

## DEVELOPMENT OF AGRICULTURAL, ARABLE LAND AND ORGANIC FARMING IN THE CR, DEVELOPMENT OF LAND PRICES IN SELECTED EU COUNTRIES

\*KRISTINA KABOURKOVÁ

*Institute of Technology and Business in České Budějovice,  
School of Expertness and Valuation, Okružní 517/10, 37001  
České Budějovice, Czech Republic  
email: "kabourkova@mail.vstecb.cz"*

**Abstract:** The paper compares the development of agricultural and arable land in the Czech Republic between 2000 and 2020. It has been found that the area of agricultural and arable land had decreased. Obviously, the legal norms that are supposed to ensure its protection are not observed in practice and that there can always be found a reason to grant an exception. The paper also examines the development of the prices of agricultural and arable land in selected EU countries between the years 2000 and 2018. In all cases examined, price growth has been recorded. The area of vacant land is decreasing; therefore, the people interested in its purchase are willing to pay high prices. In the paper, the development of organic farming in the CR from the 1990s until present is addressed. There has been a massive development of this way of farming. This could be considered positive, since organic farming is beneficial for the environment, farm animals, and consumers, who can get quality food.

**Keywords:** agricultural land, arable land, prices, organic farming.

### 1 Introduction

The basis for life is breathable air and water. In the human body, heart and lungs are connected vessels; similarly, the quality of soil and water are mutually dependent in the landscape. The term land as a production factor refers to land used for agricultural production, a place where other economic activities are carried out (e.g. in the construction sector), or all natural resources. Land, labor, and capital are the basic economic resources. However, it shall be stated that land is currently one of the most endangered resources. It is necessary to realize that becomes increasingly rare and needs to be protected for the future.

Unfortunately, it shows that people are unaware of the importance of land. This is alarming especially in the case of politicians who make decisions concerning present as well as the quality of life in the future. In the past, the protection of the environment was considered just "icing on the cake", which is an attitude leading to the devastation of the environment not only in the CR but in almost all states. Nevertheless, some people are already beginning to realize that the environment, which includes land, is a complex system affecting the everyday life of all people.

However, there is still the detrimental practice of land take, especially the high-quality land, for the purposes of building apartment blocks, industrial premises, highways, etc. Citizens, and particularly politicians who are responsible for making decisions concerning land take, should consider all potential risks prior to issuing these decisions or in creating legal standards. An example could be the current political and economic situations. At the beginning of this year, hardly any person would have thought that Russia would attack Ukraine and what impacts, whether political or economic, this conflict would have for almost the whole world. The EU countries are now striving for ensuring energy for their inhabitants and industry, which is challenging but feasible. Another example can be the problems that arose during the outbreak of the Chinese flu epidemic. As there was a lack of protective aids in Europe, countries had to buy overpriced and even low-quality protective aids from China. However, food shortage in the EU would have far worse consequences. The EU now produces more food that it can consume but there is still a risk that it will change in the future. The volume of fertile land is decreasing, increasingly larger areas are drying out due to the climate changes, thus becoming less fertile. If land is destroyed by using it for construction, there will be no place for agriculture. It takes one centimetre of soil about one hundred years to form. If there is no opportunity or place for producing enough food, there will be a complete breakdown of society.

A big challenge is the so-called Green Deal for Europe, which raises concerns among many politicians and entrepreneurs. In fact, it is a great chance for Europe where citizens first change their thinking and then their behaviour. The principles of Green Deal can be easily combined with solutions to current problems. Naturally, this cannot be done within a few months but over the course of the next few years. It is assumed that saving resources or using local renewable resources not only save money but enable citizens to become more independent. The paramount is the change in people's thinking followed by the courage of politicians to implement the changes.

The paper deals with the development of the land fund in the Czech Republic and the acreage per inhabitant by regions. Moreover, it analyses the development of land prices in the CR and selected EU countries and focuses also on the development of organic farming in the CR, mapping its development from the beginning of the 1990s until present.

The goal of the paper is to compare the development of land fund in the Czech Republic and the development of the acreage of agricultural and arable land per inhabitant by regions in the monitored period. Attention is also paid to the comparison of agricultural and arable land prices development in the CR and selected EU countries, and the assessment of the development of organic farming in the CR with selected EU countries.

To achieve the defined goals, the following questions are formulated:

1. Which region of the CR has shown the greatest loss of agricultural and arable land in recent years?
2. Have the prices of agricultural and arable land in the EU decreased, increased, or stagnated?
3. Is organic farming on the increase in the Czech Republic?

### 2 Literature Research

The environment concerns us all, engaging in our daily life, previous and new generations. In his encyclical from June 2015, Pope Francis warned about environmental pollution, whose abatement went ignored by global authorities and a neglectful population. We relished the idea of being the global rulers, having the carte blanche to devastate nature. Changing our deep-rooted mindset requires discipline and strong motivation. Pope Francis tries to hold a dialogue on the future of our planet, 'Our Common Home'. Every person living on the Earth is a part of nature, where social inequalities affect humanity. The ecological debt set people thinking about the ethics of international relations, severely harming the environment and depleting natural resources.

Many scholarly articles and literature have extensively discussed how humanity treats natural heritage or capital, considering land a dynamic, organic and ever-changing structure integrated with a specific country. Čilek et al. (2022) warns about excessively consuming the Earth's natural resources. On top of ethical responsibility, we must fight for the survival of young and new generations, which will need a sustainable ecosystem. People must understand that they are just another brick in the wall and cannot pillage the planet without serious repercussions (Čilek et al., 2022). Soil is the outermost layer of the Earth's crust, comprising water, air and organisms, originating from the pedogenesis process involving external and temporal factors. Current soil contains mineral and organic particles, wears away by erosion, and is no older than the Pleistocene. Their morphological organization provides habitat to plants, animals and humans. Soil does not renew in a span long enough for people, allowing only for non-renewable natural resources. Blum (1998) suggests these soil functions: food and biomass production, retention soil filters, habitat and food for organisms, material for human activities and buildings, raw material source

and cultural heritage. Jelenová (2004) argues that soil involves a crucial factor behind efficient food production and natural heritage.

