GOCE DELCEV UNIVERSITY - STIP
FACULTY OF AGRICULTURE

JOURNAL OF AGRICULTURE AND PLANT SCIENCES

YEAR 2018 VOLUME 16, Number1

Journal of Agriculture and Plant Sciences, JAPS, Vol 16, No. 1
Successor of the Yearbook of Faculty of Agriculture of GDU, Vol 14

Editorial Office
Faculty of Agriculture, Goce Delcev University - Stip,
Krste Misirkov Str., No.10-A, P.O. Box 201,
2000 Stip, Republic of Macedonia
japs@ugd.edu.mk
http://js.ugd.edu.mk/index.php/YFA

ISSN 2545-4447 print
ISSN 2545-4455 on line
Vol. 16, No. 1, Year 2018

GOCE DELCEV UNIVERSITY - STIP, REPUBLIC OF MACEDONIA
FACULTY OF AGRICULTURE

UDC 63(058)
ISSN 2545-4447 print
ISSN 2545-4455 on line

Journal of Agriculture and Plant Sciences, JAPS, Vol 16, No. 1

Successor of the Yearbook of Faculty of Agriculture of GDU, Vol 14

YEAR 2018 **VOLUME XVI, Number 1**

EDITORIAL BOARD

CONTENT

INTORDUCTION

In the past ten years the educational, research and applicative activities of the Faculty of Agriculture – Stip, Goce Delcev University – Stip, contributed to the development of agriculture sector in the country and broader region.

The Faculty of Agriculture organized the 1st International Meeting Agriscience & Practice (ASP 2018), giving an opportunity to the participants for presentation and discussion of original scientific and practical results in different fields of agriculture.

The 1st International Meeting Agriscience & Practice (ASP 2018), heled on 10-11 May at Faculty of Agriculture - Stip, was organized with intention to bring together all agricultural stakeholders for sharing their knowledge, experience and obstacles. One of the main aims was to link research and field work in agricultural sector in the country and broader, giving it an international dimension. All oral presentations as well as poster presentations at ASP 2018 were organized in several scientific sessions:

- Agricultural economics,
- Plant biotechnology,
- Plant production,
- Plant protection,
- Quality control and food safety,
- Soil science and hydrology,
- Viticulture, enology and fruit production.

The main goal of the Meeting was linking and promoting scientific achievements and practical knowledge, presented in different thematic areas, which were achieved in the Republic of Macedonia and wider in the region.

Journal of Agriculture and Plant Sciences Vol. 16, No. 1 contains the presented papers from the 1st International Meeting Agriscience & Practice (ASP 2018).

Editorial Board, **Editor in chief,**

August, 2018 **Prof. Liljana Koleva Gudeva, PhD**

JOURNAL OF AGRICULTURE AND PLANT SCIENCES, JAPS, Vol 16, No. 1, 2018

Manuscript received: 05.06.2018
Accepted: 14.06.2018

In print: ISSN 2545-4447
On line: ISSN 2545-4455
UDC: 631.147(497.7:4)

Review paper

EVALUATION OF THE CURRENT STATUS IN ORGANIC AGRICULTURAL PRODUCTION IN REPUBLIC OF MACEDONIA AND EUROPEAN COUNTRIES

Olivera Bicikliski[1*], Fidanka Trajkova[1], Ljupco Mihajlov[1]
[1]Faculty of Agriculture, Goce Delcev University, Krste Misirkov 10-A, PO box 201, 2000 Stip, Republic of Macedonia
**Corresponding author: obicikliski@gmail.com*

Abstract

Implementation of organic agriculture and development of sustainable agriculture production gives a new lifestyle quality in local communities and country in general. Intensive agriculture is unsustainable and it cannot support production of enough food longtermly because of compromising the basic settings for food production.

The modern agriculture trends involve favorizing of new high yielding varieties produced with high input consumption which is a direct threat for genetic diversity and agriculture. Ingenious genotypes have enormous gene poll of different desirable characteristics, but they are permanently endangered because of utilization of commercial varieties.

