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REGIONAL DIVERSIFICATION OF FRUIT PRODUCTION IN POLAND

The aim of the study was to identify the spatial differentiation of cultivated area and fruit harvest in Poland in year 2015. The sources of data for the study were based on studies of subject literature and statistical publications of the Central Statistical Office of Poland. The research shows that the location of orchards is primarily determined by natural conditions, such as temperature, precipitation, sun exposure, length of vegetation period, level of groundwater retention and slope exposure to sun. The largest fruit orchards in Poland are located in Grójec-Warka area in Mazowsze, near Sandomierz and Lublin. According to the administrative system most of the orchards are located in Mazowieckie, Lubelskie, Łódzkie, Świętokrzyskie, Wielkopolskie and Lubuskie Voivodeships. In addition, various socio-economic determinants of the development of fruit production are determined by the different socio-economic conditions. It contains closeness to the absorptive markets, price to costs relation, processing base, specialized equipment and storage facilities.

Key words: *fruit production, regional diversification, area of orchards.*

Introduction and review of literature. There is a spatial variation in fruit production in Poland. According to data from Central Statistical Office of Poland, in 2015 the orchards in Poland occupied 349939 hectares, which accounted for 2.4% of the total area of agricultural land, and it was close to 156 thousands of farms [12, p. 38].

According to Central Statistical Office, orchards define permanent plantations with not less than 0.1 hectares of area. They include plantations of fruit trees (apple trees, pear trees, plums, cherries, other trees: walnuts, peaches, apricots) and berry bushes (raspberries, currants, gooseberries, other bushes: hazel, bilberry, vines). In addition, CSO counts orchards of fruit trees and bushes in orchards, but does not count the area of strawberries. The classified orchards also do not include perennial crops, intended for self-supply in the household of the user, which belong to the grounds of home gardens [6, p. 96].

The structure and size of the orchard production and its location are influenced by various factors. Among which are the natural-climatic and soil conditions, which are the determinants of the selection of typical crop plants and the formation of regions typical of a given plant production. Economic and social relations are also influenced by the regionalization of orchard production: the size of the farms, the location of the area in relation to the consumption and processing centres and the communication network [13, pp. 111–117].

The largest areas of such crops are primarily metropolitan areas of large cities

and areas located near processing plants. The size and type of fruit production in different parts of the country are influenced by the availability of labour and the possibility of obtaining financial support from various governmental and local government organizations [8, pp. 79–89]. Examples include: EU subsidies to orchard and orchard and walnut plantations. Another important determinant of the distribution of orchard crops is the cost of production, and above all the cost of delivering the products to the collection point. Production should be located so that the costs were as small as possible [4, p. 57].

In the southern part of the country, the best climate conditions for orchard crops may be found in the Kielce-Sandomierz and Lublin Uplands, the Podkarpacie and the Sudety Foothills, also between Wloclawek – Warsaw – Lodz and Radom and in the Sandomierz-Lublin and Carpathian regions, especially in the Nowosądecka Basin and the Beskidy in the Podkarpackie Voivodeship. In these areas orchards have developed the most intensively which is related to the middle course of the Vistula River. In addition to the regions mentioned, smaller orchard crops can be found in suburban areas of larger cities such as Poznan, Wrocław, Bydgoszcz and the Śląskie conurbation. On the other hand, fruit orchard development in the Pomorskie and Masurian Lake Districts and in the Podlasie region is very poor. In these areas, besides unfavourable climatic conditions – short growing season and steeper winters, a serious barrier (in some areas) can be found high levels of groundwater [3, pp. 156–167]. In general, fruit production in Poland is influenced by significant weather factors affecting yield and quality

