

# Study on the evolution and regional comparison of organic agriculture in the world

Umair Kashif<sup>1</sup> Chen Hong<sup>1\*</sup> Ali Abid<sup>1</sup> Ali Raza<sup>1</sup> Snovia Naseem<sup>1</sup>

1. College of Economics and Management, Northeast Forestry University, 26 Hexing road, Harbin 150040, China

\* E-mail of the corresponding author: [nefuchen@126.com](mailto:nefuchen@126.com)

## Abstract

This paper reviewed the development and evolution of organic agriculture in the world. The development course was divided into the stage of emergence, production, development and growth and also introduces the main features of each stage. In Oceania, North America, Europe and Asia, the typical comparative analysis of the development of organic agriculture was performed to analyze the better region. The analysis was based on the selection of organic farmland area, organic agricultural practitioners and organic products sales indicators. It further evaluates the dynamic development trends of organic farming in the world and also summarizes the development of organic agriculture throughout the regional successful experience. Consequently, it put forward the countermeasures to develop the future of organic agriculture in the world.

**Keywords:** organic agriculture, regional comparison, evolution

## 1. Introduction

Since 1970, it has been widely acknowledged that although traditional agriculture brought high labor productivity and abundant material products to mankind but it also caused destruction to natural environment, declining soil productivity, desertification, and water holding capacity. Use of excessive chemical fertilizer and pesticides in the production process have terrible impact on the food quality, raise the cost of production and seriously bad effect on the farmer (Virto et al., 2014). Organic agriculture as a model of agriculture development varies in explanation but its content implication on each country is same. According to the relevant standards of organic agriculture it refers to the principle of sustainable development in which no use of pesticides, livestock feed additives, materials such as synthetic fertilizers, growth regulators without genetic engineering technology and their products but follow the natural law and the principle of ecology to coordinate the planting and breeding balance (Kremen, Iles, & Bacon, 2012). To achieve a steady and reasonable improvement in agriculture, it is essential to establish restoration of agricultural environmental biodiversity and virtuous cycle. There is no doubt that organic agriculture has several advantages over traditional agriculture and it will also help in alleviating the severe pressure of conventional agriculture on the resources and environment (Reganold & Wachter, 2016).

## Development and evolution of global organic agriculture

Organic agriculture firstly need to emphasize on the human activities with environmental issues then emphasizes on the food health. Since its evolution, various countries has perfected this idea through legislations and promulgation of organic standards and promoted the healthy and rapid development of organic agriculture. According to the progression features of organic agriculture, it can be segregated into 3 phases; production, development and growth (Conway & Barbier, 2013).

(1) The production phase (1930-1965). The practices of organic agriculture initiated in the United States back in 1940 and an American Rodale (J.I. Rodale) carryout organic farming in his private farm who published a book "Organic Gardening" in 1942. Organic farming has undergone a long practice until some governments of developed countries began to attach importance to it in the 1960's and encourage farmers to convert from conventional agricultural production to organic farming, where the concept began to be broadly acknowledged.

(2) The development phase (1965-1990): At this stage, instinctive emergence of large number of institutions and organizations takes place globally including Organic Agriculture Association and Organic Agricultural Research institution. In 1972, the global non-governmental organization--- International Organic Agriculture Movement Union (IFOAM) was established in Europe, which was a milestone in the development of organic agriculture. The formation of IFOAM stimulates the rapid development of organic agriculture in America, Europe, Japan and some developing countries with the main purpose of eco-environmental protection and safe agricultural

production (Beeman, 1995).

(3) The growth phase (1990 so far). In 1990's, many countries approved legislations to promote the development of health norms in organic agriculture. As compare to traditional agriculture, organic farming has strict standards and legislations. For instance the European Community issued the Organic Agriculture Ordinance (1991) and in the same year United States promulgated the Organic Food Production Act while Japan formulated the JAS specifications in 2000. In the meantime, a number of authoritative organic product certification bodies have been established, such as Swiss IMO, United States OCIA, and Japan's JONA (Stoate et al., 2009). The changes in the organic farmland area of the world are shown in Figure 1.



