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# **Lithuanian Organic Agriculture in the Context of European Union**

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Additional information is available at the end of the chapter

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## **1. Introduction**

Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved (As approved by the IFOAM General Assembly in Vignola, Italy in June 2008) [1]. The growing criticism of intensive agricultural practices that leads to a deterioration of natural resources and a decrease of biodiversity has progressively led to more environmental constraints being put on agricultural activities through an “ecologization” of agricultural policies [2]. Organic agriculture nowadays is well accepted in governmental and scientific institutions, and organic products are highly appreciated by consumers [3]. Organic agriculture can contribute to solving the food crisis and mitigating global climate change as long as it is based on the principles of agroecology. However, organic agriculture must also be integrated with certain conventional agricultural practices in order to maintain rational production and satisfy the food requirements of the population [4].

Organic agriculture is the form of farming that sees nature as a living organism. Determination of further health and productivity of this organism differs from that in conventional agriculture. It is a versatile system that supplements and conditions the environment friendly measures enabling regulation of ecological system. At the same time application of chemical synthetically measures can be abandoned. Ecological system must be maintained, preserved and rebuilt as completely as possible as we are absolutely dependent on its functioning. This trend of farming requires general systematic way of thinking – the course of the entire process should be considered when applying each measure [5]. The goal of organic farming is to give

priority to long-term ecological health, such as biodiversity and soil quality, rather than short-term productivity gains [6, 7]. In low potential agricultural areas characterized by soil degradation and erosion, organic agriculture can provide a means to break the downward spiral of resource degradation and poverty [8]. Organic farming represents an innovation in agriculture that is both lauded and deplored. Agricultural innovations are accepted on four broad levels: research, extension, farmer and community (not necessarily in that order) [7]. The implementation of European legislation as well as various national pesticide action plans and public policies pertaining to organic agriculture, could bring about major changes to agricultural practices within the coming years [2].

Farming is only considered to be organic at the EU level if it complies with Council Regulation (EC) No 834/2007 [9] amended in (EU) No 1030/2013 [10], which has set up a comprehensive framework for the organic production of crops and livestock and for the labelling, processing and marketing of organic products, while also governing imports of organic products into the EU. The detailed rules for the implementation of this Regulation are laid down in Commission Regulation (EC) No 889/2008 [11] amended in commission implementing regulation (EU) No 392/2013 [12].

Many of the environmental problems of great concern today are either directly or indirectly related to past and present agricultural practices. The only way to preserve the nature and especially agrocenosis for future generations in the XXI century is organic sustainable development.

## 2. Material and methods

The area of study is Lithuanian organic agriculture in the context of European Union that Lithuania joined in 2004.

Lithuanian territory situated between 56°27'N and 53°53'N latitude, 20°56'E and 26°50'E longitude occupies intermediate geographical position between west Europe oceanic climate and Eurasian continental climate. Climate of the Lithuanian territory forms in different radiation and circulation conditions. Differences in these conditions hardly cross the boundaries of microclimatic differences; therefore, Lithuania belongs to western region of the Atlantic Ocean continental climatic area [13, 14] with average annual precipitation of 675 mm (572-907 mm) and temperature of 6-7 °C.

A review of the scientific literature on organic agriculture and the research on the development and perspectives of Lithuanian organic agriculture are evaluated. Statistical information is an important tool for understanding and quantifying the impact of political decisions in a specific territory or region [15].

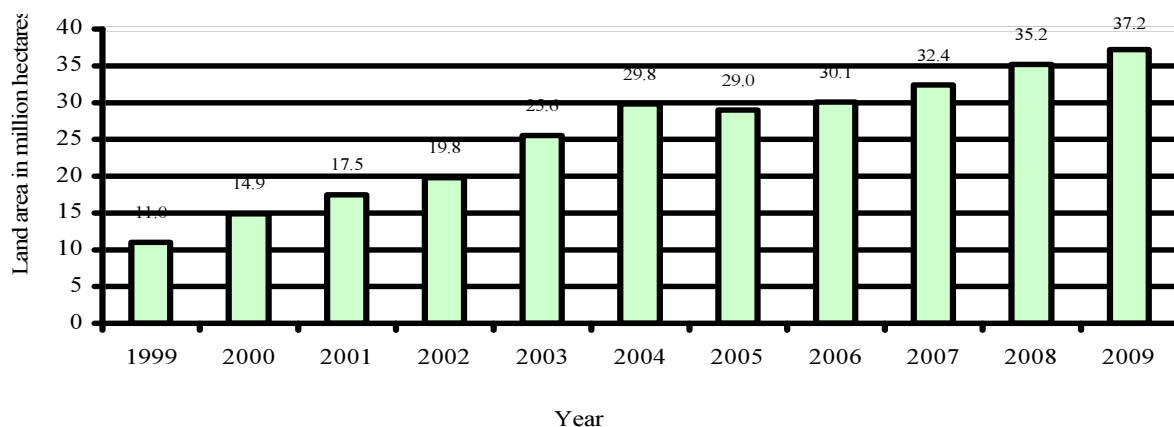
In the manuscript statistical data of organic agriculture of Lithuania and European Union are analysed scientifically and analytically with interpretation of praxis.

### 3. Development of organic agriculture

To make spread and development of alternative agriculture in the world easier the International Federation of Organic Agriculture Movement IFOAM was established in 1972. This federation unites majority of alternative agriculture movements in different states. At present IFOAM includes over 700 organizations of alternative-ecological agriculture from more than 100 countries. Several directions of IFOAM activity cover consulting, data exchange and standardization [5].

The area of certified organic agricultural land in the world continuously is tending to increase (Figure 1). During ten years period from 1999 to 2009 organic agricultural area increased by 3.4 times and reached 37.2 million hectares.

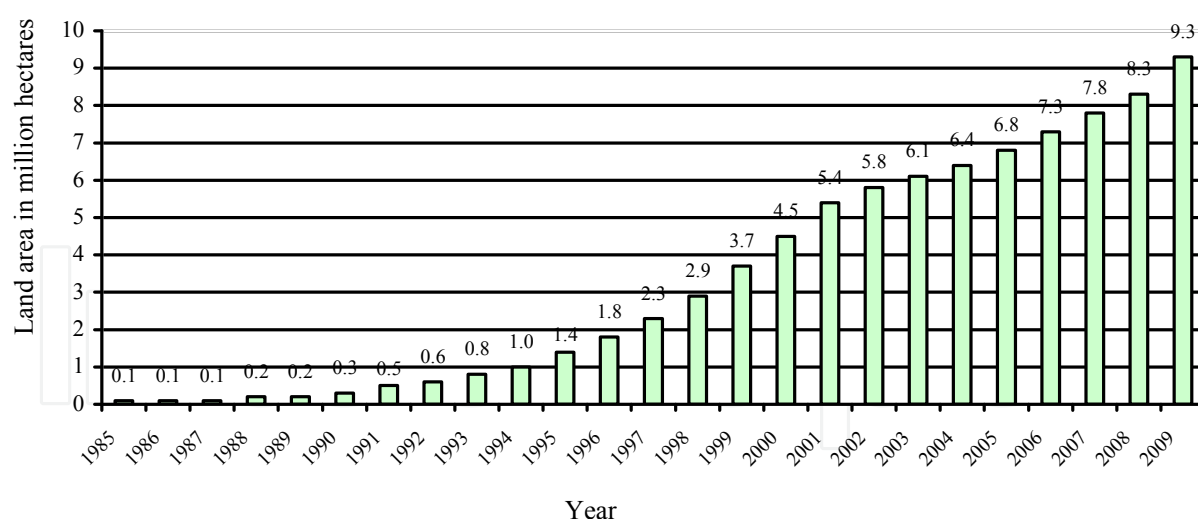
Sharp development of organic agriculture lightly moved to more balanced development while increase in organic area from 2008 to 2009 already consisted 5.7%. Such dynamics is in conformity with the organic area development in Europe (Figure 2) and separate countries (Figure 6), as well as in Lithuania (Figure 7).



**Figure 1.** Development of organic agricultural land 1999-2009 in the world [16]; Source: FiBL, IFOAM and SOEL 2000-2011; [www.fibl.org](http://www.fibl.org)

Area of certified organic agricultural land in Europe increased by million hectares or 12 percent from 2008 to 2009 (Figure 2) while in early years (2005, 2006, 2007, 2008) increase consisted of 6.4-7.3%. The organic area 2009 in Europe covered 9.3 million hectares while European Union countries covered 8.4 million hectares from them. The geographical distribution of area and share of organic agriculture in Europe by country in 2009 is presented in figure 3. The biggest organic areas were established in Spain, Italy and Germany.

Geographical distribution of fully converted organic crop area in 2012 in EU is presented in figure 4 and share of organic agriculture in percent (Figure 5). It showed that the highest certified organic agricultural areas are in Italy, Spain, Poland, France and the United Kingdom. However, share of total utilized agricultural area occupied by organic farming in Italy, Spain, Poland, France and the United Kingdom were 8.9%, 7.5%, 4.6%, 3.6% and

