

Spatial Diversification of Situation of the Organic Farming in the Polish Voivodeships in the Years 2010–2018

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ABSTRACT

The paper raises the problem of changes in situation of the organic farming in Poland. A set of features and indexes characterizing development or recession of the organic farms in individual voivodeships has been worked out. The authors used data for the years 2010–2018, made available in the Local Data Bank, and reports on the state of the organic farms in Poland. Quantitative and areal changes have been presented, concerning firstly the organic farms in relation to all farms as well as the agricultural area and, secondly, certified farms in relation to the organic farms. Using the arithmetic mean of synthetic indexes, the evaluation results have been compared to the synthetic index of usefulness for organic production which was worked out in the Institute of Soil Science and Plant Cultivation (IUNG) in Pulawy. A diversification of the voivodeships has been presented in terms of recession or development of the organic farms. Regions have been also selected where the negative trend of the phenomenon is opposite to that indicated by advantageous conditions for the organic farming. Examples of such voivodeships are Silesian, Holy Cross or Lower Silesian. The performed analysis proves that an interest in the organic farming in Poland significantly decreased in recent years. One can find the recession of the organic farming in 10 voivodeships, even at the level of 30–65% in the Silesian, Holy Cross, Lesser Poland and Subcarpathia. The satisfactory development level of the organic farms through the recent 9 years has been stated only in three voivodeships: Lodz Province, Podlaskie, Warmian-Masurian.

Keywords: organic farming, development, recession, organic farm, voivodeship

INTRODUCTION

The origins of the organic farming date back to 1920s. In that time the Polish workers knew about the alternative methods of farming owing to the count and countess von Keyserling who introduced in their farm a biodynamic method developed by Dr Steiner [Duda-Krynicka and Jaskólecki 2010]. However, 1984 is recognized as the beginning of the eco-agricultural movement in Poland. From the very onset, it was such form of farming which had to benefit not only farmers but, first of all, consumers and the environment. Thus, the development of farms promoting ecological cultivation and breeding became the subject of research [Zegar 2009].

In the source literature, the items presenting diversification in the development pace of the organic farms in various regions of the world, Europe and Poland can be found [Runowski 2009, Ligenzowska 2014, Drabarczyk and Wrzesińska-Kowal 2015, Golik and Żmija 2017]. Of course, it is affected, i.a. by the environmental conditions, natural quality of the agricultural space as well as financial aspects of the organic farming and market of ecological products [Kowalska 2010]. The majority of authors limit themselves to the quantitative characteristics [Komorowska 2007, Drabarczyk and Wrzesińska-Kowal 2015, Golik and Żmija 2017, Raport...] and tries to analyze it with the use of graphical methods (e.g. Lorentz's concentration curve) or analytical ones (Gini's

coefficient) [Makowska et al. 2015]. It must be emphasized as well that many works concern the situation in Poland [Komorowska 2007]. The spatial characteristics are presented mostly in relation to the voivodeships, rarely in relation to smaller units, as counties [Kacprzak and Kołodziejczak 2011, Dąbkowski and Podawca 2017].

Till 2013, one can distinguish three periods in the development of the organic farming in Poland. Till 1999, when a financial support of that farming system did not exist, there were few of such farms – only 555, most of which were localized in the Holy Cross, Lublin and Mazovia voivodeships, while the least in the Kuyavia-Pomerania, Subcarpathia and Opole [Komorowska 2007]. When the payments for ecological areas were introduced in 2001 and the government started to refund the certification costs from the state budget in 2000-2004, the popularity of that form of farming increased [Łuczka-Bakuła 2013]. In 2004, an almost 8-fold increase of the organic farms related to 1999 (from 555 to 3760) was observed in Poland. In this period, the most organic farms were registered in the Lesser Poland, Holy Cross and Mazovia voivodeships. In 2013, however, the total number of the ecological farms in Poland amounted 26 598, what means a 7-fold increase in the number observed in 2004. Most farms were placed in the Warmia-Masuria, Podlasie and Mazovia voivodeships [Makowska 2015].

OBJECTIVES OF THE ANALYSIS

The main objective of the analysis was a presentation of the diversification of parameters characterizing the organic farming in individual voivodeships. The state of the organic farming has been described by a set of indices which constitutes a technique for assessing the development level of this method of agriculture in the voivodeships. It was assumed that the timespan of the analysis are the years 2010-2018.

The complementary objectives were:

- presentation of diversification of amount of the organic farms in each voivodeship,
- presentation of diversification of the voivodeships in terms of the area of organic agriculture.

Apart of the quantitative comparison, a time comparison has been worked out. The presented material allows observing the change trends occurring year by year in the individual voivodeships

in relation to each parameter characterizing the organic farming.

METHODS

The following data were assumed to characterize the organic farms in Poland:

- amount of the organic farms L_{of} [items],
- amount of the certified organic farms L_{cof} [items],
- total amount of farms L_{af} [items],
- area of the organic farms A_{of} [ha],
- area of the certified organic farms A_{cof} [ha],
- total area of farms A_{af} [ha].

The following data were assumed with order to evaluate the diversification in the organic farming in terms of the area of farms as well as to compare the administrative units in these terms:

- share of the organic farms in the set of all farms C_{of} [-],
- share of the certified organic farms in the set of the organic farms C_{cof} [-],
- share of the area of the organic farms in the total agricultural area C_{aof} [-],
- share of the area of the certified organic farms in the area of the organic farms C_{acoof} [ha].

