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DOMINIKA KUBERSKA¹, MAŁGORZATA JUCHNIEWICZ

University of Warmia and Mazury, Poland

SPATIAL EVOLUTION OF ORGANIC FARMLAND IN POLAND

Key words: sustainable agriculture, organic farming, organic farmland, organic crops, spatial concentration, location quotient

ABSTRACT. The main aim of the study was to determine changes in the concentration degree of organic farmland at the regional level in Poland. Spatial aspects were considered using absolute shares determining the interregional distribution of the analysed features and the location quotient (LQ) measuring the degree of regional specialization against the national background. The study utilized secondary source material from the Inspection of Commercial Quality of Agricultural and Food Products and Statistics Poland. It was found that the area of organic farmland undergoes continuous evolution, both at the national and regional levels. Considering the size of organic farmland, it was noted that there was a systematic increase from 2004 to 2013, followed by a decrease until 2018. Similar trends, although with varying intensities, were observed at the regional level. The leaders in terms of organic farmland area in both 2014 and 2021 were Zachodniopomorskie and Warmińsko-Mazurskie voivodeships. In analyses concerning the area of farmland allocated for selected organic crops, these voivodeships dominated in all types except for orchard and berry crops, which were most prevalent in Mazowieckie, Lubelskie, and Podkarpackie voivodeships. Based on the calculation using the location quotient, it was found that the highest spatial concentration of organic farmland was in Lubuskie, Podlaskie, Warmińsko-Mazurskie, and Zachodniopomorskie voivodeships, and no significant changes occurred in this regard from 2014 to 2020.

¹ Corresponding author: dominika.kuberska@uwm.edu.pl

INTRODUCTION

The concept of sustainable growth and socio-economic development is now a widely accepted paradigm [Mensah 2019]. This process emphasizes three equal areas: environmental, social, and economic [Sadowski et al. 2021, Elegbede et al. 2023]. Mieczysław Adamowicz [2021] highlights that sustainable development pertains to all spheres of human activity, including agriculture and rural areas. In the European Union (EU), the principles of sustainable development have been promoted for years, and organic farming is one of the key elements of this strategy. In the environmental dimension, organic farming represents the most nature-friendly method of agricultural production [Tuomisto et al. 2012]. Laura Cattell Noll and her team of researchers [2020] indicate that farming in accordance with the ecological system contributes, among other things, to improving soil and water quality, reducing greenhouse gas emissions, and decreasing the release of chemical pollutants into the air.

In the social sphere, external and internal aspects of organic production related to sustainable development can be distinguished. The first, according to Rod J. MacRae and his team [2007], results from providing consumers with high-quality food products. The second concerns the potential use of existing labour surpluses in rural areas. Juan Torres and co-authors [2016] highlighted this aspect of sustainable development in their work.

In the economic dimension, many scientists [Seufert et al. 2012, Krause and Machek 2018] point to the relatively lower efficiency of organic production compared to conventional farming. When considering the economic dimension of organic production, the demand side must also be mentioned. According to Irene Tzouramani and her team [2014], consumer demand for organic products is a very important factor influencing the profitability of organic farms. In this context, the data published in a special edition of the Eurobarometer [EC 2022] is concerning. It shows that the demand for organic products in Poland is relatively lower compared to other European countries.

Another factor affecting the profitability and development of organic farms in the EU is the activities conducted under the Common Agricultural Policy (CAP). It is worth noting that financial support for organic farms depends on the type of activity conducted. Organic production covers three areas: 1) arable crops (mainly cereals, root crops, fresh vegetables, green fodder, industrial crops), 2) permanent grasslands (pastures and meadows), and 3) permanent crops (fruit trees, olive groves, vineyards). The subsidy rates under the Polish Strategic Plan for the CAP for 2023-2027 [MRiRW 2022] also depend on the crop group. Additional payments are awarded for conducting sustainable plant-animal production.

Research by Wioletta Wrzaszcz [2022] and Justyna Miecznikowska-Jerzak [2022] indicates that the structure of organic production in Poland is changing. This points to ongoing changes in its profile. The area of organic farmland is also changing [IJHARS 2021]. Considering the necessity of monitoring changes in the organic agricultural market,

where the area of organic farmland is a significant issue, the main aim of the study was to determine changes in the concentration degree of organic farmland at the regional level in Poland. This main goal was accompanied by a secondary goal regarding the determination of changes in the spatial distribution of areas allocated for selected organic crops at the voivodeship level in Poland between 2014 and 2021.

