of organic bazaars. Some of these rules are listed as follows (Ekolojikpazar.org., 2017):

1. Selling price of the processed food items are set by the suppliers. However, this price cannot exceed the retail prices of the products with the same brand,

Table 2. Quantity of products and weekly gross income for organic bazaars (2015)

100% Ecological Bazaar	Fresh vegetables and fruits	
	Amount sold (Kg/week)	Gross income (TL/week)
Sisli	13917,67	95280,66
Kartal	5416,47	37609,69
Bakirkoy	2884,03	19528,47
Kayseri- Kocasinan	7732,29	18205,81
Kucukcekmece	3053,28	19008,85
Kayseri-Talas	5645,22	12480,05
Beylikduzu	1184,39	8162,66

Source: Ekolojikpazar.org. (2017)

same weight, and with the same type of packaging of products sold in the same city, and on online shopping stories more than 20%.

2. Fresh vegetable and fruit stall owners determine the prices themselves, but the project partners may also make market recommendations to find a middle way to satisfy both the producers and consumers for the long-term success of the market and to support the development of the industry.
3. Producers of fresh vegetables and fruits are expected to get information about the prices by contacting the association and project partners and inform them about the special type of products they will bring to the market.
4. Price tags of the products will be written and distributed by project partners. Selling cannot be started without proper placement of the price tags on relevant products.
5. Project partners are informed when changes will be made at the prices determined in the morning. Thus, project partners will be able to inform other producers.
6. Special or permanent customers can be discounted, but for whatever reason the consumer cannot be offered a different price with a loud voice.
7. Suppliers must carry their certificates, try to provide the market with fresh products as much as possible, and obey the rules and ethics.

Control

Control of local organic bazaars are made officially by the provincial directorates of the Ministry of Food, Agriculture and Livestock. In addition, NGOs operating or supporting the organic bazaars also conduct regular or random inspections directly or through the control and certification bodies.

Regular records are kept for entrepreneur certificates and supplements; product certificates and supplements; and marketing information including billing for purchases, varieties, quantities, labels, and weekly communications with certificate agencies. Data and information sharing with related stakeholders are also possible.

Although it is not mandatory for 100% Ecological bazaars which are supported by Bugday Ecological Association, routine pesticide residue analysis, visits to ecological bazaars, visits to the land of the producers supplying the products, and visits to warehouses are conducted. The Bugday Ecological Association has conducted 156 pesticide and residue analyses in 261 different products belonging to 113 different producers. In these analyses, a total of 507 active substances were monitored with two different tests (GC MSD 1 and LC MS / MS 1). The sensitivity of the measurements is 0.01 mg/kg. Results of the analyses made in accredited laboratories can be examined in public relations stands at 100% Ecological Markets.

Potential of organic bazaars in Uzbekistan

Although agriculture plays an important role in the economy of Uzbekistan and there is a great potential for organic agriculture, no organic bazaars selling certified organic products was reported. To develop ideas and come up with related suggestions for the establishment of organic bazaars in Uzbekistan, it is useful to provide some overall agricultural figures which include the following:

Uzbekistan is a central Asian country with a total population of 32.12 million people and 26,770 thousand hectares of agricultural area. Annual population increasing rate is about 1.5%, and total population is estimated to reach 34 million by 2020. Gross Domestic Production amounted in 2016 to 67,22 Billion of USD (Trading Economics, 2017). Traditionally agriculture plays a multifunctional role on Uzbekistan's economy. It supplies with food and provides food security for the population living both in rural and urban areas, employment for millions of people including women, raw materials for agricultural processing companies which help the development of agri-food industry, and foreign earnings by exporting many agricultural commodities. More than half of the population (60%) in Uzbekistan lives in rural areas and earn income mostly from agricultural activities. In terms of civil employment, around 30% of people are employed in agriculture, which contributes more than 40% to Uzbekistan's

GDP. Cotton is the dominant crop, accounting for roughly 45% of Uzbekistan exports. GDP from agriculture was estimated to 46194,3 Billion of UZS in the third quarter of 2017 (Trading Economics, 2017).

The number of farm operations in Uzbekistan is more than 67,800. All farming activities are regulated by the Law of the Republic of Uzbekistan "On farmer enterprise" and President's Resolution "On measures for further improvement of the organization and the development of farming in Uzbekistan". In 2015 Uzbekistan had developed more than 17,500 farms in Tashkent, Jizzakh, Namangan, Samarkand, Kashkadarya, Ferghana, Andijan regions and the Republic of Karakalpakstan. Out of this work more than 250,000 new jobs were created. The government's preferential crediting system facilitated farmers' access to fertilizers, pesticides, fuel, seeds, and other inputs (JIA, 2017).

Agricultural sector in Uzbekistan has a stable growing rate. The last 24 years' growth rate in this sector was about 6-7%. The volume of agricultural products within this period increased more than twice. This, in turn, allowed saturating the market and increasing the consumption of basic foodstuffs several times. For example, in 2014, 12.592 million tons of vegetables including potatoes, 1.85 million tons of melons, 1.556 million tons of grapes, and 2.731 million tons of fruits were grown (JIA, 2017).

Productivity in agricultural sector is continuously increasing. For example, average yield of wheat reached 55 quintals per hectare, and total volume of agricultural production increased by almost 7 percent in 2015. By the year 2020, the Cabinet of Ministers of the Republic of Uzbekistan, decided to increase the volume of cereal crops up to 8.5 million tons with an increase of 16.4%. The volume increase plans for other products are those of potato (35%) other vegetables (30%), fruits and grapes (21.5%), meat (26.2%), milk (47.3%), eggs (74.5%), and fish (2.5 times). The plan also included the increase of the export volumes of these commodities (JIA, 2017).

Pioneers of organic agriculture in Uzbekistan

JV "Pearls of Samarkand", a private company, initiated organic fair-trade products in Uzbekistan. Because Samarkand is the natural production area of peanuts, chickpeas, cherries, bee berries, mulberries, almonds, linseeds, tahini, and many other naturally growing products. Samarkand region has steppe climate with hot,

dry summers and cold winters. Because of the low level of industrialization and urbanizations in the rural areas, soils haven't been contaminated with chemicals and pesticides. Air pollution isn't a major problem either. Farming activities are closely related to nature and family farms represent the main socioeconomic structure of the rural life style. Although people living in rural areas and trying to make their lives from agriculture face some problems such as electricity blackouts, lack of fresh water for house consumption and irrigation, and lack of transportation possibilities, the government is trying to make every effort to develop rural infrastructure.

One of the opportunities of developing rural areas, increasing rural livelihoods, improving the living conditions of rural people, and providing a sustainable rural life in the long-term span is to utilize the unique climatic and natural characteristics of the region. Organic agriculture is a mean of utilizing these characteristics in Samarkand region. As more farmers involve in organic agriculture, rural people, rural women, rural youth, and other stakeholders such as processors, marketing companies, and governmental agencies will benefit from this situation.

JV "Pearls of Samarkand" is really a pioneer in Uzbekistan to develop organic sector. It is an export oriented company connects Samarkand farmers with Austrian companies through farmers' cooperatives. Farmers producing mostly peanuts, chickpeas, cherries, bee berries, mulberries, almonds, linseeds, and tahini around Samarkand region have established their own member-owned cooperatives to purchase inputs and sell their commodities collectively in reasonable prices, and to make collective contract with processing and marketing companies. JV "Pearl of Samarkand" is the domestic contracting company which get technical assistance and certification support from the foreign importer company. It also provides training and advisory service to cooperative members who are the producer farmers. Training and advisory services are to ensure that farmers apply the suggested practices and regulations which are predetermined for organic and fair-trade certifications.

Pre-production input supply is provided to farmers. Once commodities are produced the pre-determined practices are also applied in post-harvest season according to organic and fair-trade rules and regulations. Harvested products are transported to the warehouse of the company. After proper standardization and storage, they are exported to the Austrian company. The company applies proper packing for the products. After that they are transported to mainstream retailers to make them available for consumers.

Barriers and challenges in marketing of organic products in Uzbekistan

Barriers:

(a) Lack of state generic statistics on number of producers, regions, volume of production and sale;
(b) Commercial traders / agents have little access to information;
(c) No national associations / network of organic producers;
(d) Low interest to sell in the domestic market;
(e) High interest to export and therefore low competition (pricing, quality and choice) in the domestic markets;
(f) Costumers aren't satisfied with diversity and amount of supply;
(g) Higher prices compared with conventional products;

Suggestion:

(a) Awareness building on healthy food and organic movement for the public society, schools and kindergarten, and consumers.
(b) Diverse cropping systems and sustainable production intensification support the development of high-value organic crop production for domestic and export markets.
(c) Promote healthy foods and awareness building programs about healthy foods, build its customers, and develop organic food supply chain "from field-to table".
(d) Promote establishing of local bazaars, groceries, shops, supermarkets and cafés for purchasing and accessing to organic certified foods & drinks.
(e) Driving environmental friendly system through organic agriculture.
(f) Increase income-generating opportunities for farmers who produce organic crops.
(g) Provide job opportunities for rural population domestically engaged in production, processing, and sales of high-value organic crops.

Discussion

In order to enhance organic agriculture, it is important to develop local organic bazaars both in Turkey and in Uzbekistan. First of all, it is important to conduct a marketing research in advance. In this research, population of the region to be

addressed by the organic market, agricultural structure of the region, number of organic product producers, farmers and regions that can produce organic products should be determined. Estimation of possible price differences between present conventional products and potential organic products; determining support possibilities from NGOs, municipalities, governmental agencies, and local finance providers; and determining general education level and culture of the society are the basic subjects to be investigated in this stage.

If marketing research in the first step is favourable and all conditions are suitable for establishment an organic bazaar, then it is necessary to get the support of an NGO. An NGO is the key element of organic bazaars since it provides marketing information, inspection, control, and many other services to increase the success. NGOs control producers, quantities to be brought to the markets, the products if necessary, certifications, and the stands. They speed up communication between the producers and the certification body, mediate the access of all kinds of information to the customers coming to the market, and fulfil the obligations required by the municipality in the matters concerned. After providing the support of an NGO, the next important element is to gain the support of the local municipality. A municipality can allocate a market area that does not have a highly complicated structure, creates financial resources when necessary, arranges the transportation facilities to provide security, and provides logistical needs.

The next step is to arrange a financier to support organic bazaar activities. Activities such as building the stands, printing product price tags, publishing announcements and brochures, promoting the market through press are supported by the financers. A financier that can carry the financial burden of the market will directly affect the market's long-term prospects or success.

Once all the above duties are completed the producers can be identified. In this regard, the organizers must make contact visits with the provincial directorates of agricultural ministry and arrange organic producers. Producers are informed on the new marketing project, invited to the bazaar, and explained with the rules of the market. Of course, we also need to decide on whether the producer is suitable for the market we are planning to establish. Whether they will produce on a regular basis, their product range, the sensitivity they show to their business, and their farming record will help us to decide whether these farmers are suitable or not. Once the producers are determined, considering the harvest times of the products an opening program is prepared.

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Problems of organic food producers and consumers in Kazakhstan

Vladimir Vasilievich Grigoruk[51]

Abstract

The author of the article focuses attention on the lack of trade in organic products among the countries of Central Asia and demonstrates this fact using the example of interstate turnover of agricultural raw materials between Kazakhstan and Uzbekistan. Explains in a well-argued manner the reasons behind the belated transition to environmentally friendly products production in comparison with the western countries. Voluntary adoption of organic production standards is associated with certain risks, therefore the author convincingly substantiates the need for state farmers support by means of both financial and non-financial support methods. The article presents possible parameters for diversifying agriculture from traditional to organic and organic farmers stimulating.

Key words: production, market, rules, incentives, efficiency, standard, consumer, producer, demand, survey, respondent, state program, synthesis.

Introduction

Natural environment preservation and enrichment, human health are not only environmental, but an economic and social issues. Central Asian region is very favourable for organic products production. Each country can enter the market with its own original products that do not create competition for neighbouring countries. In particular, Kazakhstan can become a global partner in the trade of durum wheat, oilseeds, cattle meat, mutton, horse breeding products.

Main part

Trade in food products between Kazakhstan and Uzbekistan has traditionally been developing successfully. For example, in 2015, the total turnover of agricultural products amounted to 751.2 million USA dollars of which Kazakhstan accounted for 62%, and Uzbekistan – 38%. Kazakhstan exports mainly food grain and flour to Uzbekistan, and Uzbekistan to Kazakhstan – vegetables and fruits (Table 1).

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Table 1. Agrarian products trade turnover between Kazakhstan and Uzbekistan, 2015

	Tonnes (net weight)	Amount, thousand US dollars	Share in total volume,%
Export from Kazakhstan to Uzbekistan			
Total	x	464 543	100
Including corn	1 405 873	232 121	50
Wheat flour or wheat-rye flour	818 117	193 746	42
Sunflower seeds	76 876	26 526	6
Import from Uzbekistan to Kazakhstan			
Total	x	286 744	100
Vegetables	175 543	100 210	35
Fruits	198 840	167 205	58

Undoubtedly, the quality of mutually sold products according to environmental assessment is high. At least, Kazakhstan guarantees the ecological safety of exported wheat.

Unfortunately, these products are not certified as organic, although the opportunity of each of the Central Asian countries is huge. Region notably lags behind western countries.

There are several reasons. First, we have belatedly noticed world markets needs for environmentally friendly products. After a 50-year "green revolution", it became obvious that economic prosperity, achieved through environmental degradation, threatens the existence of human beings as a biological species, their physical and mental health, and especially the health of future generations. In response to chemical fertilizers, pesticides and genetic engineering technologies diffusion, systems of "sustainable" agriculture have emerged. The highest technological and market formalization level in the world practice was given to organic agriculture system.