Introduction of organic farming is a hope for survival of endangered and ingenious varieties and genotypes. The positive role of organic farming is foreseen in growing crops in their natural environment which contributes to conservation of existing genetic diversity. Utilization of old varieties and local genotypes in organic farming is one of the ways to increase genetic diversity and biodiversity in agricultural system and it gives to the organic farming broader and durable meaning regarding protection of ecosystem and environment.

Environmental conservation and protection are important to the politics of rural development in EU. Following this approach, there is need for implementation of instruments which will create conditions for development of sustainable, highly harmonized agriculture with the principles of environmental protection.

Key words: *sustainable agriculture, intensive agriculture, biodiversity, organic farming*

INTRODUCTION

Conventional agriculture in the last century achieved significant results in the field of food production. Conventional agriculture is characterized by the use of advanced technological solutions, significant investments, enlargement of agricultural land, cultivation of monocultures, uniform high-yield hybrids and varieties, using large amounts of pesticides and fertilizers, using external energy inputs, high efficiency of workforce, etc. But, on the other hand, in conventional farming, soil processing is intense and as such destroys its quality in different ways. First of all, it reduces the amount of organic matter in the soil, and therefore it reduces its fertility and disrupts its structure. Also, other agrotechnical measures applied in intensive agricultural production contribute to environmental degradation and pose a threat to the sustainability of the agroecosystem in the long run.

In response to the vicious disruption of agro-biocenosis and environmental pollution, as well as the decrease in the quality of agricultural products and the deterioration of the structure and fertility of the soil, the need and necessity for sustainable agriculture will be carried out under conditions of reasonable comfort within the framework of natural boundaries of natural communities.

Sustainable agriculture is based on sustainable agricultural practices with adapted soil treatment systems, with the application of which produces positive effects on the health and productivity of mutually

dependent communities, the life of the land, plants, animals and humans. At the core of these agricultural practices is the avoidance of the use of artificially synthesized materials in the production and promotion of exclusively natural materials used as fertilizers, plant protection products, that is, pesticides, plant growth and development stimulators, as well as additives in the production and processing of food. The application of the crop rotation, plays a key role in the achievement of the objectives of sustainable agriculture (Lampkin, 1994; Wijnands, 1999; Milošev and Šeremešić, 2004) and improvement of soil quality (Jaenicke and Drinkwater, 1999; Olesen et al., 1999; Lampkin and Measures, 2001). In fact, the key principle of sustainable food production is the interaction of all components involved in the food production cycle.

Organic farming is a sustainable food production system aimed at reducing harmful effects on the environment, soil fertility conservation, using natural mechanisms in ecosystems and improving natural resources. Today, the organic farming sector is the fastest growing food sector. Consumer interest grows in response to the ever-present fear of food safety and animal welfare, as well as the impact of conventional agriculture on the environment (Bavec and Bavec, 2006).

The Republic of Macedonia has natural resources that enable the development of organic agricultural practice and environmental production management systems. Organic farming is separated as a system of agricultural production that has been established on the agricultural land in the Republic of Macedonia in recent years. Although this system is introduced to only about 1% of the total arable land, the trend for introducing organic farming is increasing and it gives the right to expect organic farming to be the carrier and basis for the further development of other systems of sustainable agriculture in Macedonia (National Plan for Organic Production, Ministry of Agriculture, Forestry and Water Economy, 2013 - 2030). The activities and measures undertaken in this area are in line with the National Agricultural Strategy and Action Plans that the Ministry of Agriculture, Forestry and Water Economy creates for certain programme periods, with the aim of increasing the development of organic farming in the Republic of Macedonia.

In the past few years, organic farming in Macedonia has seen a certain increase, which is perceived through the increased total production capacities and the increased number of organic producers. However, despite the favourable conditions and resources available in the Republic of Macedonia, it can be pointed out that they are underutilized, especially in terms of arable land.

MATERIAL AND METHODS

This paper presents the overall situation in the organic agricultural production in the Republic of Macedonia in the period of 2013-2017. During the preparation of the paper, relevant literature and data were obtained from public, state and scientific institutions. Also, certain consultations have been made personally with manufacturers, control and certification bodies and advisory services.