Field (2017) argues that land ensures food, water, energy and high biodiversity, improving human health. It also contains organic carbon that cuts greenhouse emissions. Moldán (1997) suggests that land comprises natural capital that contributes to national heritage. The World Bank proposes this indicator as an adequate replacement for the gross national product that will safeguard sustainable biodiversity.

The land has a production and non-production function. The former involves agriculture and forestry, while the latter encompasses ecology, technology (natural resources, building foundations), history (nature archives), aesthetics and recreation. The landscape provides a natural habitat for plants, serves as a water filter, ensures water cycles, contains nutrients and substances and gives foundations for buildings. As a non-renewable resource, land is essential for survival and nourishing plants and various animals (Šimek et al., 2019). On top of its nurturing function, the landscape lays the foundations for human dwellings and purifies water. Soil provides an invaluable genetic repository in the form of microorganisms. Soil organic matter is a vast natural reservoir of carbon, nitrogen, phosphorus and sulphur. Although people always ran and cultivated farms, the landscape has recently suffered devastating effects (Environment Yearbook Welcome to Earth. National Information Institute for Education, 2008).

Since the 1990s, hectares of fertile land have disappeared, given developed areas and built roadways. Storage spaces and industrial and residential areas have been growing exponentially, yet giving way to new ecological trends (CENIA, 2016). Seven ecological (environmental) functions include filtration, accumulation, retention, purification, transformation, decontamination and transportation. The land also creates genetic repositories and wildlife habitats. Zámková (2021) found that farmers welcome eco-farming as an attractive alternative to traditional agriculture, meeting the high demand for eco-products (Zámková et al., 2021). Bryant (2022) confirms the transition to farming alternatives, giving reasonable grounds for abandoning industrial agriculture in favour of the environment, animals, and personal and public health. Plant-based animal product alternatives (PB-APA) aim to reduce animal product consumption by effectively combining style, price and comfort (Bryant, 2022). The dynamic development of eco-agriculture in some regions informed us about converting arable land to eco-farming. When mapping the conversion of agricultural land to the ecological system, we relied on the same regional classification according to the representation of eco-farming as in 2000. This categorization reflects the ratio of the converted land to the total eco-agriculture area in regions with the lowest eco rates in 2000 (Hrabák, 2020).

The terrain and land have been evolving since they exist. The landscape evolution responds to multiple environmental influences, including terrain folding, land registry, impactful historical events and related social changes (government land seizure in the seventeen century). We also observed the impact of social and political factors on landscape formation and how various terrain types adapt to the environment (Fanta et al., 2022).

Hrabák (2020) argues that people can use the land for different purposes than farming and growing plants, condemning cultivating biofuels on the arable land. Čermáková (2019) suggests changing European regulations and then adopting remedial measures. One centimetre of quality arable land can absorb water and prevent water and wind erosion, forming for one century. Rather than creating jobs, the Czech Republic should focus on long-term land protection.

We estimate that 95% of food comes from land and the rest from sea fish and fruits. The land also gives birth to technical, medicinal and aromatic herbs. Although arable land covers 13% of the dry land, the Earth embraces 87 m km<sup>2</sup> (Šimek, 2019).

Land users were well aware of its scarcity, giving rise to cut-throat competition between the following sectors: settlements/transport, agriculture, forestry and environmental protection (Gebeltová et al., 2017).

The Czech Republic rents the land to 80% of farmers, who struggle to pay the rent. This article explores the price movement of Czech agricultural land and discovers the causes and effects of this change on national land ownership (Severová et al., 2021). Some investors, who are not farmers, purchase arable land for ten Czech Crowns to sell for thousands when the zoning managers decide to build flats or commercial areas (Ginter, 2022).

The landscape must be ecologically stable, leaving a permanent memory trace. Unfortunately, our territory witnessed the ploughing of 45 k ha of meadows, 240 k ha of baulks, 50 k ha of groves, more than 1/2 of dirt roads and destroying 45 k km of linear greenery. In 2000, the European Council discussed land protection, adopting the European Landscape Convention joined by the Czech Republic (Malá, 2003). The total area of the Czech land fund amounts to 7,887 k ha, while the overall extent of the Czech agricultural land fund (ZPF) is 4,200 k ha to 31.12.2020. The share of the farmland (z.p.) equals 53.25% of the Czech total land fund area, whereas arable land peaks at 37.17% of the overall land fund area. The plough rates slid from 71.6% in 2005 to 69.8% in 2020, indicating a slight decrease. Since 1999, the Czech Republic has seen a decline of farmland by 82,424 ha, which is 10.7 ha/day on average. This slump reflects extensions of forest covers and water surfaces and, to some extent, expansion of built-up and other areas (Situational reports and forward-looking statements MZ - land, 2021).

Europe is witnessing accelerated property development, growing by 9% between 1990 and 2006 (Prokop et al., 2011). Many enterprises eagerly seize and deplete farmable and agricultural land, regardless of the legislation. Zoning regulations and decrees apply only to the poor, leaving large investors exempt from the law (Vašků, 2008).

Climate change currently troubles the entire world, which has recently been facing severe droughts. Although the temperature shifts directly involve uncontrollable natural processes, anthropogenic activities, including past interferences with nature, gave rise to many of today's problems. Disrupted flows, landscape desiccation and expanding fields are only some items to put on the blacklist. Covering large areas with concrete prevents water from soaking into the ground, causing massive surface runoffs. Too long have we been damaging the land, and remedial measures will be costly. Instead of brownfields, investors, hellbent on monetizing, use farmland for developing industrial and commercial zones, ignoring drastic social and economic repercussions.