The purpose of the article. The aim of the study was to identify the spatial differentiation of cultivated area and fruit harvest in Poland in year 2015. The subject of analysis was the area of the orchard and the total fruit production, including the fruit of the trees and berry. Time range conveys the whole year 2015 (area of orchards, detailed division of fruits from trees and berries by Voivodeships). The accepted scope of research has resulted in the use of secondary sources in the article. The main source of the materials was the Central Statistical Office's (CSO) materials (Statistical Yearbook of Agriculture) and reports of the Institute of Agricultural Economics and Food Economy – National Institute of Research. In addition, macro and microeconomic information was used in the resources of the CSO Local Data Bank. The research was conducted with use of a comparative analysis, elements of SWOT-analysis (strengths, weaknesses, opportunities, and threats) and inductive reasoning method. Analyses of fruit orchards and fruit crops were done by a regional arrangement by each Voivodeship. The presentation was made with use of descriptive and tabular method.

Results and discussion.

Orchard area. One of the main factors influencing the development of fruit production in Poland is the climate. The possibility of adverse weather events is the biggest threat to the profitability of production. Among the most common climatic hazards for growing fruits in Poland are:

- strong winter frosts,

- late spring frosts,
- cool and rains during flowering and fruit setting,
- excess rainfalls during the summer,
- cool, rains and early frosts during the flowering and ripening of fruit.

The occurrence of any of these phenomena can lead to the loss of a significant portion (or even a whole) of the crop, or adversely affect the quality of the fruit. It is worth to mention that not all regions in Poland offer equally favourable climatic conditions for setting up fruit farms [20].

The differentiation of climate, soil and economic factors influences the regionalization of orchard crops, while the location of farms under optimal production conditions contributes to the improvement of production efficiency. Arboriculture is one of the most intensively developing agricultural divisions in Poland however in recent years, the growth rate of the area of orchards was low. New varieties of fruit plants and the use of modern production technologies make it possible to achieve much larger yields than a dozen or so years ago. As a result, the harvest of fruit is growing, despite a small increase in the area of orchard crops [5, p. 69].

In 2015, the area of fruit plants was 390245 hectares, including 248627 hectares of fruit trees and 141618 hectares of berries. Same time 63.7% were fruit trees and 36.3% were berries of the total fruit growing area. According to CSO data, in the analysed year 72.6% of the examined area of all fruit trees in the orchards were apple trees, 11.9% – cherry trees, 5.6% – plums, 3.8% – sweet cherries, 3.7% – pears and the other species – peaches, apricots and walnuts – accounted for only 2.4% of the total area of fruit trees (Table 1). Strawberries – 36.8%, 31.3% – currants, 19.0% raspberries, 1.6% gooseberries and 1.6%, and other fruits from bushes and berry plantations – accounted for 11% in the horticultural berry farms.

The largest area of orchards in Poland is located in the Mazowieckie Voivodeship, amounting to over 127 thousands of hectares (32.6% of the total area of orchards in Poland). The second, though more than half of the "fruitful" area is the Lublin Voivodeship, where the area of orchards is 78.5 thousands of hectares, which constitutes to 20.1% of the total orchard area. More than three times smaller area of the orchard is in Świętokrzyskie Voivodeship (40700 ha), a region which in Poland is mainly associated with orchard farming and in Łódzkie Voivodeship (38600 ha). Relatively many orchards were found also in the Wielkopolska, Zachodniopomorskie, Małopolskie and Podkarpackie Voivodeships. Thus, there can be noted spatial concentration of orchards in the middle east and south-eastern part of the country. The smallest area of orchards is found in Śląskie Voivodeship, which may be due to the fact that it is an industrialized area and in the Opolskie Voivodeship, despite its favourable natural conditions for agricultural production.

In 2015 the area of orchards for apple growing in Poland amounted to 180399 of hectares, of which over 76.0% was located in the Central and South-Eastern Poland, where the largest "orchards" exist. These were orchards located in the following Voivodeships: Mazowieckie 41.0%, Lubelskie (12.6%), Świętokrzyskie (11.8%),

Łódzkie (10.7%). There are fluctuations in the area of apple trees in Poland, they are mainly associated with unfavourable atmospheric conditions, most often with extremely low temperatures, and no snow at the same time. Freezing is, however, an impulse for the restoration of apple orchards, the exchange of varieties and the introduction of modern crop systems [9, p. 188].

