

Development tendencies in crop production in Slovakia after 2004 – regional differentiations

Vývojové tendencie v rastlinnej výrobe na Slovensku po roku 2004 – regionálne diferenciacie

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Abstract

One of the key milestones of joining European Union was to decrease disparities within economical and social environment in Slovakia. On the contrary, disparities are still growing, also in agriculture. Structural changes in agriculture between 2004 and 2014 are explained based on several stages of development, leading to regional differentiations. Based on indicators of crop production such as – gross crop production, crop production (cereals, oil plants, potatoes, sugar beet and perennial fodder crops), production per one hectare of selected crops, per capita production of selected crops and per 1 hectare of agricultural land this paper shows trends in crop production in Slovakia between 2004 and 2014. Individual regions and their ranking in Slovakia are analysed based on the level NUTS (Nomenclature of territorial units for statistics) III (regions). The classification of development of indicators of crop production in regions of Slovakia in relation to the calculated average value of Slovak Republic from 2004 to 2014 is based on calculated average values for the monitored period. Selected statistical methods (standard deviation, coefficient of variation, the ratio of the data set and the relative size of the data file) are applied to analyse, study and interpret development of regional disparities in crop production in Slovakia.

Keywords: crop production, indicators, regional differentiation, self-governing regions, Slovakia, statistical methods

Abstrakt

I napriek tomu, že jedným zo základných atribútov vstupu Slovenska do Európskej únie (EÚ) bolo zníženie regionálnych disparít v ekonomickom a sociálnom prostredí, naďalej dochádza k ich prehĺbovaniu, nevynímajúc ani poľnohospodárstvo. Štrukturálne zmeny, ktoré nastali v poľnohospodárstve v tomto období sa premietli

do jeho vývoja vo viacerých oblastiach a navonok sa prejavili v regionálnych diferenciáciách. V príspevku pomocou zvolených ukazovateľov rastlinnej výroby – hrubá rastlinná produkcia, produkcia plodín (obilniny, olejniny, zemiaky, cukrová repa a viacročné krmoviny), hektárová úroda vybraných plodín, výroba vybraných plodín na 1 obyvateľa a na 1 ha poľnohospodárskej pôdy) poukážeme na vývojové tendencie v rastlinnej výrobe Slovenska v období rokov 2004 – 2014. Na úrovni regiónov NUTS (Nomenklatura územných štatistických jednotiek) III (samosprávnych krajov) predstavíme postavenie jednotlivých krajov Slovenska v produkcii skúmaných plodín. Na základe vypočítaných priemerných hodnôt za sledované časové obdobie rokov klasifikujeme vývoj ukazovateľov rastlinnej výroby v krajoch Slovenska vo vzťahu k vypočítanej priemernej hodnote za SR v časovom horizonte rokov 2004 – 2014. S pomocou využitia zvolených štatistických metód (smerodajná odchýlka, variačný koeficient, pomer dátového súboru a relatívny rozsah dátového súboru) interpretujeme vývoj regionálnych disparít ukazovateľov v rastlinnej výrobe Slovenska.

Keywords: kraje, rastlinná výroba, regionálne diferenciácie, Slovensko, štatistické metódy, ukazovatele

Detailed abstract

V príspevku sa detailnejšie zaoberáme vývojom rastlinnej výroby Slovenska od roku 2004 po rok 2014 a v rámci nej sa venujeme produkcii plodín, ktoré ju najviac ovplyvňujú. Posledné roky rastlinná výroba na Slovensku dosahuje stále lepšie výsledky ako živočíšna výroba. Pokles živočíšnej produkcie súvisel s prípravami Slovenska na vstup do EÚ. V tomto období viaceré podniky živočíšnej výroby znížili stavy hospodárskych zvierat, čo sa prejavilo na celkovom znížení živočíšnej produkcie dôsledkom poklesu spracovateľských kapacít a zánikom viacerých podnikov na spracovanie mäsa. Jedným z ukazovateľov hospodárskej vyspelosti štátov a tiež úrovne ich poľnohospodárstva je pomer medzi rastlinnou a živočíšnou výrobou, resp. ich podiel na celkovej hrubej poľnohospodárskej produkcii. Všeobecne platí čím vyspelejšia ekonomika štátu, tým vyspelejšie je i poľnohospodárstvo – podiel živočíšnej výroby je vyšší než podiel rastlinnej výroby. V roku vstupu Slovenska do EÚ (r. 2004) hrubá rastlinná produkcia (HRP) dosiahla 50,7% z celkovej hrubej poľnohospodárskej produkcie a hrubá živočíšna produkcia (HŽP) 49,3%. Táto štruktúrna nerovnováha sa v poľnohospodárskej výrobe Slovenska stále prehlbovala. V roku 2014 predstavovala HRP až 59,3% a hrubá živočíšna produkcia dosiahla podstatne nižší podiel 40,7%. Ako uvádza Chrastinová et al. (2014) živočíšna výroba na Slovensku má dlhodobu klesajúcu tendenciu, čo súvisí s ekonomickými podmienkami ako napr. vyššími nákladmi na chov hospodárskych zvierat. Spoločná poľnohospodárska politika EÚ prostredníctvom svojich nástrojov motivovala poľnohospodárov obmedzovať živočíšnu výrobu a rozvíjať rastlinnú výrobu, hlavne v pestovaní veľkoplošných plodín, ktorých výrobný proces sa dá zvládnuť prostredníctvom mechanizácie a malého počtu ľudí (Serenčes, Mučaji 2014). Objem poľnohospodárskej produkcie SR po roku 2004 sa postupne stabilizoval, začala viac prevládať rastlinná výroba nad živočíšnou a rozšírili sa extenzívne formy hospodárenia. Pri porovnaní rokov 2004 a 2014 bol zaznamenaný

nárast hrubej poľnohospodárskej produkcie (o 4,8%), na ktorom sa podieľal nárast hrubej rastlinnej produkcie (o 22,6%) a hrubá živočíšna produkcia poklesla (-13,4%). V 90. rokoch 20. storočia na Slovensku ešte prevládala HŽP nad HRP. Táto prevaha trvala do roku 2006 a od nasledujúceho roka sa HRP stáva významnejšia. Pokles podielu živočíšnej produkcie na celkovej poľnohospodárskej produkcii SR súvisel najmä s poklesom počtu všetkých hospodárskych zvierat pred vstupom Slovenska do EÚ (Némethová, Dubcová, Kramáreková, 2014).

Postupne medzi rokmi 2004–2014 sa začala meniť aj štruktúra rastlinnej výroby Slovenska v prospech obilnín a niektorých technických plodín, najmä olejní, naopak klesla produkcia niektorých klasických trhových plodín ako zemiakov, zeleniny, ovocia a hrozna (Chrastinová a Uhrinčatová, 2014). Výrazne zmeny v osevných plochách nastali vstupom Slovenska do EÚ, ktoré súviseli hlavne s vylúčením niektorých komodít z dotačnej podpory (napr. zemiakov a cukrovej repy). Veľmi významnú skupinu plodín predstavujú olejnin, o ktoré je v súčasnosti na trhu veľký dopyt, hlavne pre ich nepotravinárske využitie na energetické účely, čo sa následne začalo odrážať aj na pomerne vysokom podiele týchto plodín v štruktúre osevu. Po úpadku živočíšnej výroby, ktorá spotrebúvala 2/3 z celkovej produkcie obilnín, sa stali spracovatelia biopalív alternatívou, ktorá umožnila poľnohospodárom plynulé hospodárenie na pôde (Némethová, Dubcová, Kramáreková, 2014). Dochádza k celkovému poklesu osevných plôch u viacročných krmovín, hlavne po vstupe Slovenska do EÚ, na čom má svoj podiel celkový pokles hospodárskych zvierat v tomto období. V súčasnosti je zaznamenaný mierny nárast produkcie viacročných krmovín, ktorý je podporený postupným zúrodňovaním trvalých trávnych porastov a transformovaním nižšej bonity ornej pôdy do výrobného procesu.