Figure 1: Development of organic agricultural land around the world

Source: FIBL-IFOAM-SOEL-Surveys 1999-2017

In the 21st century, the organic agriculture has been flourished and IFOAM with the collaboration of Organic Agriculture Research Institute (FIBL) issued the survey report titled “The World of Organic Agriculture-Statistics and Emerging Trends 2017”. The survey was carried out in July 2016 to February 2017 and covers more than 179 countries worldwide. As of 2017, the report shows that the world's organic farmland area amounted to 50.9 million hectares (including conversion areas) which account for 1.1 percent of total agricultural land. It further specifies that there are currently 2.4 million producers of organic agriculture but it should also be noted that the number is more than that because all the certified producers are not reported. The detailed data of the survey report are summarized below in table 1.

Table 1: Countries and territories covered by the global survey on organic agriculture 2015

Region	Countries* with data on organic agriculture	Organic agriculture land (hectares)	Regional share of global organic land	Share of countries that provided data (%)
Africa	41	1,683,482	3%	73%
Asia	41	3,965,289	8%	84%
Europe	48	12,716,969	25%	98%
Latin America and Caribbean	33	6,744,722	13%	72%
North America	3	2,973,886	6%	60%
Oceania	13	22,838,513	45%	52%
World/ Total	179	50,919,006	100%	78%

Source: FiBL survey 2017

Recently, the global demand for organic agricultural products consumption has continuous upward trend. In 2011,

Organic Monitor Survey indicates that the global market for organic products has reached up to \$63 billion but the same survey conducted in 2015 shows handsome amount of increase and was estimated to be 81.6 billion US Dollars. The data from IFOAM and FiBL revealed that the area of production and space region of global organic agriculture system exhibit non consistency characteristics. Organic products consumer market is concentrated in United States and in Europe, where the sales of these products are more than 90% of the total global sales. The largest sales market of organic products was the United States with 35.8 billion euros, followed by Germany, France and China with 8.3, 5.5 and 4.7 billion euros respectively (FiBL-AMI survey 2017). By region, North America (38.5 billion euros) was the top of the list trailed by Europe (29.8 billion euros) and Asia. Globally, the highest per capita consumption of organic products is in Switzerland followed by Denmark and Sweden. About 85% of the world’s organic agriculture practitioners are from Asia, Latin America and Africa and also important producers and exporters of organic agricultural products. India is leading in this regard with 585,200 producers trailed by Ethiopia (203,602) and Mexico (200,039). Since 2014, more than 160,000 or over 7% rise in number of producers is noticed. The rich countries and regions are in focus and have more demand of organic products in Asia such as Korea, Japan and Singapore. Japan is the largest end user market of organic agriculture products and also one of the leading destinations for China's organic agricultural exports (H. Willer & J. Lernoud, 2017).

### Development status of organic agriculture in the world

Since 1990’s, the prompt development in organic agriculture has been noticed. According to the “Ecology and Agriculture Foundation” (SOEL), it was practiced in more than 100 countries over the world. The four regions where the organic agriculture was flourishing most are the Oceania, North America, Asia and Europe. Therefore this paper compares and analyses the organic agriculture development in these four regions from several aspects such as organic farmland area, organic farming practitioners and organic market.

### The development status of organic agriculture in Oceania

The major countries included in the Oceania region are Australia, New Zealand, and the Pacific Island states. Oceania has managed 22.8 million hectares of organic land; which accounts for 45 percent of total world land and 5.4 percent land in the region. Since 2000 (5.3 million hectares), increase in area under organic agriculture is tripled and 4.3 million hectares were developed in the years of 2014-2015. The number of producer in the region were almost 24000 and the intensive impact on growth of Australia, New Zealand, and the Pacific Island’s organic industry is because of overseas demand. The total retail sales of organic products in Oceania are approximately 1085 million euros (962 Australia, 124 New Zealand). However, Australia holds the highest share in the organic land with 22.7 million hectares (97 percent) in Oceania (Julia Lernoud & Willer, 2016). The change of organic farmland area is shown in Figure 2.