RESULTS AND DISCUSSION

The potential of the natural resources of the Republic of Macedonia for the development of organic production as part of sustainable agricultural practice and as an environmentally friendly production management system is necessary to be used at a higher level. This is necessary in order to achieve a reasonable relation of man to the environment, thereby supporting and strengthening the health of ecosystems as a whole. Proper targeting of the Macedonian agro-food sector to the process of approximation of the standards defined by the Common Agricultural Policy of the EU is necessary.

Organic production in the Republic of Macedonia is regulated by the Law on Organic Agricultural Production (Official Gazette of the Republic of Macedonia, No. 146/2009, 53/2011, 149/2015, 39/2016, 132/2016), which is fully harmonized with the European Regulations for Organic Production, No. 834/2007 and 889/2008. In order to protect organic producers from unfair competition and at the same time to protect consumers of organic products, it is necessary to guarantee that the product is produced in accordance with the principles of organic farming. Professional control and certification are a guarantee for consumers that the organic product is produced in accordance with all the criteria and requirements of the law and the by-laws for organic agricultural production.

The certification of organic production in Macedonia is carried out by two national control / certification bodies - Balkan Biosert and Pro Cert. These bodies are authorized by the Ministry of Agriculture, Forestry and Water Economy (MAFWE) on the basis of accreditation received by the Accreditation Institute of the Republic of Macedonia, which is a full member of the European Accreditation and is a signatory of the EA MLA - Multilateral Agreement, which is an agreement between European accredited certification bodies for mutual recognition of certificates.

Based on the data from the procedure for expert control, the authorized control / certification bodies prepare a report and make a decision for certification of organic production, and for that they issue a certificate to the applicants for the certification. The certificate shall be valid until the next control, generally one year from the date of issue. By acquiring a certificate for organic production, the right to use the national organic product label is acquired.

a b

Figure 1. National label for organic product (a) and organic product in conversion (b).

The Government of the Republic of Macedonia is making great efforts to increase the production of organic food through various support measures, harmonizing the legislative basis with the European regulations for organic production and implementing various measures for encouraging the development of this food production system.

In order to raise the national awareness of the value of organic food, as well as to promote the national organic product label, the MAFWE, in cooperation with the Federation of Organic Producers of the Republic of Macedonia (FOPM), implemented various promotional activities and campaigns for raising the awareness of consumers for organic foods, on the basis of which is the need for additional awareness raising and information regarding organic agricultural production. Among many promotional activities, MAFWE also promotes plant protection products approved for use in organic production and present on the market in Macedonia.

All activities and measures undertaken in the direction of better development of organic production in the Republic of Macedonia are in accordance with the National Plan for Organic Production (2013-2020). According to this strategic document, a national strategic goal for increasing the competitiveness of organic production in the Republic of Macedonia has been set up, for the successful placement on the domestic and foreign markets, for which the realization has determined several specific goals and measures in both primary and secondary organic production, in trade, control and certification, etc. One of the most significant specific goals to be achieved by 2020 in the area of primary agricultural production is to identify and support strategically important organic products, improve the availability of raw materials authorized for use in organic production, the arable land under organic production to have a share of 4% in the total arable agricultural land in Macedonia and 4% of the total livestock in the country to be certified as organic livestock (including beekeeping and fisheries).

Bearing in mind that organic production is more complex in terms of conventional production, the Government of the Republic of Macedonia financially supports the development of organic production each year with 30% to 100% increased financial support in terms of conventional production (MAFWE, Decree on the detailed criteria for direct payments, users of funds, maximum amounts and the manner of direct payments, 2018).

The total National Budget, as well as the measures for financial support of organic production are created annually and are suitable to the specific needs of the sector.

The number of farmers and other operators of organic products has been increased in the last few years (Fig. 2),while organically certified arable land is decreasing (Fig. 3).

Specifically, although in 2014 as compared to the previous year, the number of farmers, processors and traders with organic products decreased from 400 (2013) to 344 (2014), their number from 2015 shows an increasing trend, so the number of operators in 2015 is 481, 533 in 2016 and 654 in 2017.