Introduction

Changes between 2004 and 2014 were caused by Slovakia's EU entry and joining the common agricultural policy of new EU members. Common agricultural policy (CAP) significantly affects Slovak's national agricultural policy. Development in agriculture is remarkably subsidised by EU in order to improve agriculture and its effectivity in Slovakia. Position of agriculture in Slovakia is well explained by the indicator gross domestic product (GDP) referring to a declining importance of this sector during the analysed period of time 2004–2014. In 2002, this indicator was 3.7% and in 2004 achieved this indicator 2.9%. Following years had a declining trend until 2013 and 2014 achieving 3% level. Additionally, number of people employed in agriculture is decreasing. Share of employed people in agriculture to the total number of employed people was 5.06% in 2004 and 2.93% in 2012. Furthermore, important is also the share of gross plant production and gross animal production resulting in an increased share of gross plant production (59.3%) in 2014.

Slovakia's EU entry in 2004 significantly affected Slovak agriculture. Slovakia adapted its policies to the common agricultural policy of EU and to the requirements of common European market. On the one hand, Slovak agriculture needs to be competitive in the common market place of EU countries. On the other hand, there are not equal conditions among the EU countries, such as lower subsidies towards new EU members in comparison to old EU members. Increased government expenditure in agriculture leads to an increase in Slovak's price levels achieving EU

price levels (Némethová, Dubcová, Kramáreková, 2014). Due to the lack of domestic capital, foreign investors entered Slovak agricultural environment and ensured sustainable growth of agricultural production.

Due to structural problems caused by the transformation process of Slovak agriculture related to the EU entry, global economic crisis, excessive market regulation by EU, Slovak agriculture faces difficult economic situation. Additionally, EU subsidies together with financial sources from national budget are directed mainly to less developed regions in Slovakia in order to ensure development in these areas.

Main goal of this paper is to show development trends in plant production in Slovakia after joining EU. Additionally, the focus is on regional differentiation on NUTS III (regions) based on selected indicators. Regional differentiation in agriculture in Slovakia is a longterm development determined by soil and climatic conditions on lowland, highland and mountain regions (Marcinčáková, 2013). Diverse production and economic conditions affect agricultural production and its volumes (Gozora in Marcinčáková, 2013). Productive areas of lowland are more favourable for plant production resulting in lower importance of animal production in these areas. Animal production specialises in pig and poultry stock in these regions as plant production ensures sufficient fodder base.

Materials and methods

Adoption of common agricultural policy of EU had a significant impact on Slovak agriculture. One of the main effects was an increase in direct payments resulting in an improvement of farmers' income. New EU members recorded remarkably lower direct payments than old EU members did. However, differences were gradually reduced. Common agricultural policy directs considerable amount of financial resources to rural development. According to many opinions, Slovak farmers benefit from the EU entry. All mentioned funds and subventions are higher for EU members, farmers' raise prices for their final products, direct payments are higher as well as funds for rural development are higher. Furthermore, Slovakia invests less money to the common budget than it is accepting in form of funds and subventions. Outlook in the future indicates that direct payments go up at the expense of price subventions. Additionally, future emphasis is on rural development and protection of the environment (Chosraviová, 2009). In line with Lacko-Bartošová and Buday (2013) Slovak agriculture has undergone a complex development period of recession recently. Currently, important economic and production indicators stagnate. Selected indicators of sustainable agriculture show that Slovak agriculture is not able to produce an adequate level of profit in order to stay competitive on the global EU market in the long term.

As current development substantially increases social-economic differentiations between individual regions. This topic is studied by diverse experts in Slovakia and Czech Republic (e.g. Věžník and Bartošová, 2004; Spišiak and Némethová, 2008; Věžník et al., 2008; Némethová, 2009a, 2009b; Král et al., 2012 a pod.). According to Kroupová and Trnková (2014) objective factors such as size of the farm unit, yield per hectare, number of staff per farm as well as natural conditions objectively affect production ability of Czech farmers active in plant production. Size of the farm unit

was identified as the most influential determinant of incurred differences. Adoption of common agricultural policy significantly affected agricultural development in all member states in positive as well as negative way. According to Svobodová a Věžník (2011) among negative affects belongs the reduction of breeding of pigs and cattle. However, the share of still competitive plant production increased. Positive affects include investment in rural development. Farmers aim at differentiation of their activities. However, more endeavour currently needed.

Attempt to assess individual assumptions of revitalisation of agriculture and strengthening its non-production functions as well as raising opportunities for rural development are in line with development of common agricultural policy of EU (Shucksmith et al., 2005; Spišiak et al., 2005; Ramniceanu and Ackrill, 2007). Sadowski, Czubak (2013) analyse key priorities of rural development in EU countries between 2007-2013.

Maye (2013) assesses and analyses agricultural multifunctionality in the light of food security and climate change associated with changes in land use. Several international experts (such as Kulikowski, 2005; Kolodziejczak, 2006; Buchenrieder, 2009; Csaki et al., 2010; Kolodziejczak and Kossowski, 2011) deal with impacts of common agricultural policy and compare structural changes in agriculture in selected new EU member countries after their EU entry. Polish expert Rudnicki (2013) assessed the situation from the perspective of beneficiaries of EU funds. Bencheva (2005) deals with the impact of European agricultural policy on agriculture in Bulgaria as well as the development of agriculture during the transition to a market economy, the restructuring of agriculture and its competitiveness. Todorová (2016) analyses the Bulgarian agriculture adaptation to the new conditions introduced by the CAP.

Bulgaria's EU entry significantly affected farmers' income. Farmers specialising in crop production recorded a significant income increase. On the contrary, farmers oriented on production of vegetables, fruits and vines experienced a decline in sales. Skarżyńska et al. (2016) analyse the impact of growing costs on profitability of plant production in Poland. Research carried out in Poland points out that even with lower production inputs results that are more favourable can be obtained in comparison to a stronger technologisation.

Statistic data about plant production in Slovakia used in this article come from database DataCube Statistic office of Slovak Republic. The analysis of regional differentiations is based on NUTS III (regions) level in Slovakia from 2004 to 2014. In order to explain and outline regional disparities in plant production in Slovakia key indicators such as gross plant production, total gross agricultural production, crop production, yield per hectare, production per capita and production per 1 hectare of agricultural land. Development index (V_{iA-B}) was applied in order to analyse plant production, gross plant production and gross agricultural production in two periods 2004 and 2014. It best describes differences in development of indicators in two time horizons (A and B). Mathematical formula to define development index is:

$$V_{iA-B} = 100 \cdot \frac{P_{iB}}{P_{iA}}$$

P_{iA} – share of category i at the beginning of analysed period,

P_{iB} – share of category i at the end of analysed period.

Index with value 100% defines development without any changes, higher values show an increase and lower values show a decrease in analysed phenomenon (Bičík et al., 2010).

Selected statistical methods such as standard deviation and coefficient of variation were applied in order to evaluate disparities on the level of Slovak's regions. Standard deviation is derived from dispersion σ . Dispersion is mathematically calculated as arithmetic average value of square deviations of the value of the arithmetic average by:

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

n is range of statistic file,

x_i is value of character x acquiring values $i = 1, 2, \dots, n$,

\bar{x} is arithmetical average of indicator's values x_i (Markechová, Tírpáková, Stehlíková, 2011). Standard deviation σ is calculated as the square root of the dispersion:

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

n is range of statistic file,

x_i is value of character x acquiring values $i = 1, 2, \dots, n$,

\bar{x} is arithmetical average of index values x_i (Markechová, Tírpáková, Stehlíková, 2011).