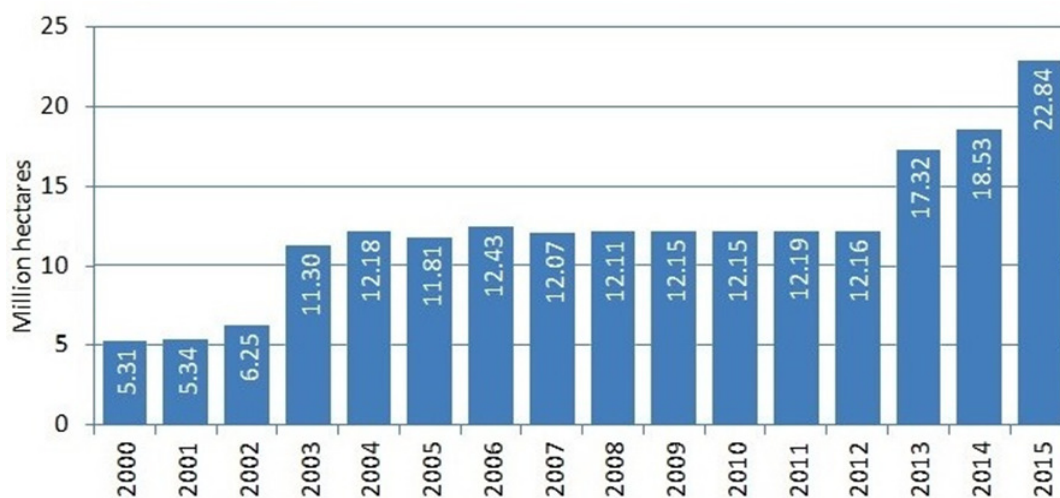


Figure 2: Development of organic agricultural land in Oceania

Source: FiBL-IFOAM-SOEL-Surveys 1999-2017

Australian organic foods are diverse, including meats, vegetables, fruits and dairy products. From its product

structure analysis, dairy product accounted for almost 50 percent (where beef was the largest organic product) followed by vegetables and fruits (46 percent) of the total value of Australian organic farms. From its market consumption area, the exports of Australian organic food were in more than 30 countries and all regions of the world. Among them, the largest region is North America which accounted for about 34 percent of the total exports, followed by East Asia accounting for 33%, Europe accounted for 12%, South East accounting for 11%, and the Oceania 6%. In the long run, South Korea, China, Hong Kong and Singapore will also be its important export market. The rapid development of organic agriculture in Australia is due to its many organizations devoted to researching organic food, adequate financial support and perfect certification management and regulatory system (Julia Lernoud & Willer, 2015).

### The development status of organic agriculture in Latin America and the Caribbean

In the Latin America and the Caribbean, Brazil, Argentina, Peru, Chile and Colombia has the leading marketplace for organic products. The organic farmland area of this region is 6.7 million hectares; which set up almost one percent of regional agricultural land and 13 percent of total organic land in the world. Argentina were the leading country with 3.1 million hectares, followed by Uruguay (1.3 million hectares) and Brazil (0.75 million hectares). According to the report by 2017, Latin America has almost 46000 practitioners who performed organic agriculture. In this region, Brazil has the leading market for organic products but due to political and socio-economic crises there was slow growth in recent years. Other Latin American countries, for instance Argentina, Peru, Chile, and Colombia, have largely export-oriented organic food markets and the total organic retail sales accounting for 31 million euros (largest contribution was from Mexico and Peru 14 million each).