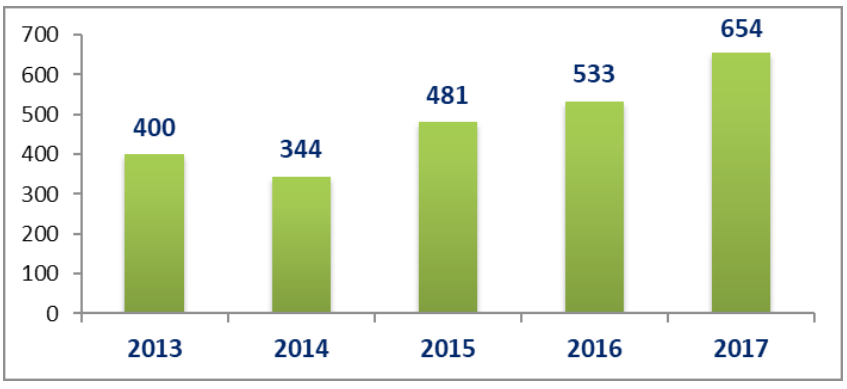

Figure 2. Number of operators involved in organic production (2013 – 2017)

Despite the increased number of operators, the situation with the production capacities under plant organic production in the investigated period registered changes of 2,359 ha in 2014 to 3,240 ha in 2016. In 2017 organic farming was established on 2,900 ha. With the measures of support undertaken by the MAFWE in the forthcoming period even greater development and increase of the production capacities is expected.

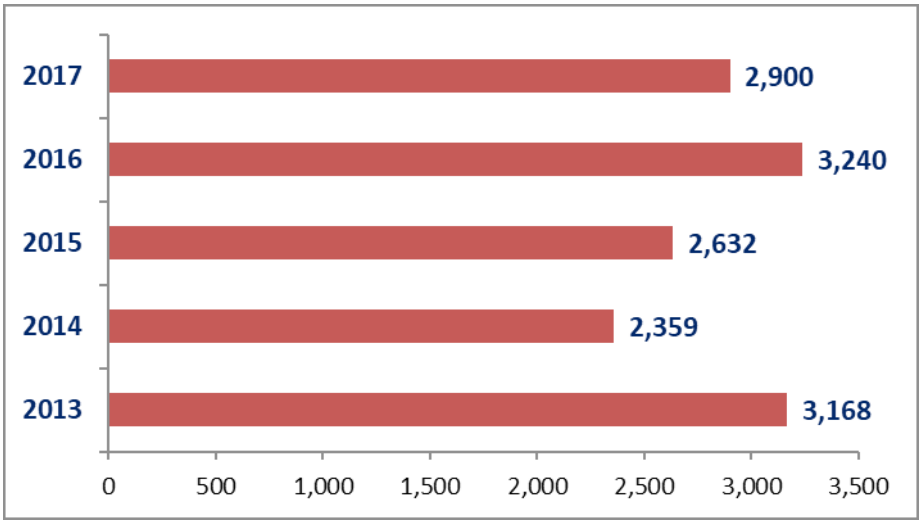

Figure 3. Organically certified arable area in the Republic of Macedonia (2013 – 2017)

According to FiBL and IFOAM data, the situation in the countries of the region and some EU countries shows a gradual increase in agricultural land certified for the organic production. There were 515 ha (2013) and were 662 ha (2016) certified arable areas in Albania. In Bosnia and Herzegovina and Serbia, there is also a trend of increasing the area. Serbia in 2013 had 8,228 ha, 9,548 ha (2014), 15,298 ha (2015) and 14,358 ha (2016), while in Bosnia and Herzegovina this trend is even more noticeable because the certified arable land increased from 292 ha in 2013 to the 992 ha in 2016.

In some EU countries, organic farming areas are also increasing. Detailed list organic agriculture land is given in Table 1.

Table 1. Organic agriculture land in some EU and courtiers from the region (FiBL & IFOAM, 2018).