The changes of the following data within the 9-year period 2010-2018, in the annual time modules, were used to present the development dynamics of the organic farming:

- increase or decrease of the area of the organic farms ΔA_{aof} [ha],
- increase or decrease of the amount of the organic farms ΔL_{of} [items],
- increase or decrease of the area of the certified organic farms ΔA_{acoof} [ha],
- increase or decrease of the amount of the certified organic farms ΔL_{cof} [items].

The following indices, related both to the amount and the area of the organic farms, were used to evaluate a development level in the organic farming within the period 2010-2018:

$$W_{devof} = (L_{ofmax} - L_{of2010})/L_{ofmax} \quad [-];$$

$$W_{recof} = (L_{ofmax} - L_{of2018})/L_{ofmax} \quad [-];$$

$$W_{devaof} = (A_{aofmax} - A_{aof2010})/A_{aofmax} \quad [-];$$

$$W_{recaof} = (A_{aofmax} - A_{aof2018})/A_{aofmax} \quad [-].$$

It was caused by a fact that in each case one can determine a maximum of the amount of the organic farms and, usually, two periods – development and recession of the organic farms. In order to depict synthetically the diversification of the voivodeships in terms of the situation in the organic farming, synthetic indices were used, which constitute a difference between the periods of development and recession:

$$W_{\text{synt1}} = W_{\text{devof}} - W_{\text{recof}} [-];$$

$$W_{\text{synt2}} = W_{\text{devaof}} - W_{\text{recaof}} [-].$$

The analysis and interpretation of the investigation results were followed according to the stages below:

- filtration of the data gathered in the Local Data Bank (BDL) with use of the features contained

in the category Agriculture, forestry and hunting, the subgroup Organic farms and Farms, in terms of areal groups of agricultural lands;

- data aggregation for individual subsets;
- dynamic data analysis (in one-year periods) with presentation of a trend of the changes.

Compilation of the numerical data in spatial terms has been worked out with use of the data from the BDL and the ArcGis software.

CHARACTERISTICS OF DEVELOPMENT OF ORGANIC FARMS

The data and features concerning the organic and certified farms are gathered in Table 1.

Table 1. Data and features concerning certified farms along with the change trend for the voivodeships in the years 2010-2018 (by authors)

Voi.	Year	L _f	A _{af}	L _{of}	ΔL _{of}	A _{of}	ΔA _{of}	L _{cof}	ΔL _{cof}	A _{acof}	ΔA _{acof}	C _{of}	C _{cof}	C _{aof}	C _{acof}
LOWER SILESIA (DOLNOŚLĄSKIE)	2010	61834	995916	1227	95	39703	5844	778	136	25476	4555	0.0198	0.634	0.0399	0.6417
	2011	---	1072649	1322	---	45547	---	914	---	30031	---	---	0.691	0.0425	0.6593
	2012	61099	1084896	1312	-10	44304	-1243	1041	127	34423	4392	0.0215	0.793	0.0408	0.7770
	2013	59544	976338	1189	-123	37455	-6849	1009	-32	30972	-3451	0.0200	0.849	0.0384	0.8269
	2014	---	994492	1046	-143	37005	-450	954	-55	33594	2622	---	0.912	0.0372	0.9078
	2015	---	958588	849	-197	31261	-5744	773	-181	27622	-5972	---	0.910	0.0326	0.8836
	2016	55993	950243	813	-36	29200	-2061	657	-116	23854	-3768	0.0145	0.808	0.0307	0.8169
	2017	---	964719	741	-72	27542	-1658	573	-84	21605	-2249	---	0.773	0.0285	0.7844
	2018	---	898865	713	-28	27357	-185	578	5	21002	-603	---	0.811	0.0304	0.7677
KUYAVIA-POMERANIA (KUJAWSKO-POMORSKIE)	2010	68148	1233609	327	44	7688	688	232	27	6150	345	0.0048	0.709	0.0062	0.7999
	2011	---	1227665	371	---	8376	---	259	---	6495	---	---	0.698	0.0068	0.7754
	2012	64770	1132881	390	19	8813	437	297	38	6956	461	0.0060	0.762	0.0078	0.7893
	2013	65115	1140071	415	25	11152	2339	341	44	8925	1969	0.0064	0.822	0.0098	0.8003
	2014	---	1149709	401	-14	11573	421	361	20	10246	1321	---	0.900	0.0101	0.8853
	2015	---	1147637	363	-38	10645	-928	330	-31	9495	-751	---	0.909	0.0093	0.8920
	2016	63830	1107332	470	107	9263	-1382	292	-38	7753	-1742	0.0074	0.621	0.0084	0.8370
	2017	---	1147008	419	-51	8331	-932	260	-32	6198	-1555	---	0.621	0.0073	0.7440
	2018	---	1183952	395	-24	7655	-676	285	25	5781	-417	---	0.722	0.0065	0.7552
LUBLIN PROVINCE (LUBELSKIE)	2010	188266	1599705	1962	103	34855	-18	1386	83	23539	1178	0.0104	0.706	0.0218	0.6753
	2011	---	1650534	2065	---	34837	---	1469	---	24717	---	---	0.711	0.0211	0.7095
	2012	177525	1614948	2174	109	37466	2629	1613	144	28164	3447	0.0122	0.742	0.0232	0.7517
	2013	178135	1584383	2129	-45	40819	3353	1711	98	31351	3187	0.0120	0.804	0.0258	0.7680
	2014	---	1584924	1975	-154	38467	-2352	1776	65	32622	1271	---	0.899	0.0243	0.8481
	2015	---	1643830	1825	-150	34052	-4415	1643	-133	29586	-3036	---	0.900	0.0207	0.8688
	2016	179994	1628626	1980	155	31343	-2709	1487	-156	25187	-4399	0.0110	0.751	0.0192	0.8036
	2017	---	1647054	1904	-76	29001	-2342	1387	-100	22938	-2249	---	0.728	0.0176	0.7909
	2018	---	1614774	1948	44	28428	-573	1466	79	22682	-256	---	0.753	0.0176	0.7979
LUBUSZ PROVINCE (LUBUSKIE)	2010	22147	490418	833	248	35797	8462	417	143	19297	4570	0.0376	0.501	0.0730	0.5391
	2011	---	521539	1081	---	44259	---	560	---	23867	---	---	0.518	0.0849	0.5393
	2012	22354	515376	1356	275	52581	8322	772	212	31610	7743	0.0607	0.569	0.1020	0.6012
	2013	21256	456736	1422	66	54692	2111	923	151	35500	3890	0.0669	0.649	0.1197	0.6491
	2014	---	468979	1370	-52	53300	-1392	1133	210	44414	8914	---	0.827	0.1137	0.8333
	2015	---	419363	1202	-168	46343	-6957	1056	-77	39339	-5075	---	0.879	0.1105	0.8489
	2016	20236	423777	1148	-54	43235	-3108	920	-136	32643	-6696	0.0567	0.801	0.1020	0.7550
	2017	---	414919	948	-200	37923	-5312	706	-214	27323	-5320	---	0.745	0.0914	0.7205
	2018	---	408942	877	-71	37174	-749	646	-60	26651	-672	---	0.737	0.0909	0.7169