Variation coefficient V_k is applied to study comparative spatial analysis. It expresses the intensity of variations of the phenomenon in percentage based on the value of arithmetic average value (Michalek, 2012). Variation coefficient is one the mostly applied indicators in order to analyse disparities between regions. It is calculated as the quotient of the standard deviation and arithmetic average:

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

n is range of statistic file,

x_i is value of character x acquiring values $i = 1, 2, \dots, n$,

\bar{x} is arithmetical average of index values x_i (Markechová, Tírpáková, Stehlíková, 2011).

Further statistical methods used in the article are the ratio of data file Kx_j and relative range of data file Qx_j . Ratio of data file (Kx_j) expresses the multiplication of difference between maximal and minimal value of data in analysed file. Indicator's formula:

$$Kx_j = \frac{x_{max}}{x_{min}} ; 0 \leq Kx_j < \infty$$

Kx_j is indicator's value x in analysed unit j ,

x_{min} is minimal value of indicator x_j ,

x_{max} is maximal value of indicator x_j .

Relative range of data file (Qx_j) is defined by the ratio of difference in maximal and minimal value of indicator x_j to the average value of the file. Indicator's formula:

$$Qx_j = \frac{x_{max} - x_{min}}{\bar{x}} ; 0 \leq Qx_j < \infty$$

Qx_j is indicator's value x in analysed unit j ,

x_{min} is minimal value of indicator x_j ,

x_{max} is maximal value of indicator x_j ,

\bar{x} is arithmetical average of values x_j in data file (Marcinčáková, 2013).

Results and discussion

Important indicator for evaluation of plant production is gross plant production. In analysed period 2004–2014 gross plant production increased in more than 20%. In 2004 plant production achieved 1,060,877 € and in 2014 it achieved 1,300,065 € resulting in an increase of 239,188 thousand €. Almost all regions in Slovakia recorded a production growth, except of Žilina and Prešov region. Plant production in Žilina region fell by 23%. This region is not dominated by agriculture as grassland dominates over arable land. The most fertile regions in Slovakia are Nitra and Trnava region. Thus, the highest levels of gross plant production were achieved in these two regions. Nitra region is characterized by a remarkable increase in plant production by 41.6% from 2004 to 2014. Further regions with a growth in gross plant production are Košice (38.9%), Bratislava (22.2%) and Trnava (16.9%). The highest share on the total plant production in 2014 achieved the most productive regions (Nitra - 37.2% and Trnava - 20.7%). On the contrary, the lowest share showed Bratislava region (6.3%), Prešov region (5.8%) and Žilina region (2.7%). Additionally, Nitra region (20.4%), Trnava region (5.3%) as well as Bratislava (34.4%) were determined by an increase in total gross production. All other regions noticed a decrease. Nitra (37.2%) and Trnava (20.7%) achieve highest share of total gross agricultural production in Slovakia. Both regions dominate in production of several plants.

Diverse production-economic determinants of agricultural sector such as soil and climate conditions, transformation and restructuralization of agriculture, sectoral specialization of farms) affect the differentiation of plant production in Slovakia. Mission of common agricultural policy of EU is support and maintain agricultural production in all EU regions. Despite the CAP subsidies, regional inequalities in agriculture still exist in Slovakia. In order to observe development of regional differences in crop production between 2004 and 2014, following indicators are analysed: production of selected crops, crops yield per hectare, crop production per one inhabitant and crop production per 1 hectare of agricultural land. This paper focuses on crops that are highly important for the sowing structure in Slovakia, such as cereals, oilseeds, potatoes, sugar beet, and perennial fodder crops. Evaluation of development of selected crops is based on standard deviation and variation coefficient. Furthermore, statistical indicators were applied in order to assess and evaluate development of other indicators of plant production: relative size of data set and share of data set. Lower values of indicators indicate minor regional inequalities and higher values indicate greater regional disparities. Cereals are one of the most important crops. Cereals occupy more than half of the arable land worldwide. In

Slovakia, cereals keep leading role among produced crops. However, corn's production increasingly intensified on the cost of rye as technological progress lead to an increase in production and decrease in corn farming risks (Blaas, 2013). Crop production achieved in 2004 in Slovakia 3,793,237.83 tons. During the period of years 2004–2014 crop production had a fluctuating course. Until 2014 crop production grew by 915,099.87 tons (24.1%) reaching 4,708,337.7 tons. The highest increase based on development index in analysed years 2004 – 2014 happened in Košice region (44.8%) a Nitra region (32.3%), minor growth was observed in Banská Bystrica region (8.7%), Trenčín region (10.9%) and also Žilina region (13.6%). Best farming conditions for crops are on lowlands with the most favourable soil and climate conditions. Hence, the highest share of cereals production was achieved in regions located in Danubian plain, Nitra region (40%) and Trnava region (21.9%). Nitra region is also called Slovak breadbasket. Additional region specialized in cereals production is Košice region located in East Slovak lowland (12.9%). On the contrary, the lowest level of crops grows in the north of Slovakia, Žilina region (2%), Prešov region (4.7%) and Bratislava region (4.9%). Although, interregional disparities in cereals production fluctuate (Table 1, Figure 1). Disparities further extended in recent two years 2013 and 2014. Cereals production as well as production of other plants is affected by climate changes that have become considerably fluctuating recently. High temperatures and dry seasons quickly change with heavy rains. Minor regional differences in cereals production were observed only in years 2007 and 2012.

Due to growing demand for oil plants for energy purposes, the oil plant production has significantly increased in Slovakia since 90s. Whereas oil plant production volume was 478,362.82 tons in 2004, it reached 738,666.9 tons in 2014, resulting in an increase of 54.4% (260,304.08 t). Additionally, EU funds in form of direct subsidies for energy plant lead increasingly to the use of arable land for oilseeds. Domestic demand for oil plants is closely associated with processing of methyl ester. Based on the development index, slight decrease among regions occurred only in Prešov region (-1%), most extensive volume growth was marked in Trenčín region (90.35%), Trnava region (90.1%) and Nitra region (64.8%). Although volume of oil plants production in Slovakia extensively exceeds domestic consumption and local industrial capacity allows domestic production, domestic market is largely supplied by imported finished products. However, domestic industrial companies face strong international competition and suffer from low processing efficiency (Blaas, 2013). Due to the best climate conditions in Danubian plain, Nitra region (37.8%) and Trnava region (16.8%) as well as East Slovak lowland, Košice region (20.7%) (Figure 2) are most productive regions of oil plants in total oil plant production in Slovakia. Regional disparities fluctuate during the observed period. In 2013 and 2014 they show a growth trend based on values of standard deviation and coefficient variation. Significant decrease in disparities happend in 2005 and 2012 (Table 1).

Table 1. Development of regional differentiations in regions of Slovakia within the production of selected crops in 2004 – 2014

Tabuľka 1. Vývoj regionálnych diferenciácií v krajoch Slovenska v produkcii vybraných plodín v rokoch 2004 – 2014

Statistical indicator	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cereals											
Standard deviation	427,919.77	439,332.33	357,219.33	313,500.08	480,483.19	379,259.6	322,409.61	446,290.98	322,546.52	401,247.25	562,966.62
V _k %	90.25	98.03	97.57	89.79	92.91	91.11	100.98	96.13	85	94.08	95.65
Oil plant											
Standard deviation	49,581	46,258.17	59,546.39	51,753.7	70,070.86	62,044.23	54,637.34	66,949.97	46,391.49	71,126.28	83,906.28
V _k %	82.92	81.69	92.56	88.56	88.54	83.3	87.3	93.21	81.7	92.92	90.87
Potatoes											
Standard deviation	27,042.04	18,331.04	16,013.96	22,031.86	16,586.8	14,854.71	8,757.27	12,562.54	9,287	12,625.2	13,053.39
V _k %	48.06	42.54	43.07	52.38	47.07	47.53	46.29	46.26	44.85	61.41	58.4
Perennial fodder											
Standard deviation	35,953.1	28,992.87	26,536.81	28,754.23	27,657.85	28,956.3	25,377.07	24,722.2	27,207.09	24,293.65	27,885.31
V _k %	40.62	35.93	33.74	36.89	31.65	36.03	29.49	29.37	34.68	28.66	29.89
Sugar beet											
Standard deviation	274,471.58	293,907.81	240,407.73	142,999.77	105,548.59	138,196.93	153,723.15	193,954.31	145,126.79	189,741.21	251,735.36
V _k %	120.17	118.61	122.75	84.47	77.73	76.88	78.62	100.26	81.81	82.89	81.61

Source: Data Cube, 2016, own calculations.