Rather than quality, the land valuation rewards locality, observing supply and demand when setting the price (Nýltová, et al., 2016). A healthy environment reflects a prosperous economy, as in Sweden, Denmark or Canada (Epping, 2004).

The Czech Republic has the hugest land fragmentation in Europe, renting most of the arable land to farmers. In 2013, the owned/rented land ratio peaked at 25.7%. The country also ranks first regarding the past massive agricultural production and land blocks in Europe. Konečný et al. (2017) argues that Czech surveyors have recently focused on the regional impacts of transformed agriculture and adopted a joint agricultural policy on farming (Konečný et al., 2017).

The agricultural land fund involves farmlands, including arable land, hop gardens, vineyards, gardens, orchards, permanent grasslands and farmable land that lies fallow. This ecosystem further includes duck or fish ponds. We shall not omit non-agricultural land, ensuring agro-production that comprises dirt roads, plots with irrigation equipment, irrigation tanks, drainages, dams against wetting or flooding and technical anti-erosion facilities.

The Act on Protecting Agricultural Land Fund in the Czech Republic - Nature and Landscape Protection under sec. 2, ss. (2) par. h) Act No. 114/1992 Sb., Nature and Landscape Protection, governs the protection of land funds, including land development. The agricultural land fund is our natural heritage and irreplaceable food source, creating a biophysical environment. The protection of farmable land fund, its cultivation, and careful use ensure environmental protection under Act No. 334/1002 Sb., Agricultural Land Fund Protection Title I - Agricultural Land Fund, sec. 1, ss. (1). The same act in Title III, sec. 4 governs Principles of Agricultural Land Fund Protection. Non-farmable land should serve non-agricultural purposes, including unused and vacant lands in developed municipal areas, empty building plots outside the territory, gap sites or empty plots after pulling down derelict buildings. Should seizure of the cultivated land fund take place, it is imperative a) not to disrupt agricultural land fund organization, hydrological/runoff ratios in the territory and agricultural road networks, b) not to seize more land fund than necessary, c) to avoid hindering further cultivation of the agricultural land fund, d) to prepare the used land for recultivation after the permission for non-agricultural activities extinguishes.

Unfortunately, agricultural technologies aim only to boost results, adversely affecting land's ecological functions. Matulová and Cechura (2016) found comparatively low land supply elasticity in the plant and combined production. It is surprising because land, as a crucial production factor, determines the final product. The author puts it down to inefficient support allocation policies among farmers who possess the plot but use it extensively (Matulová and Cechura, 2016).

Situation reports and forward-looking statements of MZ CZ - land (2018) state that soil sealing relates to uncontrollable suburbanization and, together with erosion, imposes enormous pressure on agricultural land. Soil sealing is covering the land with impervious materials. Soil irreversibly loses its resources and cannot serve the ecosystem. Low land prices attract investors to greenfield projects rather than use built-up city areas or encourage brownfield revitalization. The soil then loses its quality and production, and ecological functions.

Tremendous losses of agricultural land entail less fertile ground for future generations, decreasing territorial biodiversity and changing the landscape. Due to inhibited infiltration and retention, raindrops cause territorial floods within built-up areas. Groundwater depletion, new buildings, increased traffic volumes, and wastewater may be a source of massive contamination. The position of the Czech Republic in the 'heart' of Europe is ideal for soil sealing and developing transit centres and storage.

On the other hand, extensive forest areas are not always rewarding. Although the Czech Republic boasts the hugest forests within the last 400 years, these wood areas have turned into plantations. Dense and linear conifer plantations serve a single purpose - the mass production of wood. 'How could a creature survive in such a habitat' Miroslav Svoboda, professor of the Department of Forest Ecology from the Czech University of Life Sciences in Prague (CZU).

Drastic climate change makes the plantation economy detrimental, pushing plants and animals out of the forest, which loses its essential features (Svěrák, 2022).

The EU authorities have long been dealing with land cultivation. Resolutions on Protection on Soil Protection (2021/2548/RSP) suggest that healthy soil is a resource of essential nutrients, ensuring sustainable food production. The resolution holds that nutrition sustainability, mainly plant food, safeguards the appropriate use of land. Good soil helps achieve the goals of the European Green Deal, including climate neutrality, renewing biodiversity, zero emissions free of pollutants, effective and sustainable food systems and a healthy environment. The land is at the centre of attention when implementing Farmer to Consumer marketing, the EU strategy on forestry, recovering

biodiversity until 2030 and zero air, water and soil emissions. The European Commission's action plan involves removing all land pollutants and revising directives on industrial emissions.

In 2018, the Copernicus Climate Change Service mapped the whole of Europe, producing valuable data for landscape analysis and land use in the EU member states. The findings revealed greater landscape stability after 2000. Arable land covers 25%, pastures reach 17%, and forests extend to 34%. The suburban expansion between 2000 and 2018 embedded an area about the size of Slovenia, consuming vast grassland areas. Between 2000 and 2006, built-up areas amounted to 1,086 km<sup>2</sup>, plummeting to 711 km<sup>2</sup> in 2012 - 2018.

The soil quality impacts its purchase or rental price, determining the capital investments in the agricultural business run by a landowner. The land price is subject to land appreciation or valuation (Broušková, 2011).

Climate change gave rise to a dramatic average temperature increase and precipitation upheaval, causing marked discrepancies between tabular overviews and reality. We cannot predict whether the effects will positively or negatively impact agricultural production and official land prices (Slaboch et al., 2022).