Table 1

Area of orchards in Poland by Voivodeship in 2015, ha

Specification	Total	Tree fruits	Apples	Pears	Plums	Cherries	Sweet cherries	Rest of tree fruits	Berries	Strawberries and wild strawberries	Raspberries	Currants	Gooseberries	Other fruit from bushes and berry plantations
Poland	390245	248627	180399	9219	13895	29587	9508	6019	141618	52139	27375	44374	2212	15518
Dolnośląskie	6994	4081	1858	261	372	810	453	327	2913	1814	210	382	101	406
Kujawsko-pomorskie	9715	6813	3415	476	715	1430	565	212	2902	1329	187	1048	127	211
Lubelskie	78469	30153	22817	590	1216	4705	490	335	48316	7973	1853	17020	554	4016
Lubuskie	6532	3081	2025	120	275	361	163	137	3451	2791	42	367	27	224
Łódzkie	38613	27118	19263	1170	1928	3788	613	356	11495	2644	387	5479	297	2688
Małopolskie	1025	9582	6698	459	1307	562	311	245	3443	1600	360	1035	150	298
Mazowieckie	127230	93951	75075	4113	2703	8579	2977	504	33279	18164	355	9306	336	2318
Opolskie	949	555	323	31	49	59	49	44	394	306	8	24	10	46
Podkarpackie	10999	6458	3956	215	303	626	136	1222	4541	1401	822	1649	105	564
Podlaskie	6275	2106	1573	120	111	196	65	41	4169	1300	358	1518	49	944
Pomorskie	5718	2857	2201	79	131	235	135	76	2861	1823	58	479	23	478
Śląskie	1839	1250	690	89	145	76	95	155	589	385	50	77	10	67
Świętokrzyskie	40653	32188	21259	630	2857	4937	1005	1500	8465	4296	521	2316	109	1223
Warmińsko-mazurskie	9120	4347	2823	190	346	552	395	41	4773	2656	616	873	84	544
Wielkopolskie	17070	13047	6892	507	1223	2298	1414	713	4023	1624	387	1136	141	735
Zachodniopomorskie	17050	11043	9531	171	213	375	643	110	6007	2035	161	1667	89	755

Source: own study based on "Agricultural and horticultural crops production in 2015", CSO.

The total area of cherry orchards in Poland was 29587 ha. However, in recent years, there has been noted a decrease in the area of cherry orchards in the country. The reason for this is the massive grubbing up of plantings caused by low profitability of production in recent years. In the first place, the least productive older and neglected plants are removed. This loss may cause a decrease in cherry harvest in Poland in the following years [1, pp. 181–182]. The largest area of cherry orchards may be found in Mazowieckie Voivodeship and in 2015 it accounted for 29.0% of the total area in the country. Nearly 5 thousands of hectares of cherry growing area are placed in Świętokrzyskie and Lublin Voivodeships. Quite a significant area of cherry cultivation was also found in Łódzkie, Wielkopolska and Kujawsko – Pomorskie Voivodeships (respectively 12.8%, 7.8%, 4.8% of the total cultivation area in Poland).

In the analysed year the area of plum orchards was 13895 hectares. The largest area of plum cultivation was in the Świętokrzyskie Voivodeship – 2,857 hectares. The smaller area of this tree species is located in Mazowieckie Province (2,703 hectares). Łódzkie, Małopolskie, Wielkopolskie and Lubelskie Voivodeships are the biggest in terms of acreage.

Cherry orchards in 2015 occupied a total area of 9508 thousands hectares. There are three main areas of cherry cultivation in Poland: Mazowsze Wielkopolska and Świętokrzyskie Voivodeships. The total area of cherry crops in these three Voivodeships exceeded 56.8% of the total area in Poland.

