Europ. Countrys. · Vol. 9 · 2017 · No. 4 · p. 746-768
DOI: 10.1515/euco-2017-0042

ECOLOGICAL FARMING IN SLOVAKIA AND ITS REGIONAL DISPARITIES

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Received 11 January 2017; Accepted 15 September 2017

Abstract: The paper points at the origin and development of ecological farming in Slovakia from 1991 to 2015. As the positive aspect of this period can be considered the increasing area of ecologically farmed agricultural land, as well as increasing number of farmers and a slight increase in the number of processors of ecological production. The increased interest of farmers in ecological farming on land occurred mainly after Slovakia's accession to the EU. The next part of the paper is dedicated to the regional disparities in ecological production at NUTS III (Slovak regions). To analyze spatial disparities at the regional level, we used the most widely applied statistical methods – standard deviation and coefficient of variation. The largest localization of ecological production is in northern Slovakia – in Žilina and Prešov region, in central Slovakia in Banská Bystrica region. In these regions, there are higher acreage of ecological farmland. Despite the slight increase of processors of ecological produce, they still lack in Slovakia. Processors of ecological products operate mainly in the regions of western and eastern Slovakia and north of the country. With the lack of ecological production, there is relatively underdeveloped distribution of products of ecological production and its lower consumption in the domestic market. Offers of bio-products is relatively low and weak competitive environment does not create the pressure to still reduce still high prices of ecological production.

Keywords: ecological farming, bio-products, regional disparities, Slovakia

Abstrakt: V príspevku sa najskôr zaoberáme vznikom a vývojom ekologického poľnohospodárstva na Slovensku od roku 1991 až po rok 2015. Je pozitívne, že v tomto období sa zvyšovala nielen výmera ekologicky obhospodarovanej poľnohospodárskej pôdy, ale aj počet farmárov a mierne stúpal aj počet spracovateľov ekologickej výroby. Zvýšený záujem farmárov o ekologické hospodárenie na pôde nastal najmä vstupom Slovenska do EÚ. V ďalšej časti príspevku sa venujeme regionálnym disparitám ekologickej výroby na úrovni regiónov NUTS III (krajov Slovenska). Priestorové disparity na úrovni krajov sme analyzovali pomocou najpoužívanejších štatistických metód, ktorými sú smerodajná odchýlka a variačný koeficient. Najväčšia lokalizácia prevádzkovateľov ekologickej výroby je v krajoch na severe Slovenska v Žilinskom, Prešovskom a na strednom Slovensku v Banskobystrickom. Sú to kraje s vyššími výmerami ekologickej poľnohospodárskej pôdy. I napriek miernemu zvýšeniu spracovateľov bioprodukcie, stále je ich na Slovensku nedostatok. Spracovatelia produktov ekologického poľnohospodárstva sa nachádzajú prevažne v regiónoch západného, východného Slovenska a na severe krajiny. Nedostatkom ekologickej výroby je pomerne slabšie rozvinutá distribúcia produktov ekologickej výroby a nižšia spotreba na vnútornom trhu. Ponuka bioproduktov je pomerne nízka a slabé konkurenčné prostredie nevytvára tlak na znižovanie stále vysokých cien produktov ekologickej výroby.

Kľúčové slová: ekologické poľnohospodárstvo, Slovensko, bioprodukty, regionálne disparity

1. Introduction

Ecological farming represents a modern system of land management that is increasingly dedicated to farmers throughout Slovakia. In addition to the production of healthy food, preventive measures, special cultivation and husbandry practices, they are trying to prevent the degradation and devastation of the environment. Greening agriculture and nature protection is a global interest. The European Union supports this area of agro-environmental production. At present, interest in ecological farming is constantly increasing and even more countries around the world pay attention to this management mode. In 2013 it was 120 countries. By ecological farming is managed 43.1 million hectares of agricultural land is managed. All over the world, 2 million bio-producers are engaged in the ecological farming. In 11 countries of the world, the share of ecological land is more than 10% (Willer, Lernoud, 2015). Among these countries, the Czech

Republic belong also with 11.2% share in 2014. In Slovakia, there is 9% ecologically farmed agricultural land (Central Control and Testing Institute of Agriculture in Slovakia, 2016). Ecological farming in Slovakia began to develop in 1991 based on the experiences and developments in the countries of Western Europe. Since 2004, it has experienced a more pronounced dynamic of development throughout the world. Nevertheless, the share of bio-products is still relatively low in the global market. Bio-products are produced especially for the group of people who put emphasis on food quality and are environmentally sound. The chance to compete on the market in ecological production are mainly for those producers who comply with the most stringent criteria for the production, processing, storage, transport and mainly produce really high quality and the most affordable products. The aim of this paper is to highlight the development and current state of ecological farming in Slovakia and the unevenness of development of ecological production at NUTS III (kraj).

2. Theoretical and methodological approach

The theoretical discussion focused on the conceptualizations of the multifunctional agriculture and agricultural multifunctionality offers the principal idea, inspiration and application, which should be useful for the analysis of changes in agriculture, or more precisely in the wider rural area of the Czech Republic and Slovak Republic (Konečný, Hrabák, 2016). In their paper Wilson (2007) argued, that the current changes in the agricultural system are characterized by non-linearity of time, space-differentiated manifestation (different local changes) and the diverse effects of key actors and structures of the agricultural system can be properly analysed within the normative conceptual framework of multifunctionality. One of the current issues in this context is ecological/organic farming.

Most of the agricultural products of the world is produced in a conventional manner using intensifying factor. Even so, each developed country try to solve its own Food Program, through pure agriculture, without using intensification factors. This type of agriculture is called unconventional and in practice is often labelled as alternative, ecological one. A clear explanation of the concept of ecological farming was offered by Schlosserová (2008), who understands an ecological farming as a complex management of agriculture at bio-farms and subsequent production of bio-products of plant and animal origin. Ecological farming has, in comparison with conventional methods of farming, more positive effects on the protection of natural features and landscapes. Also, the biodiversity of flora and fauna in areas of arable land, permanent grassland and surrounding habitats are higher in ecological farming. Land cultivated by the ecological farming system is characterized by higher organic matter content, higher microbial activity and a higher potential towards protecting soil from erosion. Ecological farming systems are not the risk of contamination of the water resources by pesticides (Demo et al, 2011). This system involves the combination of procedures preserving the elements of the environment, a high level of biodiversity and the application of the rules on animal welfare in addition to favouring the production of natural substances and processes (Ubrežiová, Kapsdorferová, Sedliaková, 2012).

Development of organic farming abroad is concerned, for instance by Shi-ming, Sauerborn (2006), who recognizes three stages of expansion of ecological farming. Wozniak (2002), Meier (2000), Locke Halpin (2005), Kerselaers De Cock, Lauwers, Van Huylenbroeck (2007), Stolze, Lampkin (2009), Moschitz, Stolze (2009), Mzoughi (2011) and others are dedicated to the economic, legislative and financial aspects of ecological farming, as well as research based on the description of transition from conventional to ecological farming system. With the emergence of ecological farming, its promotion was also connected. In each country, they adopted policy instruments to support the transition to ecological farming, to promote the growth and consumption of ecological products to attacks on government measures and market economy (Milestad, Darnhofer, 2003, Haring et al., 2004, Nieberg, Kuhnert, 2007).

Regarding the situation and trends of organic agriculture in non-EU countries, several publications can be mentioned. Based on the development of organic agriculture in Mexico, Galindo (2007) paid attention to an important feature of organic farming, which is related to the creation of learning regions through the knowledge of formation and encouragement of individuals and companies to organize in order to meet global standards and to work effectively in the conditions

of globalization. Wollni, Andersson (2014) examined factors which have an impact on the decision of Honduran hillside farmers to convert to organic agriculture. Using the spatial autoregressive probit model, they identified that information availability, social conformity concerns and productivity spillovers are essential regarding this decision. Silva, Moore (2017) explored convergences and divergences of agroecological and organic practices in organic farms in Wisconsin, USA. They selected cover cropping as a model of agro-ecological practice. The study results showed that integration of farms into cover crop diversity and complexity is not related to their size or revenue. Pelletier, Arsenault, Tyedmers (2008) estimated potential eco-efficiency gains from a transition to organic agriculture of four major field crops (canola, corn, soy, and wheat) in Canada. Applying Life Cycle Assessment, they discovered that this transition would decrease national energy consumption by 0.8%, global warming emissions by 0.6%, and acidifying emissions by 1.0%. It is worth to note that some publications investigated peculiarities of development of organic agriculture in the EU countries. Analyzing activities of organic farms in Sicily, Donia, Mineo, Perricone, Dana, Sgroi (2017) indicated that organic farming is important not just from the economic point of view, but also regarding sustainable development and environmental protection of rural areas.