Country	Year / ha			
	2013	**2014**	**2015**	**2016**
Albania	515	662	662	662
Bosnia and Herzegovina	292	353	576	992
Serbia	8,228	9,548	15,298	14,358
Montenegro	3,068	3,289	3,213	3,470
Turkey	461,396	491,977	486,069	523,777
Greece	383,606	362,826	407,069	342,485
Bulgaria	56,287	74,351	118,552	160,620
Slovenia	38,665	41,237	42,188	43,579
Croatia	40,641	50,054	75,883	93,593

Republic of Macedonia has favourable agro-ecological conditions for the implementation of organic plant production since there are large unpolluted areas suitable for crop production and favourable agro-ecological conditions and possibilities for optimal and successful organic cultivation of a wide assortment of different plant crops (cereal, industrial, fodder, horticultural and viticulture-orchard production). In plant production, the most producers are certified for organic production of various cereals, forage and fruit crops,

In the research period, the biggest area of 1557.97 ha certified for organic cereals was accomplished 2013, as opposite to 2014 and 2015, when the area under organic cereals was reduced by about 600 ha and 950 ha, respectively. The areas certified for the production of organic cereals have been gradually increased in 2016 (938.40 ha) and in 2017 (939.59 ha).

Certified areas under organic orchards have been increased from 321.55 ha (2013) to 559.20 ha (2017). There is a certain trend of growth in organic production of vegetable crops represented with 83.88 ha in 2015, 93.17 in 2016 and 174.38 in 2017 (Tab.2).

Farmers also have experience in the cultivation of crops in a traditional-extensive way, and there are opportunities for the application of appropriate crop rotation systems in plant production in the regions with the possibility of irrigation, which is considered as a strength according to the National Plan for Organic Production (2013 - 2020), (MAFWE, 2013).

Table 2. Organic plant production in the Republic of Macedonia (2013 – 2017).

Crop	Year / ha				
	2013	2014	2015	2016	2017
Cereals	1557.97	896.40	604.42	938.40	939.59
Forage	691.26	523.99	977.33	748.98	681.18
Industrial	34.59	-	-	-	-
Oilseed	73.44	119.53	103.56	42.84	32.78
Orchards	321.55	96.54	400.19	422.14	559.20
Viticulture	41.92	52.41	76.39	17.54	24.03
Vegetables	71.57	243.20	83.88	93.17	174.38
Fallow land	304.26	204.22	642.29	402.14	192.21

According to FiBL and IFOAM data, in Europe and the European Union the largest areas under the organic agriculture are certified for production of cereals and green fodder (FiBL & IFOAM, 2018). In 2016, 2.279.155 ha in Europe and 1.889.408 ha in the EU were certified for cereals, while 2.255.059 ha in Europe and 2.066.861 ha in the EU for green fodder. The same year, there were 148.088 ha (Europe) and 135.684 ha (EU) under organic vegetable production. Organic production of temperate fruits and (sub) tropical fruits was conducted on 158.182 ha in Europe and 117.276 ha in the EU. Italy (approx. 300.000 ha, including large areas of durum wheat), Germany (approx. 242.000 ha) and France (approx. 217.000 ha) have the largest organic cereal production. The largest certified areas for organic production of vegetables were registered in Italy (43.648 ha), France (18.064 ha) and Spain (17.013 ha) (Willer et al., 2016).

In the last few years, a significant increase in Republic of Macedonia occurs in organic livestock production. The country has favourable conditions for the development of organic farming of livestock, unpolluted natural meadows and pastures. Livestock producers have many years of experience and apply traditional animal husbandry practices, very close to the organic way of raising animals. Also, the interest of the processing sector for organic dairy products and meat products has increased, and various organic livestock products in the country's trade chains are more likely to be found.

The most certified animals in organic farming are sheep, but also the interest for certifying cattle and goats is increasing. The highest number of organically certified sheep (92.386) and cattle (8.565) was registered in 2017. The number of organically certified cattle in 2017 was two and a half times more as compared to 2016 and almost four times more as compared to 2013 and 2014. A slight decrease in the number of goats registered for organic production was registered in 2017, compared to 2015 (4.012 goats) and 2016 (4.142) (Tab. 3).