MATERIAL AND METHODS

The research objectives were achieved using secondary data obtained from two sources. The first source was published and unpublished data on the area of organic farmland, including land allocated for selected crops, which was obtained from the Inspection of Commercial Quality of Agricultural and Food Products (IJHARS). The difference in the scope of the IJHARS data used, published and unpublished, resulted from the level of detail – unpublished data had a higher level of detail. The analyses considered the area during the conversion period and after the conversion period had ended. The second source of data was the statistical yearbooks of agriculture published by Statistics Poland (GUS), from which information on farmland in Poland was obtained.

Since the vast majority of organic producers in Poland run farms engaged exclusively in plant production, part of the analyses focused on the area of farmland allocated for selected organic crops. Their spatial evolution was analysed with the division into land allocated for:

- 1) cereal grain crops (including seed material),
- 2) leguminous crops for dry seeds,
- 3) potato cultivation (including seed potatoes),
- 4) industrial crops,
- 5) vegetable cultivation,
- 6) fodder crops,
- 7) pastures and meadows,
- 8) orchard and berry crops,
- 9) other uses.

Spatial aspects in relation to changes in the concentration degree of organic farmland were considered using two analytical categories. The first was absolute shares, which were used to determine the interregional distribution of two variables – the area of organic farmland (in 2014 and 2021) and the area of farmland allocated for selected organic crops (in 2014 and 2021). The calculation of shares was done by comparing the level of the studied feature in a voivodeship to its level in the country. The second tool used was the location quotient (LQ), a measure used in spatial analyses related to the assessment of the intensification of ongoing economic processes [Wheeler 2005].

The following formula was used:

$$LQ = \frac{\frac{\text{Area of organic farmland in the voivodeship}}{\text{Area of farmland in the voivodeship}}}{\frac{\text{Area of organic farmland in the country}}{\text{Area of farmland in the country}}}$$

It was assumed that LQ values above 1.0 indicate above-average occurrence of the analysed phenomenon in a given area, while values below 1.0 indicate its relatively lower intensity.

The spatial scope of the research covered the national and regional (voivodeship) levels, while the temporal scope focused on the Rural Development Program (2014-2020), with the years 2013-2014 serving as the starting point for the analyses, and the years 2020-2021 established as the closing period of the analysed timeframe.

RESULTS

The organic food market in Poland is undergoing continuous evolution. One dimension in which far-reaching changes have occurred in recent years is the size of organic farmland, both nationwide and at the level of individual voivodeships. Considering the strategic plans regarding the Common Agricultural Policy (CAP), data in this area can be regarded as one of the key performance indicators (KPIs) for policies aimed at increasing the share of organic farming compared to conventional agriculture.

In the first years after Poland's accession to the EU, the area of organic farmland in Poland increased steadily until 2013 (Figure 1). However, parallel to the introduction of the Rural Development Program (RDP) 2014-2020, a gradual decrease was observed, amounting to approximately 1.8% year-on-year (y/y) in 2014 and around 11.7% y/y in 2015. The downward trend continued until 2019, when there was an increase of approximately 4.7% y/y. However, compared to 2013, the area of organic farmland decreased in 2020 and 2021 by approximately 24% and 18% respectively.

In addition to changes occurring at the macroeconomic level, evolution has also been observed at the mesoeconomic level. By the end of 2021, compared to the end of 2014, a reduction in the area of organic farmland was observed in each of the voivodeships. Reductions exceeding 10,000 ha occurred in the following voivodeships: Zachodniopomorskie (20.09 thousand ha – a decrease of 15.52%), Mazowieckie (12.90 thousand ha – by 21.38%), Wielkopolskie (12.13 thousand ha – by 28.82%), Lubelskie (10.45 thousand ha – by 27.16%), and Podkarpackie (10.20 thousand ha

