

Table S1. List of reagents with type and manufacturers used during laboratory analyses.

Analyses	Reagents with type and manufacturers
Total Organic Carbon (TOC)	gases: compressed oxygen, Air Liquide compressed air, Messer reagents: Glucose >99,5%, Sigma-Aldrich Sodium bicarbonate >99%, Sigma-Aldrich Sodium carbonate >99,8%, Sigma-Aldrich orthophosphoric acid 25%, pure, Th. Geyer hydrochloric acid 37%, for analysis, Th. Geyer
Total nitrogen (TN)	Kieltabs, Reagent for analysis, FOSS Sulfur Acid, Reagent for analysis, Merck Salt Acid, Reagent for analysis, Merck Boric Acid, Reagent for analysis, Merck Sodium Hydroxide, Reagent for analysis, Merck Tashiro WSK, Indicator Reagent for analysis, POCH
Heavy Metals (Zn, Cu, Pb, Cd)	gas: Argon, Messer reagents: metal standards, Inorganic Ventures nitric acid 65%, for inorganic trace analysis, Merck perchloric acid 70%, ACS reagent, Merck
Neutral Phosphatase (Aph)	P-nitrophenyl phosphate disodium, ACS reagent, Merck Trizma base, ACS reagent, Merck Toluene, Reagent for analysis, Merck Hydrochloric acid, Reagent for analysis, Merck Sodium hydroxide, Reagent for analysis, Merck Calcium carbonate, Reagent for analysis, Merck
Urease (AU)	Toluene, Reagent for analysis, Merck Acetic acid, Reagent for analysis, Merck Nessler's reagent, Reagent for analysis, Merck Urea, Reagent for analysis, Merck Calcium chloride, Reagent for analysis, Merck Potassium sodium tartrate, Reagent for analysis, Merck
Proteases (APr)	Trizma base, ACS reagent, Merck Toluene, Reagent for analysis, Merck Hydrochloric acid, Reagent for analysis, Merck Sodium hydroxide, Reagent for analysis, Merck Casein, Reagent for analysis, Merck
Dehydrogenases (ADh)	Trizma base, ACS reagent, Merck Hydrochloric acid, Reagent for analysis, Merck 2,3,5-Triphenyltetrazolium chloride, ACS reagent, Merck Methanol, Reagent for analysis, Merck

Table S2. The influence of the interaction of experimental factors on the zinc content in the soil.

Date of sampling	Dose of sewage sludge					Average for the term
	S0	S30	S75	S150	S300	
I	47.6±0.08	58.0±0.05	149.6±0.43	144.1±0.08	219.5±0.34	123.76 A
II	55.2±0.12	86.1±0.09	86.1±0.08	128.2±0.24	153.1±0.09	101.71 C
III	34.1±0.12	41.9±0.08	70.1±0.90	107.3±0.29	154.2±1.01	81.52 B
IV	34.2±0.05	37.3±0.12	62.2±0.21	103.9±0.12	145.1±0.08	76.55 A

Average for the variant	42.78 a	55.84 b	92.00 c	120.87 d	167.95 e
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Explanations: Explanations: EOM – Exogenous Organic Matter; Date of sampling: I – after the introduction of sediment and planting willow in spring in the first field of research, II – after the end of the vegetation period in the first year of research, III – after the end of the vegetation period in the second year of research, IV – after the end of the vegetation period in the third year of research year of research; Dose of sewage sludge: S0 – control object, without the addition of sewage sludge to the soil, S30 – object with the addition of 30 Mg ha⁻¹ of sewage sludge to the soil, S75 – object with the addition of 75 Mg ha⁻¹ of sewage sludge to the soil, S150 – object with the addition of sewage sludge 150 Mg ha⁻¹ of sewage sludge to the soil, S300 – object with the addition of 300 Mg ha⁻¹ of sewage sludge to the soil; A-D – different lowercase letters indicate significant differences for the research term; a-e – different lowercase letters indicate significant differences in the dose of sewage sludge.

Table S3. The influence of the interaction of experimental factors on the copper content in the soil.

Date of sampling	Dose of sewage sludge					Average for the term
	S0	S30	S75	S150	S300	
I	7.5±0.05	10.5±0.02	18.6±0.13	24.2±0.22	67.5±0.21	26.67 D
II	7.1±0.10	9.4±0.17	17.9±0.08	19.9±0.12	52.3±0.12	21.32 C
III	6.9±0.04	7.6±0.02	17.8±0.13	19.3±0.12	36.7±0.07	17.67 B
IV	5.4±0.04	7.1±0.08	14.6±0.08	18.2±0.17	32.9±0.08	15.65 A
Average for the variant	6.71 a	8.67 b	17.23 c	20.41 d	47.37 e	

Explanations: As under table 1S.

Table S4. The influence of the interaction of experimental factors on the lead content in the soil.

Date of sampling	Dose of sewage sludge					Average for the term
	S0	S30	S75	S150	S300	
I	20.0±0.05	25.2±0.17	22.0±0.06	46.2±0.17	73.1±0.08	37.30 C
II	30.1±0.04	28.5±0.05	32.2±0.06	55.6±0.08	45.6±0.08	38.40 D
III	15.9±0.05	28.4±0.01	27.1±0.10	38.4±0.22	37.1±0.08	29.37 B
IV	15.4±0.01	26.1±0.08	22.4±0.04	35.4±0.08	31.4±0.29	26.13 A
Average for the variant	20.37 a	27.04 c	25.91 b	43.89 d	46.80 e	

Explanations: As under table 1S.

Table S5. The influence of the interaction of experimental factors on the cadmium content in the soil.

Date of sampling	Dose of sewage sludge					Average for the term
	S0	S30	S75	S150	S300	
I	0.51±0.01	1.27±0.01	1.81±0.01	2.15±0.00	2.72±0.01	1.69 D
II	0.45±0.00	1.24±0.03	1.61±0.01	2.07±0.05	2.42±0.01	1.59 C
III	0.52±0.02	1.21±0.01	1.60±0.00	1.71±0.00	2.52±0.02	1.51 B
IV	0.83±0.02	1.13±0.04	1.42±0.01	1.70±0.00	2.12±0.02	1.44 A
Average for the variant	0.58 a	1.21 b	1.61 c	1.91 d	2.44 e	

Explanations: As under table 1S.