Zdroj: Data Cube, 2016, vlastné spracovanie.

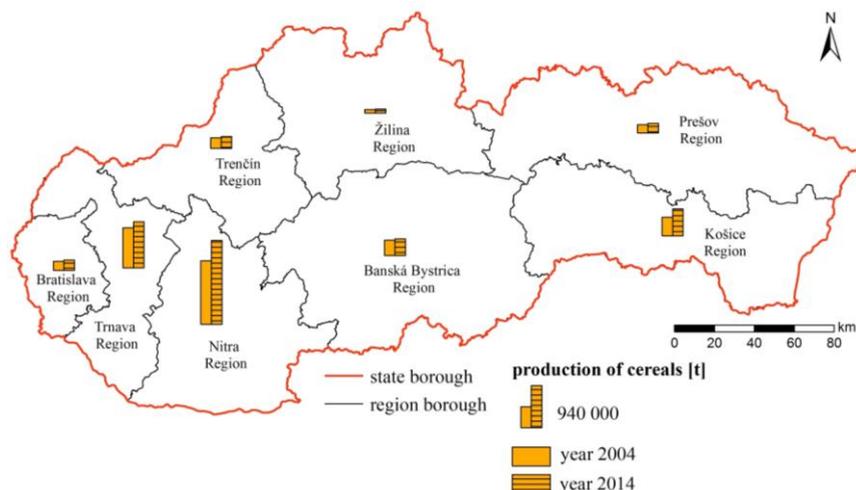


Figure 1. Development of cereals production in regions of Slovakia

Obrázok 1. Vývoj produkcie obilnín v krajoch Slovenska

The most significant decrease (-60.27%) was observed in potatoe production. In 2004 potatoe production was 450,103.16 tons and it fell consecutively. In 2014 potatoe production was only 178,817 tons plummeting by 271,286.17 tons (Figure 3). The largest production volume is in Bratislava region (23.7%), Trnava region (20.4%) and Prešov region (20%). Similarly, statistical values of potatoe production show a fluctuating trend (Table 1). Based on results of standard deviation a significant decrease in discrepancies happened in 2010 and 2012. Potatoe production prior to 1990 was located in every region in Slovakia. However, situation has dramatically changed. The most potatoes are farmed in north Slovakia. What is more, potato production is not only in decline, it vanishes absolutely. There are more reasons for this trend such as long-term difficulties with technologies, investment as well as diverse EU funding forms towards animal production and environmental protection. Additionally, EU market entry lead to an influx of cheap vegetables as well as potatoes from other EU countries resulting in a remarkable decrease in areas occupied by potatoes. North Slovakia is influenced by cheap potatoe import from Poland. Slovak farmers request a new source of subsidy to plant potatoes from government. However, there is no country in EU with potatoe subsidies (Simonidesová, 2008). Slovakia disposes of favourable conditions in order to cultivate seed potatoes as an opportunity for Slovak export. Its cultivation is to continue in traditional cultivation areas located mainly in the north of Slovakia.

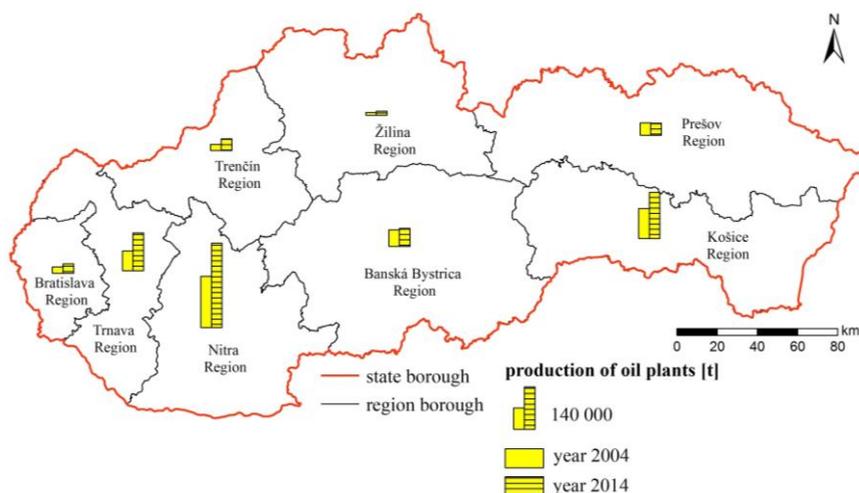


Figure 2. Development of production of oil plants in regions of Slovakia

Obrázok 2. Vývoj produkcie olejnín v krajoch Slovenska

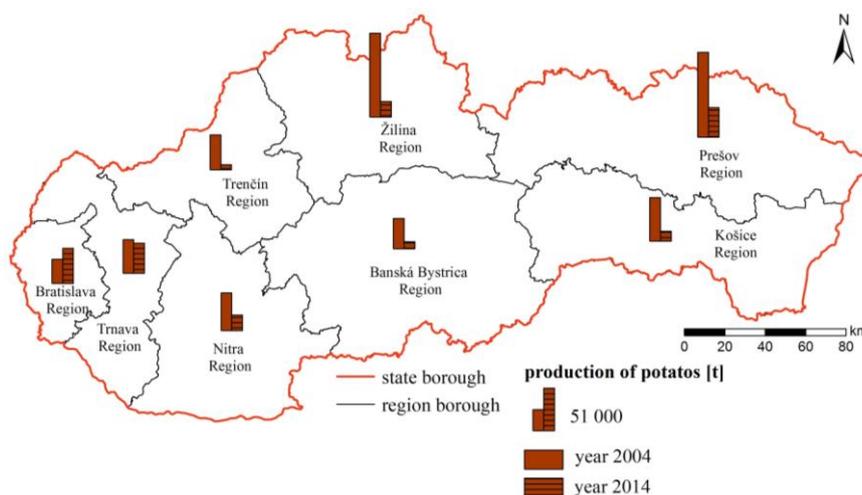


Figure 3. Development of production of potatoes in regions of Slovakia

Obrázok 3. Vývoj produkcie zemiakov v krajoch Slovenska

Perennial fodder is of a strategic importance for seeding process as they affect soil fertility. The main purpose of growing perennial fodder is production of ruminants' food. Hence, scope of perennial fodder production is closely linked to livestock volumes. In 2004 was produced 708,155.29 tons of perennial fodder in Slovakia. Production grew by 38,137.3 tons (5.39%) until 2014. The highest share on the total production have Prešov region (18.2%), Trnava region (15%) a Banská Bystrica region (13.9%) (Figure 4). Analysis of regional disparities among perennial fodder shows that disparities decline with lower fluctuations in the years 2004 – 2014. It is linked to fluctuating production process of perennial fodder in the same time period (Table 1). The largest disparities happened in 2004 (standard deviation - 35,953.1 and V_k - 40.62%).

Production of sugar beet in Slovakia has undergone an intensified process after joining EU. Average production grew towards the average production level of EU countries. Additionally, Slovakia's production achieved an out-of-scale sugar beet production level within EU countries in 2004 and 2005. However, farmers of new EU member countries benefited from advantages of EU market rules only two years (Kovács and Tomkuljaková, 2010). Slovakia's EU entry had a stimulating effect on commodity production of sugar beet (high granted prices and quotes). Due to a market rules reform in 2006 that affected also sugar refinery capacity, sugar beet production declined in Slovakia (Blaas, 2013). As a result of conflicts among sugar refineries and sugar beet farmers at the second stage of sugar refinery restructuralization, number of sugar beet producers significantly declined after 2008. Some of the farmers decided to cultivate other plants instead of sugar beet (Spišiaková, 2010). Sugar beet production requires the most fertile land and best climate conditions in Slovakia. Additionally, location is also influenced by location of two sugar refineries in Sereď and Trenčianska Teplá (Vilček, 2013). Sugar beet production fluctuated in Slovakia between 2004 and 2014.