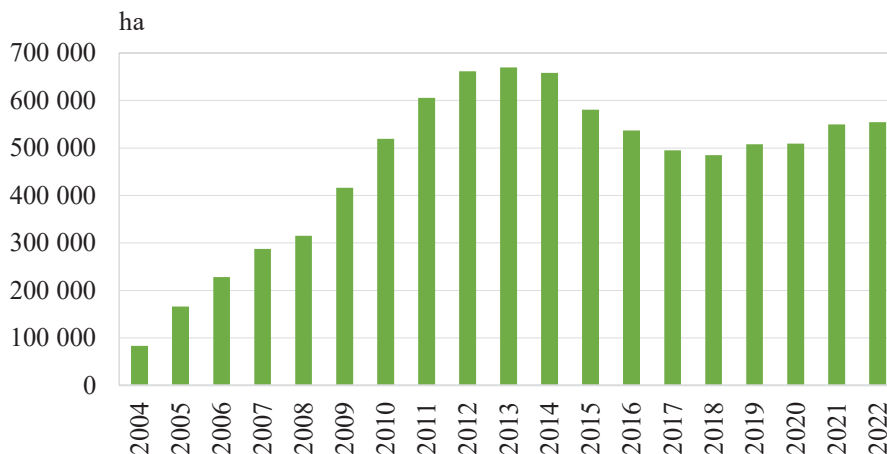


Figure 1. The area of organic farmland in Poland from 2004 to 2022

Source: own elaboration based on Inspection of Commercial Quality of Agricultural and Food Products data

– by 43.39%). The highest percentage decreases in organic farmland occurred in the voivodeships of Śląskie (by 52.47%), Małopolskie (by 48.97%), and Podkarpackie (by 43.39%), while the lowest decreases were observed in Podlaskie (6.40%), Lubuskie (5.35%), and Warmińsko-Mazurskie (2.30%).

Individual voivodeships are characterized by a significant degree of diversity in organic farmland, which is reflected in the height of their absolute shares at the national level (Figure 2). Both in 2014 and in 2021, Warmińsko-Mazurskie and Zachodniopomorskie had the highest absolute shares. Considering the absolute shares at the level of individual voivodeships at the end of 2014 and 2021, five of them experienced an increase. These include Warmińsko-Mazurskie (by 2.98 percentage points – p.p.), Podlaskie (by 1.20 p.p.), Lubuskie (by 1.09 p.p.), Zachodniopomorskie (by 0.27 p.p.), and Łódzkie (by 0.17 p.p.).

The spatial distribution of farmland allocated for organic crops varied unevenly by their purpose (Figure 3). Taking into account the considered organic crops, one can indicate the voivodeships that were leaders, as well as those whose share was relatively small, and comparing the years 2014 and 2021, it can be stated that in terms of:

- 1) cereal grain crops (including seed material) – the voivodeship with the highest share in the analysed years remained Zachodniopomorskie, and in 2021 a significant share was also noted in Warmińsko-Mazurskie;
- 2) leguminous crops for dry seeds – the two voivodeships with the highest share were Warmińsko-Mazurskie and Zachodniopomorskie, with the former being the leader in 2014, and the latter in 2021;