Table 1. cont.

Voi.	Year	L_t	A_{af}	L_{of}	ΔL_{of}	A_{of}	ΔA_{of}	L_{cof}	ΔL_{cof}	A_{acof}	ΔA_{acof}	C_{of}	C_{cof}	C_{aof}	C_{acof}
LODZ PROVINCE (ŁÓDZKIE)	2010	130565	1120552	420	58	7671	1075	234	64	3681	1036	0.0032	0.557	0.0068	0.4799
	2011	---	1115300	478	40	8746	1162	298	42	4717	881	---	0.623	0.0078	0.5393
	2012	130241	1113600	518	10	9908	434	340	56	5598	1640	0.0040	0.656	0.0089	0.5650
	2013	128309	1112531	528	-20	10342	887	396	27	7238	1515	0.0041	0.750	0.0093	0.6999
	2014	---	1100298	508	-30	11229	-1071	423	-13	8753	-316	---	0.833	0.0102	0.7795
	2015	---	1103135	478	19	10158	-172	410	-37	8437	-646	---	0.858	0.0092	0.8306
	2016	124032	1096017	497	-20	9986	-726	373	-19	7791	-360	0.0040	0.751	0.0091	0.7802
	2017	---	1160405	477	14	9260	-355	354	17	7431	-476	---	0.742	0.0080	0.8025
	2018	---	1134572	491	14	8905	-355	371	17	6955	-476	---	0.756	0.0078	0.7810
LESSER POLAND (MAŁOPOLSKIE)	2010	153771	744222	2156	-18	21968	-572	1729	179	17835	839	0.0140	0.802	0.0295	0.8119
	2011	---	811118	2138	-35	21396	-346	1908	3	18674	216	---	0.892	0.0264	0.8728
	2012	152176	710093	2103	-265	21050	-4045	1911	-215	18890	-3682	0.0138	0.909	0.0296	0.8974
	2013	142874	685394	1838	-460	17005	-1476	1696	-389	15208	-800	0.0129	0.923	0.0248	0.8943
	2014	---	649894	1378	-250	15529	-2553	1307	-237	14408	-2719	---	0.948	0.0239	0.9278
	2015	---	663461	1128	-35	12976	-612	1070	-125	11689	-1050	---	0.949	0.0196	0.9008
	2016	139923	678802	1093	-159	12364	-1673	945	-140	10639	-1364	0.0078	0.865	0.0182	0.8605
	2017	---	687629	934	-164	10691	-1847	805	-131	9275	-1727	---	0.862	0.0155	0.8676
	2018	---	669068	770	-164	8844	-1847	674	-131	7548	-1727	---	0.875	0.0132	0.8535
MASOVIA (MAZOWIECKIE)	2010	228821	2266491	1935	205	46229	3871	1232	177	25026	6076	0.0085	0.637	0.0204	0.5413
	2011	---	1328186	2140	233	50100	5704	1409	246	31102	8110	---	0.658	0.0377	0.6208
	2012	234503	2339276	2373	236	55804	7641	1655	291	39212	6777	0.0101	0.697	0.0239	0.7027
	2013	212159	2207883	2609	-235	63445	-3091	1946	78	45989	4497	0.0123	0.746	0.0287	0.7249
	2014	---	2160781	2374	-227	60354	-6564	2024	-164	50486	-5659	---	0.853	0.0279	0.8365
	2015	---	2248532	2147	279	53790	-4273	1860	-169	44827	-6093	---	0.866	0.0239	0.8334
	2016	212917	2211447	2426	-211	49517	-5169	1691	-184	38734	-4851	0.0114	0.697	0.0224	0.7822
	2017	---	2244490	2215	69	44348	-2299	1507	86	33883	-1819	---	0.680	0.0198	0.7640