The findings show that land prices in ESEU have skyrocketed to 20.6 M CZK (converted to current prices) over the last 180 years, expected to peak at 10 M CZK according to the planned land use. The figures also show that ESEU prices are 36% higher on average than in 2002. This growing trend will entail tremendous losses of agricultural land, disrupting sustainable agriculture and depleting food sources (Szturc et al., 2019). While farmers can still enjoy fertile and rich farmland, non-agricultural investors are in dire straits over exorbitant land investment prices (Soukal, 2017). The re-establishment of the right of first refusal will also disrupt the market. The appreciation of CZK against EUR and USD will produce the same negative effect, imposing inflated prices on investors from Germany, Austria, The Netherlands and Belgium (Soukal et al., 2017).

### 3 Methodology

First, the development of land fund and agricultural land in the Czech Republic between the years 2000 and 2020 is compared, which will be followed by the comparison of the acreage of agricultural and arable land in the CR per inhabitant by regions. The output is the increase or decrease in the acreage expressed in percentage. Furthermore, there will be compared the average prices of agricultural and arable land in selected EU countries where the output will be the percentage increase in the prices. Finally, there will also be monitored the development of organic farming (OF) in the CR between the years 1990 and 2020 by means of monitoring the overall acreage in the system of organic farming compared to the overall acreage of agricultural land fund. There will be examined the development of land fund in organic farming in the CR expressed in ha between the years 2005 and 2020. The output is the percentage increase in acreage used for organic farming.

### 4 Results

Land fund is classified according to individual types of land (arable land, hops, vineyards, gardens, orchards, permanent grassland, forest land, water bodies, built-up areas and courtyards, other areas).

The agricultural land fund is the basic natural wealth of a country, an irreplaceable production tool enabling agricultural production, and is one of the main components of the environment. The protection of agricultural land fund consists in its use for agricultural purposes and in the legal regulation of its protection during spatial planning activities, for construction, mining, and industrial activities, as well as in geological surveys (e.g., the obligation of overburden). The removal of land from

agricultural land fund is conditioned by the consent of the agricultural land fund protection authority (Table no. 1).

Tab. 1: Development of land fund in thousands ha in the Czech Republic

Period	Agricultural land	Forest land	Water bodies	Built-up area	CR in total
As of 31 December 2000	4 280	2 637	159	130	7 887
As of 31 December 2020	4 200	2 677	167	133	7 887
Increase +, decrease – in %	-1.87	+1.5	+5.0	+2.3	0

Note: the difference between the area of individual land fund components and the total acreage of land in the CR represents the so-called “other area”

Source: Situational and forward-looking report of the Ministry of Health of the Czech Republic - soil, 2021, author

Table no. 2 show development of land fund in thousands ha in the Czech Republic

Tab. 2: Development of land fund in thousands ha in the Czech Republic

Period	Agricultural land	Arable land	Hops	Vineyards	Gardens	Orchards	Permanent grassland
As of 31 December 2000	4 280	3 082	11	16	161	49	961
As of 31 December 2020	4 200	2 932	9	20	172	44	1 023
Increase +, decrease – in %	-1.87	-4.87	-18.19	+25.00	+6.80	-10.21	+6.45

Source: Situational and forward-looking report of the Ministry of Health of the Czech Republic - soil, 2021, author.

Table no. 3 show acreage of agricultural land and arable land in the CR per inhabitant as of 31 December 2018

Tab. 3: Acreage of agricultural land and arable land in the CR per inhabitant as of 31 December 2018

Region	Acreage per 1 inhabitant	
	Agricultural land (ha)	Arable land (ha)
CZ010 City of Prague	0.0152	0.0109
CZ020 Central Bohemia	0.4869	0.4016
CZ031 South Bohemia	0.7637	0.4788
CZ032 Plzeňský	0.6493	0.4343
CZ041 Karlovarský	0.4195	0.1790
CZ042 Ústecký	0.3347	0.2193
CZ051 Liberecký	0.3156	0.1423
CZ052 Královéhradecký	0.5020	0.3417
CZ053 Pardubický	0.5211	0.3747
CZ063 Vysočina	0.8020	0.6184
CZ064 South Moravia	0.3578	0.2957
CZ071 Olomoucký	0.4380	0.3230
CZ072 Zlínský	0.3303	0.2052
CZ080 Moravia-Silesia	0.2266	0.1394
<b>CR</b>	<b>0.3962</b>	<b>0.2782</b>

Source: Czech Geodetic and Cadastral Office, 2019.

Table no. 4 acreage of agricultural land and arable land in the CR per 1 inhabitant as of 31 December 2021

Tab. 4: Acreage of agricultural land and arable land in the CR per 1 inhabitant as of 31 December 2021

Region	Acreage per 1 inhabitant	
	Agricultural land (ha)	Arable land (ha)
CZ010 City of Prague	0.0146	0.0105
CZ020 Central Bohemia	0.4704	0.3852
CZ031 South Bohemia	0.7598	0.4707
CZ032 Plzeňský	0.6375	0.4219
CZ041 Karlovarský	0.4238	0.1780
CZ042 Ústecký	0.3361	0.2196
CZ051 Liberecký	0.3152	0.1399
CZ052 Královéhradecký	0.5015	0.3349
CZ053 Pardubický	0.5159	0.3683
CZ063 Vysočina	0.8009	0.6158
CZ064 South Moravia	0.3531	0.2907
CZ071 Olomoucký	0.4388	0.3221
CZ072 Zlínský	0.3316	0.2009
CZ080 Moravia-Silesia	0.2287	0.1394
<b>CR</b>	<b>0.3923</b>	<b>0.2730</b>

Source: Czech Geodetic and Cadastral Office, 2022.