Not all areas in Poland, however, are suitable for growing pears because of their soil requirements. Pear cultivated area amounted to 9219 thousands of hectares. The largest share took Mazowieckie Voivodeship and accounted for almost half (44.6%) of the total area of pear in the country. The second largest, although more than 3.5 times smaller area of pear cultivation was located in the Łódź area. The smallest area of pear orchards was in Śląskie and Pomorskie Voivodeships. It represented only 1% of the whole country. In Poland, predominantly pear orchards are an addition, for example, in apple growing farms.

Other fruit species (peaches, apricots, walnuts) were cultivated on an area of 6019 hectares, with the largest area of their crop located in Świętokrzyskie and Podkarpackie Voivodeships, and the smallest in Warmińsko-Mazurskie and Podlaskie (only 41 ha).

The area of berry crops in Poland amounted to 141618 hectares in 2015, which accounted for 36.3% of the area of fruit crops. This production was supported by favourable soil and climate conditions and the availability of relatively cheap labour. Fruit shrubs were cultivated mainly in Lubelskie Voivodeship, with an area of 48316 hectares, which accounted for 34.1% of the area of bush fruit growing in Poland. Another 23.5% of the area was located in Mazowieckie Province, and 8.1% in Łódź. The relatively large area of bush fruit growing was also in the following Voivodeships: Świętokrzyskie (6.0%), Zachodniopomorskie (4.2%), Warmińsko-Mazurskie (3.4%) and Podkarpackie (3.2%).

Among the soft fruits, the largest area in 2015 was the harvest of strawberries and wild strawberries (52134 hectares), followed by currants (44374 hectares), and the third raspberries, including blackberry with 27375 hectares. Gooseberries were cultivated on more than 2200 hectares, chokeberries, blueberries and other fruit trees on 15.5 thousands of hectares.

For all the species listed in (Table 1) of the bush (except for strawberry), the largest area was recorded in the Lublin province: raspberry and blackberry (18753 hectares), currant (17020 hectares), gooseberry (554 hectares), the other – chokeberry Hazel (4016 hectares). On the largest area strawberry and wild strawberry were grown in Mazowieckie (18164 hectares). Lublin is the second largest area in terms of area of strawberry cultivation, although more than twice smaller. Relatively large area of strawberry cultivation was located in the following Voivodeships: Świętokrzyskie, Lubuskie, Warmińsko-Mazurskie and Łódzkie.

The area of raspberry cultivation in orchards in 2015 amounted to 27.4 thousands of hectares. The largest area of cultivation of this plant was in Lublin province. Among the areas that stand out in raspberry cultivation are the Mazowieckie, Zachodniopomorskie, Podkarpackie, Warmińsko-Mazurskie and Świętokrzyskie Voivodeships. Altogether in these five provinces the area of

strawberry cultivation was almost three times smaller than in the Lubelskie Voivodeship and amounted to 6575 hectares. The smallest area of raspberry cultivation was in Pomorskie (58 hectares), Śląskie (50 hectares) and Lubuskie (42 hectares).

In each, even small, garden currants are preferred fruits for growing. This is because of easiness of cultivation and a widespread use of sour fruit. In Poland, in 2015, currants were grown in the area of 44.4 thousands of hectares. More than 75.0% of them were located in four Voivodeships: Lubelskie (38.4%), Mazowieckie (21.0%), Łódzkie (12.3%) and Świętokrzyskie (5.2%). In the seven Voivodeships (Zachodniopomorskie, Podkarpackie, Podlaskie, Wielkopolskie, Kujawsko-Pomorskie, Małopolskie and Warmia and Mazury) the cultivation area ranged from 3.8% to 2.0% of the total area in Poland. Only in Śląskie Voivodeship, currants were grown on the area of 77 hectares.