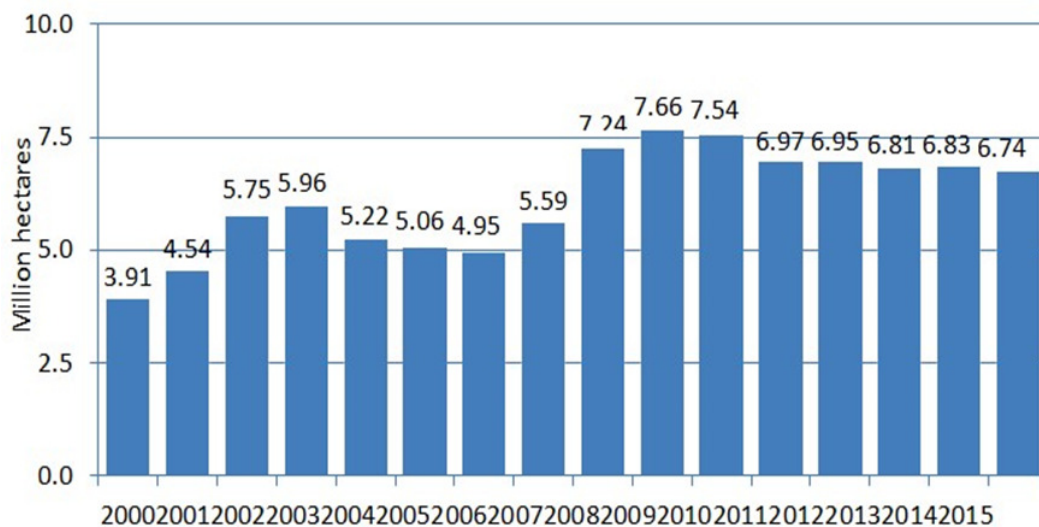


Figure 3: Development of organic agricultural land in Latin America

Source: FIBL-IFOAM-SOEL-Surveys 1999-2017

The countries like Argentina and Uruguay are the main exporter of organic bananas, cocoa, coffee, meat and temperate fruit. Cereals are the main arable organic crop demonstrating almost 40 percent of the arable area with 125,000 hectares in Latin America and Caribbean. The countries leading in its production are Bolivia (87,000), Argentina (26,500) and Peru (6,000 hectares) with main organic cereal of quinoa and wheat which represent more than 70 percent of the region's share. The main staple organic crops were coffee, cocoa and tropical and subtropical fruits with almost 480,000, 190,000 and 120,000 hectares respectively. This represents more than half of the world's total and 9 percent of regional organic coffee area. Mexico, Peru and Honduras were the largest organic coffee producers (J Lernoud & Willer, 2017).

Organic wild collections also have a significant role in the Latin America and the Caribbean that accounts for more than 4.2 million hectares; and primarily used for nuts (1 million hectares), palmito (144,000 hectares) and rose hips (58,000 hectares) collection. Mexico, Brazil, Bolivia and Argentina have the biggest organic wild collection areas with 1.3, 1.2, 0.9 and 0.4 million hectares respectively. Organic production in the region largely

depends on cooperation between smallholders, especially in coffee, cacao, banana, mango, Andean grains, and ginger value chains. Twenty-three countries in this region have an organic regulation or are drafting one. In May 2016, the European Union and Chile concluded negotiations of an agreement on trade in organic products to mutually recognize the equivalence of their organic production rules and control systems. The capacity of Latin American countries to develop their organic sectors can be improved with incentives and governmental support, and local governments are taking the lead in several national and decentralized initiatives (for instance Argentina) including support for Participatory Guarantee Systems PGS (for instance Peru) (Flores, 2015).

### The development status of organic agriculture in Europe

In Europe, organic food and farming were continuously growing over the last three decades. Since 1985, the total area of organic farmland cultivation progressively rise from 0.1 million to almost 13 million hectares in Europe, and to 11.2 million hectares in the European Union (EU) by 2015. The percentage of world's organic land in Europe is 25 percent and it has increased nearly 1 million hectares as compared to 2014. This has been supplemented by the resilient growth of market which tripled the total value of organic retail market of European Union almost from 11.8 billion in 2005 to almost 29.8 billion euros in 2015. This continuous improvement displays progressive nature of organic food and farming in responding to the needs of European purchasers for awesome food production and to the expectations of policymakers for the sector to aid the surroundings, animal welfare, and the development of rural areas (Kilcher et al., 2011). The change of organic farmland area in