Table 3. Organic animal farming in the Republic of Macedonia (2013 – 2017).

Animal	Year / number of animals				
	2013	**2014**	**2015**	**2016**	**2017**
Cattle	2.736	2.136	3.180	3.317	8.565
Sheep	64.301	53.484	70.007	78.664	92.386
Goats	2.946	2.276	4.012	4.142	3.833

Taking into account currently available information, the organic animal sector is developing at a fast pace in the European countries. In 2016 in Europe, 3.9 million bovine animals, 1 million pigs and 46 million poultry were breed as organically certified (Willer et al., 2016).

The conditions in Republic of Macedonia are also exceptionally favourable for organic beekeeping production. Many beekeepers in the past have been converting their production into organic, which also gives them higher added value for bee products that are increasingly demanded on the market. The overview of the number of bee families in the period 2013 - 2017 is given in Figure 4. The average number of bee hives in the research period is around 7,000. In 2017, this number is 7.676; in 2016, it is 7.760, in 2015, it is 6.932, in 2014, it is 6.285 and in 2013 it is 6.363.

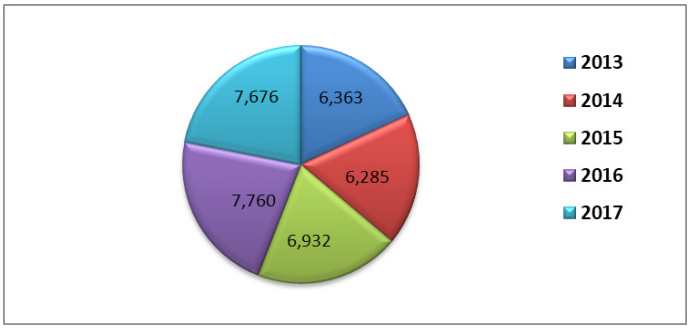

Figure 4. Number of certified organic bee hives in the Republic of Macedonia (2013 – 2017)

According to FiBL and IFOAM data, it is expected that organic beekeeping will continue to grow worldwide because to the increasing demand for organic honey and bee products. One of the main challenges for new organic beekeepers is the conversion process due to the luck of knowledge on organic beekeeping practices and the organic certification process. The country with the largest number of organic beehives is Brazil (537.014), followed by Mexico (368.000) and Bulgaria (236.462) (FiBL & IFOAM, 2018).

CONCLUDING REMARKS

The main goal of sustainable development is to create economically viable and environmentally acceptable agricultural production that would be the basis for rural development and the basis for rural livelihoods, which would create opportunities for a breakthrough in the European market.

Organic production is separated as a system that has been established in the last few years on larger agricultural areas in the Republic of Macedonia. In parallel, national agricultural policies for supporting sustainable agriculture, as well as the implementation of agroecological measures, are adapted. These policies are aimed at efficient and market-oriented agricultural production, where issues related to food safety, environmental protection and animal welfare, and which contribute to the general development of rural society, are an important place.

In fact, the main task of agricultural policies is defining strategies for the production of healthy and safe food, and the decision to support and develop the organic sector actually created the conditions for obtaining high quality and safe products for which with a well-planned and meaningful performance the markets would ensure the competitiveness of these products in the markets.

The European market offers numerous opportunities for exporters from developing countries, especially for organic and healthy foods. For that reason, Macedonia must use its potentials to produce such food, promote it and become recognizable and competitive on international markets.

REFERENCES

Bavec F.& Bavec M. (2006). Organic production and use of alternative crops. RC Press, Taylor & Francis Group, Boca Raton, FL, ISBN-13:978-1574446173.

FiBL & IFOAM, Organic International (2018). The world of organic agriculture. Statistics & Emerging Trends 2018. Available at https://shop.fibl.org/CHde/mwdownloads/download/link/id/1093/?ref=1

Jaenicke, E.C., & Drinkwater, L.E. (1999). Sources of productivity growth during the transition to alternative cropping systems. Agricultural and Resource Economics Review, 28 (2),169-181.