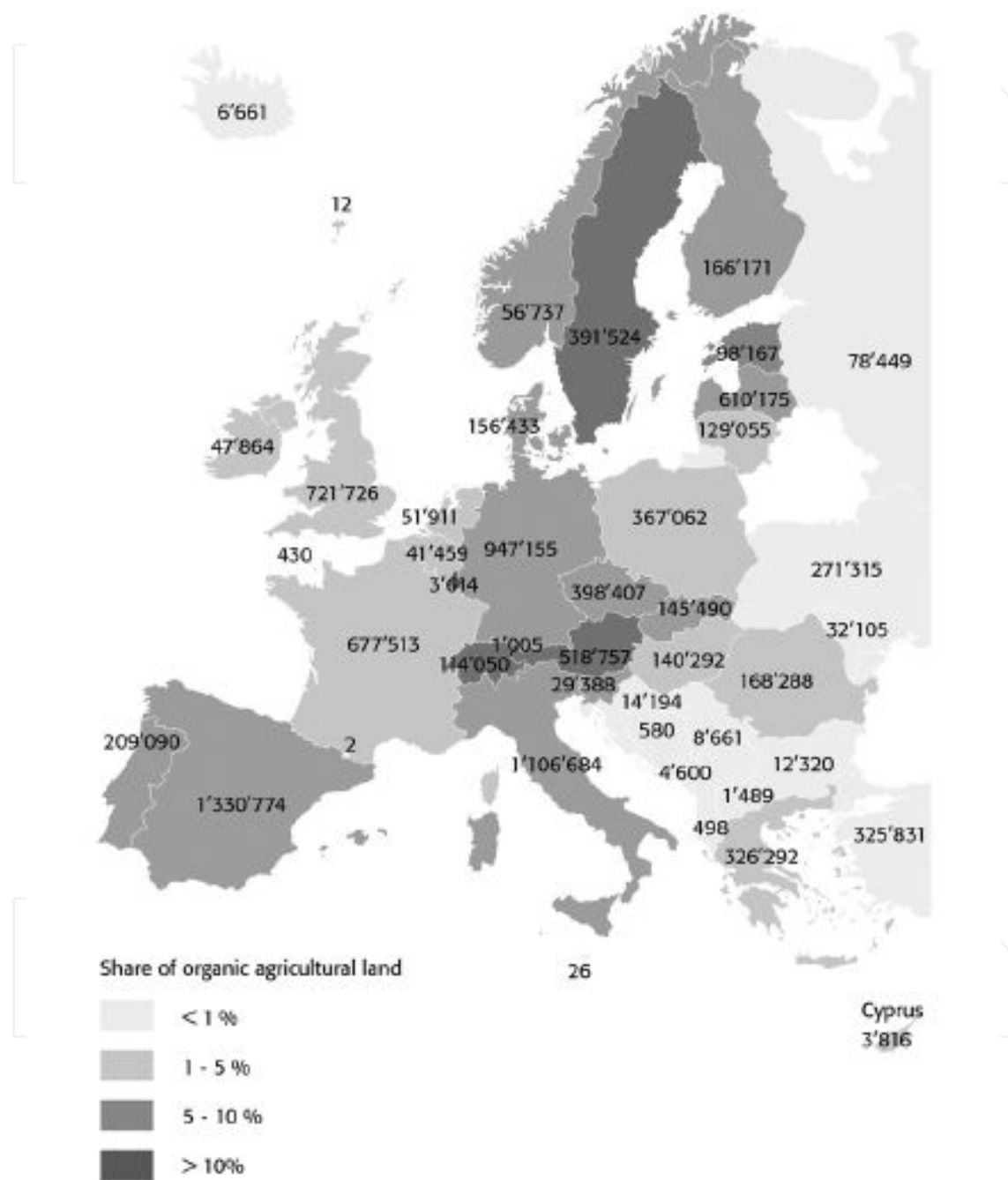


**Figure 2.** Development of the organic agricultural land in Europe 1985-2009 [16]; Source: FiBL, Aberystwyth University, AMI/ZMP

3.4% accordingly (Figure 6). The highest share from total agricultural land area in 2012 were in Austria 18.6%, Sweden 15.8%, Estonia 14.9% and Czech Republic 13.1%. The least managed organic areas were fixed in Malta and Bulgaria (till 1%). EU-28 average covered 5.7% in 2012 (Figure 6).

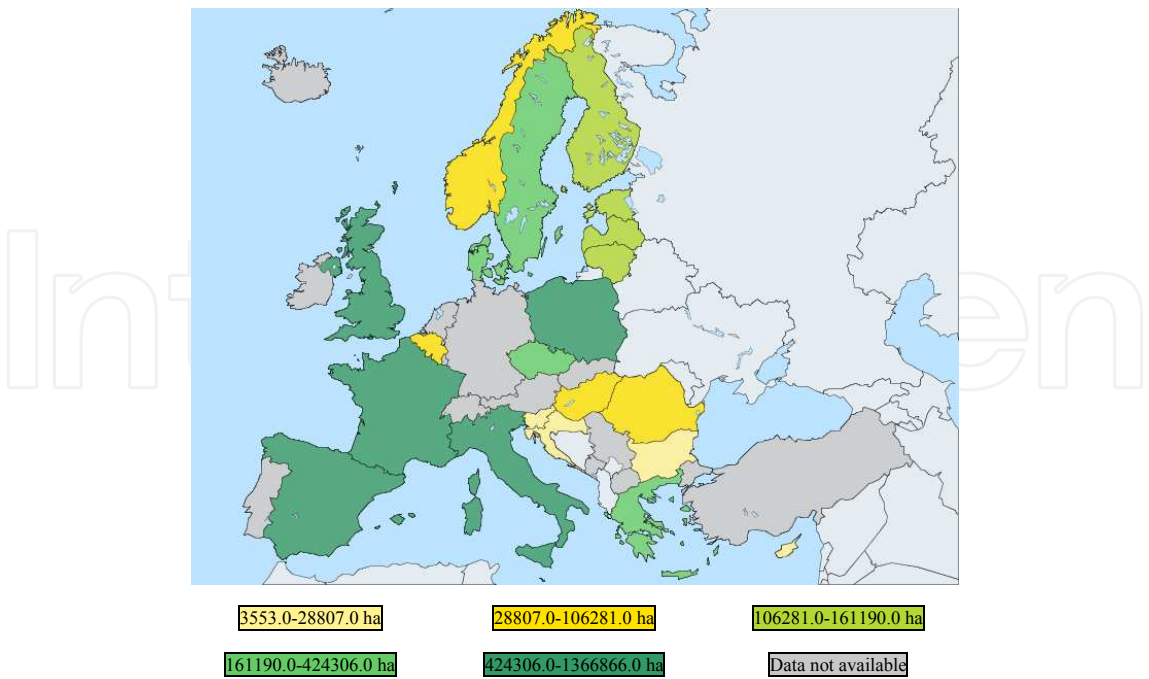
Lithuanian organic agriculture area development was extremely rapid from the start of organic agriculture as a farming form in 1990 [17]. From 2004 till 2012 area of organic agriculture in Lithuania increased 3.8 times till 162655 hectares in 2012 (Figure 7). Contrary to continuously increase of organic area the organic farm number has tendency to decrease from reached maximum 2855 farms in 2007 while 2511 farms left in 2012. Therefore, the average size of certified organic farm in Lithuania constantly increased and in 2012 already covered 64 ha (Figure 8). The distribution of certified organic farms in Lithuania according to the farm size in hectares is presented in figure 9. The most organic farms (47%) operated area is till 30 ha. Organic farms with 31-50 ha, 51-100 ha and 101-300 ha covered 16.5%, 17.0% and 16.5% respectively. The biggest organic farms with the area above 300 hectares make 2.5% of the general number of organic farms in Lithuania (Figure 9).

The average size of organic agricultural holdings in 2007 was 37 ha for the EU-27 as a whole, compared to 13 ha for all agricultural holdings [19]. The average size of each agricultural holding (farm) in the EU-28 was 14.2 hectares in 2010 [20]. In general, the average size of holdings in the organic sector was larger in most of the Member States and smaller only in Denmark, France and Luxembourg. The most noticeable differences were seen in the Czech Republic (223 ha compared to 89 ha) and Slovakia (421 ha compared to 28 ha), (Figure 10). One possible reason for these sometimes big differences is the use of a more extensive method of farming within the organic sector [19].



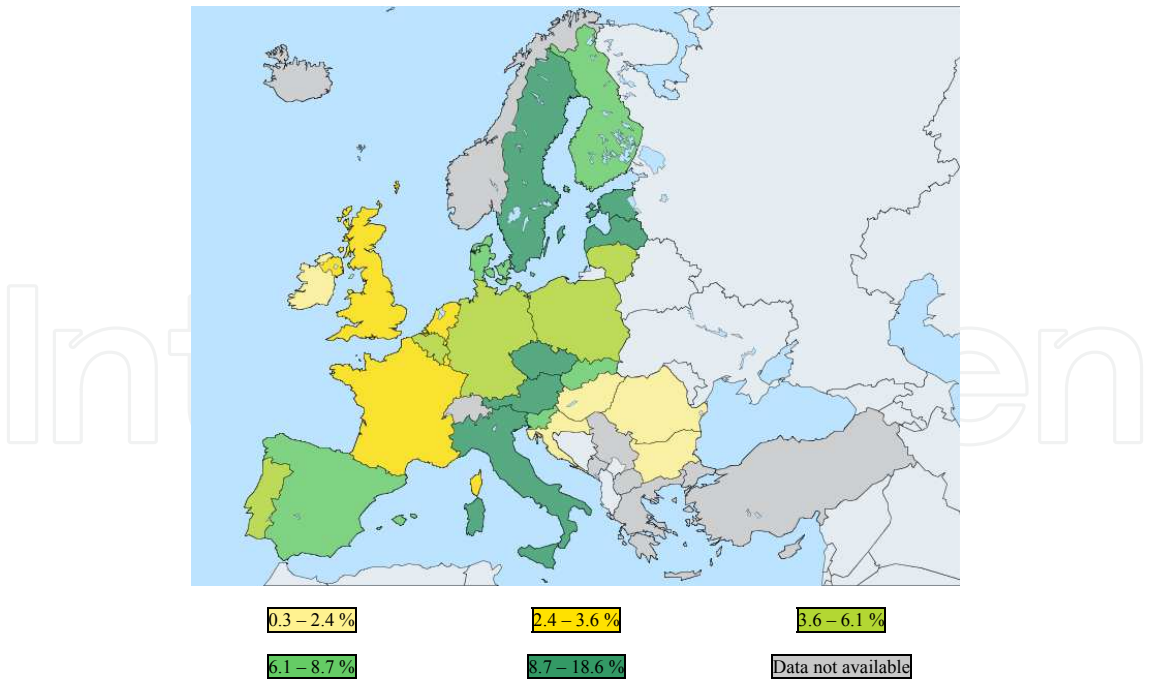
**Figure 3.** Organic agricultural land by country in Europe 2009 [16]; Source: FiBL Survey 2011; [www.fibl.org](http://www.fibl.org)





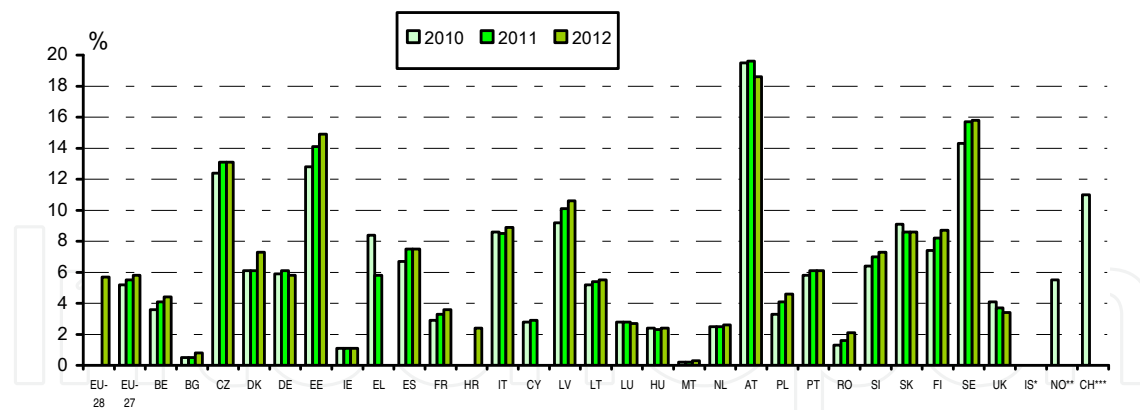
Source: Eurostat (Available from: <<http://epp.eurostat.ec.europa.eu/tgm/mapToolClosed.do?tab=map&init=1&plugin=0&language=en&pcode=tag00098&toolbox=types>>)

