

Topic of work:

Ecological structure of soil macrofauna in the assessment of the results of forest park planting reconstruction
Holovnia Alevtyna

Oles Gonchar Dnipro National University

Ecological restoration is an important means of managing urban natural areas with human and ecological values in mind. Urban park restoration involves significant impacts on soil cover. Soil quality is a major concern in urban park management, but little is known about the impact of park reconstruction on soil properties. The effect of urban park reconstruction on physical soil properties was investigated. The study was conducted in the recreational area of the Botanical Garden of the Dnipro National University.

In 2019, a 2.8 ha area of the park was reconstructed (Fig. 1). The samples were taken within polygons, 2 of which were placed in the reconstruction area and 2 of which were placed in a similar section of the park where no reconstruction was performed.

Soil properties measurement

The soil properties were measured at each test point of the polygons. The soil mechanical resistance was measured in the field using the Eijkelkamp manual penetrometer, to a depth of 100 cm at 5 cm intervals. The average error of the measurement results of the device is ± 8%. Measurements were made with a cone with a cross section of 1 cm². At each measurement point, the soil mechanical resistance was performed in only one replication. To measure the electrical conductivity of soil in situ the HI 76305, working in conjunction with the portable instrument HI 993310 were used. The soil aggregate fractions size distribution was determined in accordance with the Soil Sampling and Methods of Analysis recommendations. Soil moisture was measured under field conditions using a dielectric digital moisture meter MG-44 (vlagomer.com.ua). The core method was used for measurement of the soil bulk density.

Conclusion

As a result of the technological processes that are carried out during the reconstruction process, soil compactness increases to a considerable depth and the aggregate structure of the soil is disturbed. The thinning of the stand and the destruction of the shrub undergrowth greatly alter the microclimatic regime in the city park and increase the risks of excessive evaporation of moisture from the soil surface. These changes can have negative consequences for the ecological services performed by the soil. Therefore, measures to remediate the physical properties of the soil should be an obligatory element of the reconstruction of urban parks.

Descriptive statistics of the soil properties and the result of the principal component analysis

Properties, mean±st. error	Polygons			
	1	2	3	4
Soil penetration resistance at a depth of, cm in MPa				
0–5	1.79±0.04	1.44±0.05	0.83±0.01	0.99±0.01
5–10	2.45±0.06	1.88±0.07	1.05±0.01	1.2±0.02
10–15	2.77±0.09	2.06±0.10	1.17±0.02	1.21±0.03
15–20	2.73±0.09	1.97±0.09	1.33±0.04	1.19±0.03
20–25	2.43±0.09	1.74±0.08	1.7±0.06	1.27±0.04
25–30	2.25±0.09	1.75±0.06	2.23±0.08	1.46±0.05
30–35	2.31±0.09	2.1±0.07	2.74±0.09	1.99±0.08
35–40	2.83±0.09	2.78±0.08	3.22±0.08	2.58±0.09
40–45	3.45±0.09	3.57±0.08	3.56±0.08	3.28±0.09
45–50	4.04±0.08	4.13±0.08	3.76±0.07	3.79±0.07
50–55	4.33±0.06	4.53±0.06	4±0.07	4.23±0.06
55–60	4.64±0.04	4.77±0.05	4.36±0.05	4.53±0.05
60–65	4.87±0.04	4.91±0.05	4.62±0.05	4.75±0.04
65–70	4.9±0.03	4.99±0.04	4.75±0.04	4.89±0.03
70–75	4.79±0.03	5.01±0.04	5.35±0.05	4.85±0.03
75–80	4.7±0.03	4.88±0.04	5.63±0.06	4.86±0.03
80–85	4.82±0.03	4.57±0.03	5.67±0.05	4.88±0.03
85–90	4.99±0.02	4.15±0.03	4.53±0.04	4.98±0.02
90–95	4.78±0.02	3.95±0.03	4.64±0.04	5.02±0.02
95–100	4.23±0.03	3.95±0.03	4.79±0.04	5.10±0.03
Aggregate fraction, in %				
>10 mm	0.06±0.003	0.05±0.002	0.13±0.006	0.07±0.003
7–10 mm	0.24±0.009	0.21±0.01	0.47±0.02	0.25±0.01
5–7 mm	0.31±0.01	0.46±0.02	0.67±0.02	0.37±0.02
3–5 mm	7.65±0.18	8.74±0.37	13.03±0.34	8.52±0.25
2–3 mm	17.84±0.29	17.94±0.41	20.48±0.45	19.94±0.42
1–2 mm	24.08±0.50	24.72±0.52	27.25±0.43	30.05±0.52
0.5–1 mm	16.64±0.34	18.53±0.53	19.19±0.50	20.05±0.43
0.25–0.5 mm	12.24±0.23	12.27±0.28	9.72±0.25	10.17±0.25
<0.25 mm	21.00±0.76	16.54±0.58	8.82±0.35	10.23±0.47