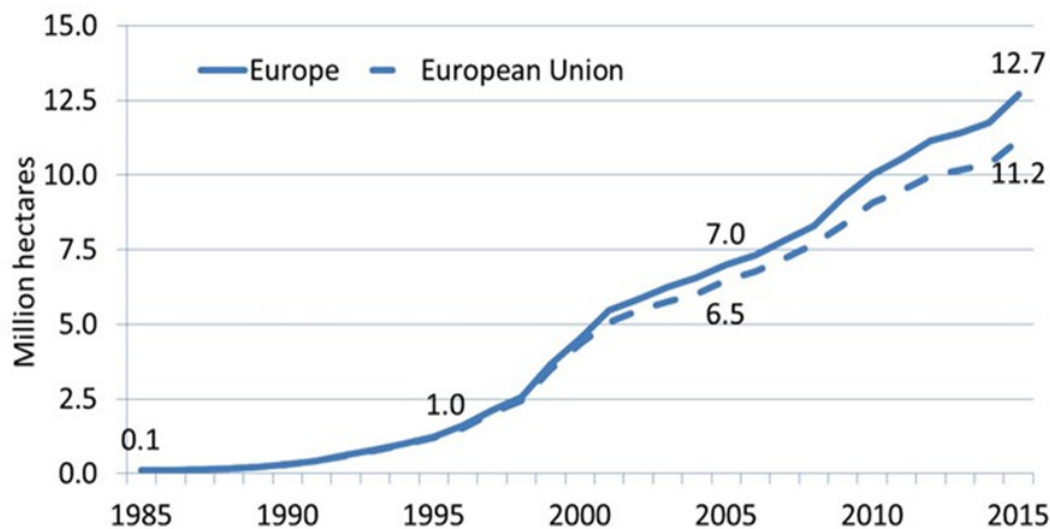


Figure 4: Development of organic agricultural land in Europe and European Union

Source: FIBL-IFOAM-SOEL-Surveys 1999-2017

Although, market of organic products has risen at higher rate as compare to previous years, farmland growth persisted to be slower comparably. The tendency of market developing quicker than the number of producers and the farmland area has been obvious in couple of years which showing that the production of organics is not in that pace as of market. This situation specifies a severe threat that the increasing demand of the organic products will be met by the imports and those European farmers may not benefit. In 2015, several countries of Europe indicates double-digit growth rates in organic products and their market raised by 13 percent; which is higher than in the previous 5 years. Consumers expenditures have been raised on organic products and their per capita consumptions from 2006-2015 have doubled to 36.4 euros. Group for specific organic products has achieved more than their average market shares i.e. in Switzerland the market share of organic egg is 24.3 percent while in many countries they crossed the 10 percent mark. Similarly, dairy products grasp 12 percent of the market share where in Austria milk alone reach over 17.3 percent (Brzezina et al., 2017). The key indicators of Europe and European Union were summarized in table 2.

Table 2: Europe and European Union: Key indicators 2015

Indicator	Europe	European Union	Top 3 countries Europe
Organic farmland in hectares	12.7 million ha	11.2 million ha	Spain (1.97 million ha) Italy (1.49 million ha) France (1.37 million ha)
Organic share of total farmland	2.5 %	6.2 %	Liechtenstein (30.2%) Austria (21.3%) Sweden (16.9%)
Growth of organic farmland 2014-2015 in hectares	959'793 ha	805'280 ha	Spain (+258'095 ha) France (+256 483 ha) Russia (+139'294 ha)
Growth of organic farmland 2014-2015 in percent	8.2%	7.8%	Serbia (+ 60%) Bulgaria (+59%) Russian Federation (+57%)
Wild collection area	17.7 million ha	15.4 million ha	Finland (12.2 million ha) Romania (1.8 million ha; 2014) Bulgaria: (0.9 million ha)
Producers	349'261	269'453	Turkey: 69'967 Italy 52'609 Spain 34'673
Processors	60'073	58'360	Italy (14'658) Germany (14'280) France (11'842)
Importers	3'681	3'474	Germany (1'452) Netherlands (314) Italy (310)
Retail sales	29.8 billion euros	27.1 billion euros	Germany (8'620 million euros) France (5'534 million euros) UK (2'604 million euros)
Growth of retail sales 2014-2015	13.0%	12.6%	Spain (24.8 %), Ireland (23.0%) Sweden (20.3 %)
Organic share of total market	No data	No data	Denmark (8.4 %) Switzerland (7.7 %) Luxembourg (7.5%)
Per capita consumption	36.4 euros	53.7 euros	Switzerland (262 euros) Denmark (191 euros) Sweden (177 euros)

Source: FiBL-AMI survey 2017.



The organic market progression differ among countries however most countries raise their retail sales up to double digit in 2015, but the growth in organic retail in countries like United Kingdom, Switzerland and Luxembourg were below the average. The dynamic growth of the organic market has resulted in more and more importers and retailers stepping into organic businesses or expanding engagement with organic food, while organic producers are not moving at the same speed. The market of organic food and drink has stretched out by more than ten percent to 31.1 billion US dollars in Europe by 2015 (Willer & Schaack, 2015).

The countries with leading market values were Germany, followed by French, UK, Italian, and Switzerland respectively. These countries hold almost three-quarters of European organic product sales with Germany being the highest market value of 9.5 billion US dollars. Austria, Sweden, Denmark, Spain, and the Netherlands were some of the other important organic produce markets. Denmark has the largest market share of organic food with 8.4 percent of the total food trades. At the same time, regardless of the dynamic marketplace growth, modern traits imply that production in Europe isn't moving on the identical pace, which offers several challenges for the future improvement of organic agriculture in Europe (Richter & Padel, 2007).