Secondly, (if we talk about Kazakhstan), not only agrarian sector producers, but also many scientists believed that agriculture does not need to dwell on organic. Agriculturists in Kazakhstan use a small amount of chemical fertilizers and pesticides. Many crops are not fertilized at all. For example, for the 2015 yield, an average of 6 kilograms of mineral fertilizers in active fraction per 1 hectare of crop acreage was applied. The share of fertilized area from all droppings was less than 7% (Table 2). According to the Ministry of Agriculture of the Republic of Kazakhstan, in 2017 fertilization makes up only 14% of the demand.

Table 2. Dynamics of mineral fertilizer applications in Kazakshtan

Indicators	Years				
	2011	2012	2013	2014	2015
Mineral fertilizers introduction, million tons in active fraction	0,09	0,13	0,08	0,12	0,13
Introduced per 1 ha of acreage, kg in active fraction	4,1	6,0	3,9	5,4	6,0
Area fertilized with mineral fertilizers, thousand hectares	973,3	1461,4	1397,5	1582,1	1459,9
Share of the area fertilized with mineral fertilizers, from all acreage,%	4,6	6,8	6,5	7,4	6,9

The situation is similar in the treatment of crops with pesticides, chemicals mainly fertilize vegetables, potatoes and industrial crops.

Thirdly, despite the absence of labeled organic products in trade enterprises, more than half of consumers believe that they consume environmentally friendly products. In 2014, the Committee on Statistics conducted a survey of rural and urban residents on the use of environmentally friendly products.

According to the survey results, about 90% of rural and 80.0% of urban households use ecologically friendly products fully or partially. The majority of ecologically clean products are used by households with 5 or more children, and by social groups - households of the upper middle class. This survey results reflect public opinion general trend, which is the ground for transition to organic production [3].

According to farmers, organic system rules and regulations are overelaborated. In this regard, some countries have double standards – somewhat simplistic for the domestic market and others that meet international requirements. From our point of view, this option is applicable at an early stage of transition to an organic system, including Kazakhstan.

Some countries' practice shows that built on trust personal contacts between producer and consumer have positive results. In Kazakhstan such connections are established, when suburban farmers deliver their products directly to the consumer. However territorial and zonal features of the republic complicate such ties. For example, in Kazakhstan population density per 1 sq. km 32 times less than in Germany, grain production and cattle breeding is developed in the north of the country, and horticulture and vegetable growing in the south. The distance between these regions is thousands of kilometers, which complicates the direct links between peasant farm enterprises and urban consumer.

Consider situation from farmer's position. Shifting to organic production, he has to voluntarily undertake responsibilities: to end synthetic fertilizers and pesticides use, not to use GMOs, to reject ionizing radiation use, to strictly stick to crop rotations, to limit nitrogen use, to apply green fertilizers – green manure, to use biological fertilizers and crop protection agents, maintain cattle leash-free, constant animals walking, do not keep poultry in cages, do not apply plant growth regulators, feed additives and antibiotics, etc. [4].

These commitments are made by the adherents of a healthy lifestyle and those who has already delivered organic products to foreign markets and received high income through their own experience.

Producing organic products farmer faces significant risks. He is not confident that the prices of organic products sold will be adequate to the costs of its production; on the domestic market organic agricultural products are almost not in demand. "Investing" risk in such a business is possible only with resources availability, and most farmers do not have them. The state should help overcome these obstacles. Especially when, organic products consumption segment is still small in the domestic market.

Western Europe and North America countries, with high level in organic production, support both the eco-farmer and the consumer. For example, in France farmers receive additional subsidies during the first five years, and within this period they switch to organic farming. The first two years the volume of subsidies is maximal. Thus, in vegetables production it is € 511 per year per 1 ha. The next two years, state support is halved – up to € 255. And in the last year amounts to € 170. The same situation with other countries, from our perspective, it is quite high. [5, 6].

Investigation of motives that would encourage the farmer to switch from traditional farming to organic farming showed that the first was partial compensation of certification and inspection costs, the second – subsidizing part of purchasing biological plant protection products and fertilizers cost, the third – subsidizing the transitional period, etc. (Figure 1). Thus, organic farmers in Kazakhstan also need multilateral state and public support, which includes:

a) non-financial support methods:
   - Legislative and regulatory framework;
   - Design and implementation of republican, regional and sectoral programs for organic production organization and development;

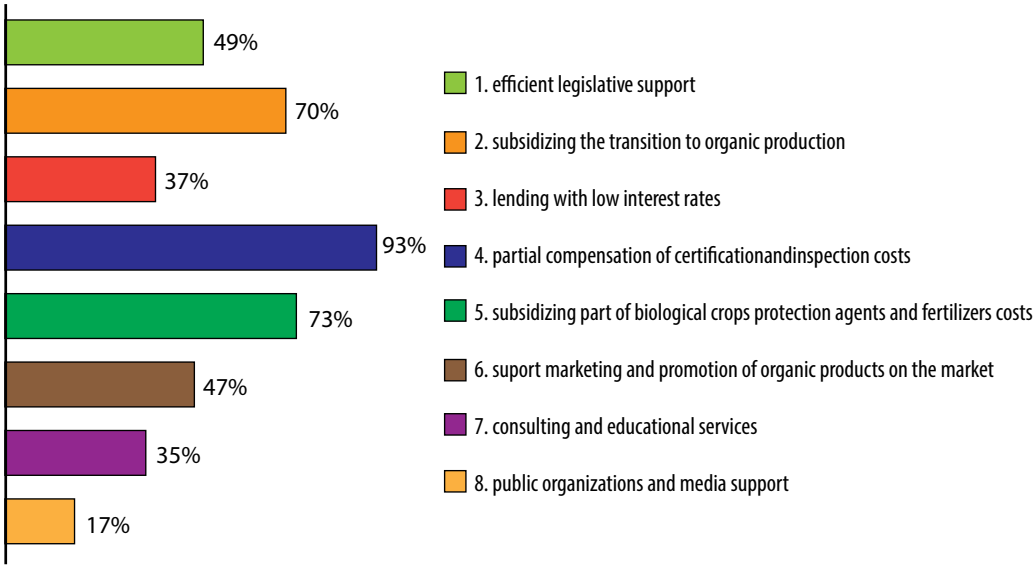

Figure 1. Incentives for the transition of farms to the organic category
(Survey of farmers in Almaty oblast, in% to all respondents, Kazakh Research Institute of Agrobusiness and rural areas development)

- Information, consulting and methodical support of organic production entities;
- Promotion of organic products to the world market;
- Support of scientific research in the field of organic production and other activities.

b) Financial support methods: Subsidies, concessional lending, tax concessions, organic production risks insurance, etc.

c) organic production market regulation:
- Organic bonus (increased price);
- Organic products demand promotion;
- Healthy diet promotion and clean ecological environment preservation;
- Marketing strategies development and implementation;
- Intention of organic production entity to get the maximum profit;
- Active promotion of organic products in the domestic and foreign markets.

d) Commitment of the farmer (enterprise) to organic agriculture idea; personal or group motivation of organic products producers [5].

Proceeding from this concept, and in order to implement the law on production of organic products, we propose to develop an action plan 2018-2020 for the organic sector. Organic production and turnover of products financial support

requires up to 10% of the Ministry's of Agriculture of the Republic of Kazakhstan annual budget, intended to subsidize the industry.

As for law implementation target indicators it is necessary to increase organic production land area to 2.5% of agricultural land total area, including: arable land – up to 3%; pastures and hayfields – up to 2%; perennial plantations (horticulture, viticulture, berries) – 20%, potatoes, vegetables – up to 5% of their total area by 2025.

It is possible to promote organic food consumption in the public sector (schools, kindergartens, hospitals, army and government agencies). For example, if a government or public organization buys organic food, it receives subsidies of 20% of traditional product average price. It is important to support young farmers starting organic production [7].

Catalyst for targets achieving can be consumer and demand for organic products, first of all, on domestic, and then on foreign market. Population incomes growth and consumption state support will allow to bring a share of consumers' organic food expenses in the general food consumption to 0,5% by 2025.

Study of organic products demand in domestic market shows that according to the ranking the following products are in the highest demand: baby food, vegetables, fruits, milk and dairy products, meat and meat food, bakery products and cereals. 51% of respondents confirmed that in the confident expectation that product is environmentally friendly they are ready to pay price increased by 20% and more.

Foreign experience shows that high-quality organic products can be sold at a price several times higher than conventional products price.

Along with the readiness to purchase organic products, agricultural producers are ready to produce it. 75% of peasant farms (farms) and 30% of private subsidiary farms intend to start environmentally friendly products production. According to our calculations, current income of the population and need to meet demand for baby food products and those who are willing to pay a higher price comprises 500 million USA dollars.[8].

In Kazakhstan, there are peasant farms, which for several years produce and export organic products. It is mainly flax oil and wheat. On the basis of specific economic data of these farms, we calculated the comparative production efficiency by means of conventional and organic technology. As a result, the income per hectare from organic wheat is 2.5, and from organic flax is 1.6 times higher than that of inorganic ones. Similar results were witnessed for other crops.

Society receives from organic products production not only economic benefits, but more of environmental and social ones. In the near future, the costs of maintaining human health and natural environment restoring because of its pollution can significantly exceed the costs of transition to biological farming systems.

Organic agriculture is part of the Government's of the Republic of Kazakhstan general agrarian policy. Ecoproducts production is an innovative direction of the agricultural sector, which allows preserving national traditions and culture, using the positive experience inherited from the older generations. In addition, it is an objective competitive advantage of the republic's agrobusiness, development of which is envisaged by the State Program of agrobusiness for 2017-2021 and is one of the country's public good.[2].

Noting organic agriculture development prospects, one should not oppose it to the existing neoclassical industrial agroproduction system. In the view of population current food provision, synthesize or balanced development of both types of agriculture will be required. Organic farming and livestock-breeding should naturally fit into the existing agrobusiness and become its important part.

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Consumer attitudes and behaviors towards organic products in Turkey

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Abstract

As in many countries, consumers in Turkey are increasingly becoming a leading factor for development of the organic sector. In this study, it is aimed to put forward consumer trends in the Turkey's domestic market regarding organic products. To this end, both micro level findings gathered through review of local consumer studies on organic market, and macro level statistical data obtained from various institutions were used. It is concluded that development of the domestic market seem to require further improvement of both producer and consumer awareness toward organic production system and collaboration among all stakeholders.

Key words: Organic food consumption, Turkey, domestic market

Introduction

There is no doubt that increased demand of organic products means increased development of organic sector. Examination of the factors affecting demand would uncover the main deterrents and encouraging aspects; therefore, would have many implications for development in the market.

Actually, this is why, attitudes and behaviors of consumers toward organic food products has became a popular research topic, elaborated in numerous research studies all over the world. Overall, consumers' approaches to organic products varied from one country/region to another and along the time in the same country/region.

The objective of this paper is to evaluate the Turkish domestic market of organic products from the perspective of the demand side and to generate suggestions for development of the organic sector.

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Material and methods

The methodology followed has been a comprehensive review of the research findings on consumers' attitudes and behaviors toward organic products in Turkey and interpretation of these findings in combination with the relevant macro level information on the domestic organic food market.

Domestic market of organic products in Turkey

In Turkey, organic agriculture was started about 30 years ago as export oriented, and as being driven by demand from other countries. However, recently, the awareness and sensitivity of the consumers in the domestic market on food safety, healthy eating and environment had been increasing. Besides, there are some government support on organic agriculture, educational activities, projects supported by various institutions and marketing efforts. Nevertheless, the production of organic products is still rather export oriented. On the other hand, according to experts in the sector, share of domestic market increases steadily, and rose from less than 5% in around year 2000 to about 25% today. In this section, a brief overview of the organic sector is presented based on macro level statistical data.

Organic agriculture in Turkey

Growth of organic agriculture in last ten years equals to 376% in number of farmers and 172% in area of production (Table 1). By 2015, Turkey is the 8th largest organic producer in Europe for arable crops, and 3rd largest for permanent crops (Willer and Lernoud, 2017). However, when the shares of farms and area allocated to organic agriculture are considered, there is still great potential for further development.

Table 1. Number of farmers and area allocated to organic agriculture

	2006	2016	Rate of increase
Number of farmers in organic production	14256	67878	376.14%
Area of organic production* (ha)	192789	523777	171.68%
			2016
		Rate of organic farms in total number of farms	2.21%
		Rate of organically cultivated area in total cultivated area**	2.07%

Source: MFAL, 2017. *Wild production area (34106 ha) included. **Wild production area not included.

Size and composition of consumption in the domestic market

Total organic market consumer sales of Turkey is estimated to be about 119 million $ per year (OTA, 2016). According to the statistics, the market for organic packaged food has reached 97.9 million $ in 2015, and is expected to increase 12.9% per year until 2020. By 2015, per capita spending on organic packaged food&beverages equals 1.3 $ (Table 2). Growth of the domestic market is based both on increasing urbanization, improving economic conditions, and on increasing availability of the products. Dairy, baby food and snacks makes up major part of the sales (Table 3).

Table 2. Organic packaged food and beverages market in Turkey (2015)

GDP per capita ($)	9 221
Consumer expenditure per capita on food and non-alcoholic beverages ($)	1 441.8
Per capita spending on organic packaged food and beverages ($)	1.3
Health & wellness products consumption ($)	7 645.7 million
Market size for organic packaged food and beverages ($)	97.9 million
Organic packaged food consumption ($)	94.3 million
Organic beverages consumption ($)	3.6 million
Sales of organic packaged food and beverages by 2020 (forecast)	170 million

Source: 1) OTA, 2016; 2) Surrett, 2016.

Table 3. Domestic sales of organic packaged food (mln USD)

Product*	2009	2014	% (2014)
Organic Baby Food	2.3	14.8	24.10
Organic Bakery Products	–	0.5	0.81
Organic Dairy	2.2	21.8	35.50
Organic Oils and Fats	1.9	5.9	9.61
Organic Rice	1.0	2.4	3.91
Organic Spreads	–	2.4	3.91
Organic Sweet and Savory Snacks	7.9	13.6	22.15
Total Organic Packaged Food	15.3	61.4	100,00

Source: Euromonitor (cited in Surrett, 2016) *Products with negligible sales are excluded.