According to Thongplew, Kris van Koppen, Spaargaren (2016), many economic actors, particularly farmers, production chain organization, milk processors, and supermarkets, played substantial roles in the promotion of organic dairy sector in the Netherlands. They mentioned that, to encourage its development, it is necessary to have, on the one hand, the linkage between corporate social responsibility strategies and civil society initiatives, and governmental supports, on the other hand. Liontakis, Tzouramani (2016) studied the economic sustainability of organic aloe vera farming in Greece. The research results confirmed that type of farming is a promising alternative to “traditional” crops in the country, especially for rural family farms that have risk-neutral attitudes and who manage marginal farmlands with poor quality of irrigated water. Jezierska-Thöle, Gwiaździńska-Goraj, Wiśniewski (2017) stated that there is a significant growth in the number and area of organic farms in Poland due in part to the introduction of EU subsidies. However, the functioning of these farms is hampered by a weak network of organic product distribution, fragmented supply and demand, low levels of marketing, and the short shelf life of products. As stated by Bryła (2015), in this case, there is also a problem of ecological awareness of the society. Aceleanu (2016) considered sustainability and competitiveness of farms in Romania through organic agriculture. It is mentioned that, to promote development of organic farming in the country, green marketing strategy, which can stimulate both consumption and production of organic products, is required. Considering the role of organic food products in the Romanian exports, Burcă-Voicu (2015) emphasised that to enhance attractiveness for the organic agriculture sector and organic food products, it is important to give attention to changes which occur concerning demand trends and consumer behaviour on these products. Brčić-Stipčević, Petljak, Guszak (2013) researched purchase patterns of organic food consumers in Croatia. It was revealed that organic food purchase depends substantially on the following factors: the region, education level, place of residence, financial status, and income level. Besides, the study showed that the eco-label plays an important role for frequent organic food consumers.

In the meat production, there are two recognized methods: the conventional and the ecological production. From this point of view, organically produced meats are the meats produced ecologically and demand for these products is growing (Kubicová, Kádeková, 2012). The essence of sustainable consumption consists in the preference of the eco products and in the consumption of renewable amount of natural resources and products. The concept of sustainable consumption can be divided into three main categories – ethical and critical consumption, ecological consumption including the favourite "3R" of ecological behaviour (Reduce, Reuse, Recycle) and elements such as agriculture, organic farming and handicraft production and social and solidarity consumption, where to the forefront becomes the corporate responsibility (Horská, Siringoringo, 2012). The results of a marketing survey on sustainable consumption published by Nagyová, Košičiarová and Holienčinová (2016) showed that only 21% of the Slovak respondents could explain what means the term sustainable consumption means, its application into their everyday life is pretty high – more than 67% of respondents buy the so-called economical packages of food and more than 49% of respondents buy products of ecological production. The evaluation of responses to the question concerning the purchase of eco products and the respondent´s gender

revealed that there exists a statistically significant relationship – female respondents prefer the purchase of ecological products in a higher way (52.89%) than the male respondents (34.48%). The most important factor which leads them to the purchase of economic package of products is its better price (59.90% of respondents) and the most important factor which leads them to the purchase of food of ecological production is their better quality in comparison to the products of conventional production (35.81% of respondents). The survey on consumer behaviour in the market of dairy products carried out in 2015 showed that consumers are willing to favour products of national origin and in purchase was increasing share of products coming from domestic producers as well as products coming from ecological farming (Šugrová, 2015). The ecological production system is the subject of study also of the other Slovak professionals e.g. Kozáková, Lančarič, Tóth, Savovov (2015), Némethová (2010, 2011), Schlosserová, Juršík (2009). In the Czech Republic, the issue of ecological farming and regional differentiation was studied by Doležalová, Pícha, Navrátil, Bezemková (2014), Brožová (2011), Hrabalová, Zander (2006) and Holota et al. (2016).

Cavaliere, Peri, Banterle (2016) investigated characteristics of vertical relationships in organic food chains in France, Italy and Spain. With respect to the vertical relations between processing firms and agriculture, the organic supply chains generally have more intensive vertical coordination compared to conventional ones due to the use of supply contracts and the geographical areas. Using Sustainable Process Index methodology, Maier, Szerencsits, Narodoslawsky, Ismail, Shahzad (2017) explored possibilities of more sustainable biomass production using eco-efficient farming practices in Austria. The study confirmed that there is a huge potential regarding organic farming and the use of renewable energy sources in this respect. The preliminary results showed that, owing to the shift from conventional technologies to organic farming and use of biogas as fuel, the ecological footprint reduction potential ranges from 22% to 57%, and the carbon footprint reduction potential is in the range of 38% to 74%.

Few authors such as Kutscherauer et al. (2010), Matlovič, Matlovičová (2011) used the measures of variability when evaluating regional disparities. Spatial disparities at the regional level were evaluated by using the most widely used statistical methods that are standard deviation and coefficient of variation. The aim of the methods of variability is to determine the degree of dispersion of character values. The variability of the character – the number of farmers, average area of farms, agricultural area and the number of processors is characterized by a standard deviation (SD), which is a measure of the variability derived from a variance signed as σ. Variance (dispersion) is calculated as the arithmetic average of squares of character values from their arithmetic mean as:

$$\sigma^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2,$$

where n is the number of divisions, x_i is the value of the indicator in a territorial unit $i = 1, 2, \ldots, n$ and $\bar{x}$ is an arithmetic average of the variable x_i. The standard deviation σ is calculated as the square root of the variance, as shown in the following relationship:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}},$$

where n is the number of divisions, x_i is the value of the indicator in a territorial unit $i = 1, 2, \ldots, n$ and $\bar{x}$ is an arithmetic average of the variable x_i.

The standard deviation indicates the average fluctuation of individual values around the arithmetic mean, and has the same dimensions as an observed character. The application of the standard (SD) deviation is problematic because its size depends on the setting of "measurement unit", respectively, the size of the measured values. Therefore is not very suitable for comparing various indicators, or for long-term comparison, when the average of the studied indicators varies significantly. This index is used mostly in a spatial analysis to measure absolute values. Relative values are rarely measured by this index rarely. More appropriate instrument for comparative analysis as standard deviation is the coefficient of variation. Therefore, for the comparative spatial

analysis was used the variation coefficient (CV), was used, which expresses the intensity of phenomenon fluctuation relative to the arithmetic average in the percentage (Mičietová, Petříček, 2012). It allows correlation of variability variables with different values (cleansing the standard deviation by the average value). The coefficient of variation is the most common method of measuring inequality between regions, we calculate it as the quotient of the standard deviation and arithmetic average:

$$CV = 100.\left(\frac{\sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n}}}{\bar{x}}\right),$$

where n is the number of divisions, x_i is the value of the indicator in a territorial unit $i = 1, 2, \ldots, n$ and $\bar{x}$ is an arithmetic average of the variable x_i.

Protection of individual data of individual operators of ecological production permits us to work with the data on a regional level, but only with limited indicators, which are mainly bound to the area of ecologically farmed land, the average acreage of eco farms and the existence of entities: producers of bio-production – farmers and processors/producers of bio-food. The statistical data used in this paper were obtained from Central Control and Testing Institute (ÚKSÚP) in Bratislava, which registers the operators of ecological farming. Such information as production volume, revenue, headcount and investment in the territory of Slovakia in ecological farming was not monitored. Therefore, based on the data it is possible just to illustrate the spatial location of farmers and processors of bio-products, namely by cartographic at the level of districts of Slovakia.

3. Results and discussion

Origin and development of ecological farming

The transition from conventional to unconventional management mode (alternative, ecological) is not easy. Boreková (2006) stated that the conversion of the transition from conventional farming to organic farming takes two or three years, exceptionally even more. The conversion period is associated with a decline in sales. At the same time, the costs, consumption of fertilizers and chemical protective equipment are decreasing, but cost reduction is usually milder than the drop in production. The result of this development is the decline in profit (Kubicová, Kádeková, Dobák, 2014). States usually take part of the conversion impact by providing subsidies for the conversion per hectare. According to Kováč and Macák (2007), in general, the higher is the agricultural holding is specialized, the longer period it is necessary to achieve the required sustainable conversion to the ecological system more complex and (agro and zoo environmental) parameters.

Ecological farming in Slovakia was founded in 1991. According Lacko-Bartošová et al. (2005) the development of eco production in Slovakia was initiated by the Ministry of Agriculture and Food of the Slovak Republic, which fixed the objectives, principles and conditions for development. The basic regulatory standards for organic farming system at that time became the "Rules of organic agriculture valid for the territory of the Slovak Republic", which were based on principles and requirements of ecological agriculture defined by the IFOAM (International Federation of Organic Agriculture Movements). The then Ministry of Agriculture and Food declared conditions for choosing subjects able to fulfil the principles and conditions for granting subsidies for conversion from conventional to organic farming system. In 1991/1992 there were four agricultural cooperatives, two state farms and one self-employed farmer creating a list of first establishments that started to apply a new management system on part of their land. Those entities that meet the conditions of the subsidy policy, taking into account the opinions of inspectors control system and recommendations of Certification Commission received subsidies, on average, 10,000 SKK ha^{-1} within three years of conversion, of which in the first year, 4,000 SKK ha^{-1}, in the second year 3,500 SKK ha^{-1} and in the third year 2,500 SKK ha^{-1}. After the completion of the conversion these 37 entities were allowed to label organic production as “bio”. In 1991/1992 after exclusion of unsuitable areas (e.g. land surrounding industrial plants, soils with increased content of heavy metals), the ecological system began to be applied to an area of 14,626 ha, e.g. 0.59% of agricultural land in the Slovak Republic (Lacko-Bartošová et al., 2005).