All the nations in Europe have organic principles or in the drafting phase. In 2016, the review of European Union (EU) law on natural farming (which applies in all EU countries) was the central topic of discussion. The EU Common Agricultural Policy (CAP) and related programs in different countries persists a key policy for the improvement of agriculture in Europe, such as organic farming. Under the current CAP for the period 2014-2020 organic farming is supported by Pillar 1 (direct payments) and Pillar 2 (Rural Development Programs). On the research end, in 2016, the European Technology Platform for Organic Food and Farming Research (TP Organics) published priority topics for the Work Program 2018/2020 of Horizon 2020, the current research framework program of the European Union (Konstantinidis, 2012).

### The development status of organic agriculture in Asia

In recent years, the share of organic agriculture in Asia has continued to grow and the countries with better development are China, India and Japan. The total area under the cultivation of organic agriculture in Asia is approximately 4 million hectares which accounts for 0.2 percent of the total agricultural land in the region. Currently, Asia holds 8 percent of the global organic agricultural land; as compared with 2001(420'000 hectares) the organic land has increased over eight-fold. In the years of 2014 and 2015, a significant increase of 11 percent or 400,000 hectares were noticed in the organic area of Asia. China is the leading country in organic agricultural land (1.6 million hectares) in the region followed by India (almost 1.2 million hectares). The total number of producers in the region was more than 0.8 million out of which only India have almost 585,000; however, the countries with largest organic shares of total agricultural land are Timor-Leste (6.6 percent) and Sri Lanka (3.5 percent). Currently, there are total nineteen countries having organic agriculture regulations and other five is in the course of drafting (Willer, Schaack, & Lernoud, 2017). The change of organic farmland area in Japan is shown in Figure 5.

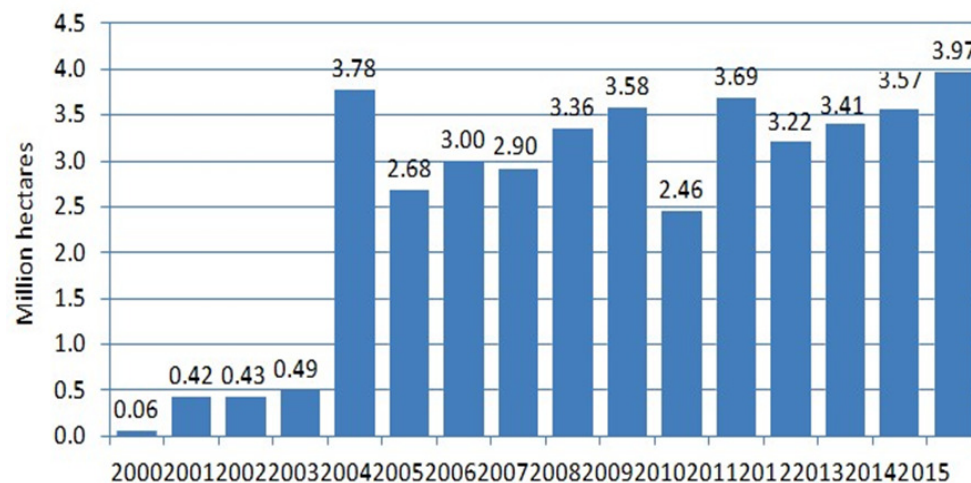


Figure 5: Development of organic agricultural land in Asia

Source: FIBL-IFOAM-SOEL-Surveys 1999-2017

In 2015, the arable crops used 56 percent (2.2 million hectares) of all organic land in Asia, for permanent crops 19 percent (750,000 hectares) and 1 percent for grazing areas (28,000 hectares). The key organic cereals comprise of wheat, rice and grain maize which holds over 900,000 hectares of total cereal area in Asia; mostly grasp by the China. The areas utilized by the wild collection are almost 5.5 million hectares and India followed by Tajikistan and China was the prominent nations. The total reported organic agriculture retail sales of Asia were almost 6.3 billion euros. China has the most part of that sale with 4.7 billion euros; which made him leading and fourth largest market of organic products in Asia and world respectively. Japan has followed the way in organic domestic market value with 1 billion euros and South Korea reported a market of 281 million euros ([Rosenberger, 2014](#)).