Table no. 5 show change in the acreage of agricultural and arable land in the CR per 1 inhabitant between 2018 and 2021

Tab. 5: Change in the acreage of agricultural and arable land in the CR per 1 inhabitant between 2018 and 2021

Region	increase +, decrease – acreage per 1 inhabitant between 2018 and 2021 in %	
	Agricultural land (ha)	Arable land (ha)
CZ010 City of	-4.0	-3.7
CZ020 Central	-3.7	-4.1
CZ031 South	-0.5	-1.7
CZ032 Plzeňský	-1.9	-3.0
CZ041 Karlovarský	+1.0	-0.5
CZ042 Ústecký	+0.5	+0.1
CZ051 Liberecký	-0.01	-1.7
CZ052	-0.1	-2.0
CZ053 Pardubický	-1.0	-1.8
CZ063 Vysočina	-0.1	-0.5
CZ064 South	-1.5	-1.7
CZ071 Olomoucký	+0.1	-0.3
CZ072 Zlínský	+0.3	-2.1
CZ080 Moravia-	+0.9	0
<b>CR</b>	<b>-0.1</b>	<b>-1.7</b>

Source: Author.

The above tables suggest that between 2000 and 2020, there was a decrease in the total acreage of agricultural land in the CR, specifically in the case of hops and orchards, while the acreage of vineyards and forest land increased. However, this does not necessarily mean a positive phenomenon, because a large part of Czech forests are the so-called spruce plantations, commercial forests that have no positive effect in terms of biodiversity. In contrast, they pose a risk of calamity, as could have been seen in recent years in the case of the spruce weevil. There was also an

increase in water bodies and, unfortunately, also the acreage of built-up areas.

The area of orchards decreased mainly because farmers have little sales for their production due to the import of cheap fruit from abroad and old orchards are thus no longer renewed. As for the EU countries, the greatest decrease in arable land in the period 2006 - 2012 was recorded in the Netherlands, Spain, and the Czech Republic, mainly because land take for the construction of industrial commercial premises and construction of houses and apartment blocks (Atlas půdy, 2018).

Nearly three quarters (71.5 %) of arable land in the EU are located in seven member countries only. In 2016, France used 27.8 million ha of arable land for agricultural purposes; in Spain, it was 23.2 million ha, in Great Britain and Germany 16.7 million ha, in Poland 14.4 million ha, Italy 12.6 million ha and Romania 12.5 million ha.

Agricultural companies in the EU managed about two fifths (38.8 %) of the total area of EU used as agricultural land, forest land (6.2 %) and other agricultural land not used for the purposes of agriculture (2.1 %). In some EU member states, agricultural land dominated in the rural areas. Two thirds of the area were used as agricultural land in Ireland (70.0 %) and Great Britain (65.7%), and the share was also very high in Denmark (60.9 %). This contrasted significantly with Finland (6.5 %) and Sweden (6.9 %) where the landscape was dominated by forests. These two Nordic countries were the only two EU member states where forest land owned by agricultural companies represented a larger share than land used for agricultural purposes.

In the EU, the area of land used for agricultural production did not change significantly (+0.2 %) between 2005 and 2016 despite of the sharp decline in the number of agricultural companies (Statistika zemědělství, lesnictví a rybářství, 2018).

The prices of agricultural land differ significantly in individual EU countries even in terms of neighbouring regions. The reasons include diverse soil and climatic conditions, uneven acreage of agricultural land in relation to the number of inhabitants, diverse business structure of agriculture, diverse economic situation of individual countries and often even smaller territorial units, as well as different regulatory measures of individual states concerning the acquisition and selling of agricultural land. There are also differences in the development of land prices over time when most countries show an increase in land prices, which is typical especially for the new EU states with membership from 2004, 2007 or 2013. Within the monitored EU countries, the highest average prices of arable land are recorded in the Netherlands, where in the last monitored period 2011-2018, the prices fluctuated between EUR 50,000 – 70,000 per ha. These high prices are given by very intensive agricultural production, a considerable extent of greenhouse farming, and mainly the lack of land for sale. High prices are recorded also in Italy, Luxembourg, and Germany. In Ireland, the price of arable land reached EUR 28 k/ha in 2019 and in Great Britain, it was EUR 23 k/ha in 2018. Within the EU 15, the lowest prices of agricultural land are recorded in France. Due to the different natural conditions including lowlands to mountain areas, France shows considerable price differentiation depending on the region. Relatively low prices are recorded in Sweden and Finland. Within EU-13 (countries that joined the EU between 2004 and 2013), there are also considerable differences at the level of average selling prices of agricultural land. According to Eurostat, in 2019, the highest prices of agricultural (or arable) land were recorded in Slovenia (nearly EUR 19 k/ha), Poland (almost EUR 11 k/ha) and the CR (EUR 8 k/ha). Prices lower than in the CR are reported in Hungary and Bulgaria, Latvia, Lithuania, Estonia, Croatia, and Romania. The stated variability of prices and their year-on-year changes are affected by the methodology used to determine selling prices in individual countries in individual years but also reflect the objective facts arising from the specifics of individual countries both in terms of natural conditions and production structures as well as tax and legal aspects given by various legislation concerning the area of

market and protection of agricultural land fund as well as the regulation of the land market in many countries.

Table no. 6 show average prices of agricultural land in selected EU countries in EUR/ha

Tab. 6: Average prices of agricultural land in selected EU countries in EUR/ha

Country	2000	2018	Percentage increase %
Finland	3 933	8 380	213.06
France	3 650	6 020	164.93
Germany	9 081	25 485	280.64

Source: Situational and forward-looking report of the Ministry of Health of the Czech Republic - soil, 2021, author.

Table no. 7 show average prices of arable land in selected EU countries in EUR/ha

Tab. 7: Average prices of arable land in selected EU countries in EUR/ha

Country	2000	2018	Percentage increase %
Denmark	10 867	17 690	162.78
Netherlands	35 576	70 320	197.66
Sweden	2 123	8 842	416.48
Poland	1 194	10 414	872.21

Source: Situational and forward-looking report of the Ministry of Health of the Czech Republic - soil, 2021, author.

The Czech Statistical Office states that in 2013, the average price of agricultural land per square meter in the Czech Republic was CZK 8.6, and yet by 2019, the price increased up to CZK 18.9.