	2018	---	2474522	2284	69	42049	-2299	1593	86	32064	-1819	---	0.697	0.0170	0.7625
OPOLE PROVINCE (OPOLSKIE)	2010	28437	538712	79	7	3180	-477	49	6	2190	-603	0.0028	0.620	0.0059	0.6887
	2011	---	555283	86	4	2703	227	55	11	1587	229	---	0.640	0.0049	0.5871
	2012	26832	543306	90	-2	2930	613	66	8	1816	762	0.0034	0.733	0.0054	0.6198
	2013	26753	571488	88	-13	3543	-237	74	-5	2578	-97	0.0033	0.841	0.0062	0.7276
	2014	---	510019	75	-8	3306	-264	69	-11	2481	-247	---	0.920	0.0065	0.7505
	2015	---	520303	67	1	3042	174	58	-1	2234	119	---	0.866	0.0058	0.7344
	2016	26919	533060	68	-11	3216	-426	57	-9	2353	-164	0.0025	0.838	0.0060	0.7317
	2017	---	529825	57	4	2790	764	48	2	2189	312	---	0.842	0.0053	0.7846
	2018	---	524200	61	4	3554	764	50	2	2501	312	---	0.820	0.0068	0.7037
SUBCARPATHIA (PODKARPACKIE)	2010	140465	723600	2091	-46	31868	491	1620	104	24868	1467	0.0149	0.775	0.0440	0.7803
	2011	---	772538	2045	-105	32359	-1978	1724	-18	26335	-26	---	0.843	0.0419	0.8138
	2012	134024	748495	1940	-190	30381	-875	1706	-133	26309	-429	0.0145	0.879	0.0406	0.8660
	2013	132823	686671	1750	-275	29506	-5996	1573	-208	25880	-5213	0.0132	0.899	0.0430	0.8771
	2014	---	678969	1475	-214	23510	-6854	1365	-234	20667	-6176	---	0.925	0.0346	0.8791
	2015	---	670218	1261	-9	16656	-1170	1131	-112	14491	-1585	---	0.897	0.0249	0.8700
	2016	132851	686614	1252	-58	15486	-137	1019	-107	12906	-381	0.0094	0.814	0.0226	0.8334
	2017	---	683730	1194	-63	15349	-1719	912	15	12525	-1090	---	0.764	0.0224	0.8160
	2018	---	645746	1131	-63	13630	-1719	927	15	11435	-1090	---	0.820	0.0211	0.8390
PODLASIE PROVINCE (PODLASKIE)	2010	84136	1260925	2033	407	42917	9149	1038	379	18890	11251	0.0242	0.511	0.0340	0.4402
	2011	---	1271067	2440	484	52066	4301	1417	494	30141	9032	---	0.581	0.0410	0.5789
	2012	80873	1286687	2924	483	56367	7181	1911	324	39173	5635	0.0362	0.654	0.0438	0.6950
	2013	79083	1256787	3407	25	63548	1349	2235	345	44808	6492	0.0431	0.656	0.0506	0.7051
	2014	---	1264636	3432	-159	64897	-8369	2580	235	51300	-2747	---	0.752	0.0513	0.7905
	2015	---	1243342	3273	164	56528	-1360	2815	-87	48553	-2480	---	0.860	0.0455	0.8589
	2016	81181	1277656	3437	-226	55168	-1617	2728	-152	46073	-1058	0.0423	0.794	0.0432	0.8351
	2017	---	1263799	3211	-222	53551	-1943	2576	-156	45015	-3226	---	0.802	0.0424	0.8406
	2018	---	1235832	2989	-222	51608	-1943	2420	-156	41789	-3226	---	0.810	0.0418	0.8097

Table 1. cont.