**Figure 4.** Organic crop area (fully converted area) in hectares in European Union 2012



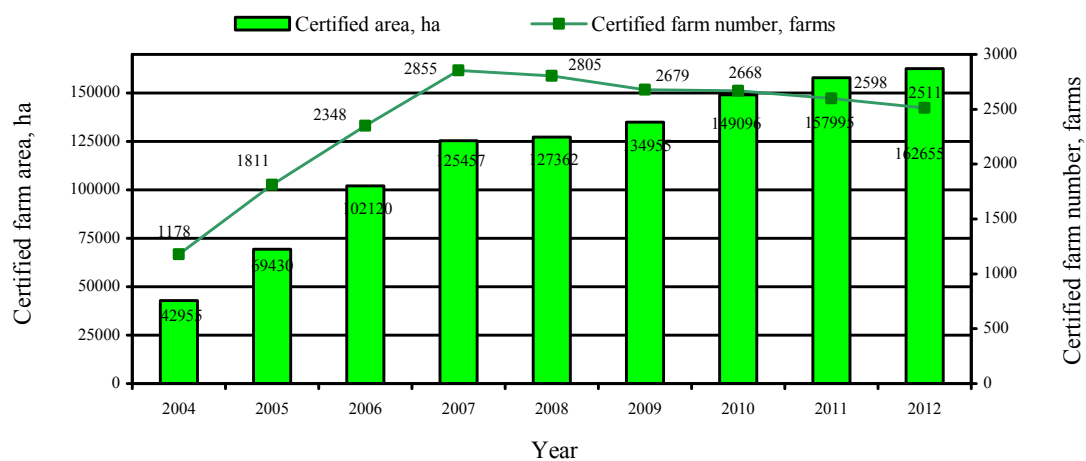
Source: Eurostat (Available from: <<http://epp.eurostat.ec.europa.eu/tgm/mapToolClosed.do?tab=map&init=1&plugin=0&language=en&pcode=tsdpc440&toolbox=legend>>)

**Figure 5.** Share (%) of agricultural area under organic farming in European Union, 2012.

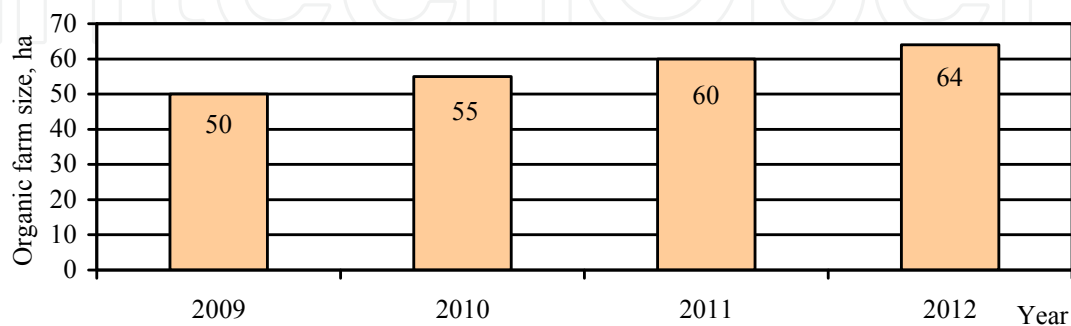


Note. \*-data not available, \*\*-2009, \*\*\*-2005; Source: Eurostat (Available from: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=0&language=en&pcode=tsdpc440>)

**Figure 6.** Share of total utilized agricultural area (UAA) occupied by organic farming (fully converted and under conversion) in per cent (%) 2010-2012.

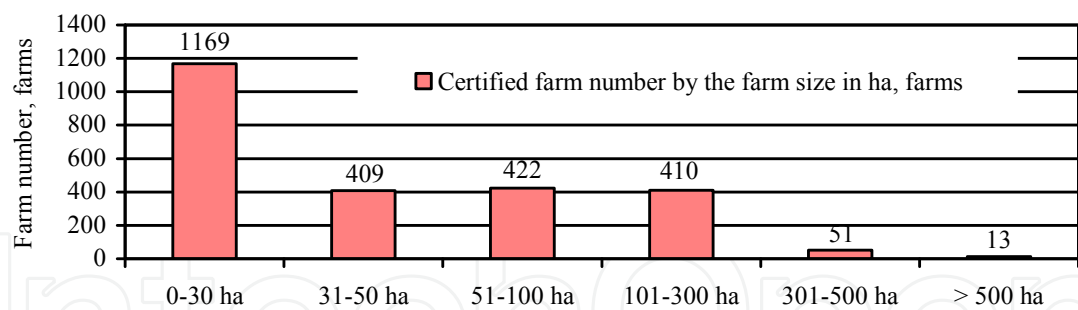


**Figure 7.** Dynamics of certified organic agriculture farms number and area (fully converted and under conversion) during 2004-2012 in Lithuania including area of fishery farms [18]; Source: Ekoagros.

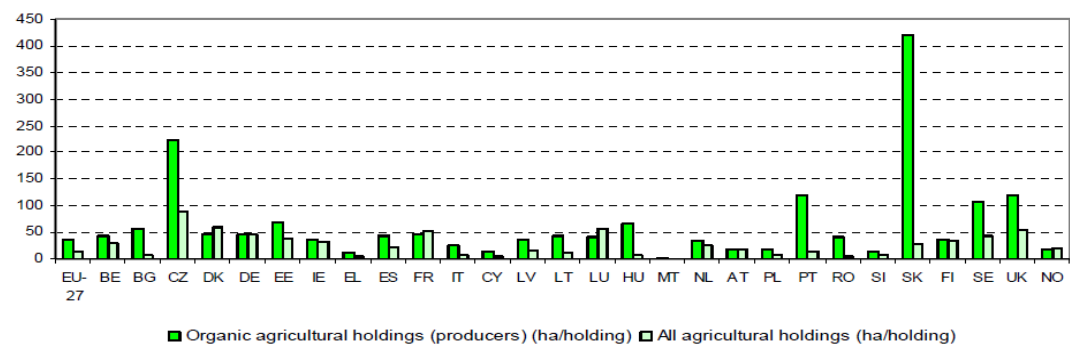


**Figure 8.** Average size of certified organic farms in Lithuania, including area of fishery farms [18]; Source: Ekoagros





**Figure 9.** Differentiation of certified organic farms in Lithuania according to the farm size in hectares 2012 [18]; Source: Ekoagros.



Note. Organic area: DK, MT data 2006; Organic holdings: MT data 2006; PL data 2008 [19];

Source: Eurostat (food\_act2, food\_in\_porg1, ef\_ov\_kvaaesu)

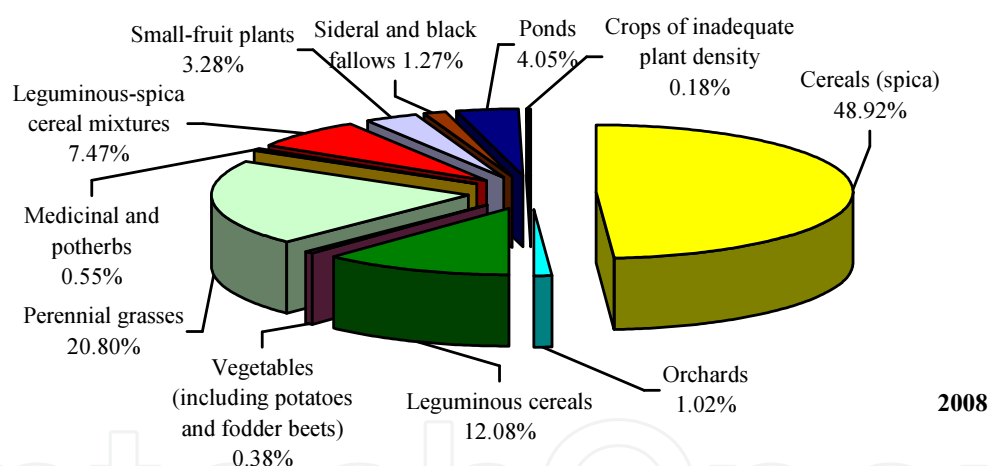
**Figure 10.** Average size of agricultural holdings/farms in European Union, 2007 (ha/holding)

## 4. Organic crop production

### 4.1. Dynamics of organic agriculture crop structure and distribution

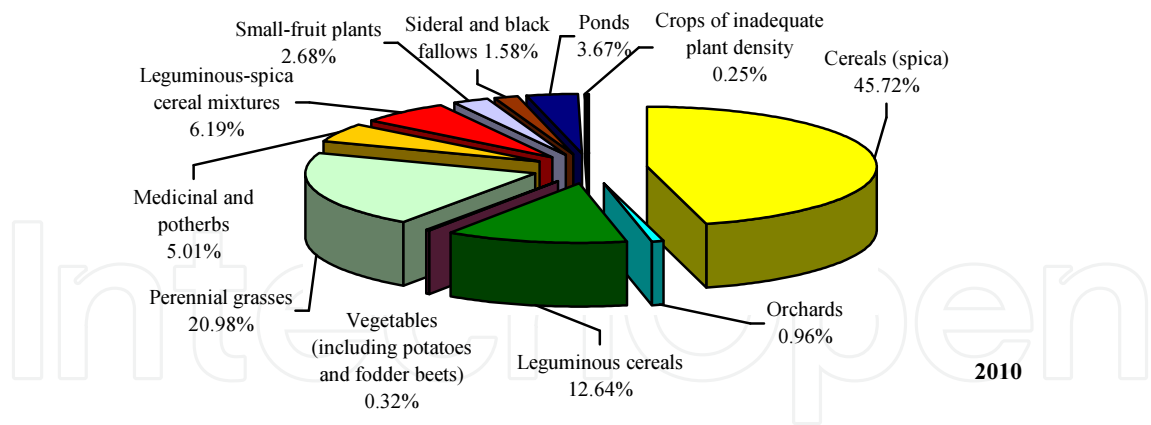
The structure of agriculture in the Member States of the European Union varies as a function of differences in geology, topography, climate and natural resources, as well as the diversity of regional activities, infrastructure and social customs. There were 12.2 million farms across the EU-28 in 2010, working 174.1 million hectares of land (the utilised agricultural area) or two fifths (40.0 %) of the total land area of the EU-28 [20]. Farming land covers nearly 54% of the total area of Lithuania, with arable land and grassland accounting for 70% and 27% respectively.

The organic crop area structure and its dynamics in Lithuania from 2008 to 2012 are presented in figures 11, 12, 13 and 14. The main crop by the occupied area covered soil productivity exhausting cereals (spica cereals). They covered 49% in 2008 (Figure 11) and slightly decreased till 46% in 2010 (Figure 12). In 2011 cereals covered only 36% (Figure 13) and it was positive turn concerning the soil productivity preservation. The decrease of cereals in the crop structure in 2011 mostly was influenced by the drastically increase of medicinal and potherbs area in the crop structure from 0.55% in 2008 to 5.01% in 2010 and to 15.94% in 2011. The reason of such rapid increase in organic medicinal herb area could be 3 times higher subsidies than for organic cereals (see table 6). However, difficulties in growing and processing of medicinal and potherbs as well still limited local market for medicinal and potherbs because of much higher price turn its area back to 4.12% in 2012 (Figure 14). Parallel area of the cereals in organic crop structure increased back till 43%. Vegetables are still not common in Lithuanian organic agriculture with range of 0.38%-0.30% in crop structure; at the European level organically grown vegetables unfortunately take analogous position (Figure 15). The permanent crops in Lithuania have tendency to decrease from 4.3% (2008) to 3.26% (2012) as orchards (from 1.02% to 0.74%) and small-fruit plants (from 3.28% to 2.52%) while in Europe organic permanent crops in 2009 increased to 11% (Figure 15) compared with 2008 (Figure 16).