As compared to 2015, the consumptions of organic products in Japan raised by 42.6 percent in 2016. In the meantime, the production of non-organic but condensed chemical fertilizer and pesticide free food has grown by 45.2 percent. To participate in the first “Organic Lifestyle Expo” in Tokyo, more than 190 exhibitors came together in November 2016. This fair of two days appealed approximately 20,000 tourists which indicate rising interest of public in the undertakings of organic and sustainable standard of livings. The main principle of development of Japan’s organic agriculture is to improve self-sufficiency rate and environmental protection. Japan attributes significance to sustainable management of agriculture organizations, related laws and regulations, certification procedures, direct dialogue and contact of producer-consumer, operation mechanism, both sides should provide funds and workforces to back and form transport station system, develop joint understanding and supporting the producer-consumer “help” system ([Rosenberger, 2014](#)).

India made the news in the start of 2016 for having first organic state named “Sikkim” in Asia or possibly in the world. In the last ten years, the organic agriculture area grows considerably in India, which shows almost three-fold rise from 528’171 hectares in 2007- 2008 to 1.18 million hectares of cultivable land in 2014-15. Apart from this area, there are many zones in different states that are organic by nature but not certified. India regardless of being an exporter, shift his focus to local orientation and developing his domestic organic agriculture market rapidly. As per study of Assocham Associated Chambers of Commerce of India, the turnover of organic food is growing annually at the rate of 25 percent, which leads the expected earnings from 0.36 billion in 2014 to 1.36 billion US dollars in 2020 ([Willer & Lernoud, 2017](#)).

The range of crops of china has considerable resources and conventional farming strategies encompass many organic farming control methods. At the same time, some of the remote areas where the production of organic agriculture has been enormous were comparatively reluctant in technology; however, china has laid down solid foundation in its organic farming. The sales value of China’s domestic organic sales were showing increasing trend in 2015 with a growth of more than 20 percent as compared to 2014 although the certified area did not grow. This retail sales progress was mainly due to growth in the certified organic liquor being incorporated ([Zhang, Qiao, Wang, & Zhang, 2007](#)).

China has the largest organic market of temperate fruit, oilseeds, vegetable and food sales, tea, wheat and rice. Northeast, eastern and southern coastal parts of China were the major areas of organic agriculture products which mainly produce organic vegetable, beans, organic tea and grains etc. The main agenda of china’s five years plan (2016-2020) is to develop the capacity of farmers and farm managers through training and the government is planning to invest approximately 187 million euros in this regard. The preference of the program is to grow interest in young graduates from college and also emphasis on sustainable and ecological agriculture with the aim to have more than 1 million qualified farmers by 2020 in the international market. The Chinese organic authority (Certification and Accreditation Administration, CNCA) signed the bilateral agreement of mutual recognition of organic certification with organic authority of New Zealand in November 2016; which is also China’s first mutual agreement on organic certification recognition ([Chadwick et al., 2015](#)).

## Conclusion

Globally, the organic agricultural production technology and market mechanism in North America, Oceania and Europe is perfect and the increasing demand of organic product consumption has laid a solid foundation for further development of organic farming. The development level of organic agriculture in Australia and Germany was comparatively high in the world. Australian organic products are rich in varieties and generally the product has been processed in a deeper level to improve the added value of organic products. The organic agricultural production organization and management of the United Kingdom are more perfect, its higher organic product sales benefit from the diversification of production and management mode.

The organic agricultural market in Asia gradually expanding and it has become an important producer and



exporter of organic products. At the same time, consumption demand of organic products in Asia has also increased steadily and the development mode of organic industry is increasingly diversified. Therefore, organic agriculture in the Asian region has great potential for development. In Asia, the development level of organic agriculture is higher in Japan; however, the development speed and expansion scale of china were relatively fast in recent years. Although, the organic farmland area of Japan is small but its sales volume and high number of practitioners indicates that their organic farmland unit output and production proficiency is quite higher. China has the highest aggregate organic farmland area but compared with the conventional farmland production; the proportion of organic agriculture produce is still low and the operation is more extensive.

From the actual natural and resources endowment condition of the countries, they should enlarge support to the organic agriculture to adopt different mode of development, encourage farmers to diversify the management of the exploration, enrich and improve the farm management mode, focusing on the support and financing of scientific research institutions, constantly improve the technological content of organic products with the added value and to improve the unit output and productivity of organic products by the refined management.