In 2004 was produced 1,598,772.99 t of sugar beet in Slovakia. Over the course of coming years sugar beet production fluctuated. In 2014 production level of sugar beet in Slovakia was 1,550,218.3 tons, resulting in a decline by 48,554.69 tons (-3%). Almost zero production level was in Žilina, Prešov and Košice region between 2004 – 2014 (Figure 5). Among the regions where sugar beet was produced during the entire analyse period, the highest increase happened in Trenčín region (55.84%) and Bratislava region (26.2%). Other regions remarked a declining trend. Furthermore, the largest decline was observed in Banská Bystrica region. Sugar beet is currently produced only in West Slovakia regions. The largest sugar beet producers are in Trnava region (41%), Nitra region (37.3%) a Trenčín region (14.5%). In general, differentiations in sugar beet production decline based on values of variation coefficient in 2011 (V_k - 100.26%). The highest levels of the variation coefficient were achieved in 2004 – 2006. Values of standard deviation fluctuate as the sugar beet production fluctuates. In addition, different values among statistic indicators are caused by diverse calculation method (Table 1).

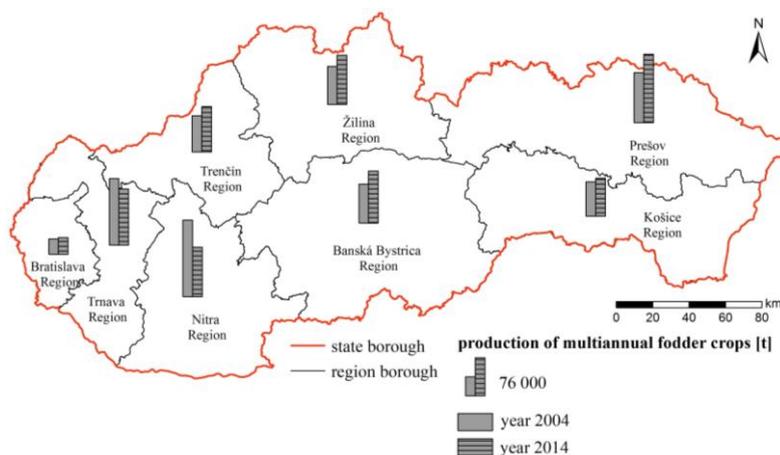


Figure 4. Development of production of perennial fodder crops in Regions of Slovakia

Obrázok 4. Vývoj produkcie viacročných krmovín v krajoch Slovenska

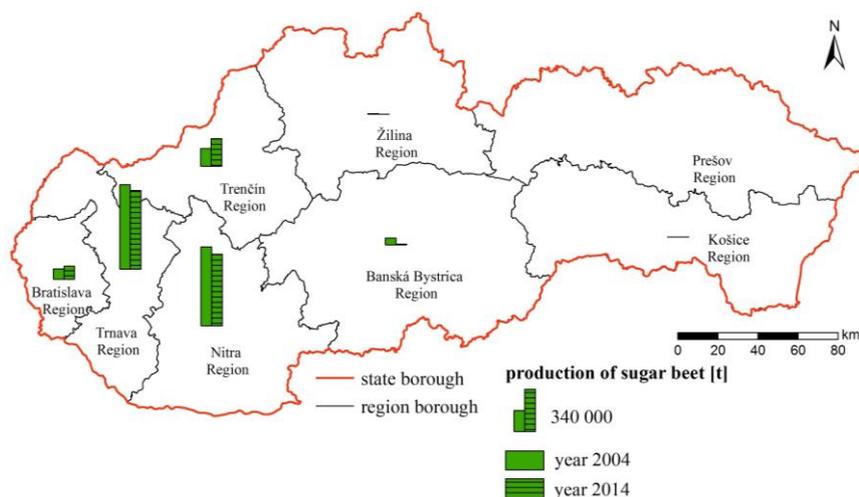


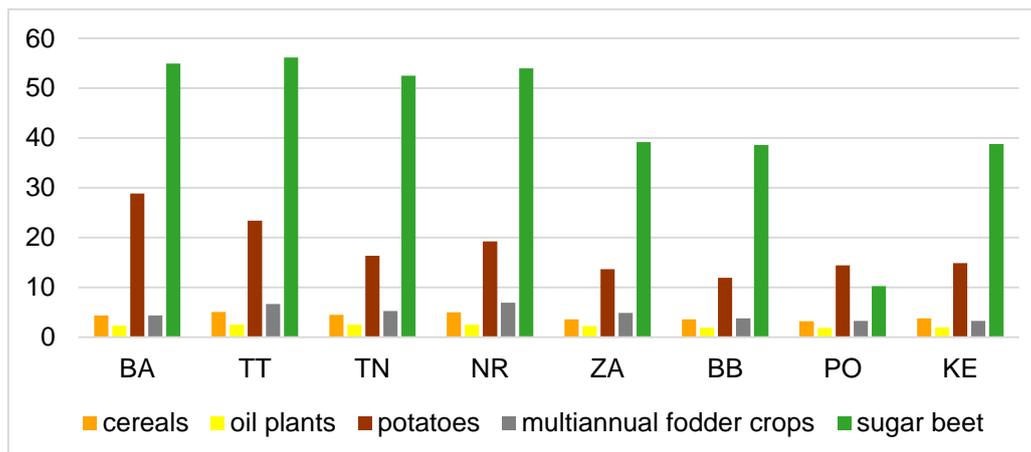
Figure 5. Development of production of sugar beet in Regions of Slovakia

Obrázok 5. Vývoj produkcie cukrovej repy v krajoch Slovenska

Analysis of yield per hectare of selected crops shows regional disparities among Slovak regions. Yield per hectare continuously grew over the analysed period 2004 – 2014 whereas the growth rate was about 30%. Yield per hectare of crops in Slovakia reached level of 6.04 t/ha, average value over the entire course of analysed period was 4.49 t/ha. Evaluation of regions of Slovakia shows that Košice region achieved the largest increase in yield per hectare (42%), followed by Banská Bystrica region (35.8%) and Prešov region (35.1%). The highest average yield per hectare during 2004 and 2014 in Slovakia achieved Trnava region (5.06 t/ha) and Nitra region (5.02 t/ha) (Figure 6).

In order to analyse regional disparities based on indicator - yield per hectare of selected crops, statistical indicators such as ratio of data file (K_{xj}) and relative range of data file (Q_{xj}). The lowest indicator's values indicate lower disparities. On the contrary, higher indicator's value point out larger disparities. As values of yield per hectare fluctuate in the individual regions of Slovakia, the values of statistical indicators vary (Table 2). Minimum statistical values were achieved in 2012 (K_{xj} - 1.3, Q_{xj} - 3.33) and 2007 (K_{xj} - 1.35, Q_{xj} - 3.05).

Similarly, to yield per hectare of cereals also yield per hectare of oil plants grew during the analysed period. Value of yield per hectare of oil plants was 2.43 t/ha in 2004. In 2014, it achieved 3.06 t/ha, resulting in an increase by 25.9%. Average value for all Slovak regions was 2.28 t/ha between 2004 and 2014. Each region remarked a growth in yield per hectare. The most significant increase was in Trenčín region (51.91%) and Bratislava region (42.66%). Regions with the highest average values of yield per hectare that are even higher than Slovak average belong Trnava region (2.52 t/ha), Trenčín region (2.51 t/ha) and Nitra region (2.48 t/ha) (Figure 6). Fluctuating statistical values indicate fluctuating values of yield per hectare that rise from 2009 except of 2012.



