

Table S1. Soil conditions before establishing experiment with maize for grain (2016–2018).

Location	Soil layer, cm	pH _{KCl}	SOC, %	mg kg ⁻¹		Nmin, kg ha ⁻¹	mg kg ⁻¹							
				N-NO ₃	N-NH ₄		P	K	Mg	B	Cu	Fe	Mn	Zn
2016														
Pałów	0-30	7.0	0.86	17.09	1.83	76	106.5	212	90	1.68	2.7	999	199	14.5
	30-60	7.6	0.34	22.06	4.26	107	50.6	142	80	0.86	1.7	794	116	6.5
Pityny	0-30	6.1	1.08	2.07	4.60	29	55.8	110	91	0.75	2.0	1424	156	4.0
	30-60	6.8	0.88	5.79	1.54	32	81.5	114	71	0.69	1.7	1222	122	3.8
Rogów	0-30	6.7	1.40	15.33	8.92	104	59.3	133	103	1.00	4.7	740	128	7.7
	30-60	6.5	1.18	7.27	8.19	67	33.6	83	108	0.90	4.8	770	75	4.3
Strzyżowiec	0-30	5.3	0.93	7.96	9.92	77	47.1	291	93	1.30	3.3	640	92	5.0
	30-60	5.2	0.82	4.33	5.06	40	63.2	191	94	0.70	3.1	620	86	4.2
2017														
Rogów	0-30	5.8	0.92	4.21	2.70	27	55.9	145	53	0.77	4.8	670	93	14.8
	30-60	6.4	0.79	14.18	2.23	64	34.9	83	55	0.69	4.7	690	69	17.7
Terebiń	0-30	7.0	1.26	6.35	1.24	30	47.1	112	83	1.25	6.6	500	101	16.3
	30-60	7.5	0.56	1.80	1.14	12	12.6	42	74	0.88	6.0	400	72	10.0
2018														
Bukowina	0-30	6.7	0.54	6.84	2.77	41	85.5	85	60	1.15	4.6	750	148	4.4
	30-60	6.4	<0.17	6.68	1.29	34	14.8	79	47	0.97	4.5	420	34	<1.8
Rogów	0-30	6.5	1.09	46.83	1.42	188	108.6	129	84	2.31	6.3	725	124	9.5
	30-60	5.4	0.64	7.03	<1.00	27	31.0	71	108	1.23	6.9	675	85	6.0

Table S2. Soil conditions after harvesting maize for grain (2017–2019).