## References

- Beeman, R. S. (1995). " A green and permanent land": agriculture in the age of ecology, 1935-1985.
- Brzezina, N., Biely, K., Helfgott, A., Kopainsky, B., Vervoort, J., & Mathijs, E. (2017). Development of Organic Farming in Europe at the Crossroads: Looking for the Way Forward through System Archetypes Lenses. *Sustainability*, 9(5), 821.
- Chadwick, D., Wei, J., Yan'an, T., Guanghui, Y., Qirong, S., & Qing, C. (2015). Improving manure nutrient management towards sustainable agricultural intensification in China. *Agriculture, Ecosystems & Environment*, 209, 34-46.
- Conway, G. R., & Barbier, E. B. (2013). *After the green revolution: sustainable agriculture for development*: Routledge.
- Flores, P. (2015). Organic agriculture in Latin America and the Caribbean. *the world of organic agriculture*.
- Kilcher, L., Willer, H., Huber, B., Frieden, C., Schmutz, R., & Schmid, O. (2011). *The Organic Market in Europe. Overview and Market Access Information for Producers and International Trading Companies. Fourteen Country Examples in the European Free Trade Association and the European Union, with a Special Focus on Switzerland: FiBL and Sippo*.
- Konstantinidis, C. (2012). *Organic farming and rural transformations in the European Union: A political economy approach*: University of Massachusetts Amherst.
- Kremen, C. e. a., Iles, A., & Bacon, C. (2012). Diversified farming systems: an agroecological, systems-based alternative to modern industrial agriculture. *Ecology and Society*, 17(4).
- Lernoud, J., & Willer, H. (2015). *Organic Agriculture Worldwide: Key results from the FiBL-IFOAM survey on organic agriculture worldwide 2015 Part 2: Crop data*.
- Lernoud, J., & Willer, H. (2016). *Organic Agriculture Worldwide: Key results from the FiBL survey on organic agriculture worldwide 2016 Part 3: Organic agriculture in the regions*.
- Lernoud, J., & Willer, H. (2017). *Current statistics on organic agriculture worldwide: area, operators, and market. The World of Organic Agriculture. Statistics and Emerging Trends*.
- Reganold, J. P., & Wachter, J. M. (2016). Organic agriculture in the twenty-first century. *Nature Plants*, 2(2), 15221.
- Richter, T., & Padel, S. (2007). *The European market for organic food The World of Organic Agriculture-Statistics and Emerging Trends 2007 (pp. 143-154): International Federation of Organic Agriculture Movements IFOAM, Bonn, Germany & Research Institute of Organic Agriculture FiBL, Frick, Switzerland*.
- Rosenberger, N. (2014). *'Making an Ant's Forehead of Difference': Organic Agriculture as an Alternative Lifestyle in Japan*: University of Hawaii Press Honolulu.
- Stoate, C., Báldi, A., Beja, P., Boatman, N., Herzon, I., Van Doorn, A., . . . Ramwell, C. (2009). Ecological impacts of early 21st century agricultural change in Europe—a review. *Journal of environmental management*, 91(1), 22-46.
- Virto, I., Imaz, M. J., Fernández-Ugalde, O., Gartzia-Bengoetxea, N., Enrique, A., & Bescansa, P. (2014). Soil

degradation and soil quality in Western Europe: current situation and future perspectives. *Sustainability*, 7(1), 313-365.

Willer, & Lernoud. (2017). *The world of organic agriculture. Statistics and emerging trends 2016*. Research Institute of Organic Agriculture (FiBL), Frick, and International Federation of Organic Agriculture Movements (IFOAM), Bonn, Germany.

Willer, H., & Lernoud, J. (2017). *Organic Viticulture Worldwide 2015*.

Willer, H., & Schaack, D. (2015). *Organic farming and market development in Europe The World of Organic Agriculture. Statistics and Emerging Trends 2015* (pp. 174-214): Research Institute of Organic Agriculture (FiBL) and International Federation of Organic Agriculture Movements (IFOAM).

Willer, H., Schaack, D., & Lernoud, J. (2017). *Organic Farming and Market Development in Europe and the European Union The World of Organic Agriculture-Statistics and Emerging Trends 2017* (pp. 206-243): FiBL and IFOAM-Organics International.

Zhang, F., Qiao, Y., Wang, F., & Zhang, W. (2007). *A Perspective on Organic Agriculture in China-Opportunities and Challenges*.