Source: Data Cube 2016, own calculations.

Figure 6. Development of average values of yield per hectare of the selected crops in 2004 – 2014

Obrázok 6. Vývoj priemerných hodnôt hektárových úrod vybraných plodín v rokoch 2004 – 2014

The highlight regional disparities that result from production and climate conditions in individual regions over the analysed period (Table 2).

Additionally, yield per hectare of potatoes has a positive course. It remarked a rise by 24.6%. Whereas the yield per hectare of potatoes was 15.76 t/ha in 2004, it achieved 19.64 t/ha at the end of the analysed period (average value in Slovakia was 16.97 t/ha between 2004 and 2014). Significant rise in yield per hectare of potatoes was in Trnava region (37.9%), Prešov region (22%), Bratislava region (15.5%) and Nitra region (3.08%). Other regions remarked a fall in yield per hectare of potatoes. Maximum values (values above Slovak average) reached Bratislava region (28.86 t/ha), Trnava region (23.39 t/ha), Nitra region (19.26 t/ha) (Figure 6). As values of yield per hectare of potatoes fluctuate, fluctuate also statistical values. Its continuous growth after 2008 indicate growing inter-regional disparities (Table 2).

Potato steadily descends. Climate changes, farming efficiency, declining consumption as well as lack of processing and warehouse capacity affect the area dedicated to planting potatoes in the longterm. Consequently, planting potatoes relocate to irrigation areas in the southern Slovakia. Additionally, it affects size of hectare yields. Descent in planting areas happens among small farmers while large-scale farmers increase planting areas (Spišiaková, 2010). Decrease in yield per hectare was observed only in case of perennial fodder. In 2004, the yield per hectare of perennial fodder was 5.92 t/ha. It continuously decreased to 4.49 t/ha in 2014, resulting in a decrease by 24.2%. Yield per hectare of perennial fodder recorded a decrease in each region. The largest fall were noticed in Košice region (-27.38%), Prešov region (-25.06%) and Trnava region (-20.17%). Fall of yield per hectare of perennial fodder was mainly caused by changing weather conditions as well as a decrease in farming areas in the years 2004 – 2014. Although, in 2004 and 2014 a slight overall increase (5.39%) was remarked. Drop of planting areas of perennial fodder is caused by overall fall in volume of livestock in the analysed period. Higher average values of

yield per hectare than average value in Slovakia (4.56 t/ha) were achieved in Nitra region (6.95 t/ha), Trnava region (6.67 t/ha) and Trenčín region (5.25 t/ha) (Figure 6). Diverse values of yield per hectare in individual regions present also different statistical indicators, resulting in smaller and larger regional disparities in the analysed period. More significant differences are observed until 2008 (Table 2).

Table 2. Development of regional disparities in regions of Slovakia yield per hectare of selected crops in 2004 – 2014

Tabuľka 2. Vývoj regionálnych diferenciácií v krajoch Slovenska v hektárovej úrode vybraných plodín v rokoch 2004 – 2014

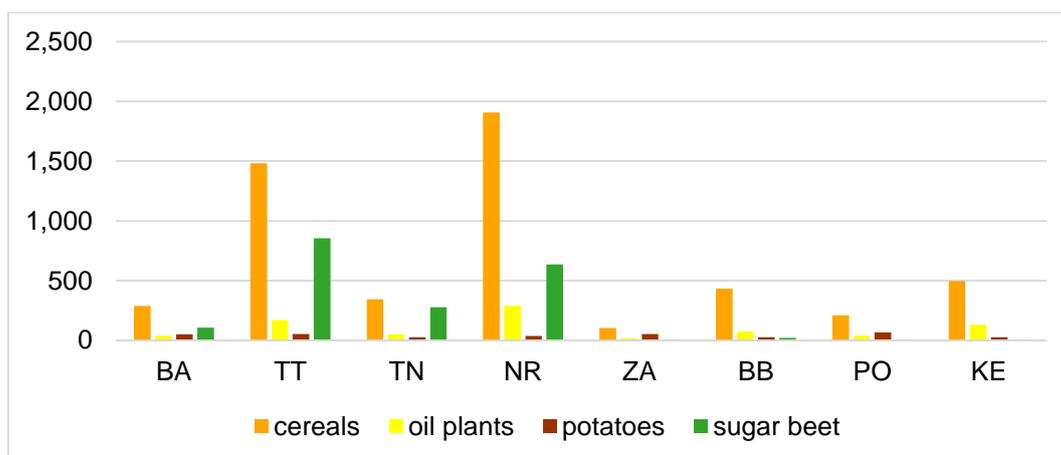
Statistical indicator	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Crops											
K _{xj}	1.75	1.93	1.65	1.35	1.71	1.53	2.04	1.68	1.3	1.54	1.67
Q _{xj}	4.62	4.62	3.83	3.05	5.27	4.2	3.84	5.07	3.33	4.34	6.14
Oil plants											
K _{xj}	1.22	1.46	1.67	1.35	1.48	1.45	1.55	1.54	1.33	1.55	1.45
Q _{xj}	1.75	1.66	1.75	1.42	2.11	1.86	1.45	1.82	1.42	2.07	2.75
Potatoes											
K _{xj}	2.2	2.23	2.3	1.44	2.12	2.02	3.58	2.21	2.48	4	2.99
Q _{xj}	27.17	27.03	26.83	24.01	28.92	29.41	24.7	31.43	28.29	30.59	31.63
Perennial fodder											
K _{xj}	1.86	2.01	2.28	2.75	2.23	2.35	2.12	2.3	2.1	2.2	2.12
Q _{xj}	7.48	6.6	6.75	6.72	7.1	6.38	5.85	5.71	5.04	5.8	6.15
Sugar beet											
K _{xj}	1.38	1.91	2.49	1.34	1.26	1.92	2.7	3.41	1.54	1.51	2.04
Q _{xj}	47.48	56.63	51.77	46.67	63.89	58.17	57.27	67.9	46.64	63.16	72.01

Source: Data Cube, 2016, own calculation.

Increase in yield per hectare by 55% happened in case of sugare beet (2004 - 45.03 t/ha, 2014 - 69.79 t/ha). Relatively high increase of 61.97% is observed in Trnava region, 60.82% in Trenčín region and 52.53% in Nitra region. Higher average values of hectare yield than the Slovak average (54.45 t/ha) were recorded in western Slovakia, Trnava region (56.21 t/ha), Bratislava region (54.98

t/ha), Nitra region (53.97 t/ha) and Trenčín region (52.51 t/ha) (Figure 6). Based on values in Table 2, regional disparities fluctuate between 2004 – 2014. Larger disparities are recorded after 2008 which also show statistical indicators (Table 2).

One of the most important indicators of an overall level of agriculture is production, plant production per capita expressed in kilogram (kg). Similar to the progress of cereal production also cereal production per capita has a fluctuating course of development. In 2004 was produced 704.7 kg cereals per one inhabitant. Production increased in 23.3% by 2014 to the level of 868.9 kg per capita. Average value during the analysed period was 639 kg cereals per one inhabitant. Nitra region and Trnava region specialize in cereal production. Therefore, these two regions achieved higher average production values than Slovak average (Nitra region - 1,906.1 kg; Trnava region - 1,481.6 kg). Further regions were below Slovak average level (Figure 7). Based on the flow index 2014/2004, the largest increase in cereal production per capita was in Košice region (40.21%) and Nitra region (36.84%). Values of statistical indicators in the analysed period fluctuate (Table 3). Due to different calculation methods, indicator K_{xj} reached minimal value in 2012 (13.9), while indicator Q_{xj} reached minimal value in 2010 (1,441.84). Further analysed years are determined by higher values indicating larger regional disparities. The biggest disparities were observed in 2005 and 2014.



Source: Data Cube, 2016, own calculation.