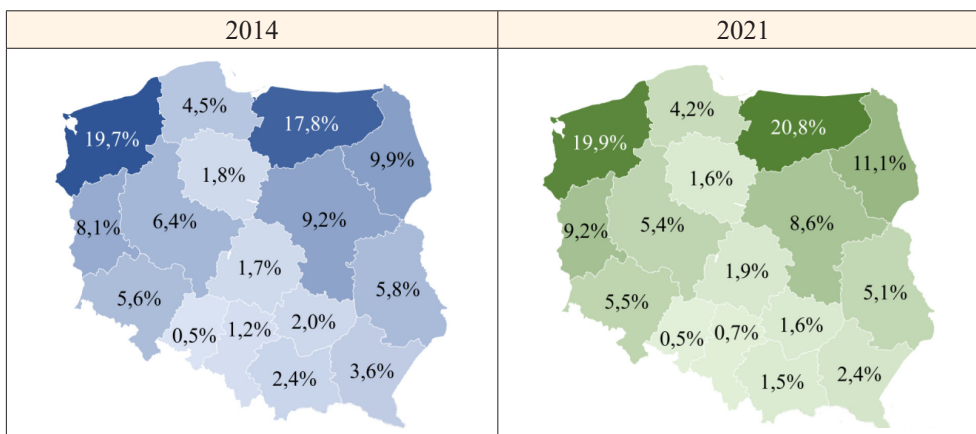
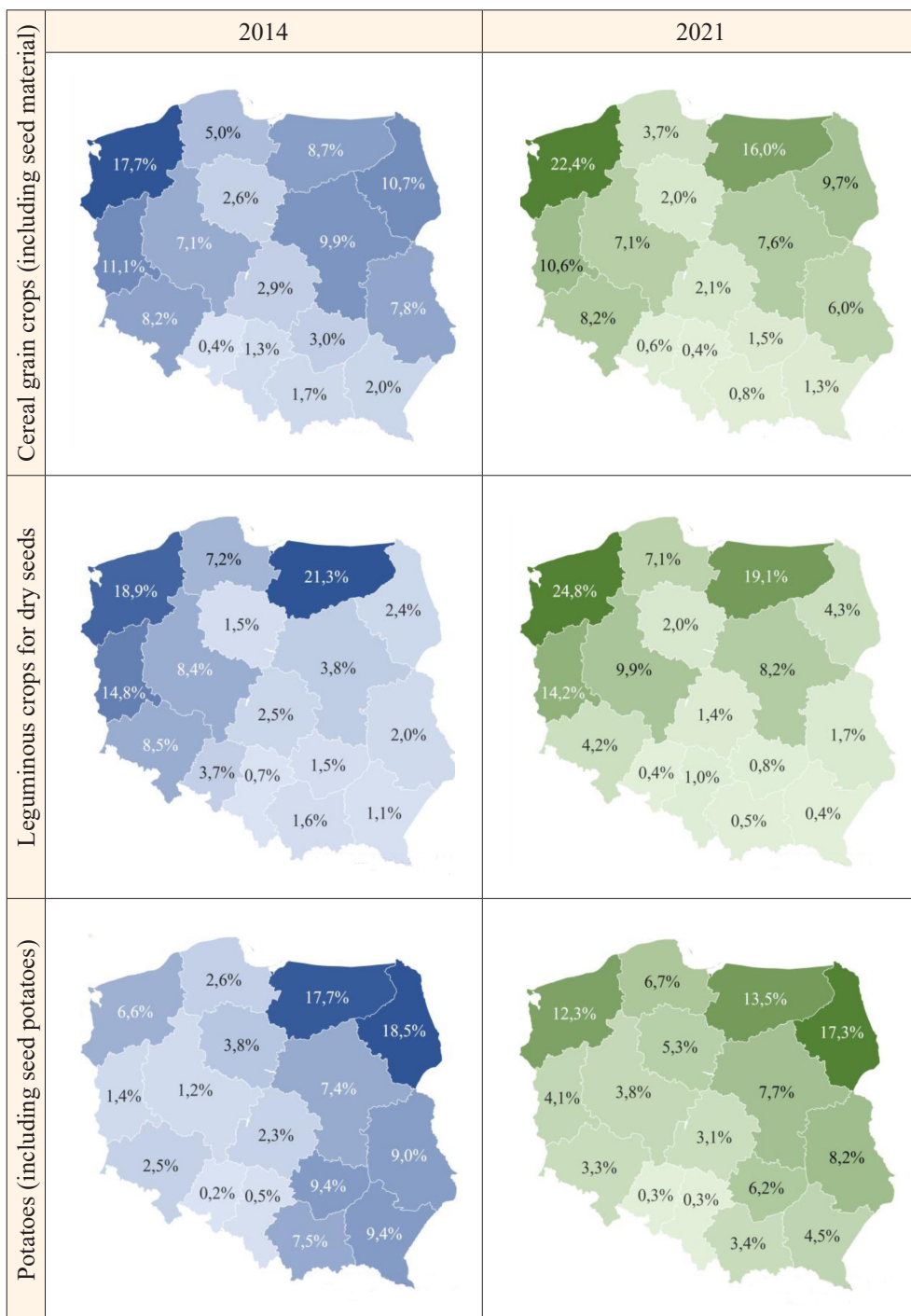