Voi.	Year	L_t	A_{of}	L_{of}	ΔL_{of}	A_{of}	ΔA_{of}	L_{cof}	ΔL_{cof}	A_{acof}	ΔA_{acof}	C_{of}	C_{cof}	C_{acof}	C_{acof}
POMERANIA (POMORSKIE)	2010	41136	859654	648	115	22554	4803	348	112	12048	4355	0.0158	0.537	0.0262	0.5342
	2011	---	895869	763	131	27357	3258	460	141	16403	4820	---	0.603	0.0305	0.5996
	2012	40035	907976	894	-1	30615	-1894	601	44	21223	-77	0.0223	0.672	0.0337	0.6932
	2013	39956	843240	893	-46	28721	561	645	63	21146	4038	0.0223	0.722	0.0341	0.7363
	2014	---	822341	847	-110	29282	-4416	708	-66	25184	-3196	---	0.836	0.0356	0.8601
	2015	---	850604	737	-58	24866	-1538	642	-74	21988	-3222	---	0.871	0.0292	0.8843
	2016	39049	814774	679	-70	23328	-909	568	-71	18766	-2268	0.0174	0.837	0.0286	0.8044
	2017	---	843223	609	-69	22419	-2445	497	-56	16498	-1823	---	0.816	0.0266	0.7359
	2018	---	833793	540	10	19974	1048	441	20	14675	801	---	0.817	0.0240	0.7347
SILESIA (ŚLĄSKIE)	2010	64745	447509	228	10	5739	1048	153	20	3451	801	0.0035	0.671	0.0128	0.6013
	2011	---	502643	238	-2	6787	338	173	19	4252	1285	---	0.727	0.0135	0.6265
	2012	64803	436500	236	6	7125	95	192	13	5537	124	0.0036	0.814	0.0163	0.7771
	2013	58981	434688	242	-12	7220	568	205	2	5661	1257	0.0041	0.847	0.0166	0.7841
	2014	---	412525	230	-29	7788	-1150	207	-34	6918	-1096	---	0.900	0.0189	0.8883
	2015	---	400909	201	-21	6638	-1314	173	-22	5822	-1420	---	0.861	0.0166	0.8771
	2016	54503	415249	180	-18	5324	-1598	151	-19	4402	-1429	0.0033	0.839	0.0128	0.8268
	2017	---	4206006	162	-14	3726	-775	132	-14	2973	-672	---	0.815	0.0009	0.7979
	2018	---	422867	148	53	2951	1178	118	81	2301	1521	---	0.797	0.0070	0.7797
HOLY CROSS (ŚWIĘTOKRZYŃSKIE)	2010	96672	598764	1243	53	13123	1178	928	81	9270	1521	0.0129	0.747	0.0219	0.7064
	2011	---	604202	1296	-8	14301	250	1009	68	10791	618	---	0.779	0.0237	0.7546
	2012	92654	587411	1288	-81	14551	571	1077	4	11409	1319	0.0139	0.836	0.0248	0.7841
	2013	90241	575996	1207	-215	15122	-2084	1081	-148	12728	-1218	0.0134	0.896	0.0263	0.8417
	2014	---	560124	992	-139	13038	-1440	933	-126	11510	-913	---	0.941	0.0233	0.8828
	2015	---	560702	853	-19	11598	-859	807	-100	10597	-1256	---	0.946	0.0207	0.9137
	2016	85308	562031	834	-94	10739	-769	707	-93	9341	-998	0.0098	0.848	0.0191	0.8698
	2017	---	564757	740	-60	9970	-883	614	-39	8343	-725	---	0.830	0.0177	0.8368
	2018	---	540019	680	754	9087	23231	575	449	7618	17450	---	0.846	0.0168	0.8383
WARMIŃSKO-MAZURSKIE	2010	43788	1144844	2279	754	75242	23231	989	449	34130	17450	0.0520	0.434	0.0657	0.4536
	2011	---	1186800	3033	760	98473	14472	1438	722	51580	16035	---	0.474	0.0830	0.5238
	2012	43995	1158564	3793	442	112945	3254	2160	446	67615	6488	0.0862	0.569	0.0975	0.5987
	2013	41928	1143952	4235	-1	116199	898	2606	590	74103	16028	0.1010	0.615	0.1016	0.6377
	2014	---	1120247	4234	-193	117097	-4329	3196	281	90131	2818	---	0.755	0.1045	0.7697
	2015	---	1096060	4041	101	112768	-4101	3477	-242	92949	-7217	---	0.860	0.1029	0.8242
	2016	43165	1130329	4142	-397	108667	-1600	3235	-365	85732	-4915	0.0960	0.781	0.0961	0.7889
	2017	---	1053008	3745	-352	107067	-2493	2870	-151	80817	-4741	---	0.766	0.1017	0.7548
	2018	---	1075762	3393	140	104574	5921	2719	78	76076	3640	---	0.801	0.0972	0.7275
GREATER POLAND (WIELKOPOLSKIE)	2010	125692	1952281	748	140	32513	5921	456	78	20755	3640	0.0060	0.610	0.0167	0.6384
	2011	---	1968065	888	86	38434	3045	534	117	24395	4792	---	0.601	0.0195	0.6347
	2012	123228	1974634	974	32	41479	138	651	111	29187	3180	0.0079	0.668	0.0210	0.7037
	2013	122788	1920099	1006	-40	41617	454	762	97	32367	5111	0.0082	0.757	0.0217	0.7777
	2014	---	1937521	966	-157	42071	-7548	859	-134	37478	-6879	---	0.889	0.0217	0.8908
	2015	---	1881413	809	34	34523	-5352	725	-133	30599	-7140	---	0.896	0.0183	0.8863
	2016	121157	1823856	843	-107	29171	-3782	592	-109	23459	-3796	0.0070	0.702	0.0160	0.8042
	2017	---	1925032	736	-9	25389	605	483	28	19663	-1162	---	0.656	0.0132	0.7745
	2018	---	1878196	727	692	25994	21757	511	295	18501	9459	---	0.703	0.0138	0.7117
WEST POMERANIA (ZACHODNIOPOMORSKIE)	2010	30525	1008609	2373	692	98023	21757	1312	295	61491	9459	0.0777	0.553	0.0972	0.6273
	2011	---	953611	3065	514	119780	15587	1607	587	70950	19016	---	0.524	0.1256	0.5923
	2012	28739	949169	3579	61	135367	-5782	2194	475	89966	8552	0.1245	0.613	0.1426	0.6646
	2013	29062	891230	3640	-114	129585	-129	2669	456	98518	17189	0.1252	0.733	0.1454	0.7603
	2014	---	891858	3526	-483	129456	-14569	3125	-282	115707	-12009	---	0.886	0.1452	0.8938
	2015	---	889560	3043	-470	114887	-14317	2843	-577	103698	-22435	---	0.934	0.1292	0.9026
	2016	29646	896383	2573	-408	100570	-12950	2266	-519	81263	-14695	0.0868	0.881	0.1122	0.8080
	2017	---	864623	2165	-105	87620	5272	1747	-194	66568	-583	---	0.807	0.1013	0.7597
	2018	---	874354	2060	92892	92892	5272	1553	-194	65985	-583	---	0.754	0.1062	0.7103

