Zeitschrift: Berichte des Geobotanischen Institutes der Eidg. Techn. Hochschule, Stiftung Rübel

Herausgeber: Geobotanisches Institut der Eidg. Techn. Hochschule, Stiftung Rübel

Band: 50 (1982)

Rubrik: Englische Zusammenfassungen der im Berichtsjahr 1982 abgeschlossenen Dissertationen und Diplomarbeiten

Englische Zusammenfassungen der im Berichtsjahr 1982 abgeschlossenen Dissertationen und Diplomarbeiten

Summaries of Ph D. and Diploma Thesis

Dissertationen (Ph D. thesis)

DICKENMANN Regula. Genetisch-ökologische Untersuchungen an *Ranunculus montanus* Willd. s.l. aus der alpinen Stufe von Davos (Graubünden). Veröff.Geobot.Inst.ETH, Stiftung Rübel, *78*, 89 S.

Genetic-ecological investigations in *Ranunculus montanus* Willd. s.l. from the alpine vegetation belt of Davos (Grisons).

Small-scale differentiation patterns were investigated in the *Ranunculus montanus* group from the alpine vegetation belt of Davos, Grisons. The study dealing with morphology, cytology, reproduction systems, germinating behaviour, population structure and ecological requirements comprised both laboratory experiments as well as field observations.

Correspondence analyses of eight morphological characters revealed that *R. montanus* s.str. was mostly but not always distinguishable from *R. grenierianus*. Furthermore, no correlation was observed between morphological characters and the pH values of the soil. The karyotypes of *R. grenierianus* (2n=2x=16), *R. carinthiacus* (2n=2x=16) and *R. montanus* s.str. (2n=4x=32) were very similar.

R. grenierianus, R. carinthiacus and *R. montanus* s.str. are almost completely self-incompatible and reproduce mostly by allogamy; their recombination system is thus potentially open. However, the gene flow seems to be confined to some population sectors. As far as *R. grenierianus* is concerned, these limitations are principally related to the reproduction biology whereas in *R. montanus* s.str. the population size plays as well an important rôle.

Experimental crosses show that *R. grenierianus* and *R. carinthiacus* are generally intercompatible but *R. montanus* s.str. and *R. carinthiacus* can exchange genes only occasionally. Crossing experiments as well as field observations suggest that no gene flow occurs between *R. montanus* s.str. and *R. grenierianus*. Germination of non-treated seeds in *R. grenierianus* and *R. montanus* s.str. was very poor, the gibberelline treatment only slightly improving the germination rates. On the other hand, very numerous seedlings were observed in the field at the beginning of the vegetation season. *R. grenierianus* and *R. montanus* s.str. have different requirements as to the soil type. Siliceous soils are mainly inhabited by *R. grenierianus* and only occasionally by *R. montanus* s.str. whereas in dolomite areas only *R. montanus* s.str. was observed. Populations of *R. grenierianus* in the study area were frequently large and semicontinuous without sharp limits, only the population density being variable. On the other hand, populations of *R. montanus* s.str. were mostly small and clearly separated from one another. These differences are apparently caused by distinct niche requirements of either taxon and also influenced by the absence of large habitats available to *R. montanus* s.str. within the alpine vegetation belt of Davos.

The most interesting microdistribution pattern of *R. grenierianus* and *R. montanus* s.str. at Jakobshorn followed precisely the recurrent microrelief: *R. grenierianus* occurred within grassy mounds whereas *R. montanus* s.str. inhabited the moister depressions and open scree slopes. The soil analyses further indicated the heterogeneity of the habitat. The chemical composition of the soil varied independently of the microrelief over very short distances. The skeleton content was usually higher in the depressions than on the mounds. The demographic studies revealed the usual population structure in *R. grenierianus,* numerous small plants being regularly distributed within the grassy vegetation. In the niches with *R. montanus* s.str. only few but large plants were observed, the flowering individuals being frequent. The pollen fertility in *R. montanus* s.str. was lower than in other stations; the seedling mortality was pronounced. In addition to the sexual reproduction, some clonal growth was observed. The particular behaviour of *R. montanus* s.str. at Jakobshorn suggests the formation of a local silicate race; it can be considered as the first step of a primary speciation on tetraploid level.

***

VETTERLI Luca. Alpine Rasengesellschaften auf Silikatgestein bei Davos (mit farbiger Vegetationskarte 1:2500). Veröff.Geobot. Inst.ETH, Stiftung Rübel, *76*, 92 S.