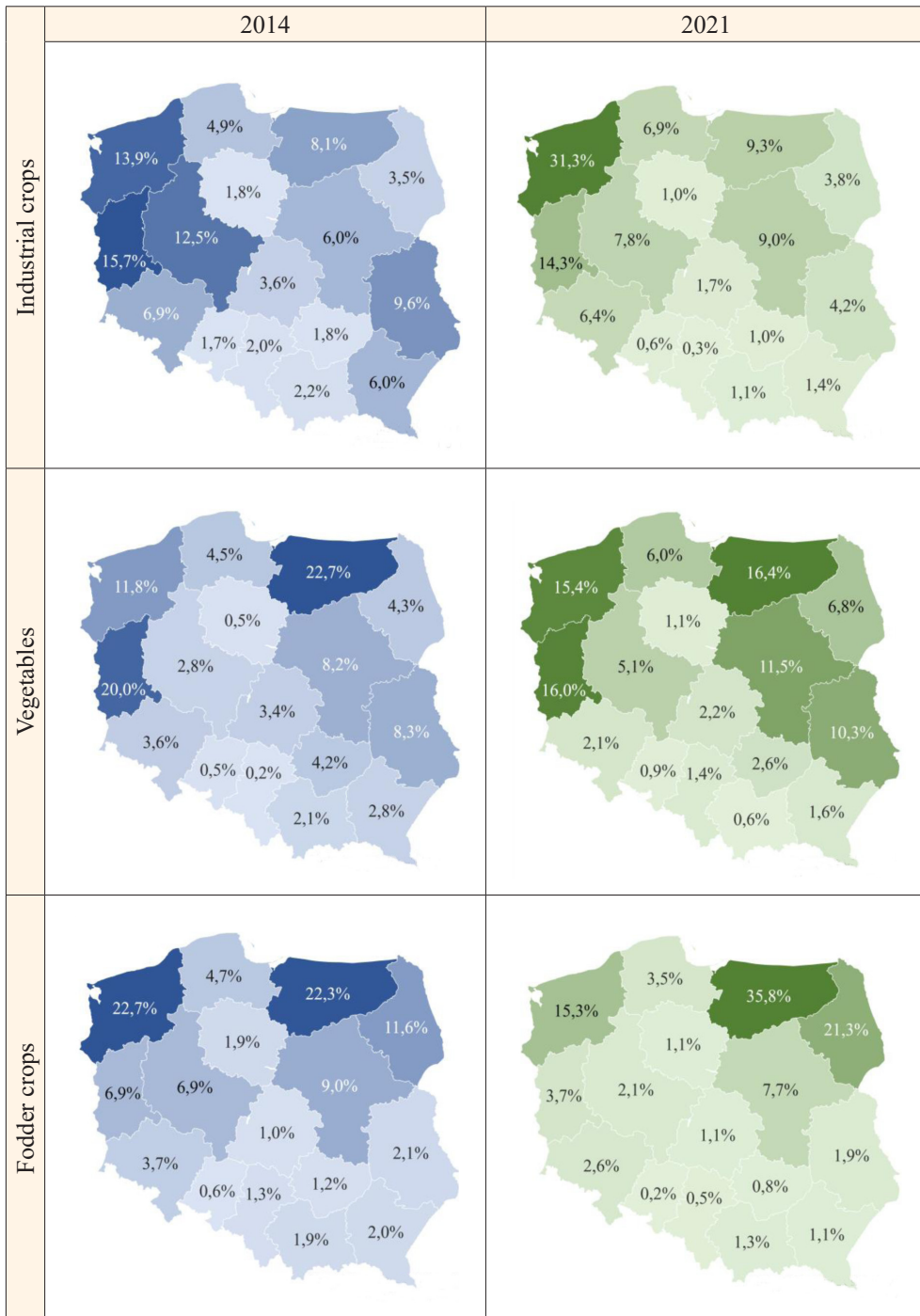