Marketing channels in the domestic market of organic products

In Turkey, organic producs certified by independent bodies (approved by the Ministry of Agriculture Food and Livestock) reach consumers by various channels. Producers (individual producer, contracting firm, cooperative etc.) may either sell their products directly to consumers, or via intermediaries; hypermarket/supermarket chains; the 26 organic open markets present in different cities; organic/natural product shops; and/or internet/mail order, home delivery method. According to the Euromonitor, currently, 84% of organic packaged food sales in the domestic market are made in hyper/supermarkets; while the share of internet is limited to 1% (Surrett, 2016).

Retail prices are varied by product, time and sales point. Retail prices of organic products sold in hypermarkets are estimated to be about 11 to 252% higher compared to conventional ones . Price premiums between organic vs. conventional bazaars range from 5 to 254% for different products (Bektaş and Uysal, 2012). Organic product prices sold in organic shops equals –17% to +44% of their counterparts sold in hypermarkets. The organic product prices in e-markets are up to 23% less or up to 88% more as compared to those sold in hypermarkets.

Another marketing channel for organic products in the domestic market is the Community Supported Agriculture (CSA) Groups appliying Participatory Guarranty Systems (PGS) which bring the producers/producer organizations and consumers together. Currently, there are more than 25 CSA Groups in Turkey, as scattered to more than 9 cities. About 15 of them are located in İzmir and İstanbul (Uysal and Bektaş, 2016). Generally, they act solely as CSAs and only three of them seem to be involved in PGS formation process (Table 4). While the number of PGS and the farmers involved in them are increasing rapidly in the world, the 2 PGSs currently operating in Turkey and their data is shown in Table 5.

Table 4. PGS in the world and in Turkey

Year	Number of related producers	Number of certified producers	Active	Setting up	Total
World/2012	32 039	12 223	40	114	154
World/2015	109 317	46 945	133	102	235
Turkey/2015	47	28	1	2	3

Source: IFOAM, 2017.

Table 5. PGSs active in organic product handling in Turkey: DBB and ÇAYEK

	Natural Food and Conscious Nutrition Group: (DBB)	Çanakkale Initiative of Ecological Life (ÇAYEK)
Number of producers	34 (individual and collective)	21 (Marmara Region)
Number of consumers	1400 (%50 active buyer, communicating, participating in the meetings, 350 in group activity)	30-40

Source: Uysal and Bektaş, 2016; and respective web pages of the PGSs.

Findings of consumer research on organic products in Turkey

In Turkey, while organic agriculture flourished based on the availability of natural resources and export opportunuties; it also appeared to be a potential investment area for rural development and environmental protection, as well as an opportunity for consumers to access an alternative healty diet. Given the importance of the subject, considerable research efforts were directed in to this field. Consumer research on organic food was not an exemption. Studies elaborated in this literature review and their characteristics are listed in Table 6.

Earlier research put forward valuable findings on "How sensitive are the consumers concerning healthy eating and environment? What do they understand from "organic"? Are they aware of organic products? Why do they buy /or do not buy organic food? How much premium are they willing to pay for the qualification of being organic? What, where, how they purchase organic? Which factors influence their preferences?" A brief summary of these findings are given in Table 7.

Table 6. Consumer research on organic products in Turkey

Author(s)	Year	Region	Samp Size	Product/consumer group
Akgüngör et al.	1999	Istanbul, Ankara, Izmir	1005	Apples, tomatoes
Özkan et al.	2000	Antalya	484	General
Koç, et al.	2001	Ankara	397	General
Yüksel&Okumuş	2001	Istanbul	245	Env. friendly products
Armağan&Özdoğan	2005	Aydın	384	Eggs, chicken
Oraman&Unakıtan	2006	Istanbul	385	Fruits & vegetables
Mutlu	2007	Almanya, Turkey	50, 64	General
Sarıkaya	2007	Ankara, Istanbul	170	General
Altuğ et al.	2008	Izmir	300	General
Semiz	2008	Istanbul	204	General

Ergin&Özsacmacı	2009	Istanbul, Ankara	215	General
Akgüngör et al.	2010	İstanbul, İzmir	202	General
Günden et al.	2010	5 cities (most developed)	803	General
Akın et al.	2010	Niğde	414	General
Dağıstan et al.	2010	Hatay	442	General
Seçer et al.	2010	Adana	225	General
İlyasoğlu et al.	2010	Istanbul	383	General
Karabaş&Gürler	2012	Samsun	478	General
Hesapci& Erkan	2012	İst., Ank., İzm., Ant., Sam.	354	Organic food consumers
Aygen	2012	İstanbul	500	General
Azak & Miran	2013	Izmir	118	General
Bal Gülse	2013	Tokat	224	General
Çelik	2013	Istanbul	195	General
Gümüş	2013	Turkey/Internet	650	General
Karaman et al.	2013	Turkey	110	Fresh fruits & vegetables
Sönmez et al.	2013	Samsun	66	Conv&org bazaar shoppers
Uysal et al.	2013	Ankara, Izmir	400	Apples and eggs
Çabuk et a	2014	Adana	385	General
Sandallıoğlu&Gültekin	2014	Adana	451	General
Ağır et al.	2014	Kayseri	341	General
Ayhan	2014	Kuşadası	720	Chicken, Milk
Cavdar&Aydın	2015	Istanbul	682	Org. bazaar consumers
Aktürk	2015	İstanbul	192	Conv&org bazaar shoppers
Demirtas et al.	2015	Turkey, urban areas	786	General
Ergönül&Ergönül	2015	Turkey	600	General
İlter&Yılmaz	2016	İzmir	882	General
Eti İçli et al.	2016	İstanbul	620	Org. bazaar shoppers
Onurlubaş&Doğan	2016	7 big cities in 7 regs.	1500	General
Kaya et al.	2016	Şanlıurfa	382	Organic food consumers
İnci et al.	2017	Diyarbakır	384	General

Discussion

The new paradigm of marketing suggests not to try to sell what is produced; but to produce what is demanded/needed, including discovery of latent needs or potential demand. Creating value is considered to be the key factor for success in marketing. Thus, analysis of consumer behavior is a key for development of the sector.

Table 7. Findings of consumer research on organic products in Turkey*

Sensitivity of consumers regarding health and environment/healthy eating	Majority of consumers are skeptical about the impact of pesticide and chemical residues in fresh fruits and vegetables (Akgüngör et al., 1999; Özkan et al., 2000; Oraman et al., 2010; Günden et al., 2010) and 72% are skeptical about the influence of conventional food on their health (Karabaş et al., 2012).
The most important attributes searched in food products	Even in the earlier studies, nutritional value, safety for health (no additives etc.), taste and price were mentioned respectively (Akgüngör et al., 1999; Özkan et al., 2000)
Level of awareness:	While those aware of organic agriculture were about 10-20% in late 1990's; this figure increased continuously and today 10-20% are those who are not aware of organic production (Akgüngör et al., 1999; Özkan et al., 2000; Koç et al., 2001; Armağan & Özdoğan, 2005; Altuğ et al., 2008; Seçer et al., 2010; İlyasoğlu et al., 2010; Karabaş & Gürler, 2012; Azak & Miran, 2013; Sönmez et al., 2013).
Certificate:	Consumers are not familiar with the organic product certificates (Mutlu, 2007; Dağıstan et al., 2010). Only %20 differentiate the organic product by its certification logo (17% by the organic product department in the store; 17% by appearance of the product, 17% by its color, 16% by its taste) (Dağıstan et al., 2010). 57.1% states to know that organic products should carry certification tag (Karabaş & Gürler, 2012). Even the organic food consumers had little knowledge about logos, yet, the declared level of trust in organic logos is high (Uysal et al., 2013). 86% of consumers are not informed that the organic product must be certified by a control certification body (Ağır et al., 2014).
Attitude toward organic products:	Consumers are positive toward organic attribute of the products, while negative toward distribution, price and quality attributes. (Semiz, 2008). Almost 70% of the consumers find organic products either expensive or too expensive (Dağıstan et al., 2010; Karaman et al., 2013). From 37 to 52% trust organic food is inspected properly (Altuğ et al., 2008; İlyasoğlu et al., 2010). On the other hand conventional local market consumers do not really trust organic products (Sönmez et al., 2013).
Reasons for preferring organic products:	Health (% 34.4) and taste (% 29.4) (Armağan&Özdoğan, 2005); safety (%76.5), taste (%68.9), being residue free (%70.2) (Oraman&Unakıtan, 2006); conservation of resources, health, supporting organic movement and sustainability, food safety (Mutlu, 2007); health benefits (96%), sensual difference (98%) (Altuğ et al., 2008); being residue free, taste, nutritional value, price (Sarıkaya, 2007); being additive free, natural, healthy, tasty, high quality and hygienic (Ergin, 2009); health, environmental friendliness and nutritional value (İlyasoğlu et al., 2010); self and/or family health (Aygen, 2012); health (85%) and taste (%15) (Sönmez et al., 2013); personal health care (52.8%) and taste (36.4%) (Karaman et al., 2013); health care (Gümüs, 2013; Aktürk 2015); health consciousness, environmental concern and food safety concern (Çabuk et al., 2014); healthy, nutritive, residue free, delicious (Sandallıoğlu&Gültekin, 2014); health and the environmental awareness (Çavdar&Aydın, 2015); healthy (%31), natural and organic (%20), reliable (%19), price (%18), nutritive (%12) (İnci et al., 2017).
Reasons for not buying/ consuming (Obstacles against domestic market development)	High price, limited availability, limited variety, income level (Mutlu, 2007). Limited availability and variety, severe price differences, hard to find in stores (Altuğ et al., 2008). Availability, cost, lack of trust (Akın et al., 2010). Availability by time and place, high price, lack of knowledge, dislike taste (Dağıstan et al., 2010). High price, limited availability, limited knowledge, low level of income (Seçer et al., 2010). High price, limited availability (İlyasoğlu et al., 2010; Aygen 2012). Trust in conventional, prejudgment that organic is too expensive (Karabaş & Gürler, 2012). Price and income (Bal Gülse, 2013). High price (Gümüs, 2013). High price, low income, lack of availability (Ergönül & Ergönül, 2015).

Products preferred as organic:	Tomatoes, cucumber, peppers, apples (Akgüngör et al., 1999). 46% fruit & veg., 30% all products (Koç et al., 2001). 70% both chicken & eggs (Armağan & Özdoğan, 2005). Fresh fruits & veg., dried fruits & veg., milk & milk products (Mutlu, 2007; Sandallıoğlu&Gültekin, 2014), Cereals (Mutlu, 2007). 61.2% fresh fruits & veg., 50% drinks etc. (Sarıkaya, 2007). Frequency of purchase is higher for eggs, fruits & veg. (Sanaktekin & Erkan, 2012). The most preferred: eggs, yogurt, fruits, vegetables, milk, bread, meat (Azak & Miran, 2013). Tomatoes, spinach, carrots, cucumbers (Çelik, 2013). 21% organic milk & dairy products, 19% organic honey & jam, 3% organic spices, 2% recognized infant baby foods (Ergönül & Ergönül, 2015). Organic product consumers: fresh fruit & veg. (43.4%), dairy (23.1%), meat (18.1%), eggs (8.6%), honey (6.5%) (İnci et al., 2017).
Frequency of organic product purchase:	30% 1-2 times per week (Mutlu, 2007). 32% consumed organic milk at least once (Altuğ et al., 2008) 83.3% at least once a week (Ergin, 2009). 57% consumed (Dağıstan et al., 2010) Most of them consume rarely or sometimes (İlyasoğlu et al., 2010). 53.3% consume (Karabaş & Gürler, 2012). 23% buy once a month (Azak & Miran, 2013). 77.4% have been buying organic for two or more years. Families with children purchase all organic foods (eggs, meat, vegetables, fruits, beverages, diary and dry food) more frequently than the ones with no children (Sanaktekin & Erkan, 2012). 20% either did not buy at all or bought very infrequently (Aygen, 2012). 86.1% at least once a week (Çelik, 2013). Purchase of organic fruit and vegetables: 38.7% 2-3 times per month; 31.7% once per month; 22.3% once per week (Karaman et al., 2013). 8% 3-4 times a week, 18% 1-2 times a week, 12% 3-4 times a month, 40% 1-2 times a month, 12% less than once a month, 10% never (Ergönül & Ergönül, 2015). 62.4% once a week, 19.7% a few times a month, 9% once a month, 7.3% a few times a week and 1.6% a few times a month (Eti İçli et al., 2016). The proportion of those consuming 79.93% in Turkey; 92.20% in İzmir; 71.10% in İstanbul (Onurlubaş & Dogan, 2016).
Preferred sales point for organic products:	78% hypermarkets, 45% farms, 41% organic shops, 22% organic open markets, 12.5% special shops (Mutlu, 2007). 52.8% hypermarkets, 37.7% organic shops, 9.4% supermarkets (Sarıkaya, 2007). 47% hypermarkets, 36.3% organic producer market, 16.7% special shops (Ergin, 2009). Hypermarkets, organic open markets and greengrocers (Dağıstan et al., 2010). Hypermarkets 39%, organic open markets %20.7, producers 20.2%, organic product shops 20.1% (Seçer et al., 2010). The most important are local markets and supermarkets/ hypermarkets. The existing marketing channel via specialized stores is not a convenient marketing approach for Turkish consumers (Günden et al., 2010) 63.5% hypermarkets, 15.3% organic open markets (Karabaş & Gürler, 2012). Well-educated use internet and specialty stores; less-educated prefer more the local markets. Organic food consumers prefer more frequently the wet markets and super markets (Sanaktekin & Erkan, 2012). Supermarkets 24%, organic food markets, 28% bazaars, 40% organic farms 8% (Ergönül & Ergönül, 2015). Consumers prefer place under public control, district or organic product bazaar, hyper/supermarket and malls (Kaya et al., 2016). 54% hyper/supermarkets, 24.6 %local bazaars, 10.8% direct producers, 10.6% organic products shops and organic bazaars (İnci et al., 2017).
Other purchasing behaviors:	74% shop for organic since 5 years (Mutlu, 2007). For about 3.5 years (Seçer et al., 2010). 56.4% buy since 2 years, 21.8% since 1 year, 18.1% since 3 years (Karaman et al., 2013)
Source of information:	Majority: Media (TV, radio, newspaper, etc.); Minority: Friends & others (Akgüngör et al., 1999; Özkan et al., 2000; Sarıkaya, 2007; Dağıstan et al., 2010; Seçer et al., 2010; Karabaş & Gürler, 2012; Karaman et al., 2013; Sönmez et al., 2013). TV commercials create a positive effect on consumer perception and affect the shopping dimension (Gümüs, 2013). TV, internet, doctor/expert&newspaper (Sandallıoğlu et al., 2014; Kaya et al., 2016). Internet, TV, friends, magazine/newspaper&salesman (İnci et al., 2017).