The common fruit that is cultivated in Poland is a gooseberry. According to CSO data, in 2015 the area of cultivation of this species amounted to – 2200 hectares (Table 1). The main limiting factor for growing gooseberries is a small assortment of high-yield varieties of fruits useful for processing or freezing. The profitability of production is also influenced by the possibility of using mechanical harvesting of fruits and resistance of particular varieties to the powdery mildew [17].

The characteristic feature of Polish fruit-growing is its regional differentiation, which primarily refers to the production potential and the structure of crops. There also should be noted a variation in the structure area. In order for individual regions to compete on the common market, it is necessary to implement programs related to the development of regional policies that would enhance the economic cohesion of the country [11, p. 181].

Harvest of fruit in regional terms. The climatic conditions in Poland cause a seasonality and high variability of yields in particular years, and the product range is limited only to temperate climates. The most important fruit species in Poland are apples, plums, cherries, pears, strawberries, raspberries, currants, and in recent years bilberries.

The fruits of the trees are dominant in the structure of fruit harvest (in the year 2015 they amounted to 3581.5 thousands of tonnes, which accounted for 87.4% of total domestic fruit production). Harvest of berries amounted to 518.3 thousands of tonnes, which accounted for only 12.6% of all fruits (Table 2).

The first place in the structure of the production of fruit from trees in Poland occupy apples, and constitute more than 70.0% of all fruit of the trees. Over the past few years, domestic production of these fruits has grown and has reached 3.17 mln of tonnes by 2015. The largest harvest of apples in the country was recorded in Mazowieckie Voivodeship and amounted to 1.48 mln of tonnes. In the three largest apple growing regions (except Mazowieckie), their harvest was over three and four times lower than in Mazowieckie Voivodeship and amounted to 480 thousands of tonnes in region of Lublin, 429 thousands of tonnes in the Świętokrzyskie voivodship and 379 thousands of tonnes in the Łódzkie voivodship. The lowest apple harvest was

recorded in the Śląskie and Opolskie Voivodeships (6.0 and 4.9 tonnes respectively).

Table 2

Fruit harvest in Poland in 2015 (in thousand tons)

Specification	Total	Tree fruits	Apples	Pears	Plums	Cherries	Sweet cherries	Rest of tree fruits*	Berries	Strawberries and wild strawberries	Raspberries	Currants	Gooseberries	Other fruit from bushes and berry plantations
Poland	4099.8	3581.5	3168.8	69.6	94.9	179.4	48.1	20.7	518.3	204.9	79.9	159.9	12.1	61.5
Dolnośląskie	43.0	32.3	20.9	1.0	1.9	4.3	2.3	1.8	10.7	5.8	0.7	2.5	0.7	1.1
Kujawsko-pomorskie	78.6	66.3	50.1	2.3	3.5	7.4	2.4	0.6	12.3	5.2	0.5	5.2	0.8	0.6
Lubelskie	766.0	546.5	480.6	6.8	13.8	39.1	4.5	1.7	219.5	57.1	63.1	78.1	3.9	17.4
Lubuskie	43.4	29.7	21.0	1.1	2.8	2.7	1.4	0.7	13.6	9.7	0.2	2.4	0.1	1.2
Łódzkie	484.3	437.2	379.4	13.3	13.4	25.9	4.0	1.3	47.1	14.0	1.0	19.9	1.1	11.1
Małopolskie	143.0	124.9	103.1	4.1	9.6	4.5	2.4	1.2	18.1	6.7	1.6	6.8	1.3	1.7
Mazowieckie	1692.7	1608.8	1482.4	30.4	23.5	56.5	14.5	1.7	83.9	50.9	3.6	16.9	1.6	10.9
Opolskie	8.2	6.5	4.9	0.2	0.4	0.4	0.4	0.3	1.7	1.1	0.0	0.2	0.1	0.3
Podkarpackie	54.0	39.7	31.4	1.0	1.6	1.7	1.1	2.9	14.3	4.2	2.0	4.5	0.5	3.1
Podlaskie	23.1	14.9	13.1	0.6	0.4	0.5	0.2	0.0	8.2	2.6	0.7	2.4	0.1	2.3
Pomorskie	28.0	19.5	17.7	0.4	0.5	0.5	0.3	0.1	8.4	5.5	0.2	1.6	0.1	1.0
Śląskie	12.8	8.3	6.0	0.4	0.7	0.4	0.5	0.4	4.4	2.6	0.3	1.0	0.2	0.4
Świętokrzyskie	501.7	474.0	429.0	2.6	11.9	21.6	3.8	4.9	27.7	16.5	1.1	7.0	0.4	2.8
Warmińsko-mazurskie	33.6	18.0	13.9	1.0	1.0	1.7	0.5	0.0	15.6	10.8	1.2	2.2	0.3	1.1
Wielkopolskie	135.9	120.9	85.0	3.7	9.4	11.4	8.4	2.9	15.1	7.5	0.7	3.4	0.8	2.6
Zachodniopomorskie	51.6	34.0	30.4	0.6	0.6	0.8	1.5	0.2	17.5	4.6	3.0	5.8	0.3	3.9

