

Understory plant community succession driven by belowground interactions with other taxa

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The progress in the primary succession on Sokolov post-mining sites (NW Czech Republic) is driven by the coincidence of several factors operating across the trophic levels. Change from more (abiotic) stress tolerant early successional vegetation towards the more stress sensitive late successional vegetation occurs only on places where the soil conditions are improved by the soil macrofauna and by earthworms in particular. Earthworm activity favors mainly the late successional species. They are advantaged in competition and suppress the early successional species. However, spreading of the late successional vegetation occurs only when common tree species goat willow (*Salix caprea*) either had not formed dense forest stand or after decline of its cover (likely due to competition with other trees). Establishment of *S. caprea* is rather stochastic, but once it forms forest stand its understory is suppressed (nearly missing) and successional changes are blocked. Experimental manipulation with belowground and aboveground interactions showed high importance of belowground processes. *S. caprea* is ectomycorrhizal species and is known for its ability to suppress endomycorrhizal (AMF) species, but in the earthworm presence competitive advantage of ectomycorrhizal species is weakened. The progress in the primary succession is therefore largely promoted by soil macrofauna, due to its joint effect on substrate conditions and mycorrhizal interactions, while dominant tree species tends to slow the rate of the succession.