Source of information:	Majority: Media (TV, radio, newspaper, etc.); Minority: Friends & others (Akgüngör et al., 1999; Özkan et al., 2000; Sarıkaya, 2007; Dağıstan et al., 2010; Seçer et al., 2010; Karabaş & Gürler, 2012; Karaman et al., 2013; Sönmez et al., 2013). TV commercials create a positive effect on consumer perception and affect the shopping dimension (Gümüs, 2013). TV, internet, doctor/expert&newspaper (Sandallıoğlu et al., 2014; Kaya et al., 2016). Internet, TV, friends, magazine/newspaper&salesman (İnci et al., 2017).
Willingness to pay (WTP):	Premium for pesticide free tomatoes: 2% (Akgüngör et al., 1999). 8.7% not willing to pay any premium; 91.3% willing to (Özkan et al., 2000). 49.4% willing to pay up to 15% premium for env. friendly product, 50.6% willing to pay more than 15% (Yüksel&Okumuş, 2001). WTP: premium: 30.41% for poultry meat, 30.61% for eggs (Armağan&Özdoğan, 2005). WTP for products with organic labels and certificates: up to 36% (Akgüngör et al., 2010). 80.5% willing to pay up to 30%, 14.3% between 30-50%, 5.2% more than 50% (Seçer et al., 2010). 36.4% willing to pay 31-40% (Karaman et al., 2013).
Determinants of awareness:	University graduate mothers are more aware compared to less educated ones (Koç et al., 2001). Environmental awareness increase by education (Yüksel & Okumuş, 2001). Awareness of organic agriculture increase with increased levels of income and education (Armağan & Özdoğan, 2005; Akgüngör et al., 2010). Education, income as well as earlier experience of organic food consumption & living standards are the most important factors for organic food awareness (Demirtas et al., 2015).
Determinants of positive perception of organic products:	Young people present more positive attitude toward packaging, product information labeling and marketing strategy compared to old. Higher income individuals trust more in the quality of organic products, and have more positive attitude towards the marketing strategy (Semiz, 2008). Higher level of education and income and being less than 40 years old are found to have positive impact on attitudes toward organic products (Akın et al., 2010). Female consumers believe that organic food has more vitamins and minerals compared to conventional ones (Akın et al., 2010)
Determinants of willingness to pay:	Quantity purchased and the level of income has positive influence on WTP. High income, over middle age consumers, sensitive to health risks, has the potential for buying (Akgüngör et al., 1999). Positive relation between WTP and income. Those who know organic product concept and females are more willing to pay a premium compared to others (Özkan et al., 2000). Young people and women are more willing to pay for env. friendly products. (Yüksel & Okumuş, 2001). Organic chicken: Higher income is decisive on the WTP. Organic milk: Younger aged people, with no children are willing to pay more, except pensioners who are willing to pay more. Knowledge on foods and prior consumption of organic foods positively affects the WTP both for organic chicken and milk (Ayhan, 2014).

Determinants of organic product purchase:	High income, middle age consumers have more potential to create demand (Oraman&Unakıtan, 2006). Turkish consumers are younger, belong to wider families with more children compared to European ones. They have high level of education & medium level of income (Mutlu, 2007). Higher education favors use of env. friendly products (Sarıkaya, 2007). Older consumers with high levels of education and income buy more of organic products. Trust, health, availability and environmental benefits are the factors influencing consumption of organic products (Ergin, 2009). Consumption of organic products increase with increased level of income (Dağıstan et al., 2010). Individuals having health related worries, higher level of income and education and environmentalists consume more of organic products (Seçer et al., 2010). Organic product purchasing behavior is explained by factors such as, health and taste, economy, trend; and also found to be related with gender, income, level of education, household size (Çelik, 2013). Organic milk consumption choices related positively with working wife and knowledge of organic product; and negatively with number of household members, education level of the wife and –unexpectedly- permanent income (Bal Gülse, 2013). Consumers of organic products are more informed on organic products and have higher levels of income and education (Sönmez et al., 2013). Total monthly income status, education levels, monthly food expenditures and marital status of consumers are effective factors in the consumption of organic products (Sandallıoğlu&Gültekin, 2014). Organic chicken consumers are generally females with older age and children, having higher income and knowledge about foods and have previously consumed organic; while those of organic milk are younger (except pensioners) and with no children. Knowledge on food and food security and prior consumption of organic affects the WTP for organic milk positively as well (Ayhan, 2014). As age and education level of consumers increase, the rate of early adoption of organic products increases (Ağır et al., 2014). Consumers who prefer organic products are middle aged, with higher education and incomes (Akturk, 2015). The organic product consumers are mainly from middle and high income groups with middle-upper age. Their educational level is higher than the others (Kaya et al., 2016). Probability of being an organic product consumer increases with increased levels of education and income. Females, families with children and higher income people are better customers for organic food products (İlter and Yılmaz, 2016). High school and university graduates consume more organic products than others. Women consume more organic products than man (İnci et al., 2017). Most of the consumers who buy organic food are women, 31-40 years old, high school and university graduates, have two children, earn between 3,000-5,000 monthly (Eti İçli et al., 2016).
Determinants of increase in organic product consumption:	Introduction of organic products: News on GMO, health problems, the fact that organic is produced using methods less harmful to environment caused starting to purchase (Seçer et al., 2010) 73.8% mentioned their consumption decision to be highly influenced by TV programs explaining adverse effects of food treated with hormones on health (Karabaş & Gürler, 2012).
Determinants of sensitivity to inspection:	Female consumers pay more attention to control (Sarıkaya, 2007). Those buying organic products more frequently trust more in certification logos. As share of organic products increase within the total food expenditure, probability that the logos are known to consumers increase. Female and older people are more skeptical about the trustworthiness of the logos (Uysal et al., 2013). 35% recognized the logo of TEMA as official logo of organic foods. Only 9% recognized the right logo (Ergönül and Ergönül, 2015). More than 50% know the organic product logo (Kaya et al., 2016).

*Due to the fact that consumer studies were numerous, only some of the studies and findings have been possible to include in the study. The findings are valid for the respective locations of the studies.

On the other hand, research on organic food sector shows that, increased demand for organic products requires consumer awareness, ability to afford the price; availability in the market (to see the product in the market, to be able to find it where / when needed, and as affordable) and trust in organic production. In other words, there is a two way relationship between "Demand for Organic

Products" and "Development of the Organic Sector". For example: Organic milk and milk products and dried fruits are dominating the domestic organic market. Because, these products are both supplied (especially organic dried fruits sub sector already improved for export) and demanded (especially milk and milk products for children) regularly in the market. Therefore, the correct strategy for development of the organic sector would be improving both production and demand at the same time.

The question of "How to increase the demand for organic?" implies answering "How to improve the consumption habits?" or "How to create behavior change?" According to consumer behavior theory, behavior change also requires better understanding of the structure of the demand. All in all, an efficient Marketing Strategy would only be possible through demand analysis. While the main research question would be "What are the factors that effect (improve/limit) demand?" factors such as motivations, cultural effects, life style etc. should be further integrated in the analysis. At this point, some of the conflicting results also points out need for improved data gathering methodology to avoid misleading questions and the resulting survey problems.

Given the negative externalities of the conventional agriculture and the positive externalities of the organic agriculture for the society, improvement of organic agriculture should not be left to market mechanism only. This would end up with market failure. For that reason, when the demand for organic is not powerful enough it should still be the State's responsibility to improve the sector. Then, the efforts by government should go both ways: Organic production should be financially supported (area based support should continue, cross compliance type privileges should be applied (priority given to small scale farms); tax rates should be reduced). On the consumer side as well, taxes over the retail prices of organic food products should be reduced. Support to organic agriculture at this early stage, out of tax payers, may be considered as «realization of the ethical behavior expected to be created on the consumer side in the name of them by the government». Certainly, targeting, in the medium and long run, that both producer and consumer put their own preferences forward. To this end, it is also critical at this stage that awareness raising activities should be carried out for both sides. Both producer and consumer awareness should be improved.

Of course, it is not only government who should contribute to an increased level of awareness and ethical concern on the consumer side. Elements of the Marketing Mix (product, price, distribution (place), promotion) should also be

well organized by the producers and retailers, according to the results of research on consumer. According to the Neo-classical Theory of Price, demand is a function of product prices (own/ substitute/ complementary goods), income, population, expectations and taste. The Theory of Consumer suggests maximization of utility which could be translated in to marketing as the need for creating consumer value. Models of consumer behavior developed under the field of marketing points out the importance of motivation, perception, learning, attitude, personality, life style, culture, reference groups, situational and demographic variables etc. With economic development (along time), decreased importance of variables such as price and income and increased effect of taste and preferences which are rather influenced by above mentioned psychological and sociological factors on consumer behavior is observed. In Turkey, currently, price and income still seem to be of considerable importance with respect to organic product demand. Then again, there are research findings pointing out influence of other factors such as knowledge, awareness, life style and motivation as well on the preferences regarding organic. Well tailored Marketing Strategies appropriate for the target consumer should be developed and used by the organic business.

Lastly, but not least, like in any field of action, if consumers would like to have healthy diets in their plates and to live in and inherit a livable environment to the next generation, they should reveal characteristics of responsible consumer (exhibiting participatory behavior), informed consumer who seeks for information, and a demanding consumer (trust, fair price etc.) as well. Proactive consumers taking part in CSA and PGS groups would have better chances for having healthier lives. Closer dialog between Consumer & Producer via social networks such as supporting/initiating CSA groups and PGSs would benefit both sides.

Overall, development of the domestic market seem to require further improvement of both producer and consumer awareness toward organic production system and collaboration among all stakeholders. Besides, rapid development of the market reveals the need for continued research.

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A case of social networks of organic and conventional hazelnut producers in Turkey

Kursat Demiryurek[54]

Abstract

This study aims to present the social networks of organic and conventional hazelnut producers in Turkey. The field study was made in three villages of Terme district of Samsun province, which is the oldest organic hazelnut production area in Turkey. The networks were examined using Social Network Analysis (SNA) method. SNA was applied using Pajek and Node XL computer programs and visual graphs were presented. In the network of organic hazelnut producers, the relationships among them were more intense, and their primary information source was the peer organic producers in their villages. Other limited information sources were public institutions and private input companies, the organic marketing company, and the mass- media sources. Compared to the organic producers, the network density of conventional hazelnut producers was lower and the sources were uniform. The most benefited information source of conventional hazelnut producers was the leaders of organic hazelnut producers. Rather than personal or informal information sources in village, the institutional or formal information sources had limited support to both organic and conventional hazelnut producers. The local and indigenous knowledge within the village or the information developed by the producers should be supported with scientific information.

Key words: social networks, Social Network Analysis, organic hazelnut, Turkey

Introduction

In contrast to conventional agriculture, organic agriculture is based on high knowledge and low input use, emerged as a closed system of agricultural production based on principles of self-sufficiency. Organic farming is the most visible sustainable agricultural system that has specific principles, certain regulations and practices from production to marketing of organic products (Demiryürek, 2000; 2016). All over the world, several countries in conversion to organic agriculture have chosen to start from specific export traditional products of the country. In Turkey, dried fruits and nuts, were the first organic products in the beginning of 1980s. Today, about 46 thousand producers produce more than

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200 different products in about 380 thousand hectares of land as organically in Turkey. Export value of organic products were about 77.8 million US $ in 2017. They were exported to more than thirty countries from Turkey and the main importers were USA (18%), Germany (17%), France (15%), Holland (14%) and others. The main organic export products in terms of value are hazelnut (32%), fig (24%), dried sultana (16%), apricot (14%) and other fruits (MFAL, 2017).

Organic hazelnut cultivation in Turkey began with a German company's demand for organic hazelnut in Çamlıca village in Terme district of Samsun. Organic hazelnut is the most-produced product in the province of Samsun. Organic hazelnut is intensively produced in Çamlıca and Yüksekyayla villages in Terme district and in Agcagüney town in Çarşamba district of Samsun province (Aydoğan, 2012). The amount of organic hazelnut production in Samsun (2.575 ton out of 12.890 tons total) province is approximately 20% of the Turkey's organic hazelnut production (MFAL, 2017). Samsun province has an important place in terms of farmers' organization of organic hazelnut producers. The first agricultural and indeed organic producers' association was established in Terme district of Samsun province in Turkey. In context of organic agriculture in the Samsun province, Terme Organic Agriculture and Hazelnut Growers Association, Yüksekyayla Village Development Association, Çarşamba Organic Hazelnut Growers Association and Yukarı Aksu Organic Village Farm Project were established. Local governments and public institutions gave support and created channels for consumers to reach organically produced products (Demiryürek, 2010; Aydoğan, 2012).

