Summary

SUMMARY

The influence of vegetation on the establishment of new seedlings was studied experimentally in a limestone grassland (*Mesobrometum*) in northern Switzerland. Seeds of six dicotyledonous species (*Arabis hirsuta*, *Linum catharticum*, *Medicago lupulina*, *Plantago lanceolata*, *Primula veris* s.l. and *Sanguisorba minor*) were collected at the study site and sown in artificially created microsites, which were differentially influenced by adult plants of three species common in the meadow (*Bromus erectus*, *Onobrychis viciifolia* and *Salvia pratensis*). The microsites were tufts of the adult plants, the edges around them and gaps beside them. The influence of moss cover on the establishment was studied on separate plots. Seeds were sown in August of 1986 and 1987. Emergence, fate of emerged seedlings and their growth was followed during one or two years. As the emergence after the first sowing was poor, the quantitative data presented in the summary is based on results of the second sowing.

1. Germination occurred in all microsites. Moderate vegetation cover increased the number of seedlings of all species, although it often delayed the emergence. Most seedlings emerged in spring. The only species with mainly autumn germination was *Arabis*.
2. Three major patterns of establishment in relation to the influence of neighbouring plants could be distinguished:
   - *Plantago* and *Sanguisorba* established well in all microsites. Their mortality was slightly higher in dense vegetation than in gaps, but in all microsites 50-90% of the emerged seedlings survived the first growth period.
   - *Linum* was extinguished by a fungal disease in spring 1988 regardless of the microsite. Thus the analysis of establishment is based only on the small number of seedlings, whose fate could be followed during 1987. The results indicate a good establishment in gaps and a detrimental effect of dense vegetation cover.
   - *Arabis* and *Primula* were hardly at all able to establish in gaps. They suffered a high mortality because of abiotic factors such as frost heave in winter (*Arabis*) and desiccation after the mowing of the meadow. The vegetation enhanced the establishment by stabilizing the soil and preventing the desiccation. Less than 5% of the *Arabis*-seedlings survived one year in the gaps, while the survival was 21-43% in edges and 25-52% in tufts. Moss cover enhanced the establishment of *Arabis* significantly. *Primula* survived to less than 25% in gaps, the figures for edges and tufts being 35-93% and 42-57%, respectively. Late emerging *Primula*-seedlings had a significantly higher mortality in summer than the early emerging ones.

   Medicago differed in its establishment in the two years of study. Survival in 1987 was high, 56-100% in the different microsites after one growth period. In 1988 survival was low. It was better in the shelter of *Onobrychis* (47-51%) than in the other microsites (0-42%).
3. The growth of the seedlings was very slow, and the seedlings remained small until the end of the study. Species with the best survival, *Plantago* and *Sanguisorba*, had the largest plants in autumn 1988. The growth of these species was reduced by vegetation cover.
4. The species of the neighbouring plant influenced the establishment and growth of *Arabis*, *Medicago* and *Plantago*. Seedlings of these species established better and were larger in *Onobrychis*-plots than in *Bromus*-plots.
5. Vegetation cover did not prevent the establishment of seedlings. Climatic factors were more decisive for their survival than competition. Neighbouring plants had a positive effect on establishment of species vulnerable to climatic hazards. On the whole, species differed more in their ability to establish in gaps than in dense vegetation. The observed slow growth and the survival of the seedlings over long periods in undisturbed turf are important factors for the maintenance of the high species density in nutrient-poor limestone grasslands.