Despite the fact that ecological primary producers produced the first bio products in 1994, domestic processing and wholesale organizations with food did not show their processing sufficient interest. Therefore, the eco producers focused mainly on sales of products to the countries of Western Europe.

In the year 1995, a "Conception of Organic Agriculture in Slovakia" was worked out and approved by the government of the Slovak Republic. This fundamental document determined the basic direction of ecological agriculture in the Slovak Republic in a horizon until the year 2010, and has adopted a set of measures for its realization. A basic change in the legal performance of ecological agriculture occurred in the year 1998 when the Act of the National Council of the Slovak Republic No. 224/1998 Coll. on Ecological Agriculture and the Production of Bio-Foodstuffs was passed.

In 2002, amendment to the Act on organic farming and organic food production (No. 415/2002 Coll.) was published. Slovakia's accession to the EU required a further amendment, which sought to incorporate organic farming in the EU SR (*Act No. 421/2004 Coll.* on ecological *agriculture.*), which creates conditions for the implementation of existing EU legislation. Slovakia's accession to the EU has changed the conditions for subsidies. For the year 2004, subsidies for organic farming graded according to the type of agricultural land, during the conversion of their height ranged from 4000 SKK ha^{-1} in the case of permanent grassland to 10,000 SKK ha^{-1} which was designed to grow vegetables, spices and aromatic plants. The cultivation of arable crops was allocated funds in the amount of 6,000 EUR ha^{-1}. After the conversion, which lasted for two years, the producers received subsidies by half, lower than during the duration of the conversion. Currently, there is a new valid Act on organic farming No.189/2009 Coll. The Slovak Republic are associated with the European regulations the *Law on ecological* production, which specifies the state administration in the field of ecological farming, the rights and obligations of persons performing, registration of operators and control authorities, details of the performance of the control, labelling the products and sanctions for breaching the obligations stipulated by this law.

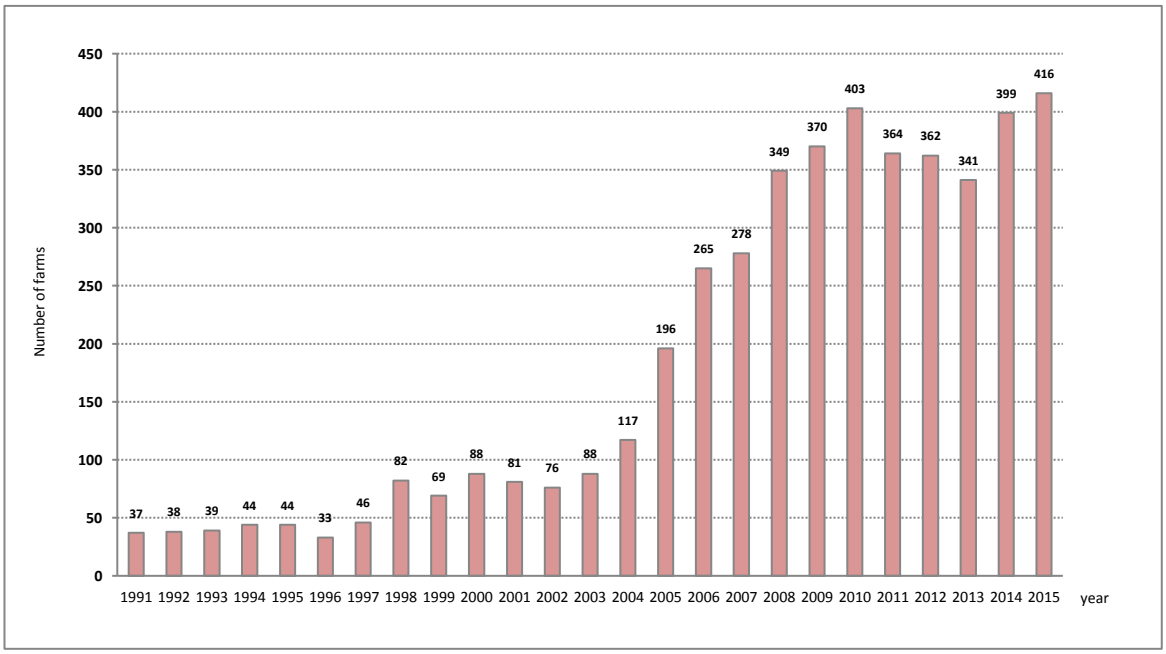

Fig 1. Development of the number of farms in ecological farming in Slovakia in the years 1991–2015. Source: ÚKSÚP, Bratislava 2016, own processing

The development of ecological farming in Slovakia shows the following indicators – the operator of an increase in eco-agricultural land, increasing the number of farms and increasing the number of processors). In the first year of forming ecological farming (year 1991), Slovakia had ecologically farmed 0.59% of agricultural land. This share rose to 2.39% in 2000. During the first six years of development of ecological farming in Slovakia, acreage ranged from 14,700 to 17,700 hectares. Significant increase occurred in 1997–1998, when the ecologically farmed land

increased to 50,615 hectares and the number of eco- entities increased to 82. The increase in areas and subjects continued after 2000. From 1997 to 2004, did not exceed the area of ecologically farmed land to Slovakia did not exceed more than 60,000 hectares. The second stage of the growth occurred in the period 2004-2005, when the area of agricultural land increased by more than 70% and the number of farms increased to 196 in 2005 (Fig. 1). In 2004, under ecological management, 117 entities on 53,091 hectares of agricultural land (4.93%) has been managed. In 2006 it was already 121,956 ha of organic land on which environmentally friendly manner managed 266 subjects (6.52% of agricultural land). The EU supports the ecological agricultural production, so that the proportion of farmed land was maximized. Since 2005 (92,100 ha), a steady increase until 2010) was recorded, when 403 bodies of ecological agriculture to the highest acreage (over 180,000 hectares), which represents 7.48%. It is a relatively high value compared to other European countries, where the average value of this indicator ranges from 2–10%. After 2010, the share of ecological land (Fig. 2) and the number of farmers (Fig. 1) began to decline. In 2015, 186,483 ha of ecological land and 416 farmers was registered by The Central Control and Testing Institute in Agriculture (ÚKSÚP). The share of ecological agriculture of total agricultural land has increased to 9% in 2015.

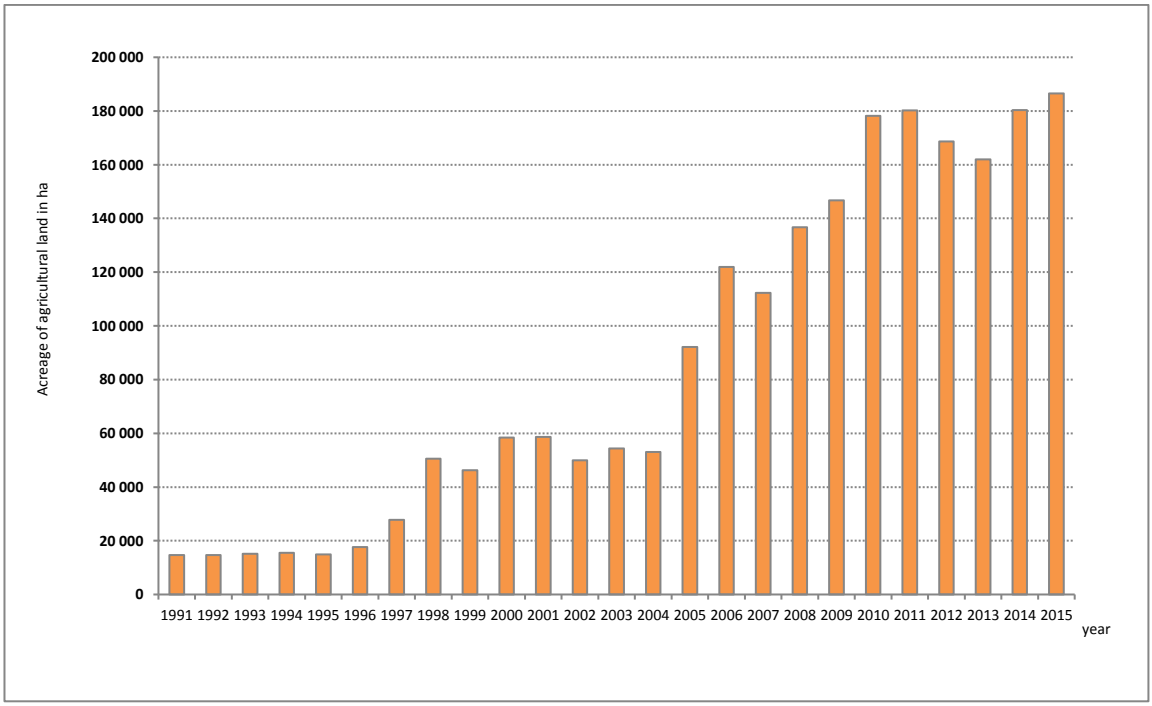

Fig 2. Development of acreage of agricultural land in ecological farming in the SR in the years 1991–2015. Source: ÚKSÚP, Bratislava 2016, own processing