The objective of this study is to analyze social networks of organic and conventional hazelnut producers in the villages of Samsun province of Turkey. The networks consist of the individual information sources between the producers (other peer producers) and the out-of-village institutional sources (staff of provincial and district directorates of Ministry of Food, Agriculture and Livestock, dealers of agricultural pesticides and fertilizers, private consultants, mass-media, and etc.). The analysis presents the structure of social networks, in other words, the information exchange or communication between producers. In sum, the aim is to reveal the actors in the mentioned system (especially the leaders), the interactions between them, and the network of information exchange.

Material and methods

This study was carried out in three different locations, namely Çamlıca village and Yüksekyayla village in Terme district and Ağcagüney town in Çarşamba district of Samsun. Çamlıca village is one of the first organic hazelnut production areas in

Turkey. Organic hazelnut production in Çamlıca village was begun with organic hazelnut demand from a German organic marketing company in 1993. The first organic hazelnut growers association in Turkey was established in Çamlıca village by organic hazelnut growers. Conversion to organic farming in Yüksekyayla village started with the project of the EU named "Capacity Development for Transition to Organic Agriculture". In Yüksekyayla village, the hazelnut growers were trained and adopted organic farming with the support of local University lecturers and researchers. Conversion to organic farming in Ağcagüney town also started with the project of Conservation of Land for Environmental Purposes (CLEP). Transition to organic farming was mandated in this town located in the basin of the drinking water dam Gökçeçakmak. Conventional agriculture due to use of chemical inputs was not allowed in the dam basins providing drinking water. These study areas were selected purposefully due to their different ways of conversion (organic hazelnut producer network is less, but ption) to organic farming.

The population of this study consists of companies operating in organic and conventional hazelnut production in Yüksekyayla, Çamlıca and Ağcagüney villages of Terme district, Samsun. The accepted margin of error in this study was 10%. The required sample size (at confidence interval of 90%) was calculated to be 55 for those producing organic hazelnut and 57 for those producing conventional hazelnut.

In this study, the hazelnut-related information sources of organic and conventional hazelnut producers, the structure of communication between the producers, and the relationship between the producers were analyzed using Social Network Analysis method.

Social network analysis is an analysis method that is used for determining the leader farmers in network comparing the structures of networks, and making inferences related with the Game Theory (Demiryurek and Aydogan, 2010; Demiryurek, 2014). In determining the structure of networks established by the organic and conventional hazelnut producers, the actors playing the role of leader farmers in network, and in making inferences regarding the Game Theory, the density and centrality (degree, proximity, and betweenness) measurements of the SNA methods were employed. In performing and visualizing the SNA statistics, Pajek and Node XL package software were used.

Results

As social networks, the village information sources of organic and conventional hazelnut producers were examined. Within the scope of research, the organic

and conventional hazelnut producers were asked to specify their primary and secondary information sources. In the study area, there were two agricultural producers' associations established by the farmers. If these agricultural producers' associations were utilized as information sources was investigated. Since the management of these associations consisted of the same producers, it was considered as appropriate to evaluate the producers together with primary and secondary information sources of the village.

Figure 1 shows the village information sources of conventional hazelnut producers while, Figure 2 shows the information sources of organic producers. In both figures, the producers and other information sources are presented in circles and named as actors. To determine the sizes of actors in the network, the eigenvector values were used. In other words, the sizes of actors in Figure 1 and 2 were drawn in proportion to their importance in the network. As the size of actors increases, the importance of that actor in network also increases. In presentation of the relationship between the actors, the primary preferences were drawn in bold black, while others were drawn in grey color. Both of the village information sources were the oriented networks, and the direction of the arrows in the diagram indicate the preferred source of information. Legend explains the meaning of colors used in the presentation of the actors. The distances between the actors in village information source networks of conventional and organic

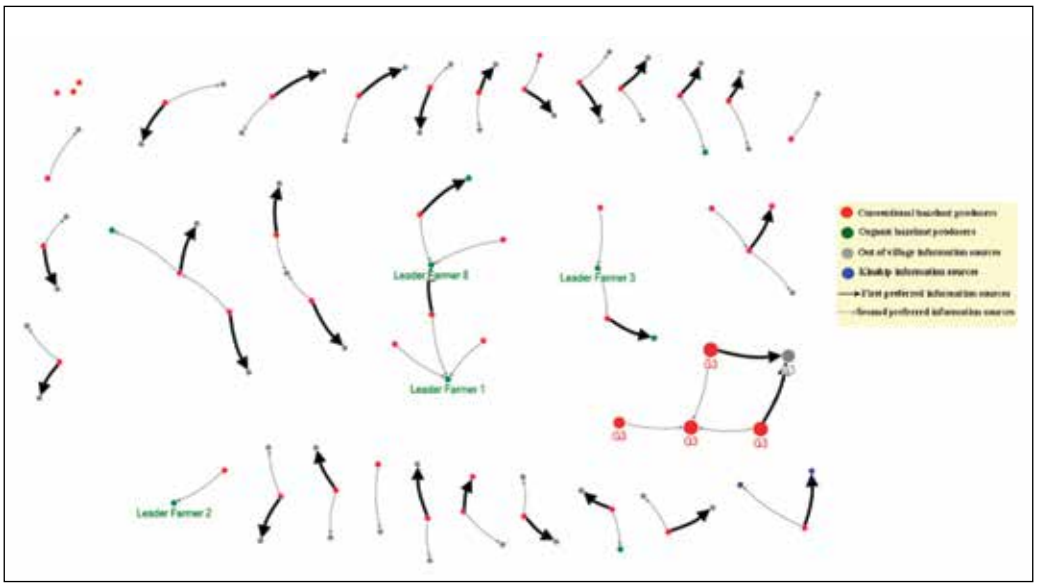

Figure 1. Social network of conventional hazelnut producers

hazelnut producers were not important, and they were manually drawn in order to provide the visual representation.

The most preferred information sources in both Figures of social or communication networks indicated with labels such as Leader Farmer, 1, 2, 3,..., 8 and etc. represent same persons in all networks. In this study, firstly, the village information sources of conventional hazelnut producers (Figure 1) and then those of organic hazelnut producers (Figure 2) were examined, and finally these networks were compared to each other.

The SNA statistics of village information sources of organic and conventional hazelnut producers are given in Table 1. The number of actors among the village information sources of conventional hazelnut producers was higher than the number of actors in organic hazelnut producers' network. On the other hand, while 3 actors in the network of conventional hazelnut producers had no relationship with anyone, it was determined that every actor in organic hazelnut producer network had relationship with at least 1 of other network members. Despite the higher number of actors in the network of conventional hazelnut producers, the number of relationships was lower than that of organic hazelnut producers. For this reason, when compared to the network of organic hazelnut producers, the network of conventional hazelnut producers was lower density. In other words,

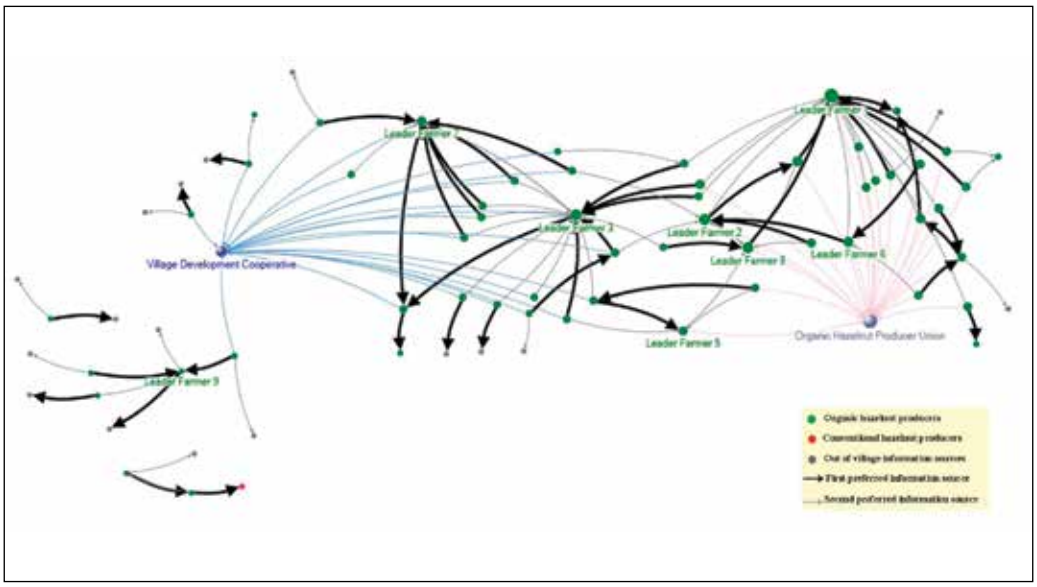

Figure 2. Social network of organic hazelnut producers

Table 1. Network statistics of organic and conventional hazelnut producers

Measurement type	Organic network	Conventional network
Number of actors in network	76	102
Number of actors having no communication with anyone in the network (isolated)	0	3
Number of groups having connection with each other	3	33
Number of actors in largest group	69	8
Network density	0.047	0.0068
Mean proximity value – potential to establish relationship	0.030	0.351
Mean eigenvector degree	0.0131	0.010
Mean betweenness degree	80.9	1.84
Number of cluster	0.304	0

the potential of sharing information between the producers in the network of conventional hazelnut producers was lower that of the organic network.

Producers' clustering (making groups) among themselves is an important advantage in terms of decreasing the costs of establishing producer organization, besides reducing the marketing costs. Clustering inclination of actors in any social network is also an important situation from the aspect of information distribution within the network and transfer of innovations (de Nooy et al., 2005). For this reason, in order to reveal the aggregation inclination of the producers in organic and conventional hazelnut producers in their village communication networks, the mean clustering coefficients were calculated. As a result of the analyses, the network clustering coefficient of organic hazelnut producers was found to be higher than that of conventional hazelnut producers. In other words, when compared to conventional hazelnut producers, the organic hazelnut producers act in a more organized manner. As a result of that, while the number of groups in relationship in village information network of organic hazelnut producers was 3, the same value of conventional hazelnut producers was found to be 33. While the number of actors in the largest group in the village information network of conventional hazelnut producers was 8, the same value was found to be 69 for organic hazelnut producers (Figure 1). Given the village information sources of organic hazelnut producers (Figure 2), it can be seen that the network cluster is formed around the leader farmers, the producers' associations and the development cooperative. Every producer group firstly cluster around the leader farmer in their village, and they can access to more institutional information through the leader farmer. Given the village information sources of conventional hazelnut producers, it can be seen that the network cluster consists of large number of possibly-ineffective actors.

The most important characteristic distinguishing organic hazelnut producers from conventional hazelnut producers in terms of aggregation is that the number of groups in the organic hazelnut producer network is less, but the number of members in groups is higher. The conventional hazelnut producers generally establish groups with 3 members. However, at the centers of groups consisting of multiple organic hazelnut producers, there are the farmers. This can also be interpreted in the way that the fundamental information source of conventional hazelnut producers living in the same social environment is the leader organic farmers. In other words, the conventional hazelnut producers selected the leader farmers within their village either in organic manner or the information transferred based on the kinship relationships (G3) in **Figure 1**.

Besides the interpretations about the entire network, the comments on the importance of actors have significant place in SNA (Scott, 2000). Within this context, the centrality degrees were calculated for conventional and organic hazelnut producers. Determining the actors controlling the information transfer throughout the network is very important for revealing the actors facilitating the information distribution within the network or those obstructing the information transfer and taking the regulatory or supportive measures. Proximity centrality degree is one of the methods widely used in determining such actors (Wasserman and Faust, 2006). The betweenness centrality degree is also important since it mathematically reveals the control strength of an actor on the communication between other actors within a social network (Freeman, 1977). In other words, it can be described as the actors' strength of controlling the information transfer and communication in the network. The actors having higher betweenness centrality strength have higher strength of controlling the network (Valente, 2006). When comparing the networks of organic and conventional hazelnut producers, it can be seen that the organic hazelnut producers' strength to control the network (80.9) is higher than that of conventional hazelnut producers (1.84). Similarly, the proximity of actors to others is also important for the development of the network. The proximity centrality degree can be defined as measuring how long it takes for the information to be distributed from an actor to all other actors (Borgatti, 2005). The actors having high proximity centrality degree are the central actors, and it is considered that the information would be distributed more rapidly in networks with lower proximity centrality values. The mean proximity centrality value of organic hazelnut producer network (0.0301) was found to be lower than that of conventional hazelnut producers' network (0.351). In other words,

information can be more rapidly distributed in the village network of organic hazelnut producers, when compared to the distribution in conventional hazelnut producers.

In determining the central actors in a social network, the eigenvector value, taking the direct and indirect relationships into account is employed. The actors having high eigenvector centrality degrees are the actors that are important for the network. The mean eigenvector value of organic hazelnut producers (0.0131) was higher than that of conventional hazelnut producers (0.010). In other words, it can be stated that there are more leader farmers in the network of organic hazelnut producers.

Analysis of the general characteristics of leader farmers showed that these farmers were the entrepreneur farmers having higher level of technical knowledge and social capitals when compared to others. As a general assessment, in the network of conventional hazelnut producers, the number of actors was high, the number of relationships was low, and most of the relationships were those preferred secondarily (57.1%). Despite the lower number of actors in the network of organic hazelnut producers, the relationships between these actors were strong, and these relationships mainly consist of primarily preferred ones (62.8%). Another difference was that, while there was only 1 conventional hazelnut producer in the network of organic hazelnut producers, the main information source of conventional hazelnut producers consists of organic hazelnut producers, and there was no organizational relationship between conventional hazelnut producers.

Discussions

In this study, the social networks of organic and conventional hazelnut producers, their information sources, the communication channels they use for accessing the information, the actors in network, and the roles of these actors were analyzed. In addition, social networks of organic and conventional hazelnut producers were compared.

