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Lichen Mapping in Switzerland: The Epiphytic Lichens of the Plateau and the Prealps

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With 1 figure

Summary

A lichen mapping project has been started in Switzerland. The aims of the project are to provide chorological information as well as data for nature conservation. In a first stage this project will focus on the epiphytic lichens of the Central Plateau and the northern Prealps. This area has been divided into 187 mapping units of 10 km x 10 km according to the national grid of Switzerland. Quantitative as well as qualitative aspects will be studied. In each mapping unit a minimum program will be carried out, ensuring standardization. As far as they are available, historical data will be taken into account. The data will be stored in a relational database ("Biodat") on PC computers.

1. Introduction

Since the death of Eduard Frey in 1974 (Welten & Ammann 1976) lichen floristics in Switzerland went through a silent but fruitful period of reorganisation. Today, about 15 trained lichenologists are willing to contribute to a lichen mapping project.

However, it would be a serious mistake to underestimate such a task as mapping the lichen flora in a country like Switzerland. When planning such a project one has to keep in mind at least three important facts:

Firstly, lichenology is far from being strongly and definitively established in the country. Unlike the mapping project for vascular plants (Welten & Sutter 1982) and bryophytes (Urmi et al. 1990), our project will be done, at least in its first stage, in spare time. Moreover the number of amateur lichenologists is very small (about one tenth of the number participating in the lichen mapping project of the British Isles (Seaward & Hitch 1982)).

Secondly although being one of the smallest countries in Europe (41.288 km^2), Switzerland shows an extreme diversity of the lichen flora:

Its altitudinal range extends from 193 to 4634 m. a.s.l., covering all the zones between the colline and nival belts with a well developed arctic-alpine element at the highest altitudes (Frey 1960).

Because of its central geographic position in Europe, Switzerland is a meeting point of several important phytogeographical elements, e. g., the oceanic west European element and the mediterranean element.

There are several specific and interesting habitats, e. g., the inner alpine dry valleys (Buschardt 1979) or the insubrian area in the southern Alps (warm oceanic element).

The high complexity of the alpine geology covers the whole range of rock types except for most of the volcanic substrates.

Thirdly many alpine rock habitats are not easily accessible, so that time and energy needed for mapping their flora is greater.

Considering these points it is not surprising that Switzerland is one of the last European countries to initiate a national lichen mapping project.

2. Background

Beside providing strictly chorological information (atlas with distribution maps of the lichen species of the area studied) the project aims at emphasizing aspects of nature conservation. Lichens are very sensitive indicators of air pollution (Ferry et al. 1973, Hawksworth & Rose 1976, Jürging 1975) and site disturbance (Rose 1976, Groner & Clerc 1988, Wildi & Camenzind 1990, Dussex & Held 1990). There are indications of rapid changes in the lichen flora of industrial countries. A main goal of this project is to characterize rare and endangered species ("Red data lists"), outline rare biotops or habitats of special interest, and protect these biotopes and their flora.

Epiphytic lichens are among the most threatened organisms in Europe and the epiphytic flora has undergone dramatic changes (Wirth 1976, Türk & Wittmann 1986, Wirth 1987, Ruoss & Clerc 1987). There is little information about their distribution in Switzerland. Easily recognizable macrolichens are an important part of this group and the percentage of taxonomically well defined taxa is much higher for epiphytic than for, e. g. saxicolous lichens.

These last two points are important if we consider the accuracy of field work and determinations as well as the training of collaborators.

The Swiss Central Plateau, with its high population density, its very dense network of roads, its industry, and its intensive farming is the area of strongest conflicts between man and nature. Consequently it is on the Plateau and adjacent areas where lichens are threatened most and here the most obvious regression of the lichen flora has been observed. Furthermore the Plateau is the area best accessible in Switzerland, this being important when considering time invested in travelling.

The Northern Prealps shelter many rare epiphytic communities, e. g. the oceanic west european element in central Switzerland (Clerc 1984, Groner & Clerc 1988, Groner 1990, Dietrich 1990, Wildi & Camenzind 1990) with small ecological amplitude, very sensitive to site disturbance like intensive forest management (Esseen et al. 1981), air pollution and wet acidic deposition (Farmer et al. 1990). Moreover this area is of high interest within the frame of forest decline studies.

Such a project should not last more than five years from the start to the publication of the results in order to avoid outdating of the first observations at the time of publication as well as to maintain interest and enthusiasm among mostly honorary collaborators.

3. The project

The points considered above recommend an initial project limited in time and size, focusing on the most threatened organisms and most sensitive areas. For this reason we decided to map the epiphytic lichens of the Swiss Central Plateau and the northern Prealps first. However, the project will be organized and managed in such a way that it will be a good basis for a future mapping of all lichens in Switzerland. This means that data collected from other substrates and areas, e. g., saxicolous species from the alpine zone, can readily be incorporated in the data bank.

Interpretation of the data at the regional or national level requires a more detailed grid than the one used at the European level. For this reason we decided to choose square mapping units of 10 km x 10 km according to the national grid of Switzer-

land. The data can then be transferred to the 50 km x 50 km UTM grid to be used for the European mapping project by a computer program.

Field work in the 187 square units (Fig. 1) will rely partly (relevés A and B) on the methods developed and used within the framework of the Natural Inventory of the Swiss Bryophytes (URMI et al. 1990). A so called minimum program will be carried out for each 10 km x 10 km square. This will ensure standardization of the investigation of the units: Each mapping unit will be investigated with the same intensity and selectivity, resulting in an equal density of collection over the whole area. The following types of standard-relevés are planned:

Relevés A: For each square unit, several localities will be studied whose coordinates have been randomly established. These relevés will provide important quantitative information on the flora, often neglected in such projects. We will be able to determine statistically the frequency of any given species in a relevé A with respect to other species.

Relevés B: For each square unit, localities will be selected by the field-worker himself, on the basis of his field-knowledge and experience. Each relevé of type B will have to be of a different habitat type: forest, isolated trees, orchard trees etc. Focusing on the qualitative side of the information collected, this type of relevé is complementary to the former one, covering rare habitats seldom or never recorded by the type A relevés. Particular attention will be paid to localities with a rich or unique epiphytic lichen flora.

The size of the relevés of type A and B, as well as their respective number for each 10 km x 10 km square is still a matter of discussion.

Relevés H: From 1920 to 1974, EDUARD FREY, the most important contributor to lichen floristics in Switzerland in this century, visited numerous localities in the mapping area. Besides collecting specimens (deposited in the herbarium BERN) he made notes on all species he observed and often made relevés. His notebooks are very precious documents of the past situation of the lichen flora of these localities. They will be analysed and as far as the collecting sites can be precisely localised in the field, new relevés will be made on the same tree if possible. Historical notes and collections of other lichenologist will also be taken into consideration. This will give a fairly accurate idea about the floristic changes since the first relevés.

In addition to these standardized relevés traditional field work will be done in many mapping units, allowing to record rarer species. These records will be kept and processed apart in order to differentiate them, on the maps, from data collected in standard relevés.

For selected species herbarium specimens of every large public herbarium in Switzerland (BERN, G, LAUS, Z, ZT) and abroad (e. g. STR) will be analysed and mapped.

All the data collected will be electronically processed and stored in a relational data bank. The program (BIODAT) was written by PAUL DIEDERICH (Luxembourg) and will be adapted for this project. This ensures full compatibility with mapping projects of other European countries using the same program (Belgium, Luxembourg).

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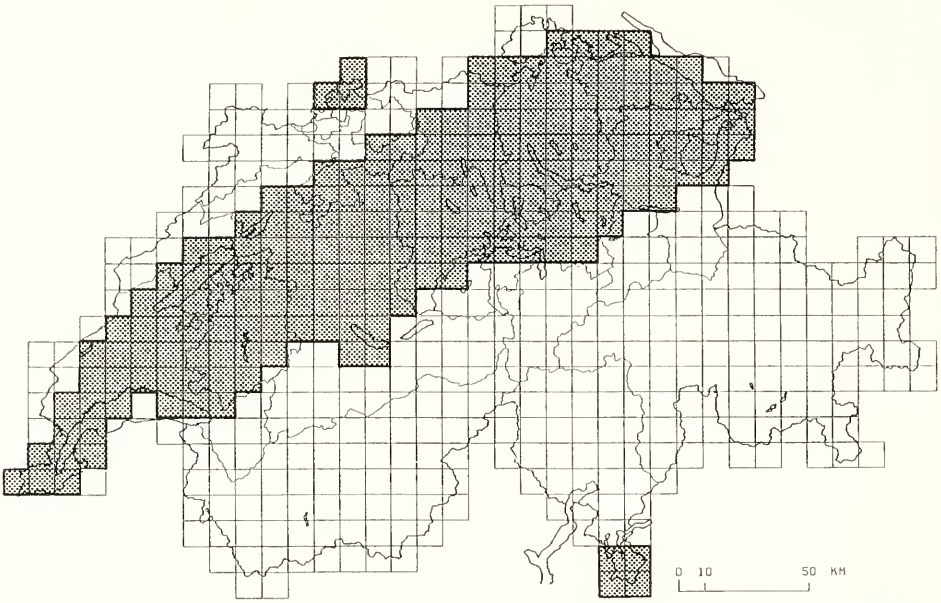

Fig. 1. National grid of Switzerland with mapping units of 10 km x 10 km. – *Dotted area*: area to be mapped in the first stage.

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