

**International Workshop on „Acidified Lakes in the Bohemian/Bavarian Forest- History, Present and Future“ March 21-23, 2000,
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Oral presentation:

Ecological relationships of *Isoëtes lacustris* L. with its environment

Field studies have been performed on *Isoëtes lacustris* populations in a multitude of lakes throughout Europe. Several biometrical attributes were measured on thirty plants per lake; the most important proved to be the number of leaves per rosette and the number of spores per macrosporangium. A highly significant regression was established between both parameters. As *Isoëtes* growth may be affected by climate, air pollution and contamination of the catchment area of the inhabited lake, the following environmental factors were also determined for sampled populations: growing season length, water pH, Secchi depth, and water colour (in Hazen). It was determined with (highly) significant regressions that with a shorter growing season, populations experiencing a higher Hazen number or a lower Secchi depth, a smaller number of leaves were recorded. The graphic expression of the relationship between water pH and the number of spores per macrosporangium is a parable. The maximum number of spores (about 120, which agrees with about 35 leaves per rosette) was found in water of pH 6.6. In acidic water (pH 4.8) or alkaline water (pH 8.4) most plants were without macrospores.

Implicating the regressions and the parable established a monitoring project has been proposed. According to the environmental data measured, the number of leaves per rosette and the number of spores per macrosporangium are calculated. Whilst SCUBA diving, the leaves have to be counted on thirty sporogenous plants and the mean value is calculated; it was 23 leaves in lake Cerne in 1990. Comparing the mean value with the (above) calculated values, an evaluation is possible which environmental factor(s) limits the *Isoëtes* growth in a particular lake. Spores count on detached macrosporophylls (63 spores in Cerne lake) and a compare with the parable data enable the evaluation of the pH possibly affecting the reproductive status. Low pH and low water transparency of Cerne lake explain the suboptimal number of leaves per rosette and number of spores per macrosporangium. Additionally, the number of spores may be calculated from the number of leaves per rosette. Local negative affects in a lake become evident by a lower number of leaves, whilst diving. A further indication of the reproductive status is seen in the existence or frequency of the early-juvenile individuals, which possess 3 leaves, on average. The maximum depth that is inhabited by *Isoëtes*, also characterizes the lake trophy state.

The advantage of the proposed non-destructive monitoring is: when determining the growth and reproductive status of the quillwort in a particular lake whilst diving, environmental factors that negatively affect the plants, may be recognized. In case the necessary measures are used, the quillwort, hopefully, may be preserved from becoming extinct. There is an urgent need to preserve the highly valuable quillwort species, the genus existing for more than 200 millions of years.