

Annual report of the Geobotanical Institute ETH (2002)

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The Institute's activities in the year 2002 reflect the large diversity of fundamental and applied research projects in which it is involved. Several interdisciplinary collaborative projects with other Swiss institutes were completed, such as the Polyproject PRIMALP on sustainable primary production in the Alps as well as the project on biodiversity in the agricultural landscape of Northern Switzerland (part of the Swiss National Fund integrated project on biodiversity). The Institute continues to involve itself in nature conservation and environmental research, for example through the leadership of both the Swiss commission for wild plant conservation and the working group on invasive plants, through participation in the Biodiversity Forum, the international 'Guidelines' project (ecological risk assessment) and several projects on the management and restoration of wetlands. At the same time, there is a strong development of fundamental research in the fields of systematics and evolution, for which some of the most modern molecular and biochemical techniques have been implemented.

The Institute's publishing activity was further enhanced according to international standards. Thus, as from 2002, the journal *Perspectives in Plant Ecology, Evolution and Systematics* appears with four issues per year (instead of two) and is now abstracted by the *ISI Web of Science*. The *Bulletin of the Geobotanical Institute ETH* is published in both printed and electronic form; the latter is also available and searchable on the homepage of *Opulus Press*, the publisher of *Journal of Vegetation Science*.

Teaching was provided as usual to undergraduate and graduate students from ETH as well as from the University of Zurich. The number of undergraduate students is currently exceptionally high, mainly because changes in the Swiss High School system cause more students to obtain their 'Maturität' at the same time.

Structural changes at ETH, already mentioned in previous annual reports, have continued to progress, and many Institute members are directly involved in the planning process. The new Europe-wide study system leading to a Bachelor or Master degree will be introduced by the Department of Environmental Sciences in October 2003 for. At the same time, undergraduate studies—especially the first year—will be to a large extent merged among the Departments of Environmental Sciences, Forestry, Agronomy and Earth Sciences. This major change implies the modification or withdrawal of many existing courses, while new courses need to be developed. For several years, the old and the new system will co-exist within ETH as the current students complete their studies according to the old system of diploma courses.

An improved research collaboration among the Departments of Environmental Sciences, Forestry, Agronomy and Earth Sciences within a new 'Centre for Environmental Sciences and Natural Resources' has also been decided. The Department of Forestry will merge with that of Environmental Sciences at the beginning of 2004. Close collaboration between the Geobotanical Institute and other research groups within the Centre is planned, especially in the fields of ecological modelling and ecosystem management.

On 28 June 2002 an interesting excursion to the Seebachtal (TG) was organised for members of the Department of Environmental Sciences by Dr. Dieter Ramseier and Matthias Suter. They presented an ongoing wetland restoration project as well as a large scale field experiment on plant competition.

The annual Institute excursion (18 to 22 August 2002) took the participants to the River Tagliamento in northern Italy. The main organisers, Dr. Sophie Karrenberg van der Nat and Dr. Dimitri van der Nat, had carried out their postgraduate research in this area; there is also a continued research collaboration with EAWAG and British research groups. The excursion gave an excellent insight into the dynamics of one of the last unregulated river floodplains of Europe.

After having been the head of the Department of Environmental Sciences for two years, Prof. Peter Edwards left on 1 October 2002 for a six-months Sabbatical in Costa Rica; Prof. Andreas Gigon acted as Institute leader during this time.

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Prof. Dr. Frank KLÖTZLI, Geobotanisches
Institut ETHZ (1.1.–31.12.02)

Prof. Dr. Elias LANDOLT, Geobotanisches
Institut ETHZ (1.1.–31.12.02)

2.3 STAFF CHANGES IN 2002

Prof. Dr. Barbara ROY, who was appointed as professor at the University of Oregon in 2001, definitely resigned from her position as ETH professor in autumn 2002. It is hoped that her position will be filled again by a new Professor of Plant Evolutionary Ecology or

Plant Ecological Genetics.