Looking at the data, one can observe that the highest amount of the organic farms corresponds to the years 2012-2013. This situation concerns the following voivodeships: Lublin, Lubusz, Mazovia, Opole, Pomerania, Silesia, Varmia-Masuria, Greater Poland and West Pomerania. The crisis in the development of the organic farms began earlier in the Lower Silesia, Lesser Poland, Subcarpathia and Holy Cross voivodeships. Only in the Kuyavia-Pomerania and Podlasie voivodeships this decline started later, i.e. in 2016. It can be observed that in most cases the decrease in the amount of the organic farms has been continuous for several years. Only in the Mazovia, Lodz and Lublin voivodeships it fluctuates i.e. in one year, their amount increases and in the next one it decreases.

It is also visible that the share of the organic farms in the set of all farms is not high. In five cases, i.e. Greater Poland, Silesia, Opole, Lodz and Kuyavia-Pomerania voivodeships, it does not even reach 1%. In most voivodeships – in eight of them (Lower Silesia, Lublin, Lesser Poland, Mazovia, Subcarpathia, Holy Cross, Pomerania, West Pomerania) – it is at a level of 1 ÷ 2%. Only in three cases, one can acknowledge that the form of organic farming constitutes a significant contribution to the agriculture: in the Varmia-Masuria, West Pomerania and Podlasie voivodeships.

The shares of the agricultural areas cultivated with ecological methods in relation to the overall agricultural area follow a similar pattern. These shares are only slightly higher than the shares

concerning the amount of the farms. Thus, it can be concluded that an average organic farm is greater than an average regular farm in the given voivodeship.

A positive aspect of the organic farming development is the share of the certified farms and their areas in the set of all ecological farms. Regardless the voivodeship, this share falls within the range of 70–90%. It proves an awareness of the organic farmers and need for the formalization of their activity and products.

RESULTS

It results clearly from the analysis that the recession in the situation in the organic farms is oncoming. In various voivodeships, this recession began in a different period, but mostly it was the year 2013. However, not only the very phenomenon of decrease in the number of the organic farms but also the intensity of this process in the years 2010-2018 must be taken into consideration (Fig. 1, Fig. 2). The indices presented in Table 2 show the dynamics of increase and decrease of the amount of the organic farms as well as the area covered by the organic farming.

The applied methodology allows showing clearly that, in most voivodeships, the recession indicators in the organic farming predominate the previous development indicators. The worst situation is observed in the Lesser Poland and Subcarpathia voivodeships where

Table 2. Indices of development and recession and synthetic indices of the organic farms in the voivodeships in the years 2010-2018

No.	Voivoship	W_{devof}	W_{recof}	W_{devaof}	W_{recaof}	W_{synt1}	W_{synt2}	W_{synt3}
1	Lower Silesia	0.072	0.461	0.128	0.399	-0.389	-0.271	-0.330
2	Kuyavia-Pomerania	0.304	0.160	0.336	0.339	0.145	-0.003	0.071
3	Lublin	0.098	0.104	0.146	0.304	-0.006	-0.157	-0.082
4	Lubusz	0.414	0.383	0.345	0.320	0.031	0.025	0.028
5	Lodz	0.205	0.070	0.317	0.207	0.134	0.110	0.122
6	Lesser Poland	0.000	0.643	0.000	0.597	-0.643	-0.597	-0.620
7	Masovia	0.258	0.125	0.271	0.337	0.134	-0.066	0.034
8	Opole	0.122	0.322	0.102	0.003	-0.200	0.100	-0.050
9	Subcarpathia	0.000	0.459	0.015	0.579	-0.459	-0.564	-0.512
10	Podlasie	0.408	0.130	0.339	0.205	0.278	0.134	0.206
11	Pomerania	0.275	0.396	0.263	0.348	-0.121	-0.084	-0.103
12	Silesia	0.058	0.388	0.263	0.621	-0.331	-0.358	-0.345
13	Holy Cross	0.041	0.475	0.132	0.399	-0.434	-0.267	-0.351
14	Warmia-Masuria	0.462	0.199	0.357	0.107	0.263	0.250	0.257
15	Greater Poland	0.256	0.277	0.227	0.382	-0.021	-0.155	-0.088
16	West Pomerania	0.348	0.434	0.276	0.314	-0.086	-0.038	-0.062

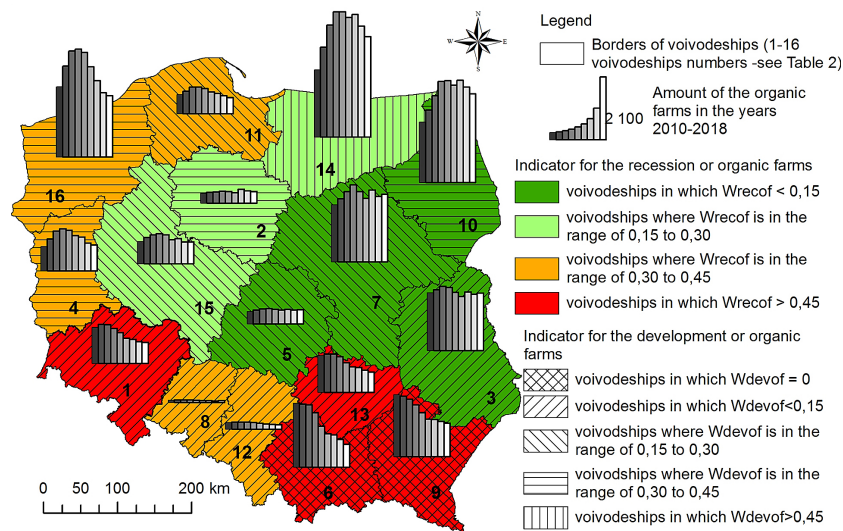


Fig. 1. Diversification of the voivodeships in terms of the changes in the amount of the organic farms in the years 2010-2018 (by authors)