The increasing interest of farmers engaging in ecological farming system is evidence of their gradual increase in environmental awareness. Farmers interested in joining this farming system positively affects support in several support mechanisms. Agro-environment payments significantly affect the results of operations in ecological farming. Support takes the form of "payment per hectare of farmland". The payment is different for production during the conversion period and the period after the conversion. During the conversion period is payment is higher. For instance, during the Rural Development Program 2007–2013, the payment for arable land had been granted to 218.12 EUR ha^{-1}. After the conversion period it was only 152.69 EUR ha^{-1}. In this programming period, the orchards and vineyards were more supported, 900 EUR ha^{-1}- during the conversion period and 671.15 EUR ha^{-1}- in the period after the conversion (Kozáková, Paška, Lančarič, Savov, 2012). Based on the above facts support for ecological farming in subsequent years continued to natural slight increase in ecological land in Slovakia which is related to natural growth of ecological farms and producers of bio food processors. Comparison between 1991 and 2015 showed the growth in the number of farms from 37 to 416. Significant growth was also recorded in ecologically farmed agricultural land, while in 1991 was this production was carried out on 14,700 hectares of land, in 2015 it was 186,483 ha.

Gradually, as the area of ecological farmland and the number of eco farms were growing, the average area of farms has changed. While in 1991 the average farm area was approximately 397 ha, it was 448 ha in 2015. The highest average farm acreage, about 724 ha, was recorded in 2001 (Fig. 3). Slovakia has a relatively high average farm acreage in comparison to other European countries, which is a consequence of the existence of cooperatives with an area of several thousand hectares to only small changes in the total area transformed into its current form. Area farms in European countries (except the UK and Russia) do not exceed 250 ha, which is in line with the intention of the European Community to promote ecological farming as an extensive alternative to intensive farming. EU seeks to eliminate unwanted surpluses of intensive production by reducing the quantity of production and by increasing the quality when the ecological farming seems to be an ideal means of achieving this aim (Kozáková, Paška, Lančarič, Savov, 2012).

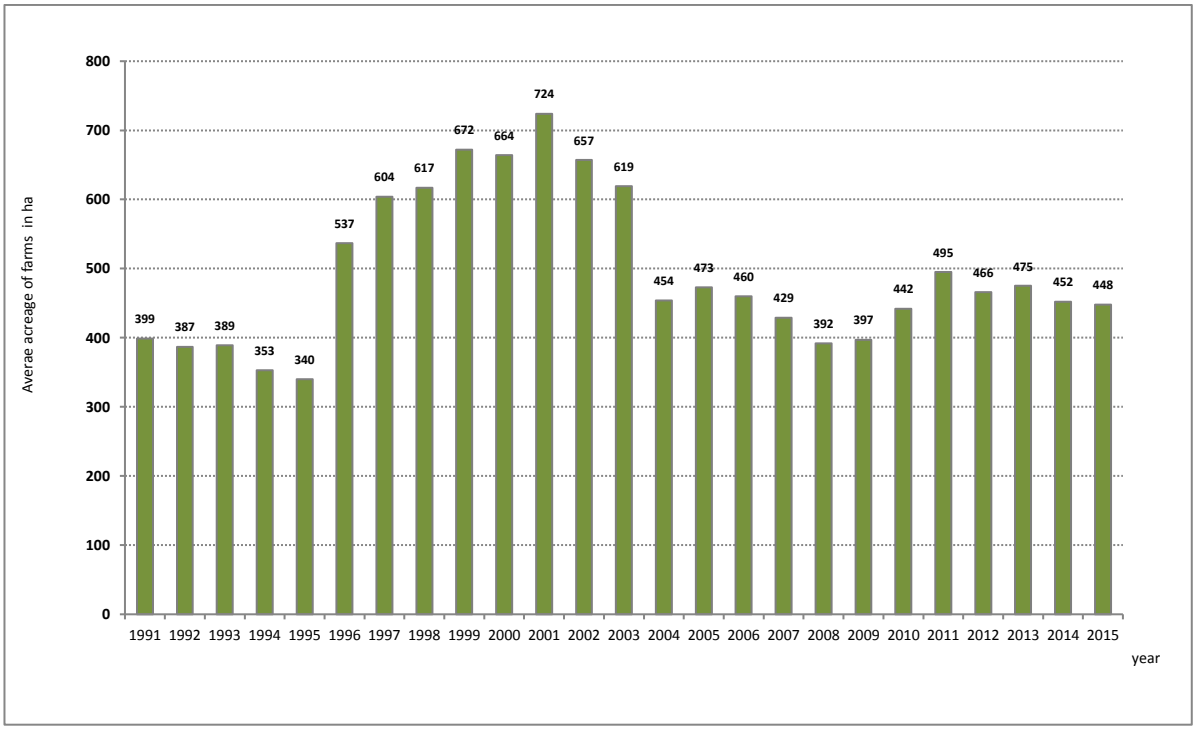

Fig 3. Development of average acreage of farms in ecological farming in the SR in the years 1991–2015. Source: ÚKSÚP, Bratislava 2016, own processing

With the growth of the ecologically farmed agricultural land it was also changing its internal structure. Structure of the production of the agricultural land in ecological farming was compared in the period 2004–2015 (Tab. 1). Agricultural land between 2004 and 2015 showed a threefold increase by 133,391 hectares. The largest rate of increase (up to 6-fold) achieved a lasting culture, especially fruit orchards which area increased by 1,361 hectares. Vineyard acreage increased by 59%, which in the absolute terms represents an increase by 46 ha. Arable land increased by 307%, an increase was by 45,929 hectares. In the category of permanent grassland were added 86,054 ha (an increase by 228%). In terms of the percentage of agricultural land structure when comparing the years 2004 and 2015 there was a minimal change. In 2015 a slightly increased proportion of arable land to 32.65% (in year 2004 it was 28.17%). The predominant permanent grassland recorded a decrease from 71.21% (year 2004) to 66.41%. Permanent crops essentially maintained the same share, around 1%, of the agricultural land.

Tab 1. The structure of registered land in the ecological farming in the SR in the years 2004–2015. Source: ÚKSÚP, Bratislava 2016, own processing

Agriculture land in ha/year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Arable land	14,961	26,796	36,715	37,776	41,779	47,549	57,416	63,029	54,264	53,181	62,279	60,890
Permanent grassland	37,801	64,750	84,456	84,053	93,843	98,127	119,506	116,004	113,075	107,622	116,528	123,855
Fruit orchards	252	554	732	707	994	1,030	1,234	1,158	1,162	1,144	1,448	1,613
Vineyards	78	91	53	53	53	55	79	70	101	82	109	124
Total	53,091	92,191	121,956	122,589	136,669	146,792	178,235	180,261	168,602	162,029	180,364	186,482

A more detailed assessment of agricultural land after years of conversion shows that the largest area for each year of conversion reaches arable land (Tab. 2).

Tab 2. Land acreage under ecological farming in 2015. Source: ÚKSÚP, Bratislava 2016, own processing

Acreage of land (ha)					
Type of land	Agricultural land	Arable land	Permanent grassland	Fruit orchards	Vineyards
ECO	140,921.60	42,629.11	97,341.21	870.26	81.02
3rd year of conversion	0.95	0	0	0	0.95
2nd year of conversion	5,631.89	2,752.27	2,705.68	157.43	16.51
1st year of conversion	39,928.17	15,509.05	23,808.43	585.29	25.40
Total:	186,482.61	60,890.43	123,855.32	1,612.98	123.88

In Slovakia, it is possible to buy bio products resulting from ecological farming directly from producers on eco farms (yard sale that brings better prices of bio products), in specialized stores for balanced diet, teahouses, stores of food in retail chains, increasing online stores, at farmers' markets in major cities and through the so-called “crates sale” where consumers can choose directly from the bio products via Internet. Offer of bio products on the Slovak market is now much wider than a few years ago – it is mostly seasonal fruits, vegetables, flour, bread, pasta, herbal teas, spices, dairy products etc. Several Slovak producers export their bio products abroad because it is more profitable for them. The bulk of bio production from Slovakia is heading mainly to Western Europe. Slovakia still lacks network of processors of organic food production and processors must also meet strict criteria for registration. Another reason for the decline of ecological production in Slovakia is weaker distribution of bio products to consumers who are willing to pay extra money for quality bio products compared to other European countries. Organic food market in Slovakia is still being developed. Demand for products of ecological production is still low because the price of bio products is quite high compared to the price of products from conventional agriculture. Offer of bio products is increasing, thus can cause an increase in the competition, which in the future may put pressure on the prices of products of ecological production.

