

Katharina Bardy

Establishment of snowbed plant species of the North-Eastern Calcareous Alps

Wien, 2005

The template of suitable habitats will probably shift upwards for alpine plant species due to climate change. Area loss and fragmentation will increase the importance of migration and non-clonal propagation, especially for species restricted to small and well-defined habitat patches such as snowbeds. Germination and successful establishment of seedlings are generally assumed to be rare in alpine regions but data on germination and establishment rates are still lacking for most alpine species.

This study focuses on four selected snowbed species (*Achillea atrata*, *Achillea clusiana*, *Arabis caerulea* and *Gnaphalium hoppeanum*) of the North-Eastern Calcareous Alps, Austria. Stratified seeds (chilled or treated with gibberellic acid) were grown in a climate chamber and transplanted to a snowbed on Mt. Rax at an altitude of 1820-1880m a.s.l.. The performance of the seedlings along a time-of-snowmelt-gradient and in different competitive environments was monitored throughout one vegetation period. The questions addressed were (1) if the stratification treatments had an influence on seedling establishment and (2) how strong the impacts of the position along the snowmelt-gradient and of the resident vegetation cover were on germination as well as on seedling establishment.

With respect to germination, seedling emergence was higher in plots with open vegetation compared to densely vegetated plots, for two of the species this difference was significant. With respect to the survival of transplanted seedlings, differences between the groups were not statistically significant for all predictors but trends within time could be detected. However, survival rates of transplanted seedlings have to be interpreted with caution as transplants had been grown in lowland common gardens during the probably most sensitive first weeks after emergence. The impact of chilling of seeds on the establishment of seedlings was minor at all observations or strongly lost importance within time. Seedlings emerged from seeds stratified with gibberellic acid showed lower survival compared to their control group except for *G. hoppeanum*, which showed the opposite trend. Seedlings transplanted at intermediate snowmelt showed the lowest mortality rates for all species. For all species except *G. hoppeanum*, dense vegetation led to a higher seedling survival than open vegetation, but differences decreased with time anywhere.

From our results we conclude that germinating seedlings profit from an intermediate level of protection by surrounding vegetation with competitive responses being more

pronounced for germination than for seedling establishment. Longer seasons will most probably drive an encroachment of grassland species into the current snowbeds and vegetation cover will hence increase. This may hamper the recruitment of snowbed specialists and the resulting negative population growth rates may lead to at least regional species extinctions in the long run.