Figure 2. Spatial distribution of organic farmland area in 2014 and 2021 (shares of individual voivodeships in terms of organic farmland area)

Source: own elaboration based on Inspection of Commercial Quality of Agricultural and Food Products data

- 3) potatoes (including seed potatoes) – in 2014, they were mainly located in Podlaskie and Warmińsko-Mazurskie voivodeships (together over 36%), and in 2021, together with Zachodniopomorskie Voivodeship, their combined share exceeded 43%;
- 4) industrial plants – in 2021, the highest share was noted in Zachodniopomorskie Voivodeship, while at the beginning of the analysed period, Lubuskie, Zachodniopomorskie, and Wielkopolskie voivodeships had similar shares;
- 5) vegetables – in 2014, the highest share was in Warmińsko-Mazurskie and Lubuskie voivodeships, and in 2021, Zachodniopomorskie, Mazowieckie, and Lubelskie voivodeships joined the group of voivodeships with the highest shares;
- 6) fodder crops – Warmińsko-Mazurskie and Zachodniopomorskie voivodeships had similar and the highest shares compared to other voivodeships in 2014, in 2021, the group of three voivodeships with the highest share included Warmińsko-Mazurskie, Podkarpackie, and Zachodniopomorskie;
- 7) pastures and meadows – the highest levels of shares were noted in Warmińsko-Mazurskie and Zachodniopomorskie voivodeships in both analyzed years;
- 8) orchard and berry crops – Zachodniopomorskie Voivodeship was the leader in terms of the share of organic cultivation area in this category in 2014, while in 2021, the most agricultural land of this type was located in Mazowieckie, Lubelskie, and Podkarpackie voivodeships;
- 9) other types of cultivation – in both analysed years, the highest percentage of other types of organic cultivation area was located in Zachodniopomorskie Voivodeship.