In the networks of organic and conventional hazelnut producers, the new information and innovations dissemination sources were the presidents of producers' associations, the imams (praying leader), the village headmen, the leader farmers, and technical knowledge of whom are trusted. For this reason, the distribution of information obtained from external sources needs to be distributed in these networks by the leader farmers.

One of the most important findings of this research was that conventional hazelnut producers received the suggestions of organic hazelnut producers. Organic hazelnut producers serving as a model for conventional hazelnut producers might be an efficient method for transition to environmental-friendly and sustainable agricultural techniques.

Both of organic and conventional hazelnut producers paid attention to the experience and opinions of the leader farmers. For this reason, the innovation and information need to be distributed throughout the network via this function of leader farmers.

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Organic agriculture in Azerbaijan and market potentials

Hazi Eynalov[55]

Abstract

Organic agriculture was entered into the development process in the early twentieth century. The main reason for it was the problems that arise in the environment, plants, animals, and human health. Particularly, the increasing market demand for organic products in developed countries paved the way to the enlargement of the organic agriculture, which gained importance in the last 20 years.

Azerbaijan that possesses significant hydrocarbon resources faced with the challenge of the development of its non-oil sector in order to diversify its economy due to the ongoing economic process in the world in recent years. The development of the agricultural sector that take an important place in non-oil sector in Azerbaijan and production of the commodities that have additional value brought the production of the organic products and development of marketing chances to the agenda of the government in the last decade. Therefore, while taking into consideration that the main source of organic production is the traditional agriculture, this research investigates the potential of general agricultural and organic productions, market chances, and potential of markets in Azerbaijan.

The increasing demand of the organic products in the world market, food safety concerns, and environmental issues turn organic agriculture into a promising target in Azerbaijan.

Key words: Azerbaijan, organic agriculture, markets.

Introduction

As a country, Azerbaijan is located in the border of Europe and Asia but its territory mainly lies in the Asian continent. Only small part of its territory in the north of the Caucasian Mountains is located in Europe.

The economy of Azerbaijan is based on hydrocarbon resources, mainly oil and gas. Export income that plays significantly important role in the development of the country depends mainly on the export of these hydrocarbon resources. Even though, the government of Azerbaijan tries to develop other sectors, such

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as construction, banking, and real estate, the export of oil and gas is the main driving force for the economy of the country. Therefore, one of the primary aims of the Government is to decrease dependence of the economy of the country from export of the hydrocarbon resources in order to assure the expansion of the economic development to the agricultural sectors, which is the third biggest sector in the economy of Azerbaijan after energy and construction and possesses biggest share in employment.

Although, Azerbaijan has diverse topographic and climatic zones that led the enrichment of the agricultural production of plant and animal origin, including fisheries and bee keeping, it is a net importer of food products. The main problem in the agricultural sector is the low agricultural productivity due to the fragmented holdings and critical degradation of the natural resources.

When the new Republic was established, there was significant demand for the structural changes in the agricultural sector, including land tenure and management capacity in farming practice. During that time, hydrocarbon resources gained significant attention in the economic growth. Today, agricultural sector is a main contributor for economic growth and for decrease of unemployment and poverty. It should be mentioned that today the share of agricultural sector in gross domestic product (GDP) is still low. However, special attention paid to the non-oil sector by the government led to the diversification of economic activities and development of agricultural sector.

Agriculture and perspectives for future development

Agriculture has a significant portion in the Azerbaijan's economy. Meanwhile, it also plays an important role in decreasing unemployment rate within the country. Thus, approximately 2/5 of employed population of Azerbaijan work in agricultural sectors and over 7% of fixed assets on the branches of the country's economy comes from agriculture. Overall, agriculture and agricultural processing sector provide more than 50% of the non-oil exportation (Khalilov, 2015).

Two types of farms, plant growing and animal husbandry, dominates the agricultural production in Azerbaijan. In 2013, more than 9/10 of the overall agricultural production came from these farms.

Generally speaking, agriculture takes the third place as a contributor to the national economy in Azerbaijan after energy and construction sectors. The contribution of agriculture to GDP is 8%. 99.8% of agricultural holdings are private. 66.8% of

them are family farms, 32.8% of them are engaged as subsistence farming, and the rest 0.2% are run by agricultural enterprises. By generating 2.7 billion $, which equals to 41% of manufacturing output, agro-industry plays very significant role within the country. Major agro-industry spheres are processing of meat and dairy products and canning of fruit and vegetables. 99.8% of the processors are private small-medium sized enterprises (Anonymous, 2011).

Agricultural sector is one of the most crucial sectors in Azerbaijan also because of its socio-economic impact. In 2016, about 4.6 million (47%) of the Azerbaijani population (9.7 million) were living in rural areas. Approximately, 36.4% of them were making their livings by agriculture, forestry or fishing activities. The territory of Azerbaijan is 86,600 square kilometres and cultivated agricultural land is 4,769.7 thousand hectares (0.055%), which has decreased from 0.58 ha in 2001 to 0.49 ha in 2015 per capita because of population increase in the country. Land uses other than arable land has stayed almost stable (Table 1).

Table 1. Land use in Azerbaijan

Years	Population, 1000 person	Person per		Utilised agricultural area per capita, ha	Arable land, 1000 ha	Permanent crops, 1000 ha	Hayfields and pastures, 1000 ha	Wood, 1000 ha
		1 km^2 of territory	utilised agricultural area					
2001	8191.4	95	173	0.58	1775.9	227.0	2682.9	1037.6
2002	8269.2	95	174	0.57	1783.2	225.9	2681.7	1037.0
2003	8349.1	96	176	0.57	1785.6	225.8	2690.3	1037.8
2004	8447.4	98	178	0.56	1790.8	222.8	2691.4	1037.8
2005	8553.1	99	180	0.56	1797.6	221.5	2693.9	1037.8
2006	8666.1	100	182	0.55	1795.5	221.1	2693.6	1037.8
2007	8779.9	101	185	0.54	1808.4	224.7	2677.8	1038.8
2008	8897.0	103	187	0.53	1818.4	227.5	2669.0	1038.8
2009	8997.6	104	189	0.53	1832.5	227.0	2656.2	1039.9
2010	9111.1	105	191	0.52	1842.7	227.4	2655.3	1040.7
2011	9235.1	107	194	0.52	1843.8	227.2	2655.8	1040.8
2012	9356.5	108	196	0.51	1855.0	230.9	2640.6	1040.8
2013	9477.1	109	199	0.50	1884.3	230.3	2614.2	1040.2
2014	9593.0	111	201	0.50	1885.6	233.5	2609.8	1040.3
2015	9705.6	112	204	0.49	1897.5	237.0	2595.2	1040.3

Source: http://www.stat.gov.az/source/agriculture/indexen.php.1.2

Wheat is the main staple food, which contributes to more than half of the daily calorie intake. 40% of the cultivated land is covered by cereals, which received high attention due to its contribution to self-sufficiency. Therefore, government of Azerbaijan subsidies production of cereal with direct payments per unit area. In addition to cereal, subsidy exists for fuel and chemical fertilizer. About 90% of the farms (620.000) are small holdings that occupy 85% of the agricultural land. Nearly all of these small holders possess few animals, which provide meat, milk, and their products for consumption of their families. This also let them use the manure of their animals directly in their plots. Thus due to the sizes of farms and absence of the cooperatives/unions the farmers face difficulties in market access. In accordance with the market demand, the farmer organizations recently highlighted planning and practices. Wheat is the top imported commodity in term of value. According to the statistics of 2015, 1.350 tons of wheat was imported in Azerbaijan that amounted 296 million $. The main suppliers of food and beverages in the decreasing order are considered Russia, Ukraine, Brazil, and Belarus. Food and agricultural imports account for about 20% of total import value and main imported products include poultry, tobacco, wheat, rice, vegetables, fruits, processed foods and powdered milk. Meanwhile, Azerbaijan also exports agricultural products, such as canned and fresh fruit and vegetables, fruit juice, early potato, and raw tobacco.

Organic agriculture potential in Azerbaijan

In Azerbaijan, organic production began approximately 10 years ago and since 2008 there is a specific legislation regulate the organic production within the country. The land that is used for the organic production is reported in 2015 as 0.8% of all lands of agricultural sector (Willer and Lernoud, 2017). Forest area that is certified for organic production was 123 ha, and the area certified for wild harvest was 919 ha, which were yielding totally 24.782 hectares certified organic land. As shown in Figure 1 the total land area in 2014 that is certified as organic within the country is described as 24.391 ha and 23.331 ha of this organic land are cultivated land, 123 ha to forest, and 937 ha are devoted to wild collection of fruit, nuts, berries and medical aromatic plants. The value of the retail market is approximately 3.0 million Euros (Willer and Lernoud, 2017).

The main annual and permanent plants in Azerbaijan are produced organically. It is also expected that the fruit orchards in conversion stage will also contribute to the future growth. Among the animal products only honey is certified organic. In 2014 932 beehives were certified as organic in Azerbaijan.

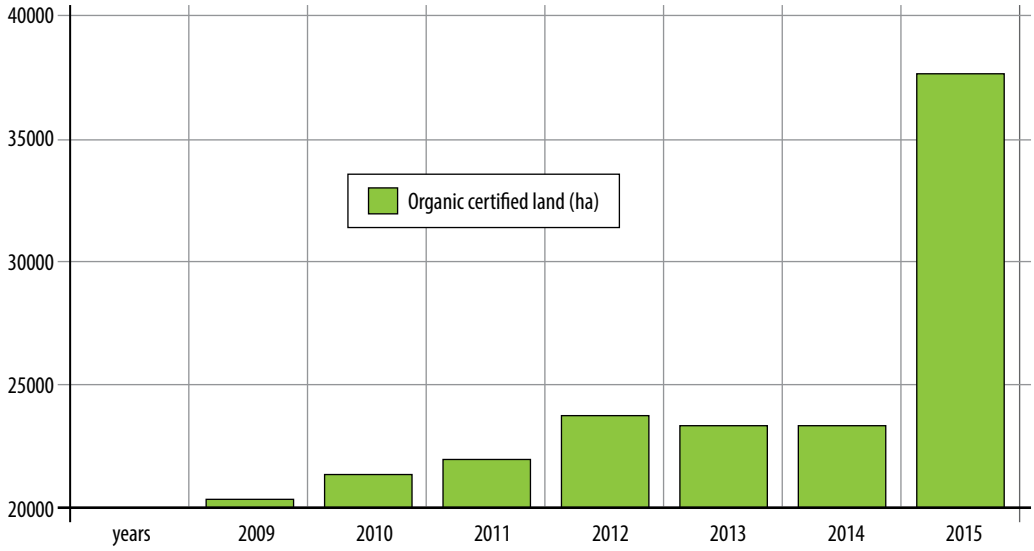

Figure 1. Organic certified land (ha) between 2009-2015 (Willer and Lernoud 2015, 2016, 2017)

Azerbaijan possesses 0.05% of the world organic agricultural land. Its share in Asia is 0.216%. Azerbaijan is in the list of the top ten countries with the highest share of organic in total agricultural land. In 2013 there were 288 producers and 14 processors in Azerbaijan and there were not any importer or exporter. In 2011 the amount of the domestic sales of organic product was approximately 3 million Euros, which were calculated as 0.3 Euro per person (Willer and Lernoud, 2016).

Table 2. Breakdown of activities on certified total land area and wild collection in Azerbaijan (2015)

Activity type	Certified area (ha)	Major activity type	Certified agricultural land (ha)	Share of organic in total (%)	Wild collection activity	Certified area (ha)
Agricultural land	37 630	Cereals	1598	0.2	Berries, wild	161
Aquaculture	123	Citrus	21	0.7	Fruit, wild	161
Forest	123	Dry pulses	6	0.04	Fruit, wild	541
Wild collection	1063	Temperate fruit	754	1.5	Medicinal and Aromatic plants	56
TOTAL	38 939	Subtropical fruit	495	4.8	Nuts	179
		Vegetables	213	0.2	No details	126
		Oil seeds	126	0.7	TOTAL	1063
		Grapes				
		Olives	13	0.8		

Source: Willer and Lernoud, 2017

Table 3. Major crops produced in Azerbaijan and certified as organic (including in conversion) in 2012 and 2014

Crops	Organic area (ha)		Organic share (%)		Area fully converted (ha)		Area under conversion (ha)	
Years	2012	2014	2012	2014	Years	2012	2014	2012
Cereals	2 186	1598	0.2	0.2	Cereals	2 186	1598	0.2
Oil seeds	126	126	0.6	0.7	Oil seeds	126	126	0.6
Protein crops (Dried pulses)	6	6	0.0	0.05	Protein crops (Dried pulses)	6	6	0.0
Citrus	8	21	0.3	0.9	Citrus	8	21	0.3
Grapes	41	41	0.3	0.3	Grapes	41	41	0.3
Olives	13	13	0.7	0.7	Olives	13	13	0.7
Temperate fruit	698	754	1.5	1.5	Temperate fruit	698	754	1.5
Subtropical fruit	385	495	4.1	4.8	Subtropical fruit	385	495	4.1
Vegetables	192	213	0.2	0.2	Vegetables	192	213	0.2

Source: Willer and Lernoud, 2014; Willer and Lernoud 2016

Between the years of 2014 and 2015 the organic certified land areas in Azerbaijan increased by 14.299 ha (Figure 1). Main developments were in subtropical and temperate fruits and vegetables, and to a lesser extent in oil seeds and dry pulses (Table 3). In 2015, the number of organic beehives was calculated as 932. According to figure of 2015, there were 123 ha certified agriculture and 123 ha forest area in Azerbaijan. Today, there are 305 producers, 50 processors, and 50 importers that are registered by the foreign certification organizations functioning in Azerbaijan (Willer and Lernoud, 2017).

Marketing channels

According to the studies the domestic marketing chains in Azerbaijan function as four different channels. The first channel is marketing of organic agricultural products directly between farmers and consumers. The second channel is that retailers purchase the organic products from the producers and sell them to consumers in the market. There are two different mediators as wholesalers and retailers in the third form of marketing chain. The fourth channel involve more actors between the producer and consumer (Figure 2).