Prof. Dr. Egon HORAK formally retired on 31 May 2002. However, he will continue to work at the Institute for some more time to ensure the continuity of his important work in the field of mycology, and especially the scientific direction of the mycological herbarium. Prof. Horak is recognised as one of the leading specialists in fungal systematics world-wide. He has had innumerable research collaborations with research institutes on all continents and still spends several months per year abroad to revise the taxonomy and systematics of certain fungal groups. He has been very active as author of scientific papers, monographs or book chapters and as scientific editor of mycological journals. In addition, he offered high-level mycological courses to students at ETH.

3 Research

3.1 OVERVIEW

The research of the Geobotanical Institute is focused on four main directions: plant ecology, plant evolution and systematics, mycology, and archaeobotany; the current research topics of the research groups are listed below.

3.2 RESEARCH FIELDS

SECTION PLANT ECOLOGY

Group 1: Community and Ecosystem Ecology (Prof. Dr. P.J. Edwards, Dr. C. Abivardi, Dr. R. Billeter, Dr. H. Dietz, Dr. S. Gusewell, Dr. E. Weber)

- Ecosystem processes: nutrient budgets, herbivory and other biotic interactions
- Ecosystems on a landscape level and GIS
- Agroecology
- Physiological and ecological characters of plants; plasticity in response to light and

nutrients

- Herb-chronology and its application to population ecology
- Ecology of invasive plants

Group 2: Plant Ecology and Conservation Biology

(Prof. Dr. A. Gigon, Dr. M. Di Giulio, Dr. D. Ramseier)

- Ecological stability: concepts and case studies
- Competition, positive biotic interactions, and coexistence of plants
- Assessment of biodiversity
- Management for nature conservation

Group 3: Risk Assessments of Genetically Modified Organisms (Dr. A. Hilbeck)

- Transgenic plant–insect interactions
- Nontarget effects of transgenic host plant resistance
- Consequences of transgene flow on populations of plants and plant-associated organisms
- Development of international scientific guidelines for the assessment of environmental risks of GMO's

SECTION EVOLUTION AND SYSTEMATICS

Group 1: Plant Systematics and Evolution

(Dr. M. Baltisberger, Prof. Dr. E. Landolt, Dr. A. Widmer)

- Speciation and population genetics in *Draba*, *Ranunculus*, *Ophrys* and *Viscum*
- Microevolution and genetic adaptation in a changing environment
- Plant–pollinator interactions
- Taxonomic revision of the Lemnaceae
- Survey of the flora of Zürich

Group 2: Evolution

(Dr. F. Schiestl; vacant professor)

- Evolution of plant–pollinator interactions
- Sexual deception in Orchids

SECTION MYCOLOGY

(Prof. Dr. E. Horak, PD Dr. A. Leuchtman)

- Plants and fungi (ectomycorrhiza, saprophytes) in various habitats of the northern and southern hemisphere
- Monographic revision of several genera of the Agaricales (*Crepidotus*, *Galerina*) and Boletales (*Boletellus*)
- Evolution and ecology of symbiotic interactions between grasses and endophytes
- Dispersal and infection strategies of the endophyte *Epichloë*

3.3 NEW RESEARCH PROJECTS 2002

(Title. Source of funding; Research assistant(s); project leader)

- Odor communication and the evolution of pollination syndromes in Orchids. ETHZ; C. Salzmann; F. Schiestl.
- Biosafety testing guidelines. DEZA; E. Underwood; A. Hilbeck.
- Invasions of woody plants into the Seychelles tropical forests. ETHZ; C. Küffer & E. Schumacher; H. Dietz, P.J. Edwards & K. Fleischmann.

4 List of publications 2002**4.1 PERSPECTIVES IN PLANT ECOLOGY, EVOLUTION AND SYSTEMATICS, 5 (2002)**

The fifth volume of the journal *Perspectives in Plant Ecology, Evolution and Systematics* appeared in four issues with a total length of 249 pages. The aims and scope of the journal are given under

<http://www.urbanfischer.de/journals/ppees>

Issue 1/02