Source: own study based on "Agricultural and horticultural crops production in 2015", GUS.

Thanks to investments made by Polish fruit planters in the new varieties of apples, improvement of their quality and modern sorting lines, or development of producer groups, they have the unique chance to use the emerging export opportunities to Arab and African countries [15].

Cherries represent a large share in the fruit harvest in Poland – in terms of harvest quantities, they occupy the second place (in the fruit harvest) or third place (in the total fruit harvest) of apples and strawberries. According to data released by CSO in 2015, the harvest of these fruits amounted to 179.4 thousands of tones. The largest cherry harvest was recorded in the Mazowieckie Voivodeship, with a total of 56.5 thousands of tonnes, which constitutes to one third of total Polish cherry harvest. High yields of these fruits were also recorded in Lubelskie Voivodeship (over 20.0% of all crops), Łódzkie (14.4% of the country), Świętokrzyskie (12.1% of total crops) and Wielkopolskie (6.4% of Poland). Lowest yields, not exceeded 1 thousands of tonnes, were recorded in the following voivodships: Zachodniopomorskie, Pomorskie, Podlaskie, Śląskie and Opolskie.

In the structure of fruit production from trees, the third are plums, with total harvest in 2015 amounted of 94.9 thousands of tonnes (which accounted for 2.7% of

* Raspberries are included with blackberry and strawberries with strawberries. In the group «other fruit of the trees» are given together: apricots, peaches and walnuts, and the group «other fruit from bushes and berry plantations» are: chokeberry, blueberry, vines, hazel and other.

total tree fruit harvest). The highest harvest was recorded in the Mazowieckie Voivodship, with a total of 23.5 thousands of tonnes of 2703 hectares. Although the area of plum orchards in the Świętokrzyskie Voivodeship is the largest, the harvest of these fruits in total amounted only to 11.9 thousands of tonnes. The second largest in terms of harvest was Lubelskie Voivodeship, where the harvest was at 13800 tonnes. A similar crop of plums was recorded in the Łódź Voivodship (13.4 thousands of tonnes). The lowest harvest (below 0.5 thousands of tonnes) of this fruit was noted in the Pomorskie, Podlaskie and Opolskie Voivodeships.

Pear harvesting in Poland is still low and accounts for only 1.7% of all fruits in our country, which causes that the domestic production does not meet the needs of consumers, especially during the winter time, when large pears come from other regions of the world. The data in Table 2 shows that pear production in Poland reached only 2.2% of apple production. For comparison, apples accounted for 77.3% of total fruit production in Poland. The reasons of that may be a greater (in comparison to apples) climatic and soil requirements of pear trees, possibility of freezing, frequent frosting of flowers or flower buds, high storage requirements for fruits, small selection of varieties and low yields [7]. In Poland, the possibility of their commodity cultivation is possible from the south to the central part of the country. Pear trees also require more fertile soils and frequent irrigation [19].