The wholesale markets develop efficiency in agro-food distribution in two ways. First, by encouraging competition by establishing conditions for transparent price discovery at relatively low costs, and second, by enhancing access to market information for different actors. Under these circumstances, retailers should deal directly with large number of farmers, so losing any gains from scale economies (Tracey-White, 1994).

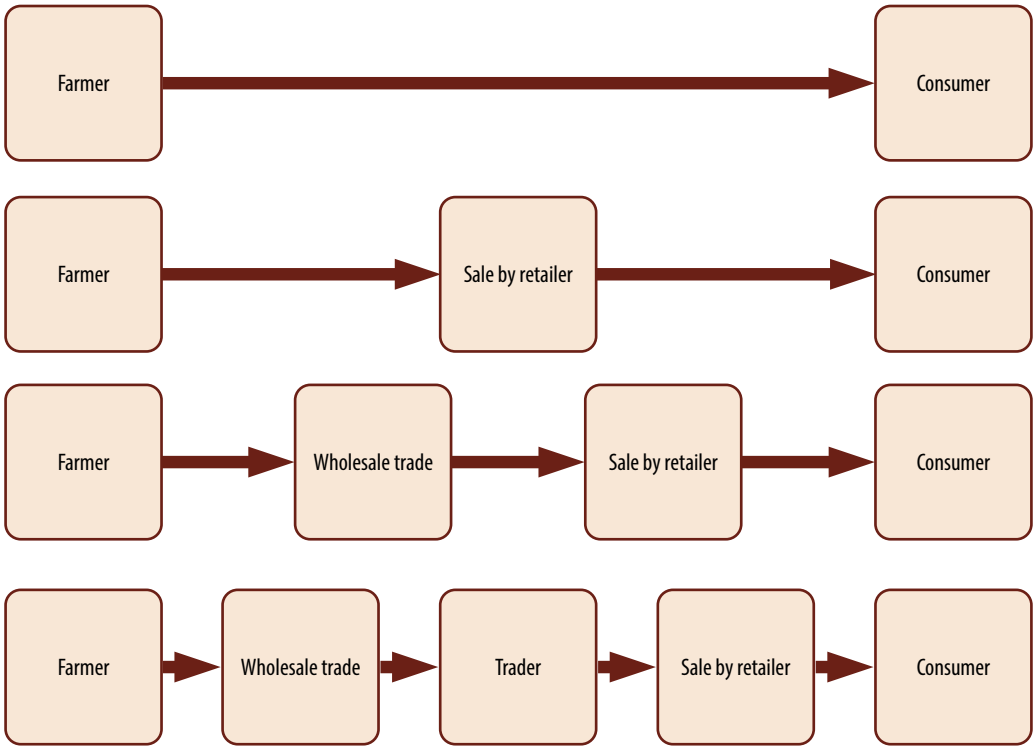

Figure 1. Organic certified land (ha) between 2009-2015 (Willer and Lernoud 2015, 2016, 2017)

That is why, wholesale markets play a significant role in the vertical coordination of food markets while equilibrating supply with demand and facilitating price information. By this way, they help reduction of marketing costs while promoting stable markets for local farmers and producers and encourage them to improve output and productivity.

There are 63 wholesale markets and 87 retailer markets in total within the country for agricultural products. The number of wholesale and retailer markets increase day by day in more populated areas in Azerbaijan, such as Baku. It is possible to use these wholesale and retailer markets for organic agricultural products even if they were created for conventional farm products. Traders and mediators play really a significant role in the marketing of products between wholesalers and consumers. However, they increase marketing margins and as a result, consumers pay higher prices and producers receive lower prices for their products. On the other hand, unlike in wholesale markets, in retailer markets, consumers have easier access to market and lower marketing margins and possess a possibility to pay lower prices for good products.

Domestic market for organic products

A domestic market is an internal market functions within the country, in which, all production, transportation, storage, distribution, consumption and security of goods and services' processes takes place within the internal borders of the country. In comparison to international marketing, producers face more limitations while competing in the domestic market. However, there are less barriers in domestic marketing, particularly, in following consumer tastes and preferences, and in obtaining data on consumer demands and marketing trends. This helps companies to improve more effective strategies on marketing and focus accurately on their future decisions. In comparison with international markets, domestic markets are perceived as less risky and require lower financial resources. Today, it is possible to find shops and supermarkets in Baku displaying imported certified organic products, such as, food, beverages, cosmetics, and textiles. All these factors show that analysing domestic markets carefully will make it possible for agro-industry to improve domestic demand, increase competitiveness, and strengthen the value chain in various commodities. It should be mentioned that organic agriculture in Azerbaijan is mainly export oriented. Therefore, there is a great need to acquire a strategy for promotion of the domestic market for organic products.

The market size of a specific product refers to present sales of that production. However, if there is an increasing demand for that product and its use expanding, the future sales may also be accepted as potential market size. Therefore, to promote the production and consumption of organic agricultural commodities and to improve a sustainable market chain, the potential market size should also be taken into account. Even though there are different reasons that have an impact on potential market size, increasing trend of the population may provide possible basic information on which the producers can base their future plans.

Although demand for many other products depends not only on population growth, but also on the price of the commodity, prices of alternative and complementary goods, income of the households, consumers' tastes and preferences, and consumer expectations, population growth have the major influence on demand of agricultural products due to their daily necessity. Therefore, high population growth increases demand for farm products. When consumer preferences increase parallel to the increase in their awareness on health and environment, the demand for organic products will also increase. However, this increase in demand of organic products is expected to slow down in comparison to conventional products, if their prices are considerably higher and if the income of consumers continue to be low.

According to a consumer survey conducted in Azerbaijan the main consumers of the organic agricultural products are listed as follows: upper-class households (37%), foreigners (31%), housewives (21%), academic elite (10%), and students (1%) (Babayev, 2012). The same research indicates that the prices of the organic products were significantly higher in comparison to conventional products. However, as shown in the research, such higher prices of the organic products do not reduce the sales of it due to the reason that consumers of the organic products are willing to pay higher prices for it. It should be mentioned that the result of above-mentioned research might be valid for high income and well-educated consumers. Thus, for expanding markets of organic products and make these products available for consumers who have low income, extra charges should be erased and prices should be decreased to as low level as possible in order to enlarge the domestic market with internally produced organic products. The devaluation of the Azerbaijani Manat exerted marked effect on prices of imported agro-food products. Therefore, today, foreign embassies, hotels, and high-income and well-educated families mostly purchase organic products in Azerbaijan.

The above-mentioned limitations are considered as common limitations in almost all developing countries in the world that are at the early stages of the development of domestic organic market. It should be highlighted that if there is assurance to the consumers in Azerbaijan that the food commodities and products are good for their health then they are willing to pay higher prices for these products even though the monthly income of them is low. To a certain extent, it derives from the lack of assurance regarding the safety of the products. The consumers are willing to decrease their spending for other commodities and pay additional money for the healthy and safe food products. The percentage of the consumers that are shopping from local bazaars is becoming reduced due to the mainstream retailers and supermarkets began to establish branches almost in every neighbourhood and good and services came closer to customers.

Conclusions

The potential of the existing agriculture is significant for the development of organic farming in Azerbaijan that mainly depends on the export of the oil and gas resources. In the development of the non-oil sector, which is one of the main strategic targets of the Azerbaijani government, the production of the agricultural products that possess high additional value is considered and perceived as one of the main targets.

It should be stated that there are productive environment in Azerbaijan for the development of organic farming, which does not have a long development history. Along with the establishment of legal infrastructure, international projects that have been implemented until today has played its role in the development of organic farming. However, lack of the local certification institution, deficiency of the coordination among the official institutions that are dealing with the development of this field, deficiency of the enlightenment among the producers, and specially lack of government support for this field are considered the main problems for the development of the organic farming.

The development of local market, activation of the marketing channels day by day is promising for the development of the organic farming, which is buy the private sector in the country. Population growth, development of the marketing channels, demand for safe food, and the increasing interests of the producers to the organic farming show that the development of this filed will increase in upcoming years.

In addition, for the development of the organic farming in Azerbaijan the following steps should be taken into consideration.

- Investigation and implementation of technical and technological researches,
- Upgrading personnel and qualification,
- Organizing educational activities.
- Thus, there is conceptual as well as legal basis for the production and circulation of the ecologically safe and clean agricultural products in Azerbaijan. An actual issue is to constitute production of ecologically clean agricultural products and its comparativeness.

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Critical points in post-harvest management of organic plant production for quality and safety

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Abstract

The value of the global organic food and beverages market is increasing at a higher rate than the conventional markets, and this growth is significant especially in developed countries. This trend creates new opportunities for producers in developing countries. The food quality and safety standards applied in these markets are on one hand creating bottlenecks in trade but on the other hand helping enhancing quality and safety levels in the domestic markets. In Central Asia, organic production is seen as an opportunity for entering export markets due to richness in diversity and low pesticide use. However, to access in export markets there is a need fulfil standards and requirements for agro-food product quality and safety of the importing countries. The paper aims to identify the major physical, biological/ microbial, and chemical hazards, the current risks arising at and after harvest and discuss the critical points at which control measures have to be applied. The problems faced in Uzbekistan are dealt with detail as case studies.

Key words: Hazard, market standards, maximum residue level, microbial load, mycotoxins

Introduction

The organic food and beverages market has reached to 81.6 billion US dollars in 2015 with a 10% increase since 2014. The North American countries, US and Canada, comprise 53% of the global market. The European market is the second largest with 31.1 billion dollars. Sales in Asia, Australia and other markets have reached to 7.2 billion dollars (Sahota, 2017). Food scandals and outbreaks as the melamine case in China, dioxin in Belgium or Mad Cow disease in United Kingdom had accelerated the organic food sales in domestic markets as well as in the world. The main objective of organic agriculture is not limited to food safety but safe and nutritious food is the expected outcome of

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the practices and inputs applied in organic management. Organic agriculture is a management system targeting to maintain long-term soil fertility and ecosystem health by giving fair opportunities to all organisms and using natural cycles and on-farm resources rather than relying on external inputs. In respect to quality, all basic requirements and expectations of the market are valid both for organic or conventional products traded at worldwide level.

Care is one of the basic principles of organic agriculture (IFOAM, 2005), therefore, organic standards are prepared or amended when necessary considering the scientific results. The organic standards bases on risk assessment, furthermore the inspection and certification plan is designed according to the production chain since each case can be more or less bear specific conditions. The decisions to allow, restrict or ban methods or inputs are made with a precautionary approach taking into account the long-term impact. The major strengths of organic production regarding food safety depend on the methods and inputs that evaluate the impact on environment and product safety; analysis of the production site for presence of a pollution risk prior to conversion, inspection of the whole production chain against valid standards and risk-based plan and the organic certificate stating compliance to the reference standard. In this regard, synthetic inputs namely pesticides, growth regulators, fertilizers are banned or severely restricted. The number of pesticides registered and approved for use in conventional agriculture in the European Union is 389 whereas only 35 are approved for organic pest management. The pesticides allowed in organic are either of very low toxicity (except pyrethrins and copper) from the consumers' point of view or are permitted only in traps and do not contact with the product (Axel et al., 2016). Various studies or surveys have been carried out on contaminant levels in organic certified products. Surveys on organic and conventional food products revealed that conventional products have higher levels of toxic metal cadmium (Cd) originating from synthetic fertilizers and four-times more detectable pesticide residues (Baranski et al., 2017). Contamination from pesticides or fertilizers are directly linked to management and input use however there could be many sources of contamination. As the case for mycotoxins or heavy metals, they could be more linked to product or site specific factors. In case the standards and the inspection-certification systems are not understood well enough, problems may be faced in the trade of organic goods due to the gaps prevailing or to issues not covered in the standards.

The paper aims to identify the major physical, microbial, chemical and biological hazards in organic plant production, the current risks arising at and after harvest, and critical points at which control measures have to be applied. The problems faced in Uzbekistan are given as case studies.

Quality and safety management in organic production

Consumers are willing to pay a price premium for the products that fit best to their expectations. Even if the consumer preferences may vary from one country or region to the other, all look for healthy food at affordable prices. Quality standards aim at establishing a common language and understanding between the producer and the buyer but has to avoid any barriers to trade. Codex Alimentarius standards on contaminants while deciding on the allowed limits take into consideration two basic aspects: as low as reasonably achievable (ALARA) and scientifically sound (www.fao.org/fao-who-codexalimentarius/en/). The quality and safety standards are mostly voluntary at international level giving guidance to the interested parties but national legislation are compulsory at national level. Thus, in principle the national legislation or allowed maximum levels of the producer and importer countries have to be fulfilled at production and sales stages. This is also valid for organic products since the content of legislation/standards on organic governs how the organic should be practiced. As a general approach, the inputs allowed in production, storage and processing of organic food are limited and various chemicals used to extend shelf life or to prevent microbial growth are excluded.

The quality and safety management of organic systems require more knowledge and expertise in hazard analysis and risk management since it requires a preventive approach in management based upon site-specific factors. Factors affecting quality and safety prevail, at field level, at post-harvest handling stage, during processing, packaging and storage, at wholesale and retail levels. In this respect, quality obtained at harvest is the determinant for final product quality. Pre-harvest factors play a crucial role and quality at harvest is the major determinant.