The most expensive agricultural land has been recorded in the Prague – East district, where the price per square meter stood at CZK 38.5 in the 2019-2020 period, followed by the Olomouc district (CZK 27.31 per square meter) and the Znojmo district (CZK 26.24 per square meter).

Recently, the European Union has focused on the issue of organic agriculture (organic farming) as well.

The European Union organic logo provides a comprehensive visual identity for organic products that are produced as well as sold in the EU. It makes it easier for EU consumers to recognize organic products and helps farmers to market their products in all EU countries.

The logo can only be used on products that have been recognized as organic and approved by the EU Control Agency or entity. This infers that such products have met strict conditions related to how they are produced, transported, and stored (Figure no. 1).

Figure 1: Organic farming logo



Source: Control of organic farming, 2022.

Organic farming is one of the fastest growing areas within the EU agricultural sector. It is a direct result of increased consumer interest in organic products. The EU has responded to the challenges posed by this rapid expansion and created an effective

legal framework for this EU sector. New legislation on the organic production sector has previously been adopted and came into force on 1 January 2022.

Changes brought about by the new organic production regulations involve:

- strengthening the control system, which will contribute to greater consumer confidence in the EU organic farming system,
- new rules for producers, which will facilitate the transition to organic production for smaller farmers,
- new rules for imported organic production, so that all organic products sold in the EU meet the same standards,
- a greater range of products that can be marketed as organic.

The new legislation on organic production is supported by the Action Plan for Organic Farming launched by the European Commission in March 2021 (European Commission, 2008).

The European organic food market achieved a record level in 2020. It grew by 15% year-on-year and reached EUR 52 billion, representing the highest growth rate in the last ten years. The growth of ecologically managed land also continues. The latest data are based on The World of Organic Agriculture yearbook, which is regularly published by The Research Institute of Organic Agriculture in Switzerland (FiBL) and IFOAM Organics International.

In 2020, 17.1 million ha of agricultural land were managed ecologically in Europe (out of which, 14.9 million ha in the EU). With almost 2.5 million ha, France has become the new number one in relation to acreage of agricultural land in organic farming, followed by Spain (2.4 million ha), Italy (2.1 million ha) and Germany (1.7 million ha). These four countries are home to more than half of Europe's organic farmland. The Czech Republic maintains seventh place within the EU behind Austria (680 thousand ha) and Sweden (614 thousand ha). (Institute of Agricultural Economics and Information, 2022).

Since the end of the 1990s, the use of agricultural land in an ecological way has been increasing in the Czech Republic. As of December 31, 2020, this is related to approximately 543,000 ha of agricultural land, which is 15.28%. Organic farming (OF) corresponds to the principles of sustainable agricultural development. In addition to the production of organic food, it contributes to better living conditions for farmed animals and protection of the environment as well as to an increase in its biodiversity. Organic farming supports economic and social development in less favourable and lagging rural areas.

Table no. 8 show development of organic farming in the Czech Republic

Tab. 8: Development of organic farming in the Czech Republic

Year of Acreage	Number of farms in OF	Total Acreage of Land in OF (in ha)	Share of Total Acreage of Agricultural Land Fund (in %)
1990	3	480	-
2020	4 665	543 252	15.28

Source: Situational and forward-looking report of the Ministry of Health of the Czech Republic - soil, 2021.

Table no. 9 show development of agricultural land fund structure in organic farming in the CR expressed in ha.

Tab. 9: Development of agricultural land fund structure in organic farming in the CR expressed in ha

Year	Arable Land	Permanent Grassland	Permanent Vegetation	Other Areas	Total
2005	20 766	209 956	820	23 440	254 982
2020	93 701	443 262	6 071	218	543 252
Percentage increase %	+451,22	+211,12	+740,36	-0,93	+213,05

Source: Situational and forward-looking report of the Ministry of Health of the Czech Republic - soil, 2021.

## 5 Discussion

The first research question was related to an enquiry into which region in the Czech Republic has experienced the greatest loss of agricultural and arable land. It was found that the loss of agricultural and arable land between 2000 and 2020 was particularly significant in the vicinity of Prague and in the Central Bohemia Region. Large-scale construction of industrial and storage areas has been taking place here on high quality land. At the same time, however, storage areas do not signify any added value for the future, they are not a promise of future scientific and technical development.

Yet another issue is the construction of motorways. Not only is there a loss of land, but (in connection with new roads and motorways) also more land is being taken over, as more and more parking spaces are built and more housing development is created in close surroundings, which irreversibly destroys the land. Preference should be given to rail transport, which is least harmful to the environment.

Except for the Karlovy Vary, Ústecký, Olomouc, Zlín and Moravian-Silesian regions, the area of agricultural land per inhabitant of the region decreased. In terms of arable land, the area per inhabitant increased only in the Ústecký region, while there was a decrease in the other regions as well.

The second research question dealt with the development of agricultural and arable land prices in EU countries. The research was conducted between 2000 and 2018 in selected EU states. It was found that there was a significant increase in the price of land in all selected countries. This also corresponds to the situation in the Czech Republic, where the most expensive land is found around Prague. It is logical, since a smaller area of land is available and yet there is increasing pressure to occupy it due to all kinds of construction.

The third research question was focused on the development of organic farming in the Czech Republic. It was found that from the 1990s to 2020, there was a massive increase in the number of farms operating in the organic farming system of the Czech Republic. Between 2005 and 2020, the area of permanent vegetation and arable land in the organic farming system considerably increased, and the area of permanent grassland also increased significantly. This can be evaluated positively, as this farming system is friendly to the environment, and farm animals kept in such conditions are ensured certain welfare. As a result, organic farming products also have a positive effect on the health of their consumers.

In ecologically managed farms, the acreage of other areas (roads, paved areas intended for handling loads, etc.) was reduced to approx. 0.93% in comparison with the situation in 2005.