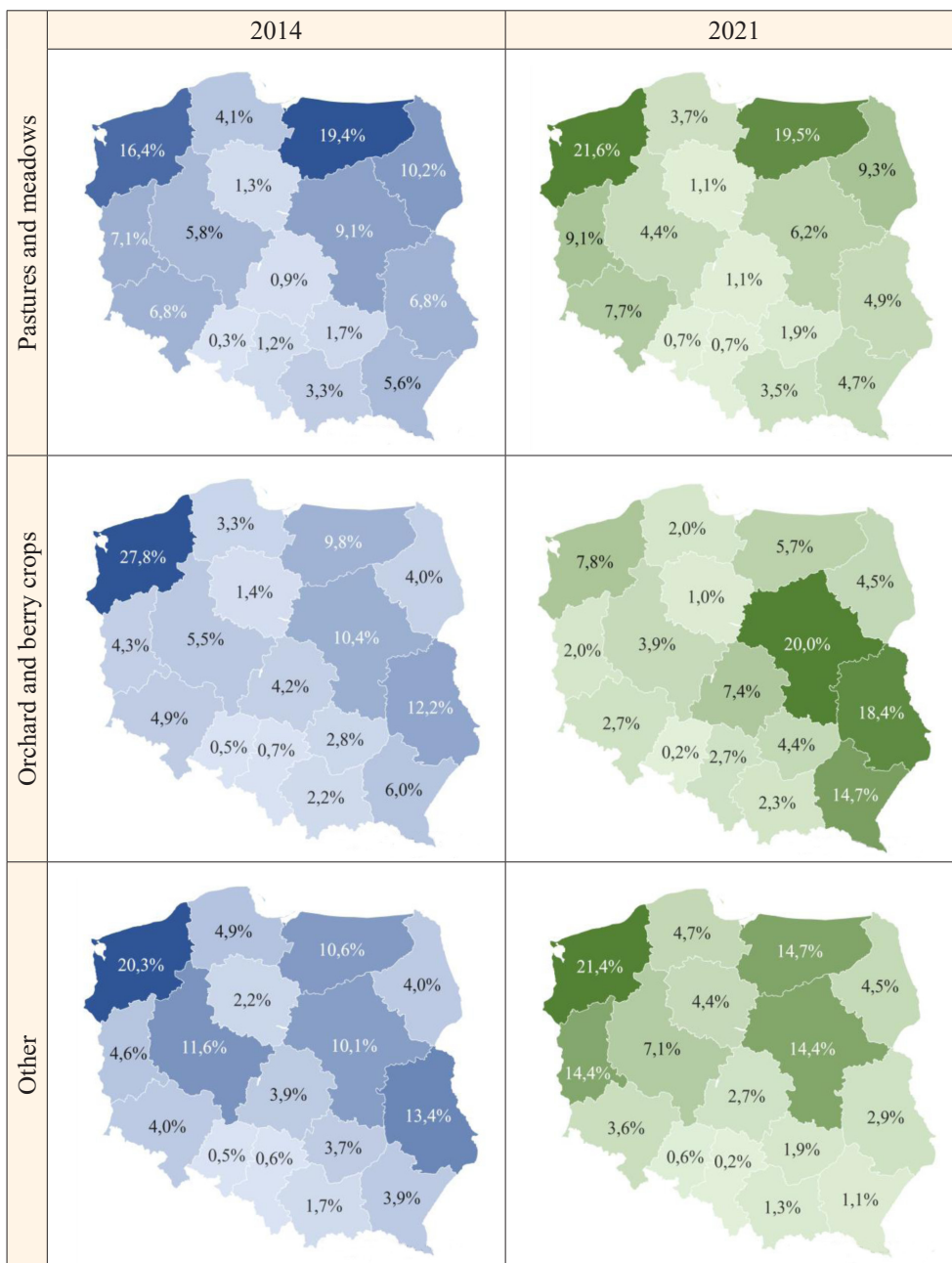


Figure 3. Spatial distribution of farmland allocated for selected organic crops by their type of use in 2014 and 2021 (shares of individual voivodeships in terms of farmland allocated for selected organic crops)

Source: own elaboration based on Inspection of Commercial Quality of Agricultural and Food Products data

In the next stage of the research, the location quotient was used as a measure of the degree of concentration in relation to the area of organic farmland. To this end, their spatial distribution at the voivodeship level was compared with the distribution of farmland overall (Table 1). Only in the case of four voivodeships were premises identified based on which it was found that there is a spatial concentration of organic farmland in their area,

Table 1. The location quotient of organic farmland area from 2014 to 2020

Voivodeships	Location quotient of organic farmland						
	2014	2015	2016	2017	2018	2019	2020
Dolnośląskie	0.876	0.861	0.878	0.887	0.968	0.917	0.980
Kujawsko-Pomorskie	0.240	0.251	0.244	0.231	0.211	0.217	0.197
Lubelskie	0.613	0.591	0.595	0.588	0.609	0.574	0.602
Lubuskie	2.686	2.967	2.930	2.867	2.899	2.944	2.851
Łódzkie	0.259	0.262	0.281	0.269	0.271	0.272	0.298
Małopolskie	0.637	0.605	0.599	0.559	0.480	0.494	0.440
Mazowieckie	0.708	0.698	0.699	0.675	0.592	0.632	0.610
Opolskie	0.150	0.153	0.171	0.164	0.220	0.183	0.188
Podkarpackie	0.905	0.726	0.713	0.798	0.752	0.687	0.652
Podlaskie	1.332	1.338	1.367	1.486	1.456	1.365	1.399
Pomorskie	0.885	0.820	0.872	0.885	0.805	0.795	0.790
Śląskie	0.471	0.466	0.391	0.296	0.240	0.284	0.260
Świętokrzyskie	0.595	0.604	0.593	0.606	0.584	0.551	0.490
Warmińsko-Mazurskie	2.597	2.840	2.879	3.353	3.336	3.291	2.977
Wielkopolskie	0.519	0.498	0.467	0.423	0.453	0.456	0.485
Zachodniopomorskie	3.443	3.437	3.205	3.184	3.408	3.436	3.211

Source: own elaboration based on Inspection of Commercial Quality of Agricultural and Food Products data and GUS [2015-2021]

and these were Lubuskie, Podlaskie, Warmińsko-Mazurskie, and Zachodniopomorskie voivodeships. In the case of each of these regions, in the years 2014-2020, the location quotient was above 1.0, which means that there were more organic farmlands located in them compared to all farmlands on average in the country. Based on the obtained results, it can also be stated that in the long-term perspective, Poland experienced a relatively stable situation in terms of the formation of the location quotient at the level of individual voivodeships, and therefore, specialization in the organic profile of farmland did not significantly deepen.