Quality of fresh products does not enhance after harvest, but deteriorate due to senescence. Quality and value can be improved by removing defected ones, sizing, quality classification, cleaning or through processing high value products, which all require a significant cost. For organic products, control bodies inspect the whole production chain to assess conformity to the organic standard and in case of conformity, the organic certification and labelling shows that the product is in accordance with the reference standard. When it comes to the overall quality and safety of the organic product, the responsibility is beyond the inspection and certification body. Almost all actors active throughout the value chain are responsible. The farmer, packer, storage keeper, transporter or processor should all be knowledgeable about the methods and inputs allowed in reference standard not only in the producing country but also in the importer country. International

standards as the Codex Alimentarius or United Nations Economic Commission for Europe (https://www.unece.org/trade/agr/standard) standards can be taken as a reference for market quality of fresh fruit and vegetables, dried produce and nuts. The specifications set by the private standards and demanded by the company are all additional to these basic standards. Inspecting and/or analyzing the process and/or the product for quality and safety at every step is time and money consuming and mostly impossible especially for fresh final produce. To obtain targeted quality and safety, risk assessment is applied both at farm level and throughout the organic production chain.

Major hazards and safety risks in organic production

In order to make a risk assessment, a systematic approach must be implemented. The first step is to identify major hazards resulting in quality loss or create health risk and then decide on the probability of their occurrence, the risk they impose on trade or health or the severity, develop corrective measures and decide on the critical control points to control the reference values targeted. The hazards may threaten quality and/or safety and may be of physical, chemical, microbial or biological origin. The sources of contamination could be diverse as the air, soil, water, humans, animals, tools, vehicles, packaging or any other infrastructure and occur at any stage of the production chain. Thus, each case should be analyzed specifically, critical control points, which are the steps at which control can be applied to prevent, eliminate or reduce the hazard to acceptable levels, have to be determined; and a control plan has to be developed.

Physical hazards can be either of vegetal (stem parts, wood, cap stem), natural (stones, sand) or other (glass, metals, nails) origin. In dried grape production, the safety risk imposed by cap stem is less than stone, metal or glass as a foreign matter. The frequency of having a cap stem in dried grapes is higher than the other physical hazards mentioned. There will be no additional risks in organic compared with conventional grape drying. The physical risk of cap stem may differ according to the cap-stem removal force of the grape variety but not according to the management system. The risk of having vegetal foreign material could be higher in organic only if the certain practices are applied such as mulching, cover cropping or double cropping for annual crops. On the other hand, concrete or soil drying surfaces may result in higher incidence of sand and stone particles.

The organic standards are developed considering the possible short and long-term impacts of synthetic chemicals (e.g. pesticides, fertilizers, growth regulators,

antibiotics, processing aids and cleaning agents) and other inputs (e.g. sewage sludge) and methods as irradiation and genetic engineering on health and environment. Therefore, the inspection based upon a reference standard aims at checking conformity to the set up rules. Additionally, the first visit decides on the suitability of the location evaluating the present or probable pollution risks. Further work is performed following the inspection plan prepared according to the site and product specific risks. Thus, organic system targets to reduce chemical contamination risk in general. Various surveys and studies put forward that organic products have chemical contamination and organic farms maintain higher biodiversity even if the species and scales may react differently (Crowder et al., 2010; Bengtsson et al. 2005; Mader et al., 2002).

Organic soil management aims at long-term soil fertility by improving organic matter content. The risk of microbial contaminants could be therefore higher in organic in case of direct incorporation of plant wastes, pruning materials or animal manure. Composting decrease the risk of microbial contamination only if temperature increase is achieved during the fermentation process. The risk assessment of microbiological hazards differ in organic standards of the US (National Organic Program (NOP)) and the European Union. NOP more detailed pre-requisites for use of raw animal manure and composting. Raw animal manure "must be composted unless it is: (i) Applied to land used for a crop not intended for human consumption; (ii) Incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface or soil particles; or (iii) Incorporated into the soil not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particles. Composted plant and animal materials produced though a process that (i) maintained a temperature of between 131°F (55°C) and 170°F (76.7°C) for 3 days using an in-vessel or static aerated pile system; or (ii) maintained a temperature of between 131°F (55°C) and 170°F (76.7°C) for 15 days using a windrow composting system, during which period, the materials must be turned a minimum of five times"[58]. The EU Regulation on the other hand addresses the issue from a more general approach and states "the fertility and biological activity of the soil shall be maintained and increased by multiannual crop rotation including legumes and other green manure crops, and by the application of livestock manure or organic material, both preferably composted, from organic production."[59]

[58] §205.203 Soil fertility and crop nutrient management practice standard of the National Organic Program.

[59] COUNCIL REGULATION (EC) No 834/2007, of 28 June 2007, on organic production and labelling of organic products and repealing Regulation (EEC), No 2092/91.

Soil is a source for microbial contamination therefore preventing contact with soil at harvest is one of the major steps. Farm animals, pests or rodents in storage or processing facilities, workers, boxes and bins, processing lines or vehicles can be sources for microbial contamination, as well. In case of mixed farms, farm design plays a crucial role in preventing contamination from animals. In case of products harvested from wild, animals could pose threat as a pollution source. In organic production and processing, antimicrobial agents are severely restricted. NOP permits the use of ozone, which is an antimicrobial agent, is allowed as a synthetic nonagricultural (nonorganic) substance as ingredient in or on processed products labeled as "organic" or "made with organic (specified ingredients or food group(s)) under §205.605." As exemplified above, the NOP sees microbial hazards as possessing higher risks in organic agriculture compared to other standards.

Some of the significant contaminants such as mycotoxins, may occur naturally and may not be linked to the management system. Cengiz (2008) report similar Ochratoxin A incidence frequencies in organic and conventional dried grapes. Microbial contaminations may also lead to the presence of mycotoxins if the substrate and environmental conditions are favorable. Battilani and Leggeri (2015) state that major determinant for Ochratoxin A formation in grapes is the success in pest and disease management and that the problem is greater in case of late harvest or drying. For wine grapes, the problem seems as controlled both in organic and conventional vineyards in Europe. If the raw material used in composting contain mycotoxins as the hulls of nuts contaminated with aflatoxins, the health risk may continue for the final composted material as well as the workers in case of professional large volume composting facilities (Wuana and Okieimen, 2011).

Heavy metals may accumulate in the soil and stay for a long time. Natural occurrence of heavy metals due to weathering of parent materials are mostly at trace ($<1000\,mg\,kg^{-1}$) and rarely at toxic levels. The major sources reported are: emissions from industrial areas, disposal of high metal wastes, application of synthetic fertilizers and pesticides, animal manures, sewage sludge, spills and atmospheric deposition. Most of the synthetic fertilizers used to add nitrogen, potassium or phosphorus contain trace amounts of heavy metals as impurities, which after continuous applications may result in accumulation under conventional management. Certain phosphourus fertilizers add Cd and other potentially toxic elements to the soil, including F, Hg, and Pb. Heavy metal contamination in soils may create risks to human and the ecosystem health either

through direct intake or indirectly through contamination in the ground water or the food chain (Wuana and Okieimen, 2011). Thus, the EU regulation on organic agriculture limits the use of copper per unit area or put limits for heavy metal contamination of allowed inputs.

Among biological risks, genetically modified organisms are ranked the first in the organic market. This mingling can be at any stage and may occur from the inputs and processing aids also. Live insects and quarantine pests are not allowed in international trade for all products. Storage pests are important for dried fruit and nuts and in organic appropriate preventive and control techniques allowed in organic must be applied.

Developing and implementing quality and safety control plans

For higher quality and safety in organic products, a control plan covering the whole production chain has to be developed based upon the major risks and critical points identified for controls are crucial. Table 1 is designed to list main factors that may create risk at different stages of organic production as an example. These aspects are not handled as a whole in the organic standards. Thus, regular inspections does not cover these aspects fully.

Traceability is one of the advantages of organic products that help to identify the origin of safety and quality problems. The most frequent source of chemical contamination comes through mixing of conventional products or uncleaned processing lines, storages or vehicles possessing chemical residues. In Uzbekistan, fresh grapes are stored with boxes having plastic bottles full of water to maintain humidity. The wooden re-used boxes or even water quality in the bottles are of utmost importance. Similarly, piling up pomegranates on the storage floor, which is a general practice in Uzbekistan enhance quality loss and create safety problems. Using boxes with labels and/or separating with colors prevent mixing. Identification and labelling of the organic raw material and applying traceability through the chain will minimize risk of cross contamination. Similarly, processing organic and conventional in separate lines or at different times (preferably processing organic first) or cleaning thoroughly with allowed agents are the necessary steps to be taken. Packaging can also result in contamination therefore packaging used at all stages must be checked for suitability and re-use of bags must be strictly avoided.

Table 1. A sample matrix for risk factors in an organic production value chain

Field/Farm	Harvest and post-harvest handling	Processing and packaging	Transportation, storage, wholesale and retail
Clean site selection	Optimum harvest maturity	Separate storage, packaging and/or processing lines for organic	Maintain traceability
Adapted species and variety, organic seeds or propagation material	Care at harvest	Training and record keeping	Prevent mixing with conventional
Proper planting distances, buffer zones	Training of workers for harvest and post-harvest handling	Methods/practices utilized (irradiation, genetic engineering and chemical extraction banned)	Prevent any other form of contamination
Proper cultural practices (pruning , irrigation etc.)	Prevent losses	Processing aids, water quality	Pay attention to mixed loads
Soil fertility management	Hygiene at the field/farm	Cleaning agents (only allowed)	Provide optimum temperature and humidity conditions
Pest, disease and weed management	Worker hygiene	Clean packaging, storage of packaging	Apply good storage practices
Prevent natural contamination or drift	Worker safety	Hygiene at facility and workers	Labelling according to the valid organic and other food labelling rules
Record all applications	Clean storage and transportation	Sanitation of the packing, processing facility; Control of flies, storage pests, rodents…	Sell as organic in the markets, prefer shorter marketing channels

Conclusion

Production of products conforming to the organic standards minimize chemical contamination, however, there are other sources that may pose threat for safety or quality. Microbial, chemical and biological risks have to be identified and prioritized for each crop and case. A control plan must be implemented based on the risk analysis prepared according to the basic rules and the market demand. Small farm sizes can a limiting factor in terms of cross contamination. Small farmers in the vicinity can be converted into organic as a whole to prevent any contamination from neighboring farms. Organic products with high quality and safety have the market demand. Competitiveness in the market relies on quality, safety, price and their continuity. Uzbekistan possess high potential for organic production however more focus is required on products' quality and safety. Thus, research, training and knowledge dissemination has to be an essential part of organic production at all stages.

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CHAPTER VI: DECLARATION OF THE INTERNATIONAL CONFERENCE ON DEVELOPMENT OF ORGANIC AGRICULTURE IN CENTRAL ASIA

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Declaration of the international conference on development of organic agriculture in Central Asia

Tashkent & Samarkand, Uzbekistan, 22-24 August 2017

The sub-regional office for Central Asia of the Food and Agricultural Organization of the United Nations (FAOSEC) in cooperation with the Ministry of Agriculture and Water Resources of Uzbekistan organized an International Conference on Development of Organic Agriculture in Central Asia during 22-24 August 2017 within the framework of the FAO project TCP/UZB/3501 in Tashkent and Samarkand, Uzbekistan.

One hundred twenty participants, including scientists, agriculture and extension specialists, farmers and policy makers from more than 20 countries of North Africa, Europe, Middle east-Central and South Asia attended in this Conference with the aims of: exchange knowledge and best practices to raise public awareness for the development of organic production in Central Asia with regard to the latest scientific and practical advances as well as improvement of legislation and regulatory documents on organic production, whole supply chain (quality, production, processing and marketing), integration of regional agricultural economics with international requirements and overcoming of technical barriers to international trade. The Conference participants wish to declare that the following issues were raised as prerequisites to develop organic agriculture at national and regional levels. Solutions on these issues can be found on a much shorter time scale through cooperation among Central Asian and neighboring countries.

The world-wide statistics show the trends on higher increase rates in organic production systems compared to conventional methods; however the rate of increase in the demand exceeds supply. In this respect, the world organic market is dominated mainly by developed countries. Central Asian countries are located in a very strategical location providing access to the eastern and western markets. They possess suitable climatic conditions, labor availability and are rich in biodiversity. These countries are major producers of various commodities as fruit and vegetables, cotton, nuts, pulses, oil seeds, wild harvested plants, honey, livestock production and other products. Organic farming through its requirement on crop rotation is contributing to food security and through its eco production to the quality and safety of consumed products. Organic production is seen as an opportunity to reach to international markets through sustainable intensification

of Central Asian agriculture. Additional certification systems especially those targeting social aspects as the Fair Trade help to build export markets.

In the Conference, the key problems identified as barriers to development of organic agriculture in the Region are as follows:

- Knowledge gap in production, processing and marketing of organic products as well as low awareness among consumers,
- Lack of harmonized of legislation and standards at regional level and problems at the implementation stage,
- Lack of government support,
- No local and only a few regional certification bodies operate,
- Inexistence of reliable and updated data on production and markets,
- Lack or unavailability of organic inputs / permitted input list,
- Lack of training programs,
- Lack of demand at domestic markets,
- Lack of research especially focusing on locally adapted organic agriculture systems addressing climate change issues.

We, as Conference participants, support that enhanced regional cooperation through involvement of FAO and national governments are required to solve these problems and develop a sustainable organic agriculture movement in Central Asia. Activities focusing on exchange of experts, organizing of training programs for farmers, processors and traders, and making training materials for capacity building, developing harmonized legislation and data collection systems will boom organic products in Central Asia. Regular regional conferences/ workshops/ training courses and implementing a regional website that allow exchange of information and data and announcements/news on relevant activities on organic agriculture will help to develop and sustain a regional network on organic agriculture.

We highly appreciate the efforts of FAO/SEC and the MoAWR of Uzbekistan for holding the Conference and hope that it will establish a strong base for a regional network, strengthen the existing ones (e.g. the IFOAM Euroasia regional group) and build up an organic cluster for all interested practitioners and activists on organic in the region, as well as, in global organic movement.

DEVELOPMENT OF ORGANIC AGRICULTURE IN CENTRAL ASIA

Proceedings of the International Conference held during 22-24 August 2017 in Tashkent & Samarkand, Uzbekistan

APPENDIX

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