Location	Treatment	Soil layer, cm	pH _{KCl}	SOC, %	mg kg ⁻¹			mg kg ⁻¹							
					N-NO ₃	N-NH ₄	Nmin, kg ha ⁻¹	P	K	Mg	B	Cu	Fe	Mn	Zn
2017															
Pagów	0	0-30	6.3	1.02	9.65	0.67	44	124.7	218	106	1.86	3.0	1061	167	16.8
		30-60	7.0	0.31	5.50	0.69	27	37.9	154	78	0.98	1.3	640	74	4.5
	1	0-30	6.8	1.0	16.69	0.60	74	98.5	202	112	1.42	2.3	963	174	10.3
		30-60	6.8	0.60	19.54	0.55	86	58.9	168	104	1.36	1.7	964	129	6.6
	2	0-30	6.5	0.88	9.24	0.81	43	131.2	159	111	0.86	2.2	907	151	21.5
		30-60	6.4	0.49	4.86	1.15	26	82.8	131	102	0.53	1.7	770	103	8.5
Pityny	0	0-30	6.1	0.64	<1.00	2.79	16	54.5	115	82	1.05	1.9	1578	176	3.7
		30-60	6.7	0.76	<1.00	21.2	96	132.5	178	79	0.81	2.2	1428	166	5.5
	1	0-30	7.0	0.95	2.9	2.78	24	116.8	131	74	0.81	2.2	1145	135	5.6
		30-60	6.8	1.08	<1.00	28.2	126	108.6	124	72	0.78	2.5	1476	174	5.3
	2	0-30	5.8	0.91	<1.00	3.42	19	51.0	93	81	0.48	2.5	1724	170	4.0
		30-60	6.1	0.64	<1.00	2.79	16	54.5	115	82	1.05	1.9	1578	176	3.7
Rogów	0	0-30	5.3	1.68	11.55	3.74	60	26.2	79	90	0.94	5.3	630	83	12.3
		30-60	5.8	1.26	41.80	2.93	172	14.4	29	103	0.90	4.9	780	55	6.0
	1	0-30	6.3	1.92	63.85	2.95	261	189.7	71	111	1.30	5.7	805	124	20.2
		30-60	7.3	1.14	51.50	2.43	210	62.3	37	105	1.15	5.8	830	95	12.4
	2	0-30	6.3	1.52	18.86	2.55	84	97.7	62	106	0.98	4.0	670	95	14.1
		30-60	6.0	0.70	20.41	2.24	88	10.5	42	124	0.60	5.0	700	52	10.6
Strzyżo-wiec	0	0-30	5.9	0.95	10.50	2.13	49.3	59.3	299	95	0.78	4.8	515	102	16.1
		30-60	5.4	0.58	17.50	1.51	74.1	20.5	87	114	0.62	4.9	510	46	12.7
	1	0-30	5.9	1.01	9.92	<1.00	38.7	93.7	407	69	1.15	4.7	630	107	12.5
		30-60	6.0	0.50	5.45	1.57	27.4	48.0	83	119	0.84	4.8	680	50	23.7
	2	0-30	5.6	0.96	9.34	1.92	43.9	74.6	299	83	0.93	4.8	560	119	10.1
		30-60	6.1	0.31	2.61	1.95	17.8	24.4	75	107	0.71	4.7	685	39	19.6
2018															
Rogów	0	0-30	6.5	1.09	46.83	1.42	188	108.6	129	84	2.31	6.3	725	124	9.5
		30-60	5.4	0.64	7.03	<1.00	27	31.0	71	108	1.23	6.9	675	85	6.0
	1	0-30	6.4	1.00	17.61	1.33	74	95.1	125	76	1.79	7.5	710	137	8.1
		30-60	6.1	0.28	3.09	<1.00	12	17.4	42	98	0.93	5.9	695	54	3.8
	2	0-30	6.0	1.04	20.65	1.12	85	50.1	125	66	2.19	5.9	690	105	6.4
		30-60	5.8	0.76	8.41	1.42	38	37.5	87	79	0.84	6.8	715	70	4.9
Terebiń	0	0-30	6.0	1.30	18.05	0.93	74	51.9	112	90	1.41	9.2	960	115	6.5
		30-60	6.5	0.68	5.63	<1.00	22	18.3	37	78	<0.50	8.9	1190	71	3.9
	1	0-30	6.9	1.24	16.58	1.30	70	79.8	129	72	1.93	8.9	750	175	6.9
		30-60	7.0	0.76	7.38	<1.00	29	16.1	42	90	1.09	7.9	885	95	4.8
	2	0-30	5.6	1.32	15.39	2.34	69	41.0	162	109	1.91	8.6	1155	126	6.9
		30-60	6.1	0.86	4.65	1.14	23	22.2	50	113	<0.50	9.2	1305	69	5.2
2019															
Bukowina	0	0-30	6.7	0.53	3.36	3.38	30	78.5	162	62	0.97	4.0	661	146	4.1
		30-60	6.6	0.23	2.61	1.65	19	27.9	95	58	<0.50	3.0	525	45	1.4
	1	0-30	7.0	0.52	7.19	2.34	43	107.7	208	65	0.67	3.7	899	177	4.3

Location	Treatment	Soil layer, cm	pH _{KCl}	SOC, %	mg kg ⁻¹			mg kg ⁻¹							
					N-NO ₃	N-NH ₄	Nmin, kg ha ⁻¹	P	K	Mg	B	Cu	Fe	Mn	Zn
Rogów	2	30-60	6.9	0.22	1.36	1.43	13	17.4	95	46	<0.50	3.1	429	43	1.4
		0-30	7.3	0.43	5.13	3.45	39	96.8	199	64	0.61	3.3	805	150	4.3
		30-60	7.1	0.18	3.08	1.00	18	22.7	91	64	<0.50	2.9	491	42	1.6
	0	0-30	6.5	0.91	10.91	2.14	51	90.3	112	71	1.01	6.2	812	143	5.8
		30-60	5.8	0.46	2.81	1.57	17	31.0	42	87	0.68	5.6	454	72	3.0
		0-30	6.6	1.06	9.04	5.24	56	90.7	141	66	1.19	6.3	661	122	5.6
	1	30-60	5.8	0.66	3.49	1.23	18	27.0	46	88	0.60	6.1	756	79	3.3
		0-30	6.5	0.98	17.92	3.01	82	88.9	129	61	1.19	6.6	859	164	6.8
		30-60	5.1	0.64	6.24	1.37	30	26.6	58	59	0.64	5.4	697	74	4.1

0: control; 1: Penergetic (K + P); 2: Penergetic (K + P) + Azoter.