Although ecological farming began to develop in the 1990´s in Slovakia, the first processor of this production occurred in 1996. In 2001, four bio-processors were registered. Gradually from this year their number increased. In 2004, during the period of Slovakia's accession to the EU, there were 19 of them. After that year, the number of processors had increased significantly, there were already 52 in 2007 and 64 in 2009. In Slovakia, there were 83 subjects engaged in ecological food production in 2014 and 2015, according to the register of bio producers. Registration of new producers of bio food ran from 1996 slowly. In the period 1996–2003, only one producer of bio products was registered each year. From 2004 through 2008, growth occurred but in 2009, it felt again. Overall, most producers of bio food were registered in 2008 (12 subjects). After this period, there is a slight increase in registrations (Internal materials ÚKSÚP, 2014). In terms of the legal

form of bio-food producers / processors 53 limited liability companies (Ltd.) dominated (Tab. 3). Even in primary production, entities with legal form of limited liability companies (187) dominated, there was also increasing number of self-employed farmers SEF (142), cooperatives (74) and public limited corporations PLC (10) in 2015.

Tab 3. The number and legal forms of ecologic production operators in Slovakia in 2015. Source: ÚKSÚP, Bratislava 2016, own processing

Legal Form	SEF	Cooperatives	Ltd.	PLC	Others	Total
Farmers	142	74	187	10	3	416
Processors	8	11	53	7	4	83

Regional differentiation of ecological farming at the NUTS III level

Agricultural production is carried out in the specific production conditions that constitute the environment in which organizations manage. Taking into account the specificities of natural and socio-economic environment, a spatial differentiation of development of ecological farming was created.

Manufacturers of bio products – farmers

Similarly, as in Slovakia, the number of ecological farms has increased after Slovakia's accession to the EU, and thus has been increasing the number of farms and at the level of individual regions (Tab. 4). In the reporting period 2004–2015, noticeable increase was recorded in regions of Banská Bystrica, Košice and Bratislava. The highest number of eco farms were in Prešov, Banská Bystrica and Košice region. Mentioned regions of Prešov (26.68%), Banská Bystrica (20.19%) and Košice (15.67%) are characterized by the highest proportion of ecologically farming subjects. Regional disparities in the development of the number of farms in the regions of Slovakia in the monitored period 2004–2015 were calculated by using the standard deviation (σ) and coefficient of variation (CV). The lower values of impact indicators, the smaller disparities are reflected within individual regions and vice versa. As indicated by Table 4, interregional disparities in a given period grew, despite the increasing number of farms. Until 2007, the indicator alternately increased and fell. Since 2008, the standard deviation and coefficient of variation have begun to rise slightly, suggesting enlarging regional differences within regions of Slovakia.

Tab 4. Development of the number of farms of ecological farming in regions of Slovakia in the years 2004–2015. Source: ÚKSÚP, Bratislava 2016, own processing

Regions /Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bratislava	5	6	7	8	15	18	18	15	18	16	20	19
Trnava	7	11	13	16	27	23	25	21	20	18	21	23
Trenčín	9	17	21	22	24	28	26	24	24	25	27	28
Nitra	10	14	16	27	38	38	39	34	35	33	34	32
Žilina	20	30	40	39	46	48	48	49	47	45	53	53
Banská Bystrica	12	32	46	50	62	69	83	68	66	58	81	84
Prešov	41	57	74	71	80	88	93	85	86	84	96	111
Košice	13	28	48	45	57	58	71	68	66	62	67	66
Total SR	**117**	**195**	**265**	**278**	**349**	**370**	**403**	**364**	**362**	**341**	**399**	**416**
Standard deviation	10.83	15.19	21.31	19.23	20.49	22.75	26.76	24.26	23.62	22.49	27.16	30.84
Arithmetic average	14.63	24.38	33.13	34.75	43.63	46.25	50.38	45.50	45.25	42.63	49.88	52.00
Coefficient of variation [%]	74.03	62.31	64.33	55.34	46.96	49.19	53.12	53.32	52.19	52.76	54.45	59.30

According to Kozáková, Pašek, Lančarič, Savov (2012), the production of organic ecological products generally lags behind the production of conventional products. The focus of ecosubjects on crop production is mainly determined by their location in regions with favourable soil-climatic conditions and prevailing arable land. Mountain regions with higher altitudes and higher occurrences of permanent grasslands create the conditions for the ecosubjects to focus on livestock production. In this paper, the attention is aimed at the spatial distribution of producers of bio products- farmers in crop production and farmers in the livestock production separately in order to highlight the orientation of production in the various districts of Slovakia (Figure 4 and 5). Greater concentration of operators in ecological farming is central and eastern Slovakia. These are the areas with significance, more than 60% representation of permanent grasslands. This type of landscape is mainly in the north, northeast and the central part of Slovakia, mainly in mountain and foothill regions. In these areas, in terms of the structure of agricultural land, there occurs arable land with grass-only or grasslands. While the arable land in these areas is more grass over and used for extensive and sheep and beef-cattle.

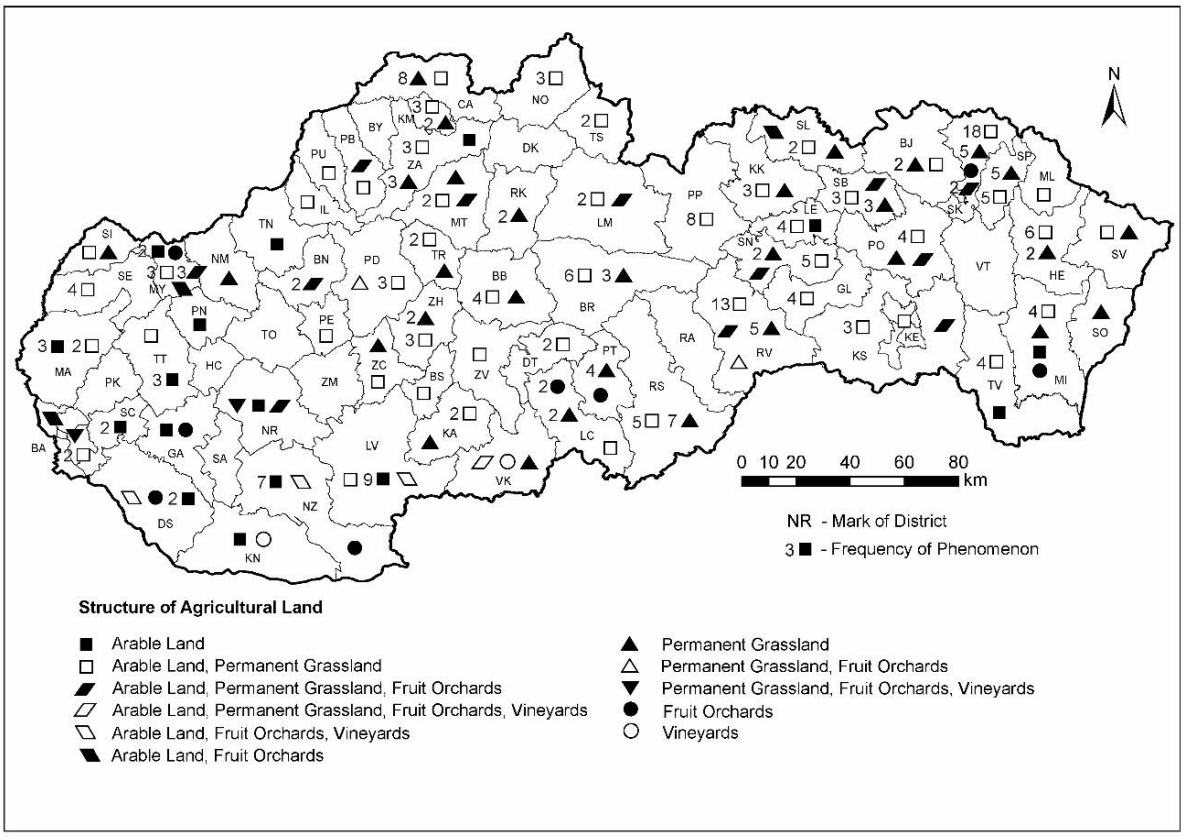

Fig 4. Spatial distribution of farmers in crop production in the districts of the Slovak Republic (year 2015). Source: ÚKSÚP, Bratislava 2016, own processing

Within the framework of ecological farming in regions of Slovakia, the arable land dominated, fruit orchards and vineyards thrive cultivation of cereals, corn, industrial crops, legumes, vegetables, fruits and organic wine production. There are also cultivated medicinal plants and plants for cosmetic purposes. Location of farmers in crop production concerned the 60 districts of Slovakia, with most of these bodies in the districts of Svidník (26), Rožňava (20), Rimavská Sobota (12), Levice (11), Myjava and Stropkov (10), Spišská Nová Ves, Nové Zámky and Čadca (9). In Bytča, Dolný Kubín, Pezinok, Topoľčany, Šaľa, Zlaté Moravce and Revúca there were no farmers in plant production. In the districts of Piešťany, Nové Mesto nad Váhom, Trenčín, Ilava, Púchov, Zvolen, Medzilaborce and Sobrance there was just one farmer in plant production.