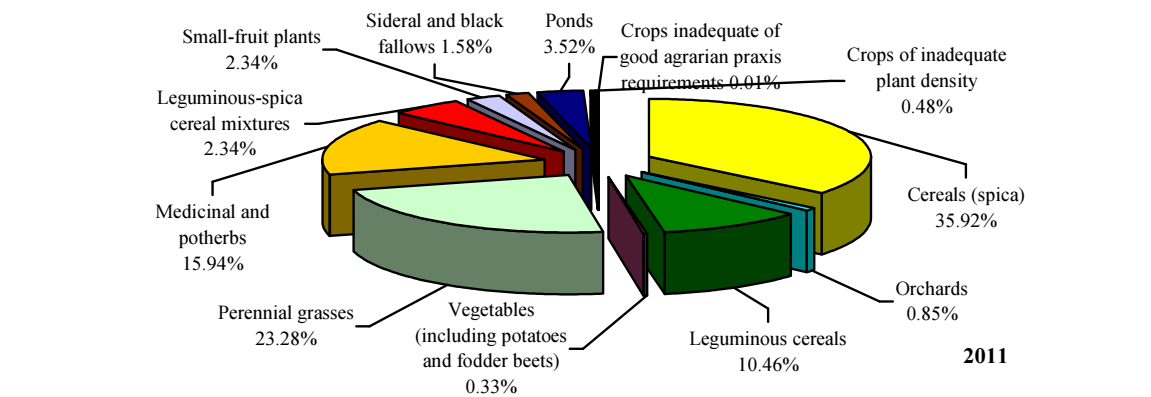


**Figure 11.** Organic crop area structure including fallows and ponds in Lithuania 2008. Source: Ekoagros; [www.ekoagros.lt](http://www.ekoagros.lt)

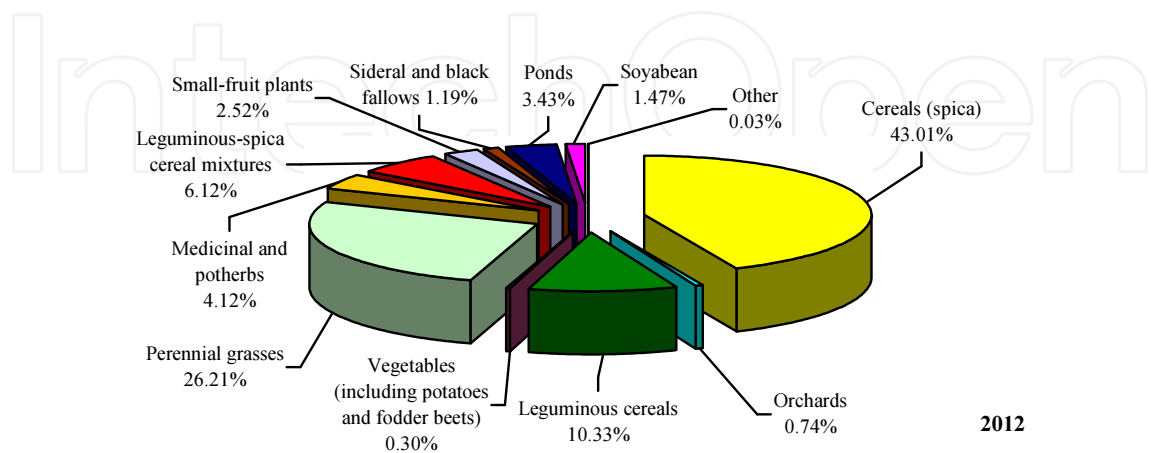
The next very important component in the organic crop structure is permanent grassland. At the European level organic permanent grassland takes fine 46% (Figure 15) while in Lithuania 26% in 2012 (Figure 14) that show slow but continuously increase from 20.8% in 2008 (Figure 11 and 16). To control organic agriculture as producing system it was introduced requirements of minimal plant density in the crop which is much lower than optimal crop density. Therefore, crops of inadequate plant density cover very low area – only 0.18% – 0.48% (Figure 11-13) and come to praxis exceptionally because of very unfavourable meteorological conditions of the year or season. It helps to prevent organic agriculture from unfair farming as well subsidies for such areas are suspended.



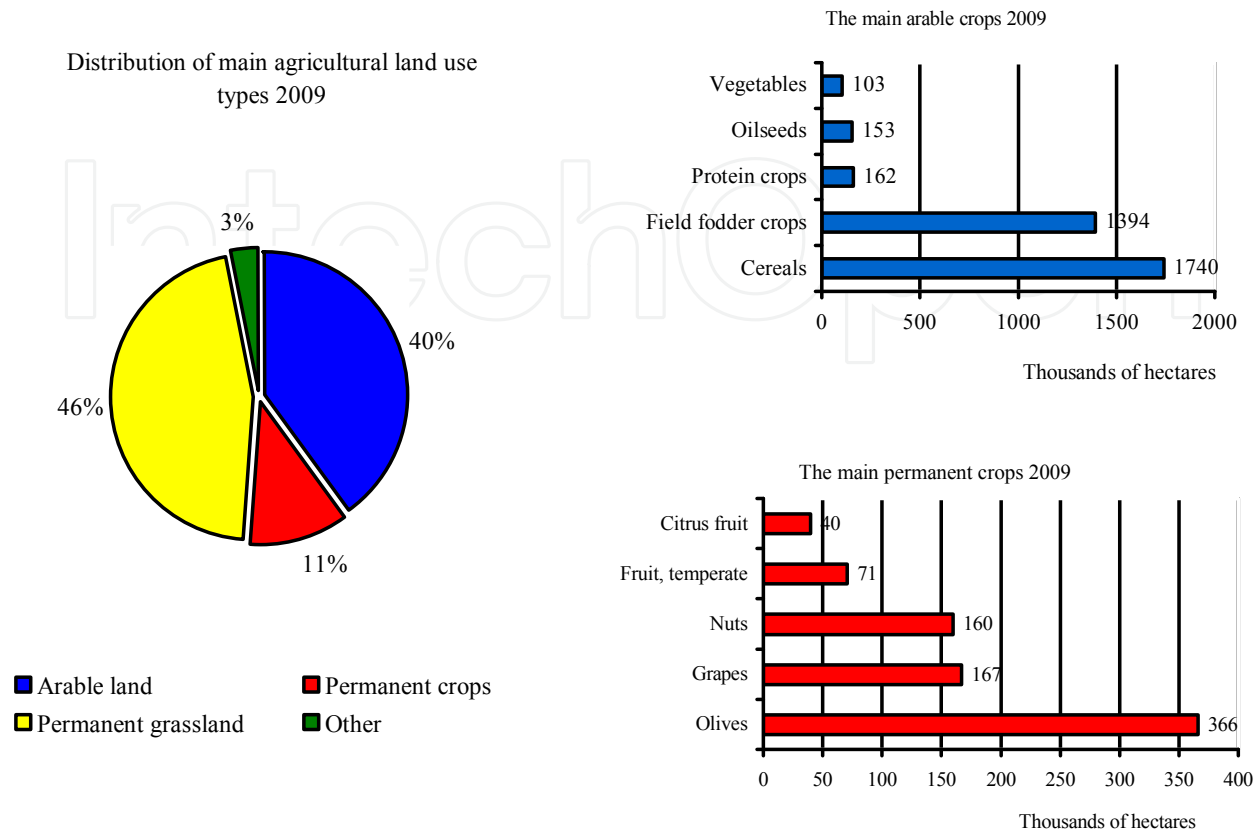
**Figure 12.** Organic crop area structure including fallows and ponds in Lithuania 2010. Source: Ekoagros; [www.ekoagros.lt](http://www.ekoagros.lt)



**Figure 13.** Organic crop area structure including fallows and ponds in Lithuania 2011. Source: Ekoagros; [www.ekoagros.lt](http://www.ekoagros.lt)



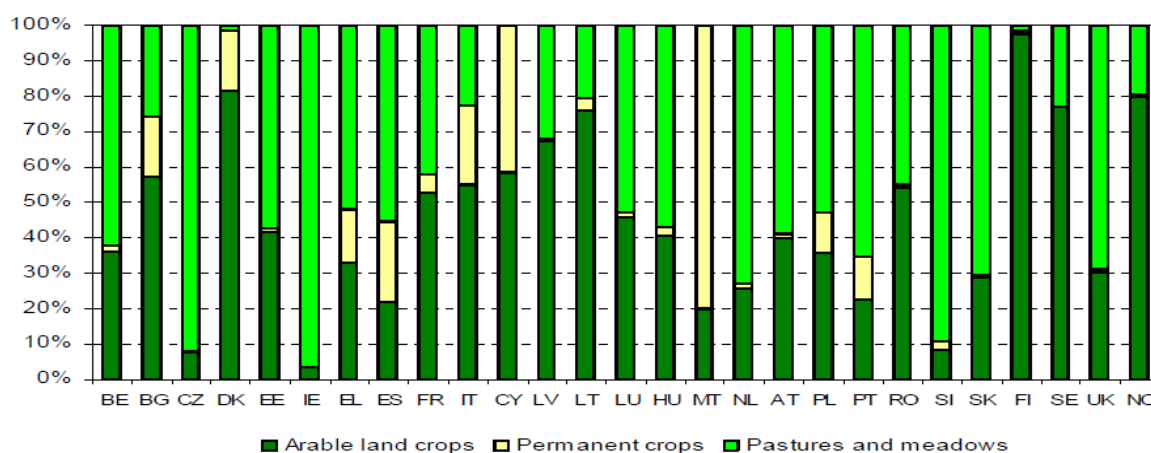
**Figure 14.** Organic crop area structure including fallows and ponds in Lithuania 2012 [18]. Source: Ekoagros



**Figure 15.** Use of organic agricultural land in Europe 2009 [16]; Source: FiBL Survey 2011; [www.fibl.org](http://www.fibl.org))

The three main crop types grown organically are arable land crops (mainly cereals, fresh vegetables, green fodder and industrial crops), permanent crops (mainly fruit trees and berries, olive groves and vineyards) and pastures and meadow land [19]. In most of the Member States and Norway, permanent crops account for a relatively insignificant share of the fully converted area of these three main types (less than 5%). In 2008, permanent crops accounted for between 10% and 20% in Bulgaria, Denmark, Greece, Poland and Portugal, while in Spain and Italy the share was over 20%. Cyprus and Malta were in the lead with 41% and 80% respectively. Olive trees predominated in both countries. In 11 countries (including Norway) arable land crops accounted for the largest share of the land area (> 50%), while in 15 countries pastures and meadows predominated (>50%). Arable crops were significant in Finland and Norway with shares of 98% and 80% respectively (75% in Lithuania), while the Czech Republic (92%), Ireland (96%) and Slovenia (89%) were in the lead in terms of pastures and meadows (Figure 16) [19].