Lampkin, N.H. (1994). Organic farming. Farming Press, 540, Ipswich.

Lampkin, N.H., & Measures, M. (2001). Organic farming management handbook. Welsh Institute of Rural Studies. University of Wales, 1-100, Aberystwyth.

Milošev, D. & Šeremešić, S. (2004). Značaj plodoreda u organskoj proizvodnji ratarskih biljaka. Zbornik radova sa III Međunarodne Eko konferencije, Ekološki pokred grada Novog Sada, Novi Sad 413-418.

Ministry of Agriculture, Forestry and Water Economy (2013). National plan for organic production, Ministry of Agriculture. Forestry and Water Economy, (2013 – 2030).

Olesen, J. E., Rasmussen, I. A., Askegaard, M. & Kristensen, K. (1999). Design of the Danish crop rotation experiment. In: Designing and testing crop rotations for organic farming (Eds. J.E. Olesen, R. Eltun, M.J. Gooding, E.S. Jensen & Kopke U.), DARCOF Report No.1, 49-62.

Wijnands, F. G. (1999). Crop rotation in organic farming – theory and practice. In: Designing and testing crop rotations for organic farming (Eds. J.E. Olesen, R. Eltun, M.J. Gooding, E.S. Jensen & Kopke U.), DARCOF Report No.1, 21-35.

Willer, H., Lernoud, J. & Kilcher, L. (2016). The world of organic agriculture. statistics and emerging trends 2013. FiBL and IFOAM Report.

Willer, H., Lernoud, J. & Zanoli, R. (2016). The challenge of collecting and publishing data on organic agriculture worldwide. Proceedings ICAS VII Seventh International Conference on Agricultural Statistics, Rome.

СПОРЕДБА НА СОСТОЈБАТА СО ОРГАНСКОТО ЗЕМЈОДЕЛСКО ПРОИЗВОДСТВО ВО РЕПУБЛИКА МАКЕДОНИЈА И ЕВРОПСКИТЕ ЗЕМЈИ

Оливера Бичиклиски[1*], Фиданка Трајкова[1], Љупчо Михајлов[1]

[1]Земјоделски факултет, Универзитет „Гоце Делчев" - Штип, Крсте Мисиров 10-А, Поштенски фах 201, 2000 Штип, Република Македонија

**Контакт автор: obicikliski@gmail.com*

Резиме

Имплементацијата на органското земјоделство и унапредувањето на развојот на одржливото земјоделско производство претставува еден нов квалитет во животот на локалните заедници и земјата во целина.

Интензивното земјоделство е неодржливо и нема да може да продолжи со производство на доволни количини на храна во подолг временски период поради загрозувањето на суштинските услови од кои директно зависи земјоделското производство.

Трендот на модерното земјоделство исто така форсира нови сорти и видови кои даваат високи приноси при големи вложувања. Тоа претставува директна опасност за генетскиот диверзитет и земјоделството. Автохтоните популации имаат во изобилство гени за отпорност на болести и гени за квалитет и истите се сериозно загрозени трајно да исчезнат заради употребата на генотипови на комерцијални сорти и видови.

Воведувањето на органското земјоделство претставува надеж за опстанок на загрозените видови. Позитивната улога на органското земјоделство се согледува во тоа што културите се одгледуваат во нивното природно опкружување, со што се конзервира постоечкиот генетски диверзитет.

Користењето на стари сорти и локални популации во органското производство е еден од начините за зголемување на генетската дивергенција на одгледуваните растенија и нивно унапредување. Зачувувањето на генетската разновидност и биодиверзитетот во земјоделскиот систем на органското производство му дава пошироко и трајно значење во однос на заштитата на екосистемот.

Зачувувањето и заштитата на човековата околина заземаат значајно место во политиките за рурален развој на Европската Унија. Следејќи го овој пристап, потребно е да се применат инструментите кои ќе овозможат развој на одржливото земјоделство кое е максимално усогласено со принципите за заштита на животната средина.

Клучни зборови: *одржливо земјоделство, интензивно земјоделство, генетски диверзитет*