SUMMARY

The extent of organic farmland, both nationally and regionally, changed over the studied period. In the early years after Poland's accession to the EU, the area of organic farmland continuously increased until 2013, after which a gradual decline was observed. Reductions in organic farmland were also noted in individual voivodeships, albeit with varying intensity. The largest reductions were observed in Zachodniopomorskie Voivodeship, while the smallest were in Warmińsko-Mazurskie Voivodeship. Analysing agricultural land designated for organic crops, it was found that in the case of orchards and berry plantations, the most were in Mazowieckie, Lubelskie, and Podkarpackie voivodeships. In all other types of organic farming considered in the study, the leaders were Zachodniopomorskie and Warmińsko-Mazurskie voivodeships. Spatial concentration of organic agriculture, measured by the location quotient, occurred in Lubuskie, Podlaskie, Warmińsko-Mazurskie, and Zachodniopomorskie voivodeships. Considering the gathered results, it must be stated that – contrary to the strategic assumptions of EU agricultural policy – the share of organic farming land remains low in Poland. Furthermore, given the current dynamics of change, achieving a 25% share of organic farmland in total agricultural land in the envisaged timeframe set by the European Commission will not be possible. Further in-depth analysis of the reasons for this situation is necessary, along with designing interventions aimed at increasing the share of organic farming land, taking into account the regional specificity of agricultural production.

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EWOLUCJA PRZESTRZENNA EKOLOGICZNYCH UŻYTKÓW ROLNYCH W POLSCE

Słowa kluczowe: rolnictwo zrównoważone, rolnictwo ekologiczne, ekologiczne użytki rolne, uprawy ekologiczne, koncentracja przestrzenna, współczynnik lokalizacji

ABSTRAKT. Głównym celem badań było określenie zmian stopnia koncentracji powierzchni ekologicznych użytków rolnych w Polsce w ujęciu regionalnym. Aspekty przestrzenne rozpatrzono z wykorzystaniem udziałów absolutnych, wyznaczających międzyregionalny rozkład analizowanych cech oraz współczynnika lokalizacji (LQ), mierzącego stopień specjalizacji regionu na tle kraju. W badaniach posłużono się wtórnym materiałem źródłowym pochodzącym z Inspekcji Jakości Handlowej Artykułów Rolno-Spożywczych i GUS. Ustalono, że powierzchnia ekologicznych użytków rolnych podlega ciągłej ewolucji, zarówno na poziomie ogólnopolskim, jak i regionalnym. Uwzględniając wielkość powierzchni ekologicznych użytków rolnych stwierdzono, że w latach 2004-2013 występował jej systematyczny wzrost, a następnie do 2018 roku jej spadek. Podobne tendencje, chociaż z różnym nasileniem, odnotowano na poziomie regionalnym. Liderami w zakresie powierzchni ekologicznych użytków rolnych zarówno w 2014, jak i w 2021 roku były województwa zachodniopomorskie i warmińsko-mazurskie. W przypadku analiz dotyczących powierzchni użytków rolnych przeznaczonych pod wybrane uprawy ekologiczne województwa te dominowały we wszystkich ich rodzajach, z wyjątkiem upraw sadowniczych i jagodowych, a najczęściej upraw tego typu zlokalizowanych było w województwach mazowieckim, lubelskim i podkarpackim. Na podstawie przeprowadzonej kalkulacji z wykorzystaniem współczynnika lokalizacji stwierdzono, że najwyższa przestrzenna koncentracja powierzchni ekologicznych użytków rolnych występowała w województwach lubuskim, podlaskim, warmińsko-mazurskim i zachodniopomorskim, a w latach 2014-2020 nie zaszły w tym zakresie znaczące zmiany.

AUTHORS

DOMINIKA KUBERSKA, PHD

ORCID: 0000-0001-7100-1017

University of Warmia and Mazury, Poland

Faculty of Economic Sciences

e-mail: dominika.kuberska@uwm.edu.pl

MAŁGORZATA JUCHNIEWICZ, DR HAB. PROF. UWM

ORCID: 0000-0002-7672-6030

University of Warmia and Mazury, Poland

Faculty of Economic Sciences

e-mail: malgorzata.juchniewicz@uwm.edu.pl

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