

BIODIVERSITY RESEARCH

How far and how fast do bryophytes travel at the landscape scale?

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KEYWORDS

bryophyte • colonization rate • dispersal • intermediate disturbance • species richness • slag heaps

ABSTRACT

Dispersal ability is a factor of prime importance to explain biotic distributions. Yet, it is extremely difficult to measure directly. In this study, we take advantage of the natural experimental design of slag heap colonization in Belgium to document the timing and range of dispersal of bryophytes at the landscape scale. On the basis of a species atlas with a 4 × 4 km grid, the minimum distance separating species found on 52 slag heaps from potential source populations was determined. Minimum dispersal rates were inferred by coupling the information on minimum distance between slag heap and source populations with time since colonization. The number of species per slag heap is significantly correlated with time since colonization and area size. The frequency distribution of the longest dispersal events is highly skewed, with 44% of the species recruited within the nearest 6 km. In the remaining 56% of the species, recruitments from source populations located within a range of at least 6–86 km occurred within a period of less than 50 years. The majority of the species that are not recruited within the nearest vicinity of the slag heaps, including rare species at the regional scale, occur on slag heaps that have been colonized for 25–50 years. Most recently colonized slag heaps are indeed characterized by 'fugitive', weedy species, whereas slag heaps that have been colonized for > 50 years tend to accumulate perennial species with a 'stayer' life strategy. These observations suggest that rare species may display the dispersal ability to travel across the landscape, but are subsequently limited by their ability to establish a viable community because of more competitive neighbours. Rare species therefore tend to accumulate at intermediate colonization stages, which represent a trade-off between an increasing probability of colonization with time and a decreasing probability of establishment due to competition.