The most common crops in Lithuanian organic agriculture are cereals and in farms with animal husbandry-perennial grasses. In organic farms without animal husbandry perennial grasses as a matter of routine are absent as in this case the subsidies for the perennial grasses are not



Note. MT data 2006, CY, PT data 2007; DE no data available; IE, ES share in total organic area, Source: Eurostat (food\_in\_porg1)

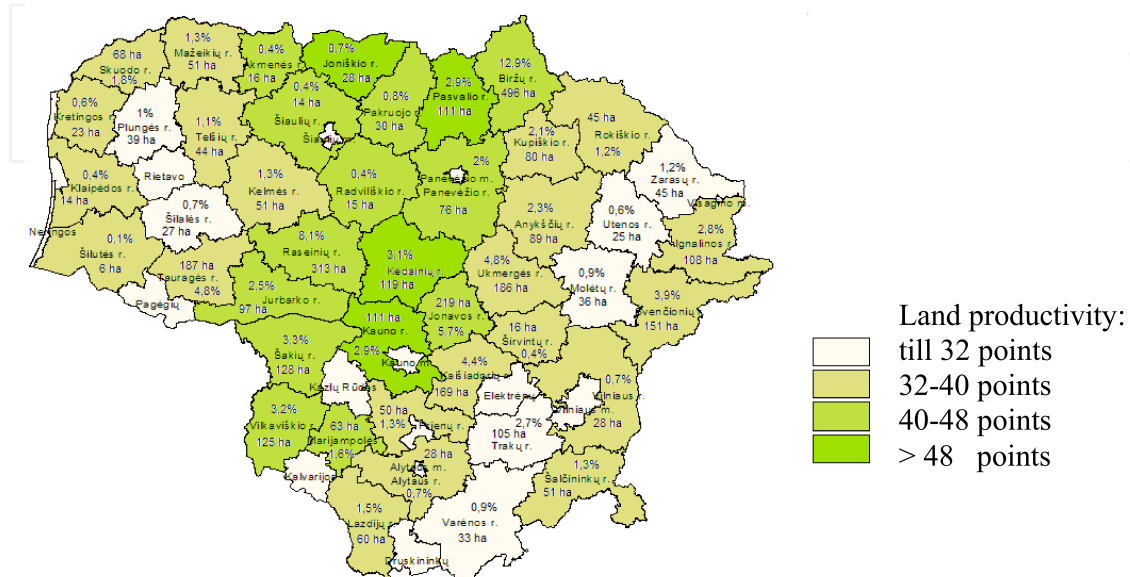
**Figure 16.** Share in percent (%) of arable land crops, permanent crops, pastures and meadows in fully converted area, 2008 [19].

paid. The distribution of wheat, barley and perennial grasses in Lithuania by the municipalities (2005) in comparison of organic to conventional agriculture are presented in figures 17, 18 and 19. To follow the relevance to grow wheat, barley and perennial grasses in separate territories are presented the land productivity points. Organic wheat covered 0.7%-3.1% and conventional 4.2%-8.7% in the crop structure in the most favourable land to wheat growing by the land productivity points (Figure 17). On the lands of 40-48 points of land productivity wheat covers 0.4%-12.9% and 0.3%-7.9% in organic and conventional agriculture accordingly. Higher share of wheat in conventional agriculture on the best lands could be explained by the higher share of cereals in the crop rotation of conventional agriculture and not seldom used sowing wheats after wheats. Though, sugar beets (that are not grown at all organically in Lithuania) take the first position on the best lands of conventional agriculture because of the highest profitability. On land of lower productivity, i.e. 32-40 points and less than 32 points organic wheat covers 0.1%-4.8% and 0%-2.7% while conventional wheat covers 0.3%-1.9% and 0%-0.5% accordingly (Figure 17).

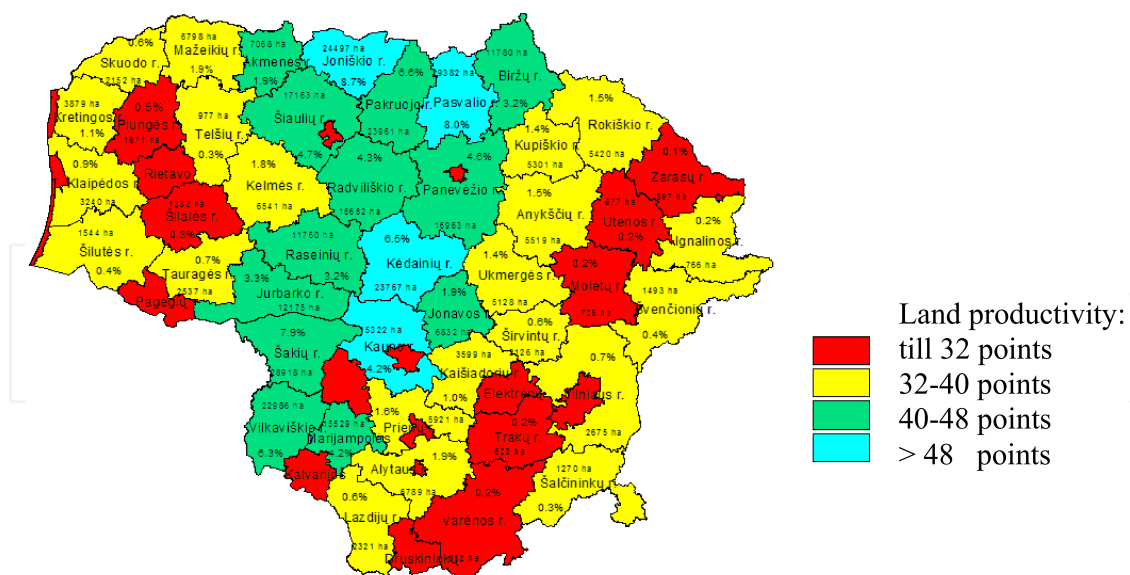
Organic barley was the most common on 40-48 points land productivity reaching till 16.2% (2005) when conventional varied in the range of 1.5%-6.3% in the crop structure (Figure 18). On the best soils organic barley covered 0.5%-1.8% while conventional one took their highest share of 3.2%-6.8% in the crop structure.

Organic perennial grasses covered till 9.3% on land of 32-40 point productivity, till 5.7% on land of 40-48 point productivity and till 5.9% on land till 32 point productivity (Figure 19). On the best soils organic perennial grasses covered only from 0% till 0.9% area in the crop structure while conventional ones from 0.9% till 3%. On the land with decreasing land productivity from 40-48 to 32-40 and less than 32 points conventional perennial grasses covered till 3.6%, 6.3% and 8.2% accordingly (Figure 19).

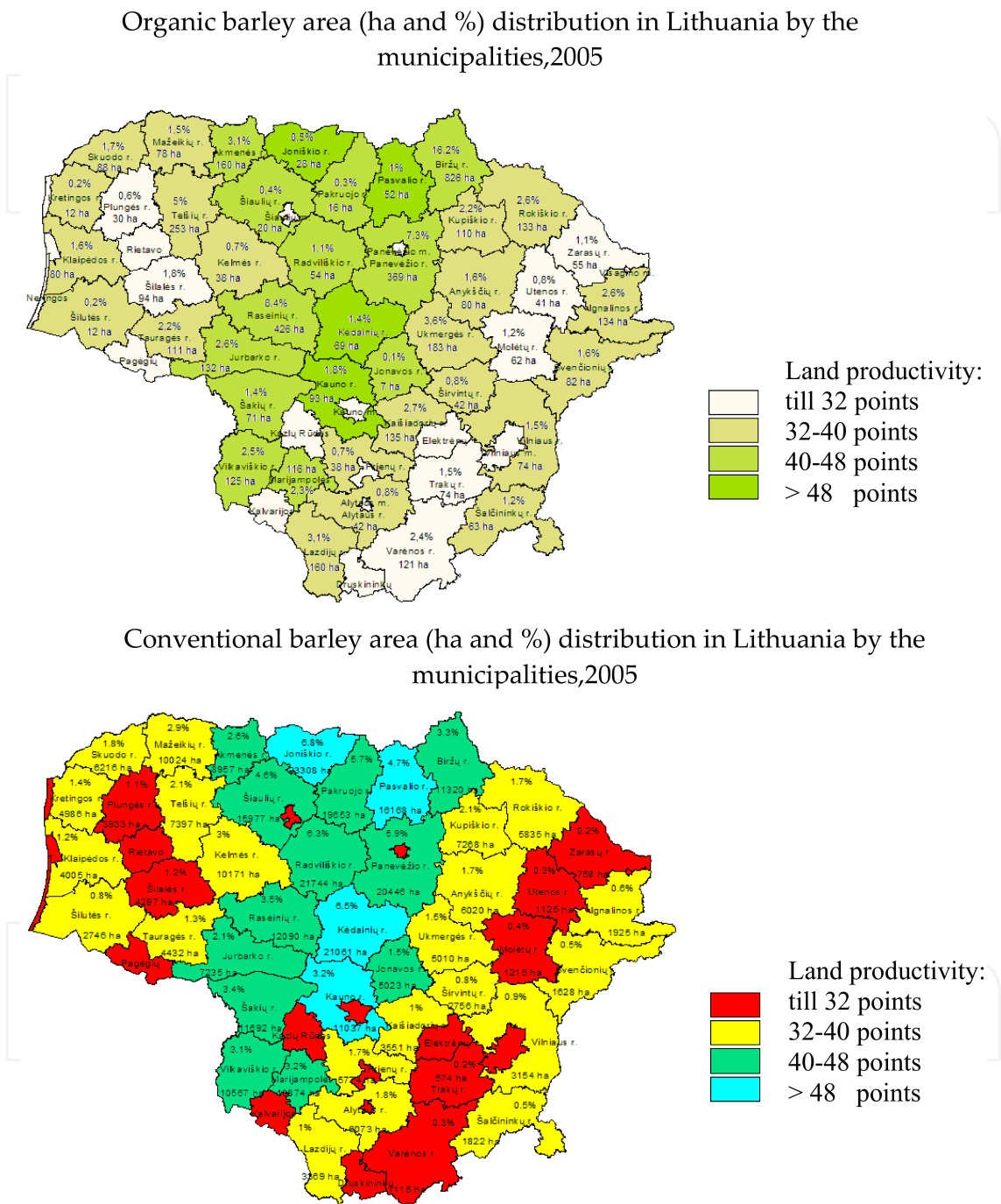
Organic wheat area (ha and %) distribution in Lithuania by the municipalities, 2005



Conventional wheat area (ha and %) distribution in Lithuania by the municipalities, 2005



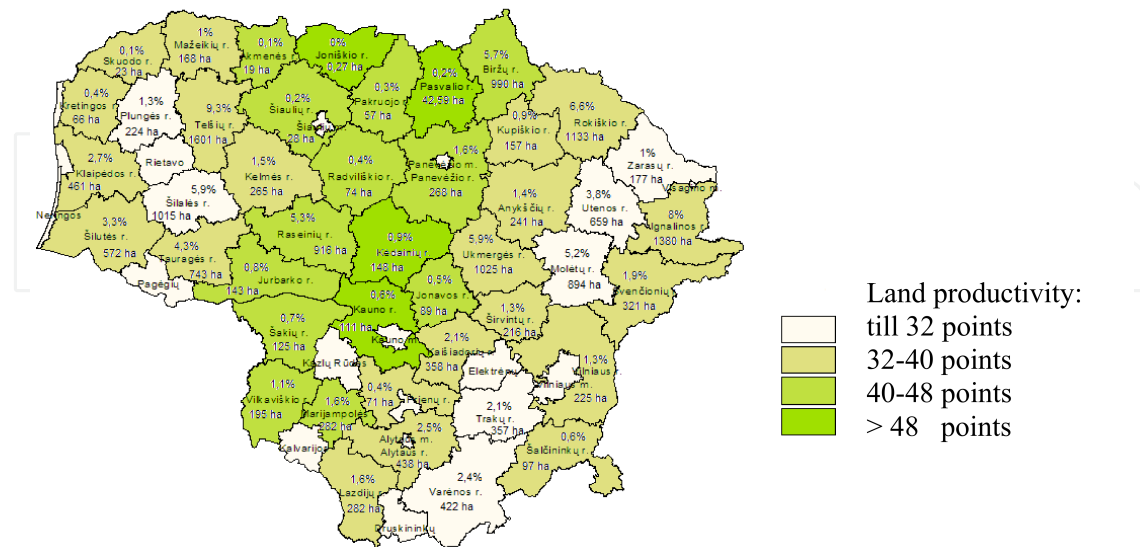
**Figure 17.** Organic and conventional wheat area distribution by hectares and percent in Lithuania by the municipalities and land productivity, 2005 [21]



