Table 4. Organic carbon (C_{org}) content in mineral soils of grasslands in Poland in the 0–30 cm layer

Type of soil	Number of samples	C_{org} average content %	Standard deviation (SD) %	C_{org} content	
				Minimum %	Maximum %
Total mineral	703	2,44	1,50	0,26	8,64
Very light	204	2,48	1,57	0,26	8,64
Light	191	2,54	1,60	0,48	7,96
Medium	216	2,31	1,42	0,58	7,49
Heavy	92	2,46	1,31	0,41	7,12

Source: own study based on the KSChR results.

Table 5. The average content of organic carbon (C_{org}) in the 0–30 cm layer of mineral soils of grasslands in individual voivodships and on the scale of the entire country

Voivodeship	Number of samples	C_{org} average content %	Standard deviation (SD) %	C_{org} content	
				Minimum %	Maximum %
Lower Silesia	43	2,25	1,00	0,73	4,41
Kuyavian-Pomeranian	19	3,09	1,88	0,79	6,79
Lublin	38	1,92	0,96	0,59	4,51
Lubusz	26	2,69	1,93	0,41	8,64
Łódź	34	2,04	1,21	0,69	5,49
Lesser Poland	62	1,90	0,73	0,58	4,19
Masovian	106	2,46	1,54	0,56	7,49
Opole	15	2,15	1,37	0,72	5,83
Subcarpathian	53	1,79	0,89	0,26	4,35
Podlaskie	67	3,81	2,04	0,69	7,96
Pomeranian	25	2,58	1,45	0,94	5,90
Silesian	39	1,99	0,79	0,30	4,00
Świętokrzyskie	34	1,69	0,96	0,59	4,71
Warmian-Masurian	57	3,06	1,80	0,76	7,26
Greater Poland	50	2,46	1,55	0,48	6,63
West Pomeranian	35	2,61	0,93	1,11	4,98
Poland	703	2,44	1,50	0,26	8,64

Source: own study based on the KSChR results.

Table 6. Organic carbon content in the 0–30 cm layer of organic grassland soils in Poland

Type of soil*	Organic matter content in a layer of 0–30 cm %	Number of samples	C_{org} average content %	Standard deviation (SD) %	C_{org} content	
					Minimum %	Maximum %
Fully mineralized peat-muck	≤ 3%	4	1,35	0,38	0,81	1,62
Mucky	(3-10%>	47	4,00	1,05	1,77	5,74
Marsh	(10-20% >	52	8,23	1,52	5,97	11,50
Mineral-muck	> 20 %	54	18,77	6,10	11,72	43,27
Total organic		157	10,42	7,35	0,81	43,27

* Soil types of organic origin were distinguished on the basis of Okruszko 1998, with partial use of soil nomenclature given by Pieściński, Gotkiewicz 1993].

Source: own study based on the KSChR results.

Table 7. Organic carbon content in the 0–30 cm layer of grassland soil of organic origin, depending on the voivodeship

Voivodeship	Number of samples	C_{org} average content %	Standard deviation (SD) %	C_{org} content	
				Minimum %	Maximum %
Kuyavian-Pomeranian	11	8,54	5,62	3,85	22,81
Lublin	4	8,31	11,35	1,60	25,29
Lubusz	9	5,69	3,93	1,77	13,74
Łódź	9	10,53	13,31	0,81	43,27
Lesser Poland	1	6,96	0,00	6,96	6,96
Masovian	19	12,09	7,45	3,55	26,00
Podlaskie	37	14,67	5,87	4,80	24,64
Pomeranian	18	7,68	4,16	2,64	20,26
Silesian	1	5,74	0,00	5,74	5,74
Warmian-Masurian	31	11,25	7,71	2,68	41,30
Greater Poland	9	2,77	1,06	1,36	4,81
West Pomeranian	8	8,13	3,95	3,41	15,26
Poland	157	10,42	7,35	0,81	43,27

Source: own study based on the KSChR results.

Table 8. Assessment of organic carbon (C_{org}) content in grassland soils

Content class	The share of GL soils in the C_{org} content classes %			
	according to the IUNG-PIB classification		according to the EDS classification	
	types of soil			
	mineral	of organic origin	mineral	of organic origin
Very low	—	—	10,1	0,6
Low	1,0	0,0	38,7	3,2
Average	15,4	0,6	47,1	29,3
High	34,4	3,2	4,1	66,9
Very high	49,2	96,2	—	—
Total	100,0	100,0	100,0	100,0

Table 9. Organic carbon resources in the soils of grasslands in Poland in the 0–30 cm layer

Type of GL soils	C_{org} average resources Mg (t) · ha^{-1}	C_{org} resources Tg (million tons)
Mineral	106,7	253,3
Of organic origin	251,2	159,4
GL total	137,2	412,7

Source: own study.

Table 10. Organic carbon content of arable soils in the 0–20 cm layer [IUNG-PIB 2017]

Specification	**Average content of organic carbon in arable soils**					
Year	**1995**	**2000**	**2005**	**2010**	**2015**	***average 1995–2015***
n	216					
C_{org} %	1,13	1,14	1,09	1,14	1,12	*1,12*

Table 11. Pearson correlation coefficients between the average content of organic carbon C_{org} in the 0–30 cm layer of mineral soils of grasslands in individual voivodships and the cows and cattle stock population in them per 100 ha of agricultural land (AL)

Variables	**Cows stock rate head · 100 ha^{-1} AL**	**Cattle stock rate head · 100 ha^{-1} AL**
C_{org} %	0,578*	0,611*

Notes: correlation significant* for the significance level $\alpha = 0.05$ with the number of correlated pairs $n = 16$. Source: own study.

Table 12. Levels of significance of comparisons of the variable 'organic carbon content (C_{org})' between groups distinguished according to the category of mineral soils

C_{org} content	***p*-Value for multiple comparisons (two-tailed) [independent (grouping) variable: 'soil category'; Kruskal-Wallis test: *H* (3, *N* =703) = 3,706266; *p* = 0,2950]**			
	BL; *R*:354,15	**L; *R*:360,34**	**S; *R*:332,25**	**C; *R*:376,30**
VL	—	1,000000	1,000000	1,000000
L	1,000000	—	0,982481	1,000000
M	1,000000	0,982481	—	0,488384
H	1,000000	1,000000	0,488384	—

Explanations: VL, L, M, H – symbols as in table 3; *N* – number of valid results, *H* – value of the Kruskal-Wallis test; *p* – level of statistical significance; *R* – average rank. Source: own study.

249 **Table 13.** Recommended depth of groundwater table location (GTL) due to the water needs of plants and inhibition
250 of the loss of organic mass in peat-muck soils [based on: Jurczuk 2004]

Moisture-soil complex	Recommended GTL depth (cm) due to	
	the water needs of plants cm	inhibition of the loss of organic mass cm
Moist – B	55	25
Periodically dry – BC	50	30
Dry – C	30–35	30–40
Notes: complex B – includes slightly and moderately rotten soils on deep, poorly and moderately decomposed peats; BC – includes medium and slightly rotten soils on slightly shallower, moderately decomposed peat; C – includes shallow and medium-deep peat-muck soils as well as mineral-muck, muck and black earth soils.		

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