Alpine grassland communities upon silicate substrate near Davos (with a coloured vegetation map 1:2500)

In this work the author presents a detailed study of the vegetation and stations of an alpine zone near Davos (Switzerland). This area consists mainly of acidic silicate substrate, and, to a lesser extent, of calcareous schists. The climate rather continental has an annual mean temperature of around -1°C to -3°C and an annual precipitation amount of about 1200 mm.

More than 200 relevés constitute the basis of this study. They were first compared mathematically (using the correspondence-, cluster- and principal component analysis), then ordinated by hand into four tables, and finally classified according to habitat factors (chap. 3).

Results:

- thirteen units of local validity were distinguished:
  1 spring fens
  2 snow-beds with mosses
  3 extreme snow-beds with few mosses
  4 not very extreme snow-beds
  5 cool and sunny slopes
  6 fairly dry slopes
  7 warm slopes at the limit of the subalpine zone
  8 fairly warm slopes relatively rich in bases
  9 steep slopes relatively rich in bases
  10 winds ridges relatively rich in bases
  11 strong windy tops and ridges, poor in bases
  12 wind sheltered steep slopes with unstable soils
  13 shady, rather humid slopes
  Units 4, 5 and 11 have been further subsivided (see annex 2).
- The sequences of vegetation units 2-3-4b-5-6-7-, 2-3-4a-13-12-11, and 9-10 form three vegetation gradients. These gradients are easy to recognize from the correspondence analysis (reciprocal averaging) of the vegetation relevés made both on their florisric composition (see chap. 4.3.1 and fig. 7), as well as on their mean indicator values (chap. 4.3.2 and fig. 9).
- These vegetation gradients correlate closely with the duration of the snow cover (see chap. 4.3.3), which is mainly determined by the relief (chap. 4.2).
- The vegetation units 1,2,3,7,9 and 10 correspond to the *Eriophoretum scheuchzeri, Polytrichetum sexangularis, Salicetum herbaceae, Festucetum halleri, Festuco-Trifolietum thalii* and *Elygnetum*. The remaining units, which represent more than half the vegetation relevés, lie outside of the variation range of each association according to the tables of BRAUN-BLANQUET (1969) and OBERDORFER (1977,1978). They fall into the gaps or the transitions between two and occasionally three associations (chap. 4.1.1, 6.1 and annexes 2-4).

- The differences between the vegetation units described here and the associations described by BRAUN-BLANQUET (1969) and OBERDORFER (1977, 1978) are due to a different choice of the relevé surfaces. In these quoted studies, the distribution of the surface has been more or less "discreet" in order to cleraly determine distict associations, whereas in this study the surfaces have been continual. Differences in the vegetation due to differences in climate or in geographical plant distribution seem to be less important here.
- In order to map the thirteen vegetation units, a main phytosociological key and three partially overlapping keys (one for each vegetation gradient) have been elaborated (chap. 5.1, annexes 5-8).
- A phytosociological map (endscale 1:2500) of an area of 56 hectares has been drawn with the help of coloured aerial photographs, which greatly facilitated orientation in the field sites, and with the use of an orthophotography (fig. 11, p. 67).
- Among the phytosociological maps for similar regions published up to now, the present map constitutes the finest spatial and phytosociological resolution for alpine grassland vegetation.
- The rich variety of vegetation types on such a small area one can see on the map is mostly due to change in the relief.

***

Diplomarbeiten (Diploma thesis)

DANN Walter. Vergleich von Klonen verschiedener Herkünfte in ihrem Verhalten gegenüber Stickstoffkonzentrationen und Stickstoffformen am Beispiel von *Lemna gibba*. 56 S. (Manuscript). (Gekürzte Fassung s.S. 86 dieses Bandes).

Clones of *L. gibba* of different origin: behaviour at different concentrations of nitrogen.
(See p. 86 of this volume).

***

FORNALLAZ Claude. Veränderungen des Wasserhaushaltes von *Bromus erectus* Huds. und *Dactylis glomerata* L. im Verlauf einer Vegetationsperiode unter feuchten und trockenen Bedingungen im Freiland. 77 S. (Manuskript).

Seasonal course of water relations of *Bromus erectus* Huds. and *Dactylis glomerata* L. under irrigated and dry field conditions.