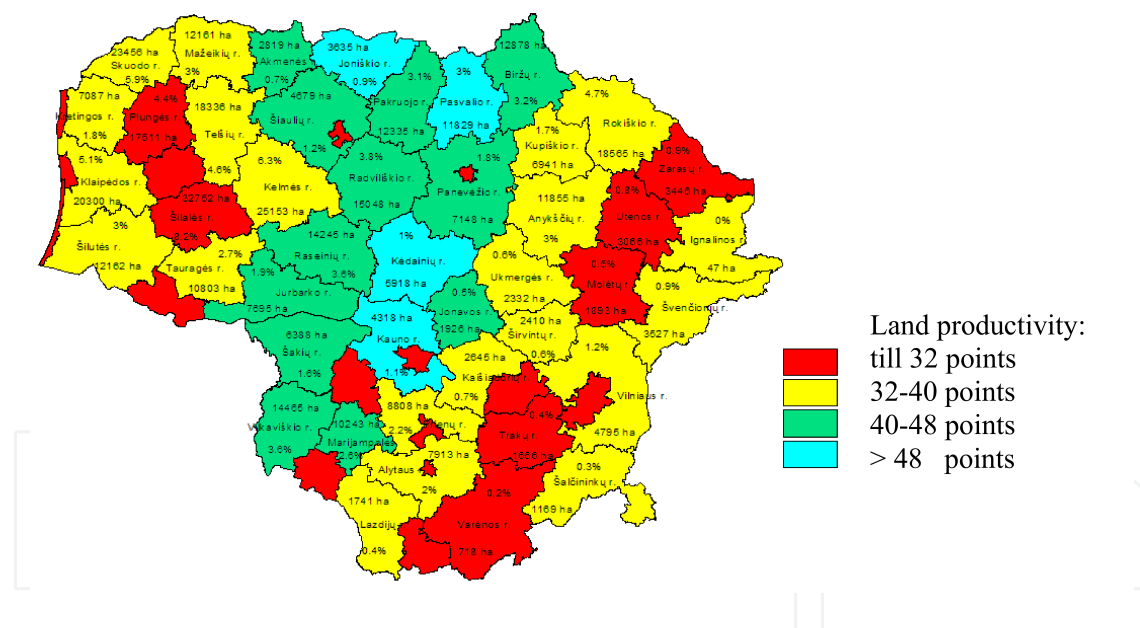
**Figure 18.** Organic and conventional barley area distribution by hectares and percent in Lithuania by the municipalities and land productivity, 2005 [21]



Area (ha and %) distribution of organic perennial grasses in Lithuania by the municipalities, 2005



Area (ha and %) distribution of conventional perennial grasses in Lithuania by the municipalities, 2005



**Figure 19.** Area distribution of organic and conventional perennial grasses by hectares and percent in Lithuania by the municipalities and land productivity, 2005 [21]

## 4.2. Productivity of agricultural crops

The main organic arable crop is cereals (Figure 11-15). Organic cereal yield and productivity in comparison with productivity of conventional grown cereals are presented in table 1. By the grown area spring triticale occupies the least territory while winter rye was the most frequently grown organic cereal in Lithuania in 2011. Productivity of the cereal crop yield [t

ha<sup>-1</sup>] except buckwheat indicated significant decrease of yield productivity in organic agriculture compared it with the conventional one. It is generally known that yield productivity is principally higher in conventional agriculture, because of its industrialization, however, in some crops we received even double size differences. The productivity of organic spring oats was acceptably lower by 23.6% compared it with the conventional oats. Hence, the yield productivity of organic compared it with the conventional winter rye, spring and winter triticale, spring barley, winter and spring wheat was even lower by 61.6%, 75.2%, 84.1%, 102%, 107.5% and 121% respectively. Just average productivity of buckwheat was higher by 20% in organic agriculture compared it with the conventional farming (Table 1).

Index	Cereals, 2011							
	Spring Oat	Spring wheat	Spring triticale	Spring barley	Winter rye	Winter wheat	Winter triticale	Buck-wheat
Organic area, ha	8644	6886	1229	6826	10360	5809	6103	7598
Organic yield, t	14241	10821	1689	10139	12957	9308	8402	9136
Average productivity of organic crop, t ha <sup>-1</sup>	1.65	1.57	1.37	1.49	1.25	1.60	1.38	1.20
Average productivity of conventional crop, t ha <sup>-1</sup>	2.04	3.47	2.40	3.01	2.02	3.32	2.54	0.96

**Table 1.** The productivity of spica cereals grown organically and conventionally in Lithuania 2011. Source: Ekoagros; Statistics Lithuania [22]

The oilseed rape growing is still a problem in organic agriculture. The confirmation of this phenomenon is three times less average productivity of organic spring rape and two times less average productivity of organic winter rape compared it with the conventionally grown rapes (Table 2). However, some Lithuanian organic farmers already are producing the organic oilseed rape alimentary oil. The leguminous cereals have high importance in agriculture and especially in organic agriculture because of symbiotic nitrogen fixing bacterium. In this segment of agricultural crops the average yield productivity was higher in conventional than in organic agriculture by 21%-36% and in vetch crop even by 137.5% (Table 2).

Organically grown vegetables need more hand work and request new mashinery and growing technologies, therefore area of organic vegetables are still insignificant (Table 3, Figure 11-15). Difficulties in growing of organic vegetables are reflected on their average productivity. In organic agriculture average productivity of total vegetables is even more than two times lower than in conventional one. The average productivity of organic potatoes in 2011 was 1.5 times lower compared it to the conventional agriculture (Table 3).

Index	Oilseed rape and leguminous cereals, 2011						
	Spring rape	Winter rape	Fodder beans	Peas	Vetch	Lupine	Soya beans
Organic area, ha	1812	90	2260	10594	110	3081	371
Organic yield, t	1198	75	3357	14193	70	2457	264
Average productivity of organic crop, t ha <sup>-1</sup>	0.66	0.83	1.49	1.34	0.64	0.80	0.71
Average productivity of conventional crop, t ha <sup>-1</sup>	1.95	1.80	1.81	1.80	1.52	1.09	0.87

**Table 2.** The productivity of oilseed rape and leguminous cereals grown organically and conventionally in Lithuania 2011. Source: Ekoagros; Statistics Lithuania [22]

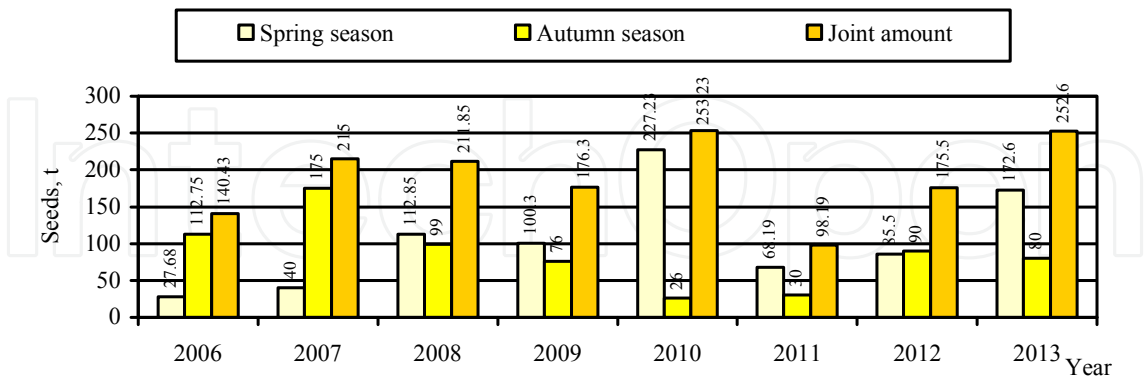
Index	Vegetables, 2011							
	Total vegetables	White cabbages	Red beets	Garlics	Pumpkins	Carrots	Onions	Potatoes
Organic area, ha	64.46	4.30	3.14	0.94	1.57	7.49	1.52	346.29
Organic yield, t	669.24	66.82	42.73	3.00	29.33	176.28	17.54	3684.6
Average productivity of organic crop, t ha <sup>-1</sup>	10.38	15.51	13.61	3.19	18.68	23.54	11.54	10.64
Average productivity of conventional crop, t ha <sup>-1</sup>	21.33	-	-	-	-	-	-	15.57

**Table 3.** The productivity of vegetables grown organically and conventionally in Lithuania 2011. Note.-data not available. Source: Ekoagros; Statistics Lithuania [22]

### 4.3. Organic seed growing

Organic seed material take the special place in organic farming. By the official regulation seed material for organic agriculture must be certified organically and should come from the special farms of organic seed material growers. The exceptions are allowed only if organic seeds are not available in the market by the objective conditions. Anyway, the use of any synthetical chemical stains for seed staining is strongly forbidden. Supply of organic seeds to Lithuanian market from the local certified organic seed growers during time period of 2006-2013 is presented in figure 20. The local specialised organic seed growers still are not able to cover demand of organic seeds. Therefore, near the local organic seed production (Figure 20) organic seeds from abroad are continuously imported (the import data are not available). Organic farmers are obligated every five years to renew the seed material from the special organic seed

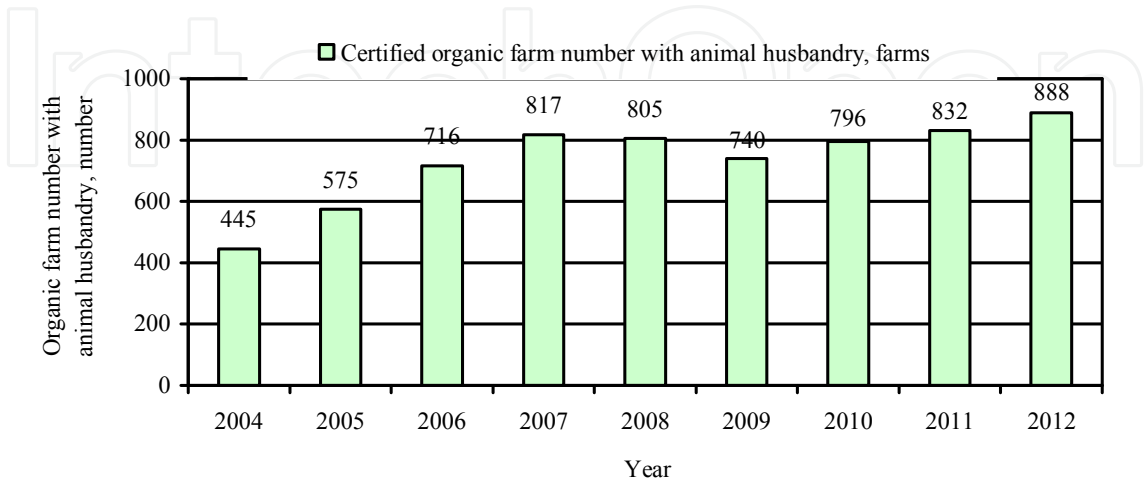
growing farms or enterprises. Normally, during five year period after seed material renewing, farmers use part of their own crop yield as a seed material for the next season.



