

Spatial distribution of soil macroinvertebrates in a dry steppe (South-Eastern Siberia, Russia)

K.B. Gongalsky

A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninsky pr., 33, Moscow, 119071, Russia, Email: kocio@mail.ru

Keywords: soil, macrofauna, spatial distribution

Introduction Soil macroinvertebrates are important components of ecosystems. They play a key role in decomposition processes and turnover of the most of elements. Adequate estimation of abundance and biomass of these animals is fundamental for understanding their input in steppe ecosystems. Asian steppes of Russia are poorly studied. Therefore, baseline soil invertebrate composition, abundance and rules of distribution were estimated.

Materials and methods The sampled site was in dry steppes on Kashtanozem soils, 30 km east of Krasnokamensk (50°05' N, 118°15' E), in the Chita region, South-East Siberia. The map is in: Gongalsky 2003. The relief is represented by small hills with a maximal elevation of 800-1300 m above sea level. The climate is sharply continental. Soils freeze up to 3 m below the surface. Dominance of bushes of *Caragana stenophylla* with *Agropyron cristatum*, *Stipa baicalensis*, *Leymus chinensis*, *Artemisia frigida*, *A. mongolica*, *Adenophora gmelinii*, *Bupleurum scorzonrifolium* is the general feature of the steppe vegetation. In August 2000, 144 intact soil cores to the depth of 8-12 cm were collected at the site. Each core was from an area of 76 cm². Samples collected formed a grid of 24x6 units. Samples were placed into separate marked plastic bags and then hand-sorted in the laboratory. Litter, soil and pebble (fraction >2.7 mm) mass, water holding capacity (WHC), pH and loss on ignition (LOI) were measured in every soil sample using standard methods in the laboratory.

Results Macrofauna numbered $139.8 \pm 14.3/m^2$. Phytophagous animals (54.2%) dominated the community; the rest were saprophagous (23.9%) and predatory animals (21.9%). Larvae of Tenebrionidae (36.1/m²) and Curculionidae (6.3/m²) were the most abundant. Dipterans larvae (mostly Therevidae, 27.1/m²) dominated also. Predatory insects included carabids, both imagines (6.3/m²) and larvae (7.2/m²) were less abundant. In general, the macrofauna consisted of beetles at different stages of development. Although stones and pebble correlated negatively with soil faunal abundance ($r = -0.569$ and -0.673 , respectively) p values were >0.05 . WHC was the only significant correlation with animals ($r = 0.810$). Soil quality (both physical and chemical parameters) defined the abundance of the soil macrofauna. Spatial distribution was heterogeneous (Figure 1).

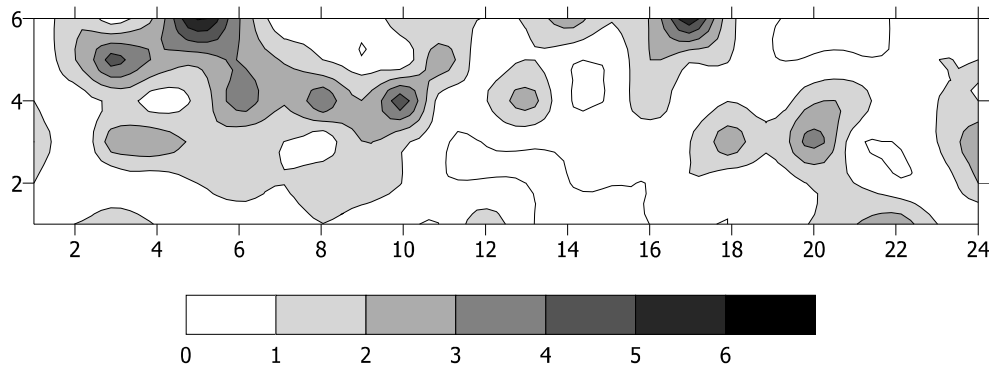


Figure 1 Spatial distribution of total animal number in a dry steppe. Axes are marked by the samples' numbers, the size of each plot is 2.4x0.6 m.

Conclusions Although the population is similar to those in European steppes (Ghilarov 1965), soil macroinvertebrates of South-Eastern Siberian steppes are characterized by a unique complex of traits. The spatial distribution of macroinvertebrates in the studied site was heterogeneous, which has to be taken into account while extrapolating abundance and biomass data to large areas.

Acknowledgements The study was supported by Russian Foundation for Basic Research (grant 03-05-64127).

References

- Ghilarov M.S. (1965). Zoological methods in soil diagnostics. Nauka Publ., Moscow, pp. 278. (in Russian).
Gongalsky K.B. (2003). Impact of pollution caused by uranium production on soil macrofauna. *Environmental Monitoring and Assessment*, 89, 197-219.