Table S3. Weather conditions during the growing season of maize (2017–2019).

Location	Month	Precipitation, mm	Average temperature, °C	Hydrothermal coefficient, k
		2017		
Pağów	April	70	8.0	2.92
	May	31	14.0	0.71
	June	101	18.0	1.87
	July	88	19.0	1.49
	August	80	20.0	1.29
	September	95	15.0	2.11
	Sum	465	–	–
Pityny	April	72	6.2	3.87
	May	30	12.5	0.77
	June	63	16.0	1.31
	July	114	16.8	2.19
	August	75	17.6	1.37
	September	145	13.1	3.69
	Sum	499		
Rogów	April	36	8.1	1.48
	May	50	13.8	1.17
	June	31	18.3	0.56
	July	94	18.6	1.63
	August	14	19.7	0.23
	September	111	13.8	2.68
	Sum	336		
Strzyżowiec	April	36	8.6	1.40
	May	45	13.5	1.08
	June	34	18.2	0.62
	July	95	18.9	1.62
	August	12	20.8	0.19
	September	118	14.5	2.71
	Sum	340	–	–
		2018		
Rogów	April	31	13.3	0.78
	May	47	17.0	0.89
	June	121	18.3	2.20
	July	196	20.1	3.15
	August	13	19.7	0.21
	September	44	14.7	1.00
	Sum	453	-	
Terebiń	April	36	13.9	0.86
	May	47	17.0	0.89
	June	111	18.1	2.04
	July	181	20.4	2.86
	August	13	20.8	0.20
	September	39	16.1	0.81
	Sum	427	–	–
		2019		
Bukowina	April	43	9.8	1.46
	May	77	13.5	1.84
	June	32	22.0	0.48
	July	43	18.8	0.74
	August	94	19.9	1.52
	September	44	13.5	1.09
	Sum	333	-	
Rogów	April	25	9.3	0.90

	May	84	13.9	1.95
	June	57	21.2	0.90
	July	48	18.6	0.83
	August	120	19.1	2.03
	September	27	13.1	0.69
	Sum	360	-	
	Average from multiyear*			
Location	Month	Precipitation, mm	Average temperature, °C	Hydrothermal coefficient, k
Bukowina	April	38	8.9	1.42
	May	90	14.3	2.03
	June	71	17.8	1.33
	July	95	19.7	1.56
	August	65	18.6	1.13
	September	62	13.2	1.57
	Sum	420	-	-
Pagów	April	37	9.5	1.30
	May	64	14.4	1.43
	June	64	17.9	1.19
	July	89	19.7	1.46
	August	57	19.0	0.97
	September	59	13.7	1.44
	Sum	418	-	-
Pityny	April	32	7.8	1.37
	May	52	13.1	1.28
	June	67	16.2	1.38
	July	98	18.7	1.69
	August	83	18.0	1.49
	September	56	13.2	1.41
	Sum	389	-	-
Rogów	April	37	9.0	1.37
	May	78	14.4	1.75
	June	75	17.7	1.41
	July	97	19.7	1.59
	August	67	18.5	1.17
	September	47	13.2	1.19
	Sum	401	-	-
Strzyżowiec, Terebiń	April	40	9.3	1.43
	May	73	14.3	1.65
	June	73	17.7	1.37
	July	100	19.7	1.64
	August	61	18.9	1.04
	September	60	13.8	1.45
	Sum	457	-	-

*Precipitation: Strzyżowiec, Terebiń (1991–2019), Pagów (1998–2019), Pityny (2001–2019), Bukowina (2001–2019), Rogów (2002–2019). Temperature: Strzyżowiec, Terebiń (2002–2019), Pagów (2001–2019), Pityny (2001–2019), Bukowina (2001–2019), Rogów (2002–2019). Source: own study based on data from IMGW-PIB, „Pagro” farm, Strzyżów Sugar Factory.