Figure 7. Development of average values production per capita of selected crops 2004 – 2014

Obrázok 7. Vývoj priemerných hodnôt produkcie vybraných plodín na 1 obyvateľa v rokoch 2004 – 2014

Based on the flow index, oil plants remarked the largest increase in production per capita (53.3%). In 2004 production per capita was 88.9 kg per capita. In 2014, 136.3 kg of oil plants was produced per capita. Nitra region (290.6 kg), Trnava region (171.7 kg) and Košice region (130.9 kg) achieved results above Slovak average. Further regions of Slovakia were below Slovak average (101.3 kg) (Figure 7). Decrease in analysed indicator was observed only in Prešov region (-3.75%). Further

regions that accomplished growth are Trenčín region (93.4%), Trnava region (88.2%) and Nitra region (70.5%). These are regions with largest oil plants farming fields. Values of statistical indicators vary. Regional disparities widened from 2008 to 2014, except of 2012. In 2012, disparities alleviated among Slovak regions (Table 3).

Table 3. Development of regional differentiation in regions of Slovakia production per capita of selected crops 2004 – 2014

Tabuľka 3. Vývoj regionálnych diferenciácií v krajoch Slovenska vo výrobe vybraných plodín na 1 obyvateľa v rokoch 2004 – 2014

Statistical indicator	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cereals											
K _{xj}	16.78	24.14	21.07	17.42	19.59	16.49	18.65	18.09	13.9	16.65	20.12
Q _{xj}	2,006.8 ₃	2,000.8 ₈	1,647.8 ₆	1,490.8 ₄	2,232.86	1,763.8 ₃	1,441.8 ₄	2,106.8 ₄	1,603.8	1,919.82	2,746.85
Oil plants											
K _{xj}	18.64	19.57	21.16	17.28	18.33	16.18	17.92	30.57	14.05	23.13	21.19
Q _{xj}	238.45	224.86	289.76	253.83	337.04	300.83	265.04	320.9	209.22	346.87	406.66
Potatoes											
K _{xj}	2.52	2.37	2.12	2.99	3.34	3.54	4.55	3.96	3.71	7.47	6.49
Q _{xj}	109.27	83.86	76.93	101.25	72.72	64.74	39.23	68.47	48.96	69.9	67.79
Sugar beet											
K _{xj}	942.31	1,137.2 ₇	3,483.3 ₃	95.17	54.53	88.83	156.27	260.25	172.11	151.27	133.29
Q _{xj}	1,225	1,251	1,045	599.58	534.36	639.58	687.59	832.79	602.38	847.09	1,132.98

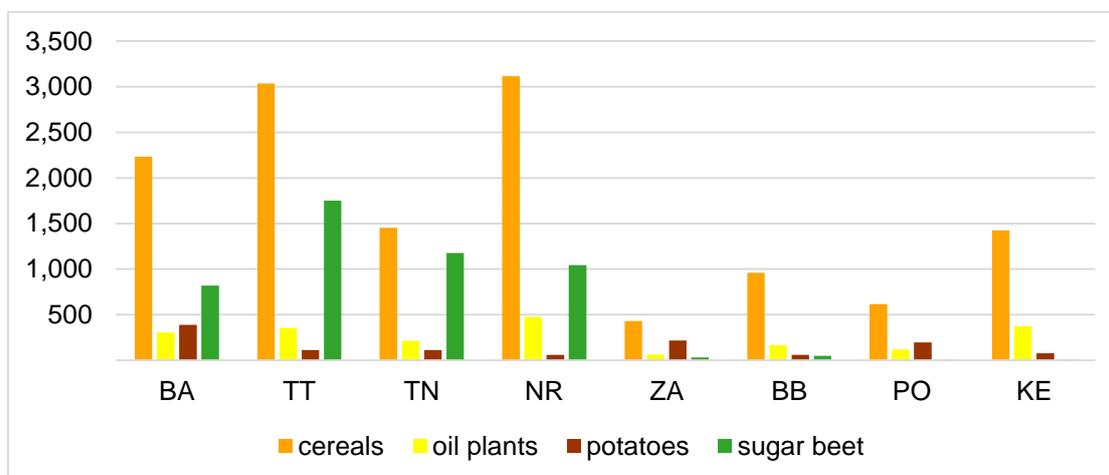
Source: Data Cube, 2016, own calculation.

Additionally, potatoe production and potatoe production per capita show similar negative progress of 53.5%. In 2004, 70.9 kg of potatoes was produced per one inhabitant, while in 2014 it was only 33 kg. Average per capita production in Slovakia remained on 42.9 kg level during analysed period. Results higher then overall Slovak average achieved Bratislava region (50.4 kg), Žilina region (52.5 kg), Trnava region (54.1 kg) and Prešov region (66.4 kg) (Figure 7). Per capita production increased only in Bratislava region (56.2%). Significant decrease noticed Trenčín region (-84.2%), Košice region (-76.7%) and Žilina region (-75.2%). Maximal disparities in potatoe production per capita were recorded in 2004 (Q_{xj} - 109.27) and 2013 (Q_{xj} - 69.9) (Table 3).

Slight decrease concerned per capita production of sugar beet. Trnava region (854.5 kg), Nitra region (636.3 kg) and Trenčín region (277.7 kg) (Figure 7) achieved

higher results than Slovak's average (216.3 kg). Košice, Prešov and Zilina region did not produce almost any sugar beet during the observed period. Trenčín region marked an increase by 58.32% and Bratislava region achieved increase by 25%. Per capita production decreased by 7.53% in Trnava region and by 5.89% in Nitra region. Minimal production is typical for Banská Bystrica region. What is more, production in this region is falling yearly, e.g. 8.5 kg per capita was produced in 2014. In general, statistical indicators refer to large disparities among regions as sugar beet is not produced in every region (Table 3).

In order to analyse development of plant production in Slovakia and regional disparities a further indicator is applied, plant production per one hectare of agricultural land in kilogram. A positive trend was observed in case of cereal production as planting area gradually extended from 2004 to 2014. Whereas 1,930 kg of cereals was produced per one hectare of agricultural land in 2004, in 2014 this value increased by 26.7% to 2,446,2 kg. Regions with higher results than Slovak's average (1,785.1 kg) are Košice region (1,425.7 kg), Trenčín region (1,454.1 kg), Bratislava region (2,233.3 kg) and Trnava region (3,036.7 kg). However, the highest average value achieved Nitra region (3,115.4 kg). Additionally, Nitra region achieved also the highest levels of production (Figure 8). Every region experienced growth, most significant growth recorded Košice region (41.75%) and Nitra region (30.31%). Based on statistical indicators disparities vary and remarkable disparities were in 2005 (after EU entry) and in 2014 (Table 4).



Source: Data Cube, 2016, own calculation.

Figure 8. Development of average production levels of selected plants per one hectare of agricultural land, 2004 – 2014

Obrázok 8. Vývoj priemerných hodnôt produkcie vybraných plodín na 1 ha poľnohospodárskej pôdy v rokoch 2004 – 2014

Oil plant production per one hectare of agricultural land grew in observed period. Whereas in 2004 the oil plant production recorded 243 kg per one hectare of agricultural land, it grew up to 383.8 kg per one hectare of agricultural land in 2014. Hence, oil plant production per one hectare of agricultural land experienced an

increase by 57.9%. Slovak's average value was 283.2 kg. Above the Slovak average were Bratislava region (304.7 kg), Trnava region (352.6 kg), Košice region (375.7 kg) and Nitra region achieving the highest average value in Slovakia (474.7 kg) (Figure 8). Slight decrease (-2.74%) experienced Prešov region. Further regions observed growth, Trenčín region (99.06%), Trnava region (92.8%) and Nitra region (62.38%). Growth of regional disparities was mostly significant in recent years 2011, 2013 and 2014, resulting from extension of planting areas in the most favourable regions for oil plants (Table 4).