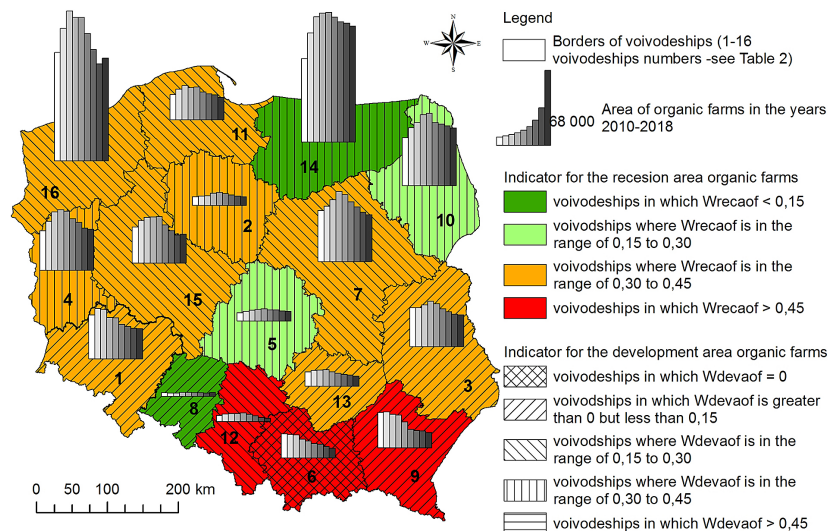


Fig. 2. Diversification of the voivodeships in terms of the changes in the area of the organic farms in the years 2010-2018 (by authors)

the amount of the organic farms has been increasing since 2010. Only slightly better conditions exist in the Holy Cross, Silesia and Lower Silesia voivodeships (Fig. 1).

Despite the general decrease in the amount of the organic farms, in the case of the Varmia-Masuria, Podlasie and Lodz voivodeships the development indices are higher than the recession indices (Fig.1).

Two characteristic units were distinguished as well. In the Kuyavia-Pomerania and Masovia voivodeships the increase in the amount of the organic farms was higher than its decrease but, despite that, the agricultural area covered by the organic farms decreased. The reverse situation

occurred in the Opole voivodeship where, despite the general decrease in the amount of the organic farms between 2010 and 2018 years, the area of the organic farms increased (Fig. 1, 2).

DISCUSSION

The abovementioned three development periods of the organic agriculture in Poland must be supplemented by a fourth period – the years 2013-2018. In these years, one can observe a recession in the popularity of this form of agriculture and decline of organic farming, both in terms of the amount and area.

Table 3. Comparison of conditions for organic production with the recession in the organic farms in voivodships in years 2010-2018

Specification		Recession in the organic farming in years 2010-2018				
		none	low	medium	high	very high
Conditions for organic production [Stuczyński et al. 2007]	very favorable	Varmia-Masuria	–	–	–	–
	favorable	Kuyavia-Pomerania	Lublin, Opole	Pomerania	Lower Silesia, Holy Cross	Subcarpathia
	medium favorable	Masovia, Lodz, Podlasie, Lubusz	West Pomerania, Greater Poland	–	–	–
	unfavorable	–	–	–	Silesia	Lesser Poland

The obtained spatial diversification of the voivodships with use of the arithmetic mean of synthetic indices (W_{synt3}) was compared to the synthetic index of usefulness for organic production which was worked out in the Institute of Soil Science and Plant Cultivation (IUNG-PIB) in Puławy [Biesiacki et al. 2004] (Fig. 3).

As one can note in the comparison, in extreme cases an analogy exists between the conditions for organic production and the recent development situation of this agriculture form. In the Warmia-Masuria voivodship, having the best conditions, the amount and area of the organic farms within the investigated period is still growing. However, it must be emphasized that since 2014, a decrease trend has occurred, which is analogical to the general situation in Poland.

The greatest recession in establishing the organic farms occurred in the Lesser Poland and Silesia voivodships. It is certainly connected to the disadvantageous conditions for the organic production in these regions. The situation in the voivodships with medium advantage conditions for organic production can be considered as quite stable. In these regions, the development slightly predominates the recession (Mazovia, Lodz, Podlasie, Lubusz) or the recession is on a low level (West Pomerania, Greater Poland).