Despite the improvements made in agrotechnical technology in recent years and the high production potential, sweet cherry crops are still low in Poland. In 2015, only 48.1 thousands of tonnes were collected. Nearly one third of all the harvest came from Mazowieckie (14.5 thousands of tonnes) and 7.4% from Wielkopolska. High yields were also recorded in the region of Łódź (8.4% of all crops). Nearly 5% of the fruit harvest came from the following regions: Małopolskie, Kujawsko-Pomorskie, Łódzkie and Dolnośląskie. The main cause–of low cherry harvest include freezing (especially in central Poland), infestations, and bad weather conditions during the flowering which are lead to even greater infections. It is because most of the varieties are grown without pollinator or the pollinator is not proper for given species [20].

For many years Poland has been a major producer of strawberries, currants, raspberries and blueberries. The harvest of all berries in 2015 according to CSO amounted to 518.3 thousands of tonnes (Table 2). The most popular berries include: strawberries, raspberries, redcurrants, blackberries, gooseberries, blueberries and chokeberry. Berries have many advantages: they are tasty and healthy because of the content of vitamins and minerals.

Strawberries play the most important role in the structure of berry fruit harvest in Poland. The harvest of strawberries and wild strawberries amounted to 204.9 thousands of tonnes in 2015 and their share in the berry fruit harvest in Poland was 39.5% in this year. Although the area of strawberry cultivation in Lubelskie voivodeship was more than twice smaller than in Mazowieckie voivodeship, the highest yields were in noted Lublin region and amounted to 57.1 thousands of tonnes. In Mazowsze, the output of 1 ha was higher, because the harvest was only 6.2 thousand tons lower than in the Lublin region. Significant producers of

strawberries in Poland were also the provinces of: Świętokrzyskie, Łódzkie and Warmińsko-mazurskie.

Production of currants amounted to less than 160 thousands of tonnes. Almost half (48.8%) of the currant harvest came from the largest "currant basin" in Poland, which is the Lublin Voivodeship. Nearly four times lower yields were noted in the Łódzkie Voivodeship (19.9 thousands of tonnes), and more than four and a half times smaller in the Mazowieckie Voivodeship. The significant producer of these fruits in Poland was Świętokrzyskie and Małopolskie Voivodeships. Since 2014 there has been a downward trend in collections. The main cause of that was the drought in 2014 and a reduction in the cost of protection and fertilization of the plantations. The low prices of these fruits contributed to the fact that part of the farmers did not fertilize and protect their plantations because of lack of funds, which in turn resulted with a decrease in yield [18].

Raspberries are one of the most popular berry species grown in Poland in 2015, Polish raspberry production amounted to 79.9 thousands of tones. In the raspberry's merchandise production there are two directions – obtaining of dessert fruits and obtaining of valuable raw materials for freezing and processing. By far, the largest producer of raspberries was Lublin Voivodeship – nearly 80.0% of all the collections in Poland came from this Voivodeship. More than 17 times smaller collections were noted in the Mazowieckie Voivodeship. In the third place, places the West Pomorskie Voivodeship with 3.7% of the total, while the Podkarpackie Voivodeship resulted with 2.5% of the total harvest. The remaining provinces had a negligible share in the raspberries. Due to the unfavourable weather conditions, the year 2015 brought a significant decrease in the production of raspberries when compared to previous years. The main reason for this was summer heat and lack of rain during growing period.

Among the other berries, the importance of gooseberry has been steady decreasing, the harvest in 2015 amounted to 12.1 thousands of tones. A slight decline in production (as compared to the previous year) was due only to weaker yields, while the area of gooseberry cultivation slightly increased. Over 65.3% of all harvest in Poland came from the "basin" of berry fruits – the following provinces: Lubelskie (32.3%), Mazowieckie (13.2%), Małopolskie (10.7%) and Łódzkie (9.1%).

