

Soil and vegetation under *Bison bonasus* grazing in the Kaluzhskie Zaseki Reserve (Central European Russia)

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Plant diversity and soil characteristics including soil macrofauna and microbial biomass were studied in two areas of the Reserve affected by grazing of semi-free-ranging European bison population during the decade. The study areas are surrounded by broad-leaved forest co-dominated by *Quercus robur*, *Fraxinus excelsior*, *Tilia cordata*, *Ulmus glabra*, *Acer platanoides* and *A. campestre*. Aiming to assess impacts of the bison population on soil and vegetation, we studied two series of conjugated biotopes: (1) a meadow with feeder, (2) a transition zone: the forest edge with damaged tree trunks, trampled soil and fragmented ground vegetation and (3) a forest without visible signs of bison activities. One biotope series was located on loamy soils and other one on sandy-loams. The following samplings of soil and vegetation were conducted in each biotope in two areas: (1) plant species list with their coverage in three vegetation layers in 5 square plots of 100 m² was compiled; (2) earthworms were sampled in 8 monoliths of 25x25x35 cm and handy sorted to estimate earthworm diversity, number and biomass; (3) soil was also sampled from 0 to 10 cm soil depths with 4 replications to estimate soil physico-chemical characteristics and soil microbial biomass.

Preliminary results showed relatively high ecological difference of the areas on loams and sandy-loams: soil on loams was richer in the main chemical elements, such as C, N, Ca and K. At that, in both areas, meadow soils were richer than forest soils in C, N, Ca, P and K. The highest values of C and N were observed in the transition zones and they were closed to values observed in the meadow soils. Total amount of exchangeable cations and Ca most strongly decreased from meadow to forest soils with the intermediate values in the transition zones. Despite the ecological differences of the areas, paired biotopes were similar to each other in structure of vegetation communities. For 10 years of grazing, forest vegetation was significantly transformed by bison. Communities in the transition zones were more diverse in structure and composition of vegetation than the surrounded forest. Number and biomass of earthworms were also higher in soils on loams than in soils on sandy-loams: biomass in forests and meadows exceeded 100 g/m² at the area on loams. For both areas, number and biomass of earthworms were lower in the transition zone than in the neighboring areas of meadows and forests. It can be explained by compaction of soils due to bison grazing at forest whose soil is not protected by natural grass turf. Soil microbial biomass carbon and the basal respiration were also higher in soils on loams than in soils on sandy-loams. At that microbial biomass carbon in soils of meadows and transitional zones was higher than the values obtained from forest soil and the difference was high in soils on loams. The basal respiration was higher in soils at the transition zones.

Thus, in the study area European bison grazing increases richness of broad-leaved forest in soil nutrients, plant diversity and soil microbial biomass and respiration.