



Legacy of earthworms' engineering effects enlarges the actual effects of earthworms on plants

Obdřej Mudrák (1) and Jan Frouz ()

(2) Fac. Sci. Charles University in Prague, Institute for environmental studies, Praha 2, Czech Republic (frouz@natur.cuni.cz),

(1) Institute of Botany ASCR, Třeboň, Czech Republic

Earthworms were recognized as key factor responsible for changes from early to late successional plant communities. They incorporate organic matter into the soil and creates there persistent structures, which improves conditions for plant growth. Earthworm activity might be therefore expected to be more important in early stages of the succession, when earthworm colonization of previously earthworm free soil starts, than in the late stages of the succession, where the soil was previously modified by earthworms. However, earthworms affect plants also via other effects such as increase of nutrient availability. The relative importance of soil structure modification and other earthworm effects on plants is poorly known, despite it is important for both theoretical and applied ecology. To test the effect of earthworms (*Lumbricus rubellus* and *Aporrectodea caliginosa*) on plants we performed microcosm laboratory experiment, where earthworms were affecting early successional (*Poa compressa*, *Medicago lupulina*, and *Daucus carota*) and late successional (*Arrhenatherum elatius*, *Lotus corniculatus*, and *Plantago lanceolata*) plant species in soil previously unaffected by earthworms and in soil with previous long term effect of earthworms. These soils were taken from the early and late successional monitoring sites of the Sokolov coal mining district with known history.

Earthworms increased plant biomass proportionally more in late successional soil. It was mainly because they increased availability of nutrients (nitrate and potassium) and plants get higher advantage out of this in late successional soil. Earthworms increased plant biomass of both early and late successional species, but late successional species suppressed early successional species in competition. This suppression was more intensive in presence of earthworms and in late successional soil. We therefore found multiplicative effect between earthworm soil engineering activity and their other effects, which might be responsible for changes in plant communities during the succession.