**Figure 20.** Organic seed amount in tons in Lithuanian market in spring and autumn seasons and joint amount during 2006-2013 [23], Source: Ekoagros.

5. Animal husbandry

The highest farm number where was certified organic livestock was reached in 2012 (Figure 21). It covered 888 farms and compounded 35% from the total certified organic farm number in Lithuania. Similar to EU (Figure 22) cattle and sheep are the most popular species from organic livestock in Lithuania (Table 4). Total certified organic livestock number in Lithuania constantly grew from 2004 to 2012 (except rabbits). The increase of organic animal number (heads) mostly was influenced with coming new certified organic livestock farms to market and only a part of observed increase was induced with development of early organically certified farms.



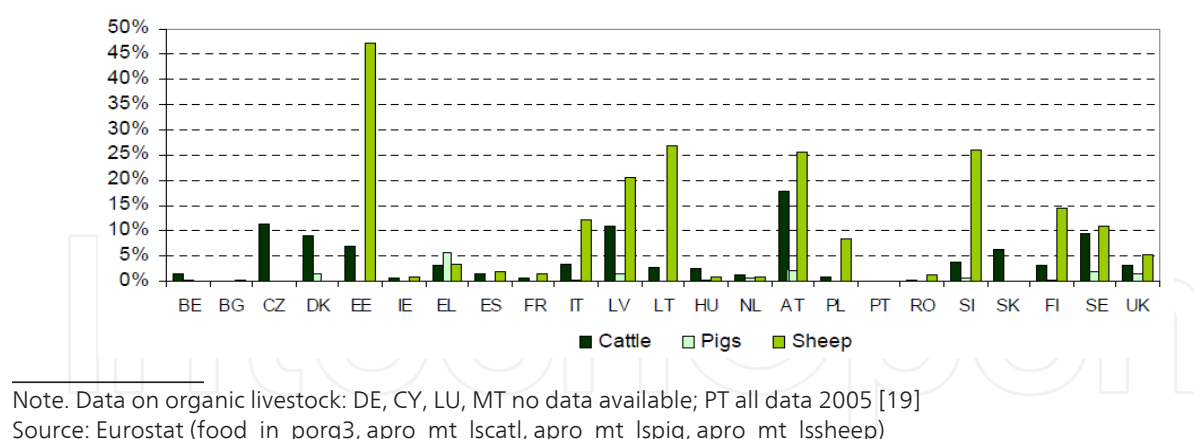
**Figure 21.** Dynamics number of certified organic farms with livestock during 2004-2012 [18], Source: Ekoagros.

Evaluating cattle's density in 2012 there were established 0.25 livestock units per hectare in conventional agriculture and 0.2 livestock unit per hectare in organic agriculture. The organic milk productivity made 5.52 tons of milk per cow in 2011 while conventional milk productivity made 4.90 tons of milk per cow. Accordingly, milk productivity of organic cows was higher by 12.6% compared it with the milk productivity of conventional farm cows.

Certified organic animal groups	Year								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Animal number (heads)									
Dairy cows	3048	4988	6401	7962	8489	8382	8891	8887	9544
Suckler cows	623	14	1071	1507	1915	2252	2863	3359	4086
Bull breeders	22	29	54	68	86	107	117	134	156
Calves	2923	6255	8662	10427	10605	11262	12752	14082	16798
Horses	190	277	321	386	441	488	364	447	474
Goats	321	549	668	740	869	755	586	640	751
Sheep	3789	5052	8507	10561	10768	13001	13683	14276	18307
Pigs	83	266	200	275	203	279	523	474	453
Rabbits	1093	908	369	239	70	215	185	141	69
Cervidae	-	-	-	-	-	-	-	582	752
Poultry	890	1182	344	1121	1100	1510	2709	4406	4103

**Table 4.** Certified organic livestock (animal number, heads) and its dynamics during 2004-2012 in Lithuania. Source: Ekoagros.

Organic livestock as a share of all livestock showed that, with respect to cattle, pigs and sheep, some Member States using organic methods were producing remarkably large numbers of animals, cattle and sheep being the most popular (Figure 22) [19]. In Austria 25.7% of the sheep were reared using organic production methods, but organically reared cattle also achieved a noteworthy 17.7% share, the highest in the whole EU-27. Estonia had the highest percentage of the sheep population with 47.3%. Lithuania reached the second highest percentage of the sheep population with 27% in 2008 (Figure 22) while till 2012 it increased by 70% (Table 4). As for organically reared pigs, they accounted for less than 1% in most of the Member States (Figure 22) [19].



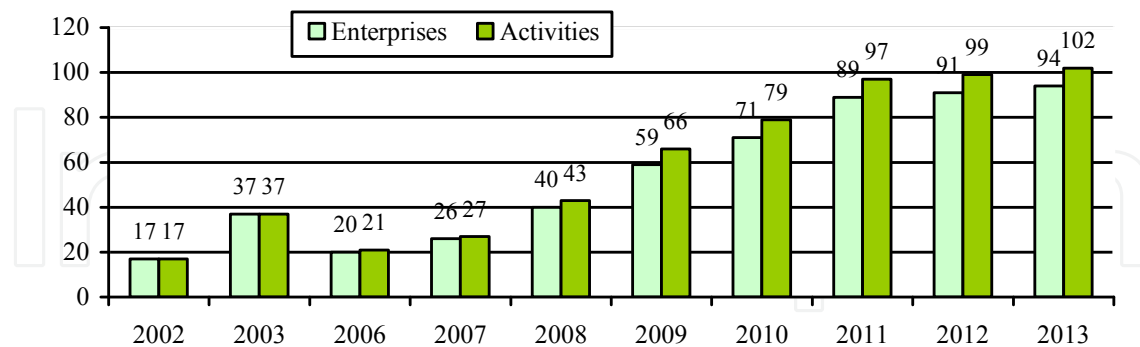
**Figure 22.** Organic livestock (number of heads) out of all livestock in European Union, 2008

## 6. Processing of organic products

Processing is a very important activity in each sector of economy. It can be as an indicator of viability and development of economy. In organic agriculture firstly it shows enough high quantity of producers that produce at least minimal critical level of primary production. Development of organic processing enterprises and activities by its number dynamics in Lithuania is presented in figure 23. The activities of organic processing enterprises in 2013 were concentrated in grain investment, storage and trading (19 activities), processing (drying, tea production) of medicinal and potherbs (14 activities), wholesale (14 activities), manufacture of grain products (12 activities), milk procurement and processing (7 activities). Some organic processing enterprises entered market in vegetable (6 activities), fruit, berries and mushrooms (6 activities) buying and processing, public catering (4 activities), seed packing and marketing (3 activities), animal slotering and meat products processing (3 activities), fish processing (3 activities) and alimentary oil production (2 activities). One at a time activity of Lithuanian organic processing enterprises was in dumpling, spice, chocolate products, tomato sauce and mayonnaise production and infant nourishment.

Activities within the organic sector include the food chain from production at farm level right through to industrial processing. Imports, exports and other activities, such as wholesale and retail trade, are also included. The production of organic crops and the rearing of organic animals are the main activities in the organic sector at farm level, but the processing of goods is also important. Producers accounted for over 50% of all operators in 2008 in all the Member States and Norway, and even exceeded 70% in most countries. Importers accounted for less than 2% of the total in most of the Member States (Figure 24) [19].

First certificate of organic product importers to Lithuania from the third-countries was issued in 2013. At the end of the year 2013 there were already certified 4 importers organic operators that imported cranberries from Belorussia and the Ukraine, coconut oil from Sri Lanka and etc.



**Figure 23.** Number change dynamics of organic processing enterprises and activities in Lithuania during 2002-2013. Note. 2013 data of January [18], Source: Ekoagros.



Note. MT data 2006, CY, PT data 2007 [19], Source: Eurostat (food\_act2)

**Figure 24.** Share in percent of different types of operators in total organic operators, 2008

On the basis of the NACE Rev.2 classification, food manufacturing activities can be grouped as follows: processing and preserving of meat and production of meat products, processing and preserving of fruit and vegetables, manufacture of vegetable and animal fats and oils, dairy products, grain mill products and starches, beverages, prepared animal feeds and other food products, including, for example, bakery products, tea, coffee, sugar, chocolate, etc. (Table 5) [19].



Country	Processors by the type of economic activity								Total
	Meat / meat products	Fruit / vegetables	Vegetables and animal oils / fats	Dairy products	Grain mill products / starches	Other food products	Beverages	Prepared animal feeds	
EU-27	2445	4114	2170	1278	1022	6833	2126	519	4633
BE	43	74	9	44	32	247	17	4	470
BG	1	16	7	3	0	10	1	0	38
CZ	72	37	1	31	17	96	69	4	327
DK	53	38	5	36	20	122	29	3	306
DE	-	-	-	-	-	-	-	-	-
EE	2	9	1	2	9	8	0	0	31
IE	33	85	0	5	9	91	3	1	227
EL	72	304	801	74	27	457	214	56	2005
ES	220	520	297	67	49	865	359	38	2415
FR	391	253	50	180	167	372	248	134	1795
IT	308	1277	835	333	353	1871	903	75	2807
CY	-	-	11	-	-	-	3	-	14
LV	3	2	-	5	1	4	-	-	15
LT	3	3	1	5	6	10	0	3	31
LU	4	6	1	2	4	18	1	3	39
HU	-	-	-	-	-	-	-	-	-
MT	0	0	3	0	0	0	1	0	4
NL	138	307	57	101	94	571	60	48	1376
AT	318	145	-	117	71	-	-	56	707
PL	-	-	-	-	-	-	-	-	-
PT12	12	33	23	-	-	2	3	2	75
RO	0	29	2	9	-	24	2	0	66
SI	10	18	3	5	1	20	-	1	58
SK	5	10	2	7	12	35	3	2	76
FI	33	83	4	15	40	52	0	16	243
SE	71	68	18	25	31	116	16	11	356
UK	650	797	39	212	79	1842	194	62	2033
NO	107	64	2	38	28	203	4	10	456

Note. EU-27 estimated; LU data 2004; AT, PT data 2005; MT data 2006; CY data 2007; DE, HU, PL no data available [19], Source: Eurostat (food\_act3)

**Table 5.** Number of organic processors by type of economic activity, NACE Rev. 2, 2008

## 7. Maintaining of organic agriculture

### 7.1. Certification

Organic agriculture indicates necessary transformation of farming system therefore it is essential to have a transitional period of 2 years [24]. Transitional period is a period through which on a farm there is introduced crop rotation, fertilization, methods of plant protection and other means of farming corresponding to the regulations of organic agriculture [25]. The certification commission can lengthen or shorten this farm transitional period. Organic agriculture differs from other farming forms as well by the requirement to keep regulations of organic agriculture and its products have origin certification [17, 24]. The whole process of organic product processing, production and all ingredients used in processing is inspected. Certification and marking of organic products initiated its high demand on market. Certification is a procedure by which certification body confirms that product and/or process of processing corresponds to the set of requirements [24, 25]. Production process of organic products control and certified public bodies are validated by the Ministry of Agriculture. In Lithuania organic farms, holdings and enterprises are certified by the public body "Ekoagros" ([www.ekoagros.lt](http://www.ekoagros.lt)). At the moment it is exclusive body for organic agriculture certification in Lithuania with the centre in Kaunas and branches in Utena and Telšiai. However, State Enterprise Lithuanian Agricultural and Food Market Regulation Agency (the Market Regulation Agency <<http://www.litfood.lt/Lists/Publications/AllItems.aspx?RootFolder=http%3a%2f%2fwww%2elitfood%2elt%2fLists%2fPublications%2fEnglish%20summary&FolderCTID=0x012000EF8B28BBC9FD604F9F45357A684ABF67>>) seek for organic production certification as well. If it succeeds, Lithuania will have two licensed organic certification bodies.