## 6 Conclusion

The aim was to assess development of the area of agricultural and arable land in the Czech Republic, development of agricultural and arable land prices in selected EU countries and development of organic farming in the Czech Republic.

It was found that in the last twenty years there was a significant decrease in agricultural and arable land, particularly in the vicinity of Prague and in the Central Bohemia Region. It is an unfortunate phenomenon, since in these areas the soil is of exceptional quality. Nobody knows what the future holds and yet ensuring enough quality food for the population is a crucial task. In the period under review, the area of vineyards, water areas, gardens and forest land increased, while the area of hop farms and arable land decreased.

As regards prices of agricultural and arable land, there was a significant increase in that respect in selected EU countries, including the Czech Republic. It remains to be seen, however, whether this is because one values the land as such or because certain developers want to purchase such land for construction purposes at all costs. On the one hand, there are dilapidated industrial areas, uninhabited apartment buildings, and on the other hand, agricultural, or even arable land, is irreversibly destroyed for these purposes. It is necessary to bear in mind that sufficient area of land, which fulfils all its functions, is essential for life, as it also reduces the risk of floods and droughts. The paper is concerned with development of the market price of land, although the real value of agricultural, or even arable land, is basically incalculable, since land as such cannot be produced and yet is necessary for life.

A positive phenomenon may be seen in the development of organic farming in the Czech Republic, as well as in a significant increase in the areas on which this activity is carried out. Agriculture in the organic farming system is beneficial in all respects and therefore its support is necessary.

#### Literature:

1. Act No. 114/1992 Coll., On Nature Conservation and Landscape Protection, as amended Act No. 334/1992 Coll., On Protection of Agricultural Soil Fund, as amended.
2. Analýza zemědělství – Asociace malých a středních podniků a živnostníků v ČR – 2019 [Analysis of agriculture - Association of small and medium-sized enterprises and entrepreneurs in the Czech Republic – 2019]. 2019.
3. Atlas půdy [Soil atlas]: Heinrich Boll Stiftung. IASS Postdam, Glopolis, 2018. ISBN 978-80-88289-07-4.
4. Blum, W. E. H.: Agriculture in a sustainable environment – a holistic approach. *International Agrophysics* 1998; 12: 13-24.
5. Broušková, V.: *Metody oceňování zemědělské půdy a jejich využití* [Agricultural land valuation methods and their use]. České Budějovice: University of South Bohemia in České Budějovice, 2011.
6. Bryant, Ch. J.: Plant-based animal product alternatives are healthier and more environmentally sustainable than animal products. *Future Foods* 2022; 6. ISSN 2666-8335.
7. CENIA: *Zpráva o životním prostředí ČR* [Report on the environment of the Czech Republic]. 2016. Ministry of the Environment of the Czech Republic.
8. Cílek, V., Polívka, M., Vacek, Z.: *Český a moravský les, jeho počátky, současný stav a výhled do budoucnosti* [The Czech and Moravian forest, its origins, current state and outlook for the future]. 1<sup>st</sup> ed. Dokořán., s. r. o., 2022. ISBN 978-80-7675-041-8.
9. Čermáková M.: *Pěstovat plodiny pro biopaliva na orné půdě je špatně, řekl expert v Rozstřelu* [Growing crops for biofuels on arable land is wrong, said an expert in Rozstřel]. 2019. Available from: [https://www.idnes.cz/hobby/zahra-da/pro-fesor-jakub-hruska-v-rozstrelu-na-tema-chemie-zemedelstvi-a-zmena-krajiny.A190410\\_115841\\_hobby-zahrada\\_mce](https://www.idnes.cz/hobby/zahra-da/pro-fesor-jakub-hruska-v-rozstrelu-na-tema-chemie-zemedelstvi-a-zmena-krajiny.A190410_115841_hobby-zahrada_mce)
10. Český úřad zeměměřický a katastrální: Souhrnné přehledy o půdním fondu z údajů katastru nemovitostí ČR [Czech land surveying and cadastral office: Summary overviews of the land fund from the data of the real estate cadastre of the Czech Republic]. Prague, 2019. ISBN 978-80-88197-11-9.
11. Český úřad zeměměřický a katastrální: Souhrnné přehledy o půdním fondu z údajů katastru nemovitostí ČR [Czech land surveying and cadastral office: Summary overviews of the land fund from the data of the real estate cadastre of the Czech Republic]. Prague, 2022. ISBN 978-80-88197-27-0.
12. Epping, R. Ch.: *Průvodce globální ekonomikou* [A Guide to the Global Economy]. Prague: Portál, 2004. ISBN 80-7178-825-2.
13. European Commission: *Pokyny k dovozu ekologických produktů do Evropské unie* [Instructions for importing organic products into the European Union]. 2008. Available from: [https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/organics-glance\\_cs](https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/organics-glance_cs)
14. Fanta, V., Beneš, J., Zouhar, J., Rakava, V., Šitnerová, I., Janečková Molnárová, K., Šmejda, L., Sklenicka, P.: Ecological and historical factors behind the spatial structure of the historical field patterns in the Czech Republic. *Scientific Reports* 2022; 12(1). ISSN 2045-2322.
15. Field, D. J.: Soil security: dimensions. In Field, D. J., Morgan C. L. S., McBratney, A. B. *Global Soil Security*. Cham: Springer, 2017. p. 15-23.
16. Gebeltořová, Z.: Exploitation of Agricultural Land in the Czech Republic and EU Countries. *Agris on-line Papers in Economics and Informatics* 2017; 09(04): 33-44. ISSN 1804-1930.
17. Ginter, J.: *Orná půda bude pořád jenom cennější* [Arable land will only become more valuable]. 2022. Available from: <https://www.novinky.cz/finance/clanek/orna-puda-bude-porad-jenom-cennejsi-40401405>
18. Hrabák, J., Zagata, L.: Development and regional differentiation of organic agriculture in Czechia. *Geografie* 2020; 125(1): 69-92. ISSN 1212-0014.
19. European Parliament: Motion for a resolution on soil protection. 2021. Available from: [https://www.europarl.europa.eu/doceo/document/B-9-2021-0221\\_EN.html](https://www.europarl.europa.eu/doceo/document/B-9-2021-0221_EN.html)
20. Jelenová, R.: *Ceny zemědělské půdy na současném trhu se zemědělskou půdou* [Agricultural land prices in the current agricultural land market]. Prague: Czech Agrary University in Prague, 2004.
21. Konečný, O.: Spatial polarization of agriculture of Czechia during the integration into the European Union. *Geografie* 2017; 122(3): 257-280. ISSN 1212-0014.
22. Malá, L.: *Současné problémy kulturní krajiny* [Contemporary problems of the cultural landscape]. Brno: Mendel University of Agriculture and Forestry in Brno, 2003.
23. Matulová, K., Cechura, L.: Technological heterogeneity, technical efficiency and subsidies in Czech agriculture. *Journal of Central European Agriculture* 2016; 17(2): 447-466. ISSN 1332-9049.
24. Ministry of Health: *Situační a výhledová zpráva – půda* [Situational and outlook report – soil]. 2018. Available from: [https://eagri.cz/public/web/file/611976/SVZ\\_Puda\\_11\\_2018.pdf](https://eagri.cz/public/web/file/611976/SVZ_Puda_11_2018.pdf)
25. Moldán, B.: 1997. Indikátory ekonomického rozměru trvale udržitelného rozvoje [Indicators of the economic dimension of sustainable development. In: Moldán, B. a kol. *Ekonomické aspekty ochrany životního prostředí* [Economic aspects of environmental protection]. Prague: Charles University, Karolinum publishing house, 1997. p. 123-126.
26. Nýltová, K., Kouřilová, J., Rybová, J.: *Zemědělské podniky z pohledu účetnictví, financování a dalších disciplín* [Agricultural enterprises from the point of view of accounting, financing and other disciplines]. Ve vazbě na GAJU 149/2014/S: ekonomické dopady legislativních změn v oblasti financí, účetnictví a daní [In connection with GAJU 149/2014/S: economic impacts of legislative changes in the field of finance, accounting and taxes]. 2016. ISBN 978-80-7394-557-2.
27. Prokop, G., Jobstmann, H., Schonbauer, A.: *Overview of best practices for limiting soil sealing or mitigating its effect in EU -27. Final report of a study contract for European Commission, DG. Environment*. Brussels: European Communities, 2011.
28. Ročenka životního prostředí Vítejte na Zemi [Environment Yearbook Welcome to Earth]. Národní informační ústav pro vzdělávání. Národní informační centrum pro mládež [National Information Institute for Education. National Information Center for Youth], 2008.
29. Severová, L., Svoboda, R., Kopecká, L.: Investing in Farmland in the Czech Republic as a Growth Factor in its Price. In *Proceedings of the 28th International Business Information Management Association Conference*, Seville, Spain. 2016. p. 443-451.

