ABSTRACT

Germination is the most critical and vulnerable stage in the life cycle of many plants and it directly influences the regeneration potential of populations and thus long-term survival of species. Species germination is affected by external conditions such as light, temperature and moisture acting both during germination (target conditions) and on maternal plants during their life (original conditions). Target and original conditions can interact and affect seed germination as well. The strong temperature and moisture control of seed germination suggests that species recruitment rates and success may be strongly impacted by ongoing climatic changes. Simultaneously, species germination is influenced by characteristics of the seeds themselves, such as, seed mass or seed nutrient content, which can be affected by external climatic conditions as well.

This thesis aimed to i) investigate the effect of temperature and moisture acting separately and in interaction as target conditions, original conditions and as interaction between target and original conditions on germination behaviour of alpine species; ii) study effect of seed origin on seed mass and seed nutrient content and their effect on germination; iii) explore how abundance of species is affected by germination behaviour in central European mountains.

I found that i) both target and original conditions and their interaction affected germination behaviour. The lowest germination percentage and the highest speed was observed in extreme warm, dry target conditions. In these conditions, proportion of dormant seeds varied between study species from very low to high. The highest germination percentage was found in warm, wet target conditions. The exception was genus *Impatiens* (coming from the Himalayas), in which germination percentage increased in cold target conditions. Plants coming from warm original conditions showed the highest germination percentage. Further, interactions of target and original conditions demonstrated that the conditions in which species commonly grow are not necessarily ideal for seed germination, as a change in conditions increased the germination. ii) seed mass and nitrogen content in seeds were significantly affected by original climate, while carbohydrates and phosphorus were not. Higher seed mass caused higher and faster germination especially in warmer target temperature; iii) rare species had higher germination than those of their common congeners. Timing of germination was different. Rare species had higher germination after cold stratification and common species had higher germination during cold stratification.

Overall, I showed the importance of including both target and original conditions and especially their interaction into germination studies. For predicting future fates of species under climate change it is necessary to focus on the species responses to changes in conditions from original to novel. Further, the thesis illustrated that germination behavior is modified by seed mass, seed nutrient content and simultaneously, these traits are affected by climate of origin. Finally, I showed that rare species are apparently well adapted to local conditions in the mountains and the inability to germinate is not a cause of their rarity.

Key words: reproduction characteristics; seed mass; alpine species; original environment; target environment; maternal effects; phylogeny; species rarity