On ecological farms with the dominance of permanent grassland it was a significant representation of cattle, sheep and goats. Farmers who were engaged in livestock breeding were active in 66 districts mostly in northern, central and eastern Slovakia. The highest concentration of livestock farmers was registered in the districts of Svidník (31) and Rožňava (21). Other districts with a relatively high number of entities involved in the livestock breeding in ecological farming

were in Spišská Nová Ves (15), Rimavská Sobota (14), Humenné and Stropkov (12), Brezno a Čadca (11), Žilina and Sabinov (10). There was only one farmer, of livestock production in Nové Mesto nad Váhom, Púchov, Nové Zámky, Partizánske, Banská Štiavnica, Zvolen, Revúca, Bardejov, Medzilaborce and Sobrance (Figure 5).

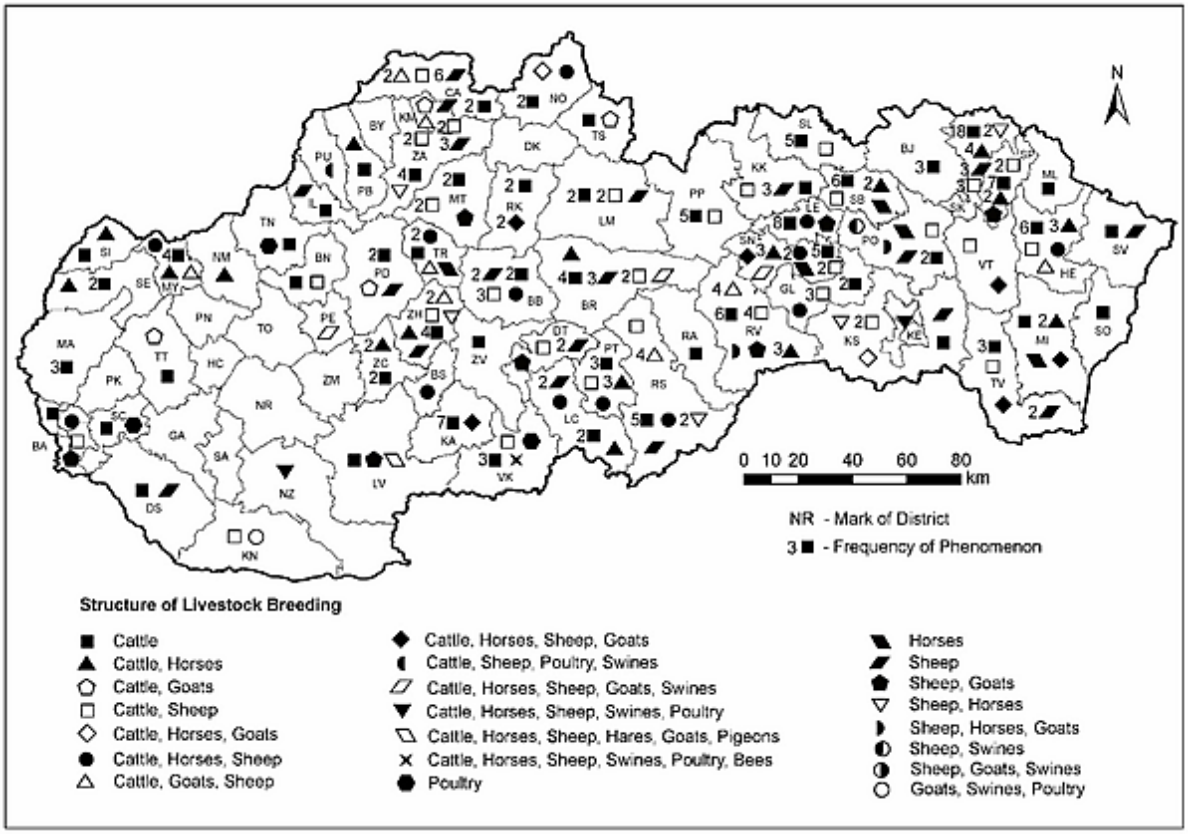

Fig 5. Spatial distribution of farmers in livestock production in the districts of the Slovak Republic (year 2015). Source: ÚKSÚP, Bratislava 2016, own processing

In terms of targeting the livestock breeding, the cattle with combination of sheep, goats and horses prevailed. Cattle was assured mainly in central Slovakia in Žilina and Banská Bystrica and in eastern Slovakia in Prešov and Košice regions. The sheep farming in combination with other livestock (goats, horses and swines) was represented to a lesser extent. The farmers were at least engaged in swine and poultry breeding; in these areas are noticeable large reserves of Slovakia. Interest of the public consumer, also the foreign one, is particularly high for organic eggs, meat and bio quality poultry and pork meat (Holúbek, Baco, Buday, 2013). In the central part of western Slovakia on the Danube basin, the livestock was not implemented in Galanta, Šaľa, Nitra, Zlaté Moravce, Hlohovec, Topoľčany and Piešťany.

Land Acreage under Ecological Farming

Dynamics of growth of land acreage under ecological farming could be seen even in the area of Slovakia as well as in its individual regions. Growth of land acreage under ecological farming significantly influenced the increase in funding within the Rural Development Program 2007–2013. In the monitored period in the years 2004 to 2015, a significant growth of the ecological land was noticed in Bratislava, Banská Bystrica and Košice (Tab. 5). Similarly, even the highest share of the total ecological farmland was concentrated in Prešov (29.07%), Banská Bystrica (22.56%), Košice (17.17%) and Žilina (13.47%) regions. These were even the regions with the highest concentration of ecological farms. During the reporting period there was a decrease of inter-regional disparities in the years 2007 to 2012 (2013), in other years, the value of the index expressed by the standard deviation and coefficient of variation increased and differentiation within the regions deepened.

Tab 5. Development of land acreage in ha under ecological farming in regions of Slovakia in the years 2004–2015. Source: ÚKSÚP, Bratislava 2016, own processing

Regions /Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bratislava	747	2,411	4,549	4,919	5,356	12,083	12,083	12,083	12,050	12,018	13,342	8,272
Trnava	3,191	4,088	4,045	4,291	4,852	4,481	5,387	4,993	4,930	4,325	7,010	12,627
Trenčín	2, 660	5,669	6,505	6,718	9,731	10,654	10,706	10,020	9,566	9,400	9,304	9,275
Nitra	1,647	3,033	3,074	4,190	3,548	4,736	5,271	4,376	4,541	4,573	2,735	2,902
Žilina	10,041	18,349	23,364	23,457	23,593	25,518	26,017	26,674	26,387	25,297	26,783	25,111
Banská Bystrica	6,733	16,422	21,039	20,838	26,351	29,381	37,536	34,933	33,666	30,242	38,501	42,063
Prešov	20,588	28,133	35,522	31,703	37,847	40,654	49,192	47,734	47,709	46,699	49,199	54,220
Košice	7,484	14,086	23,857	23,143	25,391	23,095	31,917	39,448	29,753	29,476	33,490	32,013
Total SR	**53,091**	**92,191**	**121,955**	**119,258**	**136,668**	**146,762**	**178,235**	**180,261**	**168,602**	**162,029**	**180,365**	**186,483**
Standard deviation	6,065	8,644	11,452	10,323	12, 004	12,080	15,315	15,793	14,967	14,119	15,798	17,381
Arithmetic average	6,636	11,524	15,244	14,907	17,084	18,825	22,267	22,533	22,719	20,254	22,546	25,315
Coefficient of variation (%)	91.38	75.01	75.12	69.25	70.27	64.17	68.79	70.09	65.88	69.71	70.07	68.66

Most farms in Slovakia aimed at combined production, but there were still also the farmers engaged and focused only in plants or livestock, several operated by both ecological and conventional manner. Small family farms were found in less number and only managed ecologically. The average area of agricultural land in the Slovak farms was approximately 450 ha in the period 2004–2015. Development of the average acreage of farms had a fluctuating course, which expressed the values of standard deviation and coefficient of variation (Tab. 6). Significant decrease in interregional disparities was recorded in 2005, when the standard deviation (116.36) and coefficient of variation (27.02%) recorded the lowest values. The year 2011 was marked by major disparities in the whole development, which is documented by the highest values of standard deviation 197.99 and coefficient of variation 41.80%.