30. Situační a výhledová zpráva MZ ČR – půda [Situational and forward-looking report of the Ministry of Health of the Czech Republic – soil]. Prague, 2021. ISBN 978-80-7434-598-2.
31. Slaboch, J., Malý, M.: Agriculture Land Price Setting Systems, and Possible Directions for Their Updating. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 2022; 69(6): 655-664. ISSN 1211-8516.
32. Soukal, I., Tarnowska, A.: Agricultural land prices development in the Czech Republic and the latest legal development. *Vision 2020: Sustainable Economic development, Innovation Management, and Global Growth* 2017; 2017(1): 2624-2631.
33. Statistika zemědělství, lesnictví a rybářství [Statistics of agriculture, forestry and fisheries]: 2018.
34. Svěrák, V.: *Plantáže bez života. Českým lesům chybí rozmanitost, mizí ptáci i brouci* [Plantations without life. Czech forests lack diversity, birds and beetles are disappearing]. 2022. Available from: [https://www.idnes.cz/zpravy/domaci/biodiverzita-ceske-lesy-zivotni-prostredi-klimaticka-zmena-serial.A220629\\_143148\\_domaci\\_idvs](https://www.idnes.cz/zpravy/domaci/biodiverzita-ceske-lesy-zivotni-prostredi-klimaticka-zmena-serial.A220629_143148_domaci_idvs)
35. Szturc, J., Hybler, V.: The impact of updated soil properties on the development of land price in selected cadastral area near the strongly urbanized areas. *Journal of Ecological Engineering* 2019; 20(7): 161-168. ISSN 2299-8993.
36. Šimek, M. et al.: *Živá půda: biologie, ekologie, využívání a degradace půdy* [Living soil: biology, ecology, land use and degradation]. 1<sup>st</sup> ed. Prague: Academia, 2019. ISBN 978-80-200-2976-8.
37. Ústav zemědělské ekonomiky a informací [Institute of Agricultural Economics and Information]. Zpráva o trhu s biopotravinami v ČR v roce 2020 [Report on the organic food market in the Czech Republic in 2020], 2022.
38. Vašků, Z.: *Půda je nenahraditelná* [Soil is irreplaceable]. 2008. Available from: <https://ekolist.cz/cz/publicistika/rozhovor-y/zdenek-vasku-puda-je-nenahraditelna>
39. Zámková, M., Rojík, S., Pilař, L., Chalupová, M., Prokop, M., Stolín, R., Dziekański, P., Maitah, M.: Customer Preferences for Organic Agriculture Produce in the Czech Republic: 2016 and 2019. *Agriculture* 2021; 11(10). ISSN 2077-0472.

**Primary Paper Section:** G

**Secondary Paper Section:** AH, DB, DO