

Abstract

Invasion of *Rumex alpinus* in the Giant Mountains at the landscape scale

The invasion of an alien plant species *Rumex alpinus* (alpine dock) is a serious problem in the Giant Mountains National Park. This vigorous perennial plant has threatened the biodiversity and usage of the species-rich mountain meadows, especially in the last 50 years. Information is needed about the spread of the species at the landscape scale. That is the only way to discover the potentially dangerous source populations, and find out the measure of the exposure of habitats to invasion.

I describe and generalize the landscape dynamics using several parameters. It should be possible to create a model of the invasion on the basis of these parameters and the knowledge about the recent distribution of *Rumex alpinus* in the Giant Mountains. I explored the local population dynamics by field experiments. Using a geographic information system (GIS), examined the dependence of the distribution of the species on landscape variables and evaluated the susceptibility of habitats to invasion. I described long-distance dispersal by an exponential function of terminal velocity of the fruits, flower height and wind speed.

I performed a series of simulations of the invasion from the past to the present to calibrate a model of it. The results of the historical simulations, based on the vegetation maps from 1980 and 1997, were compared with the actual recent distribution. This comparison helped me to choose the two sets of parameters that best describe the historical spread. On the basis of these parameters, I created two possible scenarios of the future rate of the invasion in the Giant Mountains.

The population growth rate of *Rumex alpinus* is rather high, which is caused mainly by massive clonal reproduction and persisting. Generative reproduction probably plays an important role in long-distance dispersal. The risk of future spread is high because there are still habitats susceptible to the invasion in 70 % of the area of the Giant Mts. If the future trend of the spread is the same as in the past, there could be about 3 – 4 × more occupied habitats 20 years later, still not reaching its potential distribution.

Key words *Rumex alpinus*, invasion, Giant Mountains, Krkonoše, KRNP, population dynamics, long-distance dispersal, landscape, simulation