Table 4. Development of regional differentiations in Slovak regions, production of selected plants on 1 hectare of agricultural soil, 2004 – 2014

Tabuľka 4. Vývoj regionálnych diferenciácií v krajoch Slovenska vo výrobe vybraných plodín z 1 ha poľnohospodárskej pôdy v rokoch 2004 – 2014

Statistical indicator	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cereals											
Kxj	6.71	9.6	8.3	6.86	7.78	6.75	7.82	7.28	5.59	6.63	7.93
Qxj	3,351.7 3	3,322.8	2,708.77	2,446.73	3,682.7 6	2,996.7 3	2,547. 74	3,430.74	2,600. 68	3,090. 72	4,368.75
Oil plants											
Kxj	7.46	7.76	8.33	6.79	7.28	6.45	7	12.29	5.65	9.22	8.37
Qxj	398.26	373.67	476.16	416.72	555.24	496.93	435.84	520.84	339.12	559.39	646.88
Potatoes											
Kxj	5.57	5.11	5.08	5.42	5.63	7.32	12.64	10.14	10.81	25.81	17.79
Qxj	457.65	352.52	309.63	343.25	349.5	385.63	316.93	523.66	384.60	541.83	537.08
Sugar beet											
Kxj	667.84	763.03	2,367.78	89.06	50.79	83.02	144.14	17.1	156.33	138.97	23.41
Qxj	2,471	2,518	2,131	1,228.98	1,096.9 7	1,319.9 8	1,426. 99	1,711	1,234. 99	1,750. 99	2,341

Source: Data Cube, 2016, own calculation.

Due to decreasing areas of agricultural land devoted to potatoes, the potato production as well as potato production per one hectare of agricultural land fell. There was production of 193 kg per one hectare in 2004. In 2014 it was only 92.9 kg/1ha resulting in a plummet by 52%. Better results than Slovak average achieved (119.5 kg) Prešov region (194.9 kg) and Žilina region (217.7 kg) (Figure 8). Best results in the western part of Slovakia regarding the average production was achieved only by Bratislava region (389.5 kg) with 66.6% growth. Bratislava region is one of the smallest regions in Slovakia regarding overall agricultural land. In the vast

majority of regions the production per one hectare of agricultural land was decreasing. The most significant plummet was in Trenčín region (-83.68%), Košice region (-76.39%) and Žilina region (-75.94%). Planting area of potatoes is decreasing yearly. Additionally, regional disparities are consecutively growing. Maximal disparities were in 2014 (Qxj - 541.83 a Kxj - 25.81) (Table 4).

As already mentioned sugar beet is not planted in every region in Slovakia. Additionally, planting area of sugar beet is consecutively falling. Index shows a slight decrease by 0.9% regarding sugar beet production per one hectare of agricultural land from 2004 to 2014. Higher results than Slovak's average (604 kg) was achieved in Bratislava region (818.1 kg), Nitra region (1,041.5 kg), Trenčín region (1,177 kg) and Trnava region (1,748.7 kg) (Figure 8). Trnava region recorded the most significant growth by 62.8%. The most significant fall (-89.3%) happened in Banská Bystrica region. Banská Bystrica achieved also the lowest values regarding the average production (47.5 kg). Diverse statistical results are affected by missing data in individual years during the analysed period (Table 4). As Slovakia consecutively gives up planting and farming sugar beet, the sugar beet is planted merely only in the Danubian plain. Sugar beet is not part of the subvention strategy of European Union. Additionally, numerous sugar refineries were closed down. There are only 2 sugar refineries out of 10.

Conclusions

European Union's main goal is to keep agriculture in less favourable regions such as mountainous areas as well as regions facing population decline, as well. Strategy Europe 2020 focuses mainly on competitiveness of Slovak agriculture, sustainable management of natural resources and economic development of rural areas in Slovakia. Slovak EU entry results in a slight increase in gross agricultural production of 4.81% in the years 2004 – 2014. Gross crop production recorded an increase of 22.55% and it slightly prevails over the gross animal production that recorded a fall of 13.44%. Structure and specialisation of crop production in Slovakia comes from fundamentals of sustainable development and ensures a proper level of competitiveness in a globalized economy. In addition, share of crops for non-food and other industrial application continuously grows. Furthermore, factors of the use of non-production application of crop production stabilize (Outlook and vision of Slovak agricultural development, Food, Forestry and rural development, 2008).

Seeding structure slightly changed as the area planted with cereals decreased, mainly in upland areas in Western Slovakia. Due to bio-energy development and continuing climate changes, it is expected that this trend will further continue also in future. Similar development is expected also for oil plant crops. Additionally, perennial fodder is stabilized. Cattle breeding affects production and cultivation of oil plant crops. Although cattle breeding currently records a decreasing trend, it is expected that the cattle breeding stabilizes in the future. Negative impact has decrease of potatoe areas. Majority of crops (except of perennial fodder crops that grow almost everywhere) grows in warm lowland areas of Trnava, Nitra and Košice region. However, these regions record lower level of rainfall. Climate change and continuous warming results in transfer of cultivation of some plants into northern parts of Slovakia. Mountainous regions are still rich on rainfall. As these regions are

less favourable for agricultural purposes they are currently used for non-food purposes.

Evaluation of regional differentiation within Slovakia between 2004 and 2014 shows that gross crop production in Nitra and Trnava region was greatest in comparison to other Slovak regions. Additionally, overall gross agricultural production was biggest in these regions. They dispose of favourable soil and climate conditions for intense crop production. Increase in cereals production was mainly observed in Nitra and Košice region. Furthermore, Nitra, Košice and Trnava region achieve highest share of cereals production within Slovakia.

Interregional disparities fluctuate between 2004 and 2014. Moreover, they increase mainly in 2013 and 2014. The most significant increase was recorded with oil plants in regions of western Slovakia (Trenčín, Trnava and Nitra region). These regions represent also the highest share on the overall Slovak production. Remarkable differences in oil plants production were in 2013 and 2014. Potatoe production plummeted by – 60% resulting in the most significant fall within Slovak agriculture. All regions except of Bratislava region recorded decreasing production volumes. Although, the largest potatoe producers are Bratislava, Trnava and Prešov region. Standard deviation shows that significant fall was in 2010 and 2012. Perennial fodder production logged an insignificant growth by 5%. Best results were achieved in Prešov, Trnava and Banská Bystrica region. Remarkable disparities were observed in 2004. Sugar beet recorded slight decrease by -3%. There was almost zero production in Žilina, Prešov and Košice region between 2004 and 2014. Bratislava and Trenčín marked the strongest growth in Slovakia in sugar beet production. Currently, sugar beet is only produced in Trnava, Nitra and Trenčín region.

Regional disparities occurred also in case of production per one hectare of agricultural land. Cereals production per one hectare had a growing character during the analysed period. Trnava and Nitra region achieved the highest per hectare production in Slovakia. As production per hectare fluctuate, fluctuate also further statistical indicators. Minimal values were achieved in 2007 and 2012. Oil plants production per hectare of agricultural land had a rising character. Trnava, Trenčín and Nitra region kept the highest average values. Due to different production and climate conditions regional disparities widen also in case of oil plants. Since 2009, regional disparities grow, except of 2012. Additionally, potatoes production per hectare of agricultural land followed a growing trend. The highest average results reached Bratislava, Trnava and Nitra region. Regional disparities widen since 2008. Only case of perennial fodder crops production per one hectare of agricultural land fell. Production plummeted in all regions. Maximum was achieved in Nitra, Trnava and Trenčín region. Sugar beet production per hectare of agricultural land increased. Sugar beet is mainly planted in regions in western Slovakia.

Moreover, crop production per capita was evaluated. Similarly, also in case of this indicator achieved western regions best results within Slovakia (Trnava and Trenčín region). These regions are typical for planting cereals, oil plants and sugar beet. Due to favourable climate conditions, potatoes and perennial fodder crops are more intensively planted in northern parts of middle Slovakia and in eastern Slovakia.

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