“Hot spots” on a New Soil Surface – How Do Testate Amoebae Settle Down?

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Summary. Testate amoebae play an important role at the very first beginning of succession on land. We used these protists to analyze initial colonization processes occurring in an artificial water catchment built as a terrestrial hillside and located in a reclaimed lignite mining area in Lower Lusatia (Germany). In the first two years after site construction, only few testate amoebae species and individuals had been found on the predominantly uncovered, sandy study site. However, the substrate removed from small vegetation patches (containing organic matter) revealed tenfold higher amoebal densities compared to uncovered, sandy sites which were only a few cm apart. A cluster analysis separated these colonization patterns into covered and uncovered micro-sites. However, larger-scaled, consistent processes dependent on environmental parameters or gradients were not visible, as demonstrated by redundancy analysis. To conclude, the immigration and colonization process of testate amoebae on newly exposed soil surfaces is highly dependent on substrate quality, also assigned to specific site structures characterized by small vegetation patches.

Key words: Testate amoebae, initial colonization, succession, soil development.

INTRODUCTION

In contrast to “classical” theories, a growing pool of data points to the fact that the very first phase of primary succession or community assembly is dominated by small heterotrophic organisms, which will facilitate the successive establishment of plants by, for example, improving the availability of nutrients (e.g., Bamforth 1997, Hodkinson et al. 2002). Further evidence is given that among the first heterotrophic eukaryotes arriving at newly exposed land surfaces, protozoa are playing a pivotal role, since these small unicellular organisms may arrive easily by air and build up quickly high densities and biomasses by binary fission, thus, providing the basis for a newly developing food web (Foissner 1987, Wanner et al. 1998, Ledeganck et al. 2003). Here, testate amoebae are one of the most important unicellulars, regarding their enormous densities (up to some hundred millions per square metre) and biomasses (up to several grams wet mass per square metre) (Hodkinson et al. 2002, Verhoeven 2002, Wanner and Xylander 2005, Wanner et al. 2008).

However, little is known about the initial colonization processes and the related habitat structures impor-