The seasonal course of stomatal resistance to water vapour transfer (r_l)

and the xylem water potential of *Bromus erectus* and *Dactylis glomerata* were examined in an unfertilized meadow (*Dauco-Salvio-Mesobrometum*) near Schaffhausen. Measurements were carried out on irrigated and artifically droughted plots. On the dry plots the number of plant species decreased from 34 to 27 and the cover from 99 to 75 % as compared to irrigated plots.

Even within the same species the variability of r_1 was very high. Under dry conditions it was always higher (up to 33%) than under irrigated conditions (up to 26%). The variability increases with higher r_1-values. The average r_1-value increases with the age of the leaves by a factor of 3 during 45 days. This holds true for both species. Under irrigated conditions the increase was significantly less (factor 1,5).

Bromus shows a sensitive, *Dactylis* a low stomatal regulation. *Bromus* always shows lower r_1-values and thus higher transpiration rates than *Dactylis*. In the first growth the xylem water potential critical for the restriction of transpiration was about 22 bars of both species. The second growth shows the same value for *Bromus* whereas *Dactylis* shows an increase to 25 bars. Both species transpire significantly less in the first than in the second growth. This can be explained by an increased water consumption during the reproductive phase.

With the exception of the adaptation already mentioned for *Dactylis* the stomatal resistance and the xylem water potential show no seasonal course (26 May - 15 September) neighther for the different species nor for the two treatments.

***

HARTWIG Ueli. Biosystematische Untersuchungen der Artengruppe von *Betonica officinalis*. 71 S. (Manuskript)

Biosystematic studies in the species-group of *Betonica officinalis* L.

Within the species-group of *Betonica officinalis* L. (=*Stachys officinalis* [L.] Trevisan) the species *Betonica officinalis* L. (from Switzerland, Yugoslavia, Germany, Austria and Italy), *Betonica serotina* Host (from Yugoslavia) and *Betonica hirsuta* L. (from northern Italy) were taken under consideration for biosystematical studies. The following results were obtained:

1) Morphologically, the species *B. officinalis* is very variable, even within a single population. However, the differences are so small, that a further division in taxa cannot be justified.

2) The following five characters showed significant differences between the population of *B. serotina* and the populations of *B. officinalis*: Length of the calyx, proportion of the length of the lower lip, habitus and length/widness-index of the stem leaves and the rosette leaves. According to these results a key is given to distinguish the two species *B. officinalis* and *B. serotina*:

   1 Inflorescence mostly branched, stem leaves five rimes as large as wide, rosette leaves four times as long as wide. *B. serotina*

1* Inflorescence mostly unbranched, stem leaves three times as long as wide, rosette leaves twice as long as wide. *B. officinalis*

3) Germination trials were carried out with differently pretreated seeds: Stratification of 5-10 weeks (4°C, humide or to freeze in and to several times). These methods led to a germination of 50-80%. Other methods (chemical and mechanical scarification, gibberellic acid- or Kott-treatment) led to a germination of less than 30%.

4) Countings of the chromosome (six populations of *B. officinalis*, one population of *B. serotina*, one population of *B. hirsuta*) yielded in 2n=2x=16 chromosomes corresponding with the reuslts of LANG 1940 and BERNHARD and CARBENIER 1980.

5) The population trials reached 3% seed formation for the spontaneous self-pollination and 30% for the artificial self-pollination.

***

Freies Geobotanisches Kolloquium

gemeinsam mit dem Botanischen Garten der Universität

GRAF K.J., Zürich: Pollen-analytische Untersuchungen in Torfmooren der Anden.
20. Januar 1982.

FERGUSSON D., Antwerpen: The phytogeographical and evolutionary implications arising from a combined study of fossil and recent Amentotaxus.
27. Januar 1982.

ELLER B.M., Zürich: Geophyllie: Oekologische Konsequenzen für *Ledebouria ovatifolia* an ihrem natürlichen Standort.
3. Februar 1982.

KNECHT M., Zürich: Araceen zwischen Schatten und Licht im tropischen Westafrika, oder eine Wuchsformbetrachtung.
10. Februar 1982.

MAYER H., Wien: Unser Vaterland begrünen... (Mao Tse-tung), Waldpflege in China.
17. Februar 1982.

KLEKOWSKI E., Amherst, USA: Genetic load in ferns.
24. Februar 1982.

VETTERLI L., Zürich: Alpine Rasengesellschaften auf Silikatgestein bei Davos.
10.12.1982.