The production of blueberries in Poland has been increasing successively starting from 2010. In the years 2010–2015 there was an average increase of about 11%. The harvest in 2015 amounted to 13 thousands of tones. According to the expert Barbara Nosecka "blueberry production is the direction of horticultural production with the highest rate of development. Mainly due to the fact that the area of cultivation and harvest of these fruits systematically increases, which in turn results from the fact that the Polish consumer accepted the blueberry as a very tasty fruit and there is still a lot of time until the market has been fully saturated" [16]. The highest yields of fruits (over 10 thousand tons) from group "other fruit from bushes and berry plantations", including bilberries, were recorded in Lubelskie (28.3% of all crops in Poland), Mazowieckie (18.1% and Łódź (17.7%). The most important

advantages of berry growing in Poland include: favourable climatic and soil conditions, high production potential of domestic plantations, large number of specialized berry farms, including high quality fruits and high processing capacity of plants operating in Poland. There is also an increase in the demand for fresh and processed berries in European markets and position of Polish suppliers in these markets [17]. The on-going changes in in business conditions, related with the climate change, environmental degradation and globalization, force changes in the fruit market that producers need to familiarise with if they are going to stay in the market. They must explore opportunities to gain competitive advantages in the market over other holdings or producer organizations and their products. An important factor of this competitiveness may be the quality of fruits [2, pp. 79–80].

Conclusions. The raw material sector shows considerable regional variations in terms of crop area and crop size. There are three main orchard regions in the country:

- Mazowieckie region – in the area of Grójec – Góra Kalwaria and Łowicz – Skierniewice dominates apple growing, raspberries are planted between Płońsk and Płock, and in the vicinity of Włocławek are planted currants and gooseberries,
- Lublin region stretches from Sandomierz to Puławy. Apricots, apricots, cherries and walnuts,
- southern region – mainly the Nowosądecka and Oświęcimska Basin (apple trees, plum trees). The southern Małopolskie region is a traditional orchard (Nowy Sącz, Limanowa, Łącko, Podegrodzie and Raciechowice).

In terms of area of orchard crops the leader is Mazowieckie Voivodeship. Nearly one third of the area of Polish orchards is located in Mazowsze region, which accounts for over 40.0% of domestic fruit production, also almost half of apples and one-fourth of strawberries are produced in Mazowieckie. Lublin, Lodz and Świętokrzyskie Voivodeships also play a significant role in fruit production.

A small share of orchards is found in the Dolny Śląsk and Opolskie Voivodeships, where there are very favourable natural conditions for fruit plants – it is possible to grow all species of trees and fruit bushes. The least favourable conditions for fruit cultivation occur within the Śląskie Voivodeship. This area does not have adequate conditions for the development of fruitfulness, because its central part is heavily industrialized and urbanized and the south is a mountainous area.

The vegetation conditions in 2015 for fruit shrubs were more unfavourable than for trees, which contributed to a decrease in yield. Lack of sufficient moisture in the soil has significantly reduced their yield, this concerns especially raspberries. Drought was the main factor limiting higher yields from fruit bushes, but not the only one. In case of blackcurrants the harvest it was an economic factor – part of the fruit was not even harvested. The large market demand for both dessert and industrial varieties, and the ease and reliability of the crop in the short run from planting to fruiting have a positive effect on increasing the production of raspberries.

To conclude, the fruit production in Poland, due to the climatic and soil conditions and also the tradition of fruit orchards in specific regions, is diversified regionally. Among the fruits from trees the most popular are apples, plums and

cherries, and from berries – strawberries, raspberries, currants and blueberries. Because of the high demand for Polish fruits on both the domestic and world markets, it is advisable to improve production technology and quality of products. The growth of fruit production is supported by a sufficient supply of land and by a large group of producers with a high level of expertise and marketing.

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