The main standard document of organic agriculture in Lithuania is "Regulations of Organic Agriculture: production, processing, realization and marking" [26] that is continuously improved and renewed [17, 25]. The certification body controls keeping of organic agriculture regulations. Certification body inspects declarant, seeking for organic certificate, performs expertise of inspection results and initiates decision for issue of organic certificate. Certificate is a document issued according to the regulations of organic agriculture and evidenced that product or processing process is in accordance with the requirements of organic agriculture regulations. Certificate gives right to mark products declared in certificate as organic. The list of certified declarants (farms, holdings, enterprises, etc.) is announced in public. Certificate is valid for one year [25]. All declarants intended to certify production as organic each year till 15 June deliver application for certification and support. After 15 June applications for certification are not admitted. Submitted application data can be corrected till 12 of July. Certification body performs inspection of organic farms till 15 of October each year.

### 7.2. Support for organic agriculture

Owners of Lithuanian organic farms can receive financial support according to the one of "Agrarian environmental protection payoff" implements programme, i.e. "Organic agriculture". The task of the programme is to support organic agriculture as a system that secures production of high quality products with good perspectives on a market. Support for organic

agriculture can be delivered only for the organically certified and declared agriculture area. Therefore, all owners of the organic farms must be registered and should contain certificate obtained from the organic agriculture certification body "Ekoagros". The exact level of support payoff varies for each organic farmer and is calculated individually depending on growing crops (Table 6). Separate organic farm can obtain maximal support of 400 thousand litas. During 2007-2013 farmers participating in "Rural development programme" implement "Agrarian environmental protection payoff" programme "Organic agriculture" submitted 12 859 applications with requests of 505.5 million litas payoff. According to "Organic agriculture" programme during 2013 there were submitted 2566 applications with request of 118 million litas payoff.

Crop	Payout, ** Lt ha <sup>-1</sup>
Cereals	742
Vegetables and potatoes	1519
Medicinal herbs	1688
Small-fruit plants and orchards	1781
Perennial grasses and meadows*	438

Note. \*-subsidies are paid only if there is certified organic livestock on farm; \*\* -1 Lt=0.290 €; 1 €=3.4528 Lt.

**Table 6.** Support for organic agriculture according to the type of crop (Lt ha<sup>-1</sup>)

To enhance marketable organic farming is foreseen compulsory realization of organic production (Table 7). Realization of organic production should be validated by actual documents. Only then financial support is delivered for organic farm in form of subsidies. The request to present documents of production realization is not applicable for farms keeping livestock and declaring just pastures and meadows, annual and perennial grasses. As well documents for production realization are not requested for cereals on farm applying proportion 1 LSU (Livestock Standard Unit) per 3 hectares. Subsidies are paid in two stages: 50% of subsidy are paid after evaluation of applications and rest 50% of subsidy are paid after delivered documents of organic production realization. For the new orchards and small-fruit perennial plantations in the first year there are paid 100% of subsidy.

Owners of Lithuanian organic farms can apply for subsidy if:

- they are applicable subjects, i.e. farmers, agricultural company or cooperative;
- have registered agricultural holding in the register of agriculture and rural business of Republic of Lithuania;
- joint agricultural and other area applicable for subsidy by the programme "Organic agriculture" are no less than 1 hectare;
- separate field plot for subsidy is no less than 0.1 hectare.

Type of crop	Required sale of production, * Lt ha <sup>-1</sup>
In suitable for farming areas	
Cereals	350
Vegetables, potatoes, medicinal herbs	1050
Orchards	1600
Small-fruit plants	1000
In less suitable for farming areas	
Cereals	180
Vegetables, potatoes, medicinal herbs	600
Orchards	900
Small-fruit plants	600

Note. \*-1 Lt=0.290 €; 1 €=3.4528 Lt. Source: National Paying Agency under the Ministry of Agriculture, <http://www.nma.lt/index.php?lang=2>

**Table 7.** Required compulsory realization of organic production for farms participating in programme “Organic agriculture” in suitable and less suitable areas for farming

Owners of Lithuanian organic farms receiving subsidies by the programme “Organic agriculture” contract to:

- participate in the programme “Organic agriculture” and to keep organic requirements at least five years from the submission of the application;
- to submit application for subsidy and declare crops each year;
- to keep integrated support interconnect requirements;
- to keep the main requirements;
- to return all paid subsidies by “Organic agriculture” programme if implementation of the programme would be suspended before the term (except special circumstances);
- to run organic agriculture on the same agricultural land, i.e. on the same field plots and every year to declare contracted areas;
- within period of contract do not decrease contracted area more than 3% and do not increase it more than 2 ha;
- to run accountancy according to the regulations of law;

- to have and implement fertilization plans if fertilized area by manure or slurry exceeds 50 ha on farm during artificial year;
- to fill-in journal of organic agriculture production if fertilized area by manure or slurry do not exceed 50 ha on farm during artificial year, plant protection means for non-professional use and mineral fertilizers are used;
- to fill-in journal of applied means and products of plant protection if there are used plant protection means for non-professional use on farm;
- to keep regulations and requirements for organic agriculture foreseen at the EU Council Regulation (EC) No 834/2007 the whole contracted period;
- to sell a part or organic production;
- to keep regulations of Lithuanian organic agriculture.

### 7.3. Education in organic agriculture

Education, vocational training and, more generally, lifelong learning play a vital role in the economic and social strategies of the European Union [15]. Education is very important in all areas of life. Agricultural professionals play an important role in helping to create and develop innovations. They also inform and educate farmers (and the public) about innovations through teaching or extension work [7].

Inceptive organic farming farmers must keep regulations of Lithuanian organic agriculture "Regulations of organic agriculture" [26] and must take part in the course of educational programme "Backgrounds of organic agriculture (for beginners)" [27]. The course completion certificate must be delivered for the certification body before the organic certificate issue day (i.e. till the 15<sup>th</sup> June of current year) no later than till the day of farm certification. The educational courses for farmers are administrated by The Centre for LEADER Programme and Agricultural Training Methodology. The tasks of educational course programme "Backgrounds of organic agriculture" is to convey for farmers scientifically and practically validated recommendation of organic agriculture, to present backgrounds of organic production and to acquaint with the main requirements of organic agriculture. The earlier received adequate education to the farmers course programme "Backgrounds of organic agriculture" can be recognized by the committee formed by the The Centre for LEADER Programme and Agricultural Training Methodology under the Ministry of Agriculture.

The State supported trainings (Table 8) as „New technologies in farms of organic production“ [28], „Organic horticulture“ [29], „Weed control system in organic agriculture“ [30] and etc. are also popular between organic farmers. The organic training courses for farmers are organized by the demand according to the educational course programmes confirmed by the Ministry of Agriculture (Table 8).

Educational programme	Year					
	2008	2009	2010	2011	2012	2013
	Number of training courses					
Backgrounds of organic agriculture (for beginners) 24 academic hours [27]	17	29	35	38	25	32
Organic agriculture for advanced 16 academic hours [31]	-	40	39	31	30	19
Organic seed growing (8 academic hours) [32]	-	-	5	5	-	-
Economical evaluation of organic products production marketing on individual and cooperative background (8 academic hours) [33]	-	-	10	8	-	-
Peculiarities of organic agriculture by the specialization of production (field day) 4 academic hours [34]	14	16	-	-	-	-
Organic agriculture for advanced (field day) 4 academic hours [35]	-	12	-	-	-	-
Backgrounds of organic beekeeping 10 academic hours [36]	-	-	18	+	-	-
Organic cattle husbandry 10 academic hours [37]	-	-	104	-	-	-
Weed control system in organic agriculture 10 academic hours [30]	-	-	29	13	-	-
Organic horticulture, 10 academic hours [29]	-	-	-	30	-	-
Organic non-traditional animal husbandry and aviculture, 10 academic hours [38]	-	-	-	24	-	-
Swine-breeding in farms of organic production, 10 academic hours [39]	-	-	-	15	-	-

Source: The Centre for LEADER Programme and Agricultural Training Methodology under the Ministry of Agriculture; Chamber of Agriculture of the Republic of Lithuania

**Table 8.** Organic training courses for farmers in Lithuania during 2008-2013

The average size of the individual course is 14 farmers. During 2008-2013 there were trained more than 5700 farmers interested in organic agriculture. Compulsory trainings "Backgrounds of organic agriculture (for beginners)" for inceptive organic farming were delivered for about 2200 participants.

## 8. Conclusions

Organic agriculture is a production system that sustains the health of soils, ecosystems and people. Farming is only considered to be organic at the EU level if it complies with Council Regulation.

The area of certified organic agricultural land in the world, EU and Lithuania continuously is tending to increase. EU-28 average made 5.7% of agricultural land as organic in 2012.

Average size of agricultural farm in general is larger in the organic than in conventional sector.

Productivity of crop average yield regularly is lower in organic agriculture compared it with the conventional one.

Cattle and sheep are the most popular species of the organic livestock.

In the manufacture of organic products fruit, vegetables, meat and meat products are dominating.

## Abbreviations

EU-28 European Union of 28 Member States

EU-27 European Union of 27 Member States

EU European Union

BE Belgium

BG Bulgaria

CZ Czech Republic

DK Denmark

DE Germany

EE Estonia

IE Ireland

EL Greece

ES Spain

FR France

HR Croatia

IT Italy

CY Cyprus

LV Latvia

LT Lithuania



LU Luxembourg

HU Hungary

MT Malta

NL Netherlands

AT Austria

PL Poland

PT Portugal

RO Romania

SI Slovenia

SK Slovakia

FI Finland

SE Sweden

UK United Kingdom

IS Iceland

LI Liechtenstein

NO Norway

CH Switzerland

NACE Rev.2 classification: Statistical Classification of Economic Activities in the European Community, Rev. 2.

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