The most diversified group comprises the voivodships with the advantageous conditions for organic production. There is no such relationship in this set as in the previously mentioned cases because one can find not only the voivodships with no recession or low recession

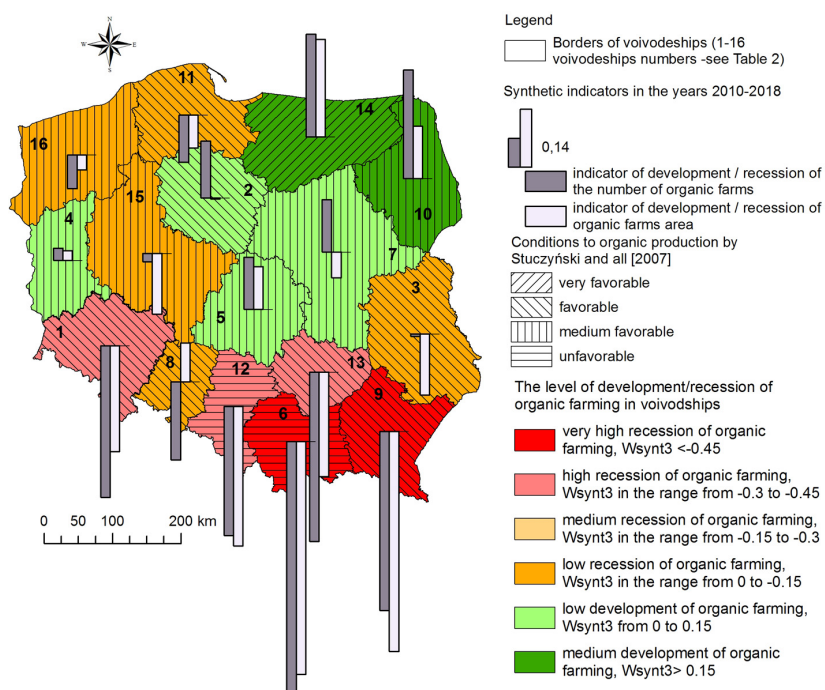


Fig. 3. Types of voivodships in terms of usefulness for organic production and of recession / development of organic farms

(Kuyavia-Pomerania, Lublin, Opole), but also with very significant recession, if compared to the previous periods (Lower Silesian, Holy Cross, Subcarpathia). Attention should be given to the worst situation in the southern voivodeships, mainly the mountain ones. The voivodeships: Kuyavia-Pomerania, Lublin, Opole, Pomerania, Lower Silesia, Holy Cross and Subcarpathia provide the evidence that the recession of the Polish agriculture can be of economic and social reasons, not only the environmental ones (Fig. 3).

CONCLUSIONS

The performed analysis proved that the statement being repeated in scientific works till 2015, according to which “the interest in the organic production in Poland is still growing” [Makowska 2015], has become false for the recent years.

The recession in the organic farming on various levels can be found in 10 voivodeships. The recession on a very high level of 30–65% occurs in the Silesian, Holy Cross, Lesser Poland and Subcarpathia voivodeships. The satisfactory development level of the organic farms within the 9-year period can be confirmed only for three voivodeships: Lodz, Podlasie and Warmia-Masuria.

The decrease of the interest in the organic form of agriculture, confirmed by the decreasing number of the existing organic farms, has been observed in all voivodeships – however, great differences in the intensity of this decrease can be noted, both in relation to the individual years and the voivodeships.

On the basis of the presented data, it can be stated that in the majority of the voivodeships, the crisis of the Polish organic farming began in the years 2012–2013. With regard to the spatial situation of the development of the organic farms in Poland, one can distinguish four characteristic regions:

- southern – with high or very high recession, where very dynamic fall in the organic farms occurred,
- northwestern – with medium recession of the organic farming,
- northeastern – where, despite the general fall of the amount of the organic farms, the development occurred within the years 2010-2018,
- central – where, despite the general fall of the amount of the organic farms as well, one can find a stable situation within the years 2010–2018.

In statistical and spatial terms, however, it must be stated that the percentage distribution of the existing organic farms in the voivodeships is quite stable within the years 2014-2018. In 2014, among 24829 organic farms, the most was found in the voivodeships: Warmia-Masuria, (4234), West Pomerania (3526) and Podlasie (3432). In total, the farms in these voivodeships constituted 45.1% of all organic farms in Poland. The lowest number of such farms was found in the voivodeships: Opole (75), Silesia (230) and Kuyavia-Pomerania (401), what constituted 2.8% in total. In 2018, the most organic farms were found again in the voivodeships of Warmia-Masuria (3393) and Podlasie (2989), but the West Pomerania voivodeship (2060) was replaced by the Mazovia (2284). The share again amounted to 45.1%. The lowest number of the organic farms again occurred in the voivodeships of Opole (61), Silesia (148) and Kuyavia-Pomerania (395), what constituted 3.1% of all organic farms in Poland. It is interesting that the situation in 2010 was the same in the group of voivodeships with the lowest number of the farms but diametrically different in the group of voivodeships with the highest number of the farms. In 2010, there were 79 organic farms in the Opole, 228 in the Silesian and 327 in the Kuyavia-Pomerania voivodeships what constituted 3.1%. The set of the voivodeships with the highest share also contained, apart from the Warmia-Masuria (2279) and West Pomerania (2373), the mountain voivodeships: Subcarpathia (2091) and Lesser Poland (2156). In total, the organic farms in these units constituted 43.2% of all organic farms in Poland.

The most negative dynamics of changes in the share of the organic farms was observed in the Lesser Poland voivodeship – fall from 10.5% in 2010 to 4% in 2018, as well as in Subcarpathia – fall from 10.2% in 2010 to 5.9% in 2018. The positive dynamics occurred in the Podlasie voivodeship – growth from 9.9% in 2010 to 15.6% in 2018, as well as in the Warmia-Masuria – growth from 11.1% in 2010 to 17.7% in 2018.

As the final conclusion, it must be emphasized that there are fewer and fewer farmers wanting to establish or transform their farms into organic ones. It is interesting in so far as the demand for organic products and healthy food is increasingly high.

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