Tab 6. Development of average area in ha of agricultural land in the Slovak farms in the period 2004–2015. Source: ÚKSÚP, Bratislava 2016, own processing

Regions /Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bratislava	149	402	650	615	357	671	671	806	669	751	667	435
Trnava	456	372	311	268	180	195	215	238	247	240	334	549
Trenčín	296	333	310	305	405	381	412	418	669	376	345	331
Nitra	165	217	192	155	93	125	135	129	130	139	80	91
Žilina	502	612	584	601	513	532	542	544	561	562	505	474
Banská Bystrica	561	513	457	417	425	426	452	514	510	521	475	501
Prešov	502	494	480	447	473	462	529	562	555	556	512	488
Kosice	576	503	497	514	445	398	450	580	451	475	500	485
Total SR	**454**	**473**	**460**	**429**	**392**	**397**	**442**	**495**	**466**	**475**	**452**	**448**
Standard deviation	161.96	116.36	143.52	152.75	138.45	163.45	163.77	197.99	181.20	182.56	163.67	137.65
Arithmetic average	400.81	430.63	435.18	415.33	361.51	398.60	425.80	473.66	474.03	452.61	427.37	419.26
Coefficient of variation (%)	40.41	27.02	32.98	36.78	38.30	41.00	38.46	41.80	38.23	40.33	38.30	32.83

Bio food producers – processors

The positive trend growth in the number of entities could be observed in processors of bio products. Greater concentration of processors of bio products was in the western Slovakia and districts in the north and north-eastern Slovakia. Since 2004 when Slovakia joined the EU until 2015, their number increased by more than 300%. The largest increase was recorded in Bratislava, Trenčín and Banská Bystrica (Tab. 7). In 2015, a higher number of organic food producers was noticed in Bratislava and Nitra region (16.87%), Trenčín, Žilina and Prešov region (13.25%). Inter-regional disparities within regions fluctuated in the period 2004–2015, while decreased in the period 2007–2012, except for 2009 (standard deviation – coefficient of variation and 2.83–35.36%). A significant increase in the standard deviation values (3.77) and the coefficient of variation (40.24%), which indicated increase regional differences between

individual regions of Slovakia, was recorded in 2013. The moderation of disparities occur in the period that was associated with decrease of standard deviation and coefficient of variation as well as with the stabilization of the number of processors.

Tab 7. Development of number of bio products processors from ecological farming in the region of Slovakia in the years 2004–2015. Source: ÚKSÚP, Bratislava 2016, own processing

Regions /Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bratislava	2	3	3	5	7	8	9	11	11	13	14	14
Trnava	2	4	5	10	7	9	9	9	9	5	5	5
Trenčín	2	2	5	6	10	11	9	7	8	11	11	11
Nitra	4	4	5	8	5	6	4	6	9	15	14	14
Žilina	3	3	3	4	5	4	8	6	9	9	11	11
Banská Bystrica	2	3	7	10	6	8	5	6	8	6	9	9
Prešov	4	4	5	7	9	13	11	11	11	12	11	11
Košice	0	0	0	2	5	5	6	3	5	4	8	8
Total SR	**19**	**23**	**33**	**52**	**54**	**64**	**61**	**59**	**70**	**75**	**83**	**83**
Standard deviation	1.22	1.27	1.96	2.65	1.79	2.83	2.23	2.60	1.79	3.77	2.83	2.83
Arithmetic average	2.38	2,.8	4.13	6.50	6.75	8.00	7.63	7.38	8.75	9.38	10.38	10.38
Coefficient of variation (%)	51.3	44.13	47.62	40.70	26.45	35.36	29.28	35.19	20.4	40.24	27.24	27.24

Processors of bio products were located in 38 districts of Slovakia. Most of them were engaged in processing of milk products (17 processors), grain mill products (6) and meat cutting and processing/slaughterhouses (9 processors). Producers of sheep's and cow's milk, goat's milk were less concentrated, mainly in northern and central Slovakia. Producers of grain mill products are more localized in western Slovakia. Slaughterhouses are evenly distributed in the various districts of Slovakia. Other processors had lower representation (Figure 6).

The importance of ecological production lies mainly on its positive relationship to the land and the environment. Hole et al. (2004) evaluated the effects of organic farming on biodiversity of the country compared to conventional agriculture. Intensification and expansion of modern agriculture is among the greatest current threat to global biodiversity. Ecological farming represents a potential solution to the continuing loss of biodiversity. Ecological farming is a system focused on food production with minimal damage of ecosystems. Critics of ecological farming argue that eco farms have lower yields, and therefore require more land to produce the same amount of food in comparison with the farms in conventional agriculture, resulting in far greater deforestation and loss of biodiversity, and so calls into question the environmental benefits of ecological farming (Seufert, Ramankutty, Foley, 2012).

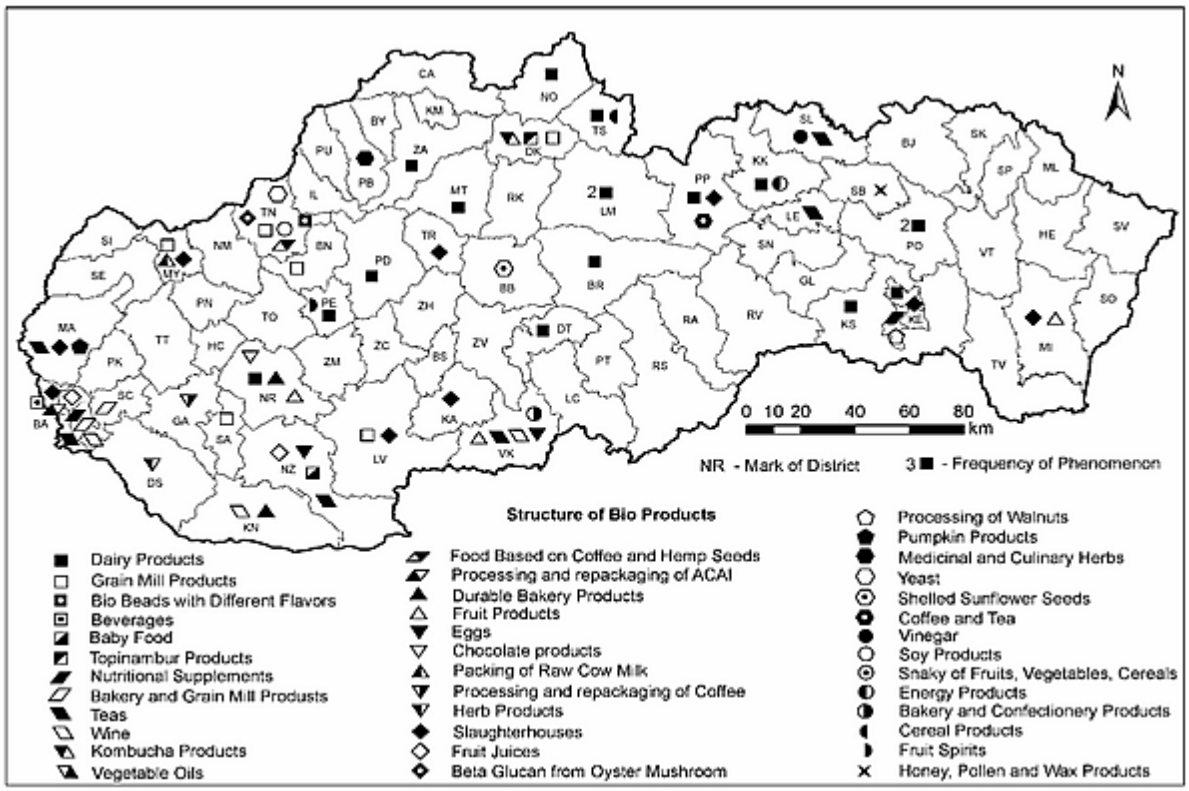

Fig 6. Spatial distribution of bio products processors in the districts of the Slovak Republic in year 2015. Source: ÚKSÚP, Bratislava 2016, own processing

According to Šimčák (2004), comparison of the costs and profitability of entities of conventional and alternative farming showed that in ecological system of production by limitation of fertilizers and chemical protective equipment, it had decreased production costs, but also reduced the crop, which could not be compensated by higher price. Ecological farming is more labour-consuming (hand-picking pests, smaller parcels, greater diversity of crops) and there is also a higher price of the product production and lower labour productivity. Higher costs of ecological farming generally offset higher prices of eco products and bio food produced therefrom (Offermann, Nieberg, 2000). Therefore, the conventional farming currently accounts for less expensive food. Research by Williamsa, Hammitta (2000) showed that organic buyers perceived more food safety risks associated with the conventional way of growing food than usual (conventional) buyers. Buyers purchasing organic products are only those people who prefer quality environment and thus are oriented towards organic production and therefore are willing to pay the higher price for organic food. There are not many such producers at present. A part of these consumers buy these products only occasionally and the value of this product is seen as a contribution to maintain their health, or as a contribution to environmental protection and the preservation of sustainable development.

The fundamental problem remains getting products from producer to consumer, which means that the distribution of these products without state support is weaker. One of the unfavourable facts to weak domestic consumption of bio products is that the state spends minimum amount of money to promote the products of ecologic production. The problem is also advertising that tends to promote eco products as those not really environmentally friendly. According to Badgleya et al. (2007), ecological farming has the potential to contribute a fairly large part to the global food supply and thereby also reduce the harmful effects of conventional agriculture on the environment. The model of ecological estimations suggests that ecological farming methods could produce enough food, to maintain the current population, and potentially more, without having to increase acreage of land.

Provided subsidies affect profits and profitability of farmers. Slovak eco farmers would also help to increase the level of support comparable with the other EU countries. In the old EU states, farmers received higher subsidies from the beginning, which could equip high-tech farms.

The Slovak farmers did not have this option and are thus unable to compete with foreign farmers. In the unequal competitive environment it is really very difficult to do business. Despite the fact that ecological farming is being developed under the auspices of the Common Agricultural Policy, according to Moschitz, Stolz (2009) between the states of European Union there are considerable differences. Authors identified a factor that affects ecological farming, and it is the political environment of each country and its resources for the development of ecological farming.

Ecological agriculture is not a new direction in Europe. Already in the 30's of the last century, the first organic farmers started emerging. The development of this concept was suspended during the second World War and the subsequent economic recovery of the countries. On a broader level, this management system began to apply in the world in the 70's and 80's of the 20th century when the first umbrella organizations in this field and national associations of ecological agriculture in individual countries were established. A subsequent attempt for legislative regulation in 1972 led to the founding of the International Federation of Organic Agriculture Movements (IFOAM), which today unifies more than 700 organizations from around the world.

A positive factor in the whole development period of ecological agriculture has been steadily growing in the area of ecologically farmed land in the countries of Europe. For example, in 1958, the share of ecologically farmed land in total land acreage accounted for only 0.1%, in 2004 it was 6.4% and in 2014 as much as 11.2% (Willer, Lernoud, 2015). With the proliferation of the EU Member Countries, it is also increasing the area of ecologically farmed land. In 2005, this acreage was 6,475,828 hectares and till 2014, it rose to 10,315,126 hectares. The largest area (almost 8 mln ha) is managed by the old EU-15 countries like Spain, Italy, France and Germany, where farmers cultivate organically more than 1 million hectares of the land. In the EU-13 countries, they make ecologically cultivated land nearly 2.4 mln ha.

In the EU, 43.22% (3,186,262 ha) of total ecologically farmed land acreage is arable land. The largest areas of arable land are possessed by France – 525,019 ha and Italy 485,603 ha. Slovakia and the Czech Republic in terms of arable land in the green economy (over 50,000 ha) belong to the first fifteen countries with the largest acreage. In terms of relative split of arable farmland in total, agricultural land in the EU is about the same 40% share accounted for by the EU-15 and EU-13 countries.

In the structure of agricultural land farmed ecologically, the largest area is covered by permanent grassland – 3,316,566 ha (44.70%). Its greatest acreage is in Spain – 723,772 ha, Czech Republic – 393,593 ha and France – 367,540 ha. Slovakia in 2014 reached the acreage of 101,454 ha. In the old EU-13 countries, permanent grassland makes up more than 50% of agricultural land. In the new member countries of the EU-15 this share is about 40%. Permanent croplands account for only 12.08% (901,958 ha) in the EU. Even this type of land has recorded favourable development pertinent to its increase. The largest acreage of permanent croplands is in Spain – 442,991 ha and Italy – 237 812 ha. Only these two countries have reached an extent of over 100,000 ha in 2014. Czech Republic amounts to 5,816 hectares and Slovakia only 1,136 ha. Greater proportion of permanent croplands in the structure of agricultural land is reached by the EU-15 countries (over 10%), the old EU-13 countries account for 5%.

Increased acreage of ecological farmland in Europe is connected also to boosted number of the operators (farmers and processors) of the ecological production. Development of all the registered operators in ecological agriculture in each country is individual and is influenced by several aspects – socio-economic advancement of the particular country, geographical, climatological and population factors. Most of the ecological production operators are in the EU-15 countries. The greatest number of registered operators, more than 50,000, are in Italy, the second place is held by Germany with a total of around 30,000 operators, and about the same level of operators in Spain, Greece and France (over 20,000) (Eurostat, 2016). Next range in the number of operators from 3,000 to 8,000 is covered by Denmark, Finland, Sweden and the United Kingdom. Slightly less (900 to 3,000 operators) are Belgium, the Czech Republic, Ireland, the Netherlands, Portugal, Romania and Slovenia. Slovakia, within this database, is with 418 operators located on the penultimate place, fewer registered operators are only in Bulgaria (311 operators). Of the total number of ecological agriculture operators, the most are farmers, especially in Italy, Spain and Austria. Finland, Sweden, United Kingdom, Denmark, Portugal and

Slovenia are EU countries with the number of ecological producers, farmers vary from 1000 to 5000. Slovakia with its 403 farmers holds the last place within the EU. Most of the ecological production processors in the EU is focused on processing and preserving fruits and vegetables. In 2014, there were 6,600 processors registered in the EU. The largest split of these processors, more than 2,500, is Italy. The smallest number of such processors are, for example, in Slovakia (8), Croatia (2), Lithuania (3) and Bulgaria (1). Second place in terms of the activity to keep the production of vegetable and animal oils and fats (about 6,000 processors), and this production again is dominated by Italy, followed by Greece and Spain.

According to De Ponti, Rijk, Van Ittersum (2012), organic crops yields are on average 80% of conventional yields. Dantsis, Loumou, Giourga (2009) argue that, in the majority of cases, organic and conventional producers in Greece did not differ significantly. Moreover, in some articles, there are doubts about the prospects of the development of organic agriculture and its ability to meet the needs of the world's population in food products (Connor, 2008; Pacanoski, 2009). At the same time, a positive opinion towards organic farming is expressed in other publications. For instance, Crowder, Reganold (2015) suggest that, because of multiple sustainability benefits, organic technologies can have a higher share in feeding the world. Based on carried out research, Torres, Valera, Belmonte, Herrero-Sánchez (2016) stated that the shift from conventional to organic agriculture can be a viable alternative for the economic and social sustainability of farmers in Spain. Oelofse, Høgh-Jensen, Abreu, Almeida, Hui, Sultan, de Neergaard (2010) mentioned that Chinese organic farmers have the point of view that participation in certified organic agriculture improves their prices, incomes and market access. The results also show that other positive consequences of organic agriculture for farmers are production intensification and production diversification. In our opinion, organic farming has significant perspectives. However, further research studies are required to determine how to adopt organic systems effectively, taking into consideration peculiarities and differences of countries and regions.

4. Conclusion

In Slovakia, the ecological farming recorded a positive trend of development, which showed increase of number of bio products producers and the acreage of ecological land and a slight increase of processors of bio products. Since joining the EU, the ecological farming in Slovakia has been going through the biggest boom. In 2015, there were 416 farms registered for ecological production. The share of ecologically farmed agricultural land has increased to 9% and the share of ecological farming land was amounted to 186,483 ha. In the development of ecological farming, the consumer demand for products of organic production plays a key role. Despite the fact that organic products are not the cheapest, current consumer, younger and middle age are interested in healthy eating and protecting the environment. A very significant advantage of organic products and foodstuffs is that their production are non-polluting. Values of standard deviation and coefficient of variation in recent years indicated a deepening of inequalities in the number of entities in ecological production in the size of agricultural land as well as in an average area of farms. The largest localization of ecological production operators was in the region Prešov, Banská Bystrica, Košice and Žilina. These regions are characterized by higher share of ecological farmlands. In 2015, in Slovakia were 83 processors of ecological production. Between 2014 and 2015, it came into a reduction in disparities, which corresponded to a decrease in the values of standard deviation and coefficient of variation and there was some stabilization in the number of processors. Processors of eco products were mainly in the districts of western, eastern Slovakia and north of the country. The most, which is 17 processors, were engaged in the manufacturing of dairy products.

Lack of ecological production is underdeveloped distribution of products of ecological production in the internal market, so manufacturers focus more on export of their bio products abroad. To increase the consumption of bio products in the internal market, which form the basis of a healthy diet without chemical attack, it is necessary to encourage producers and processors, as well as distributors and marketing promotion of products of ecological production. In recent years, Slovakia has developed especially yard sale to the final consumer, crates sale or farmers' markets that offer more products of organic production of plant and animal origin. Even so, the offer of bio products is relatively low and weak competitive environment creates downward pressure on prices of bio products.

On the territory of Slovakia, in the programming period 2014–2020 in force Rural Development Program 2014-2020, which promotes organic farming under Priority 4 "Restoring, preserving and enhancing ecosystems related to agriculture and forestry", it measures 11 "Organic Farming "sub-measure" Payments for conversion to organic farming "and the sub-measure", Payments to sustain organic farming." According to the Action Plan for the development of ecological farming in the Slovak Republic in 2020, it is important in many areas such as contribution to rural life, environmental benefits and welfare. In Slovakia, the ecological agriculture can become an important element in increasing rural employment, because it creates jobs and provides a good source of income. Its social aspect also lies in the development of agro-tourism, traditional organic food production and maintaining cultural landscapes in the state.

Acknowledgement

The paper was elaborated within the project VEGA 1/0934/17 Land-use changes of Slovak cultural landscape over the past 250 years and prediction of its further development

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