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DAMAGE TO EPIPHYTIC LICHEN VEGETATION CAUSED BY HAIL

Mechanische Schädigung der epiphytischen Flechtenvegetation durch Hagel

by
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Key words: Bioindication, lichen decrease.
Schlagwörter: Bioindikation, Flechtenrückgang.

Summary: In two recent investigations in Switzerland an abrubt decrease in epiphytic lichens could not be explained by changes in air pollution alone. Also the physical damage caused by climatic events can be an important limiting factor, wich has to be taken in consideration when using lichens as air pollution monitors.

Zusammenfassung: In zwei Untersuchungen in der Schweiz wurde ein drastischer Rückgang der epiphytischen Flechtenvegetation beobachtet, der nicht mit Änderungen in der Luftqualität erklärt werden konnte. Als limitierender Faktor wird die mechanische Schädigung durch klimatische Extremereignisse diskutiert. Dieser Faktor ist bei der Anwendung von Flechtenbioindikationsmethoden mitzuberücksichtigen.

Introduction

Investigations in the northern part of Switzerland (Fig. 1) showed that extreme climatic situations can be responsible for a decrease in lichen vegetation. A hailstorm in Küssnacht in Central Switzerland in 1992 nearly destroyed the whole lichen population on trees (VONARBURG 1993). A follow-up investigation on alley trees near Lake Zurich in 1994, five years after a lichen mapping, showed a dramatic reduced cover of lichens as well as physical damage (AfU SZ 1994). The abrupt decrease in lichens could not be explained by changes in air quality alone. Other possible reasons for the lichen decrease had to be

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considered.

Thunderstorm with hail in Küssnacht at Lake Lucerne

On July 21, 1992, a thunderstorm crossed a large area around Küssnacht (434 m.a.s.l., at Lake Lucerne, at the base of Mt. Rigi, Central Switzerland). The lichen vegetation exposed to the storm was destroyed to a large degree. The trees themselves were also damaged, and the lichens on branches and on the weather side of the trees suffered considerable damage. However, lichens growing in protected sites of the trees survived.

Follow-up investigation at Lake Zurich

In a bioindication project in 1988/89 the lichens on alley trees (*Aesculus* spec.) around Lake Zurich were studied (VONARBURG et al. 1989). Six years later the lichens at some of the sites were reexamined to see if the air quality had changed (AfU SZ 1994). Compared to the first investigation, a dramatic decrease in lichen vegetation could be observed (Fig. 2 to 4). The lichen cover at three sites (11 trees) had decreased, while visible damage had increased. The number of species had slightly decreased.

Foliose lichens, especially those on the weathered side of the trees, showed physical damage in form of spots, giving a perforated appearance. This particular kind of lichen damage was also observed on trees in Küssnacht. Air pollution measurements during this period indicated little improvement in air quality. The enormous lichen decrease did not correlate with air pollution data.

Although in this instance a single hailstorm might have caused considerable damage to lichen thalli, other factors such as the impact of insects, man, animals, as well as various climatic elements, should not be excluded. Further studies are needed.

Conclusions

Considering the slow growth of lichens, the physical damage caused by hail and strong winds can be important limiting factors. Results from New Zealand (BÜDEL et al. 1995) show, that also raindrops can produce mechanical damage to lichen thalli. The occurence of such dramatic climatic events shows in fact the limits of using lichens as bioindicators. In areas with little air pollution, climatic factors can have a greater impact upon lichen vegetation than air pollution (RUOSS & VONARBURG 1995). According to SCHÖLLER (1993) general models have to be developped. Results from this about lichen biology and their habitat should lead to an ingenious use of lichens as air pollution monitors. Follow-up investigations should especially take into account the

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environmental history that has occured in the habitat, since the initial study.

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Figures:



Fig. 1: Investigation areas

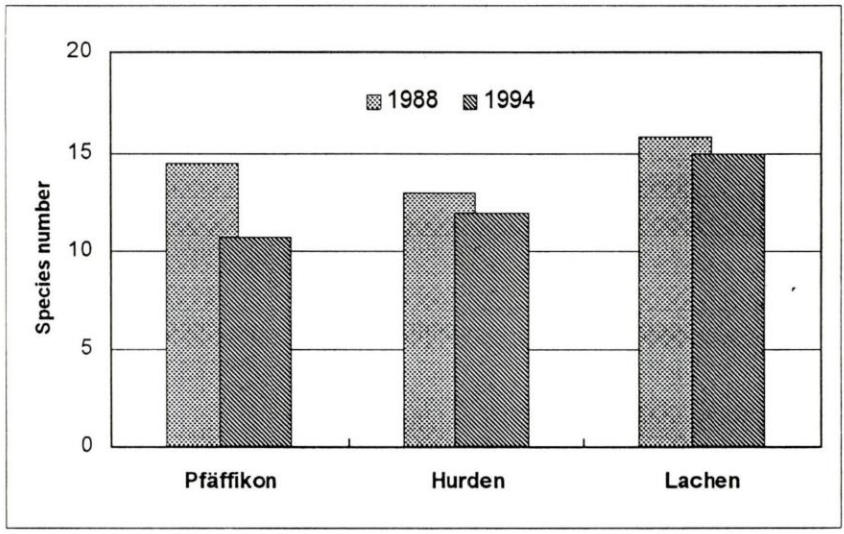


Fig. 2: Comparison of species number 1988 and 1994 at three sites near Lake Zurich

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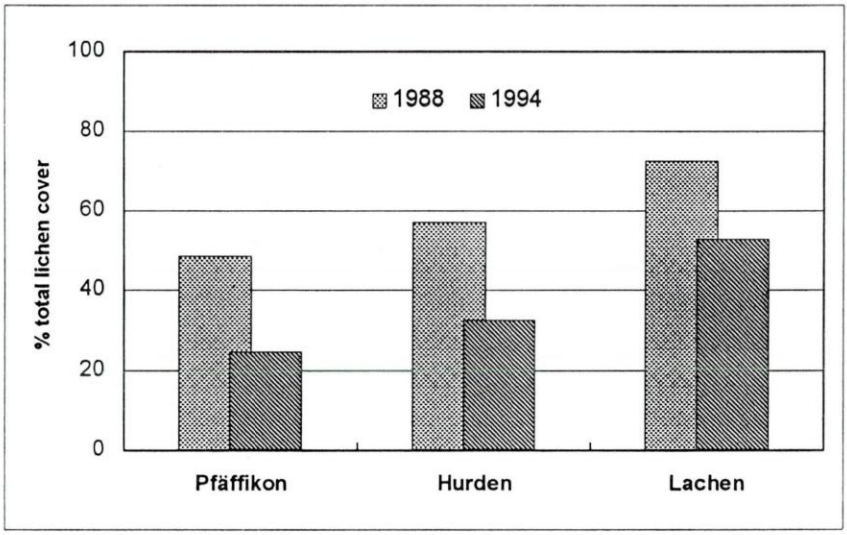


Fig. 3: Comparison of total lichen cover 1988 and 1994 at three sites near Lake Zurich

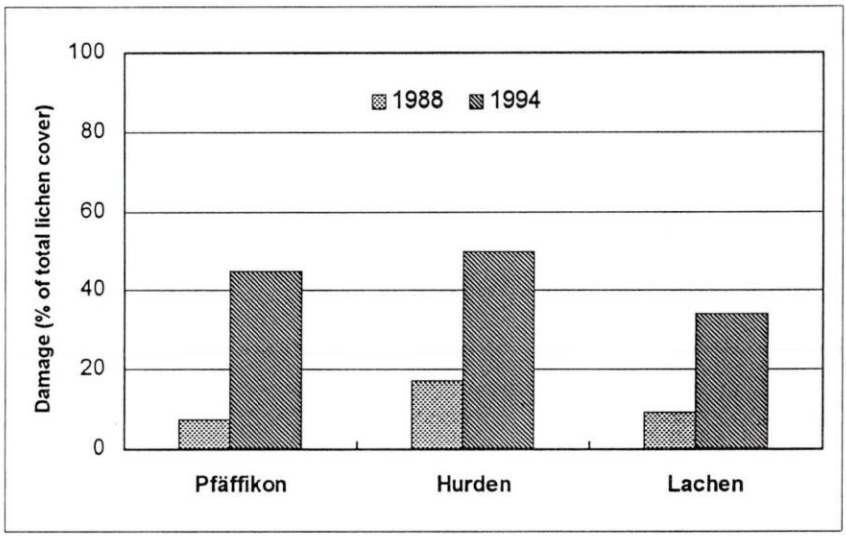


Fig. 4: Comparison of damage 1988 and 1994 (in % of total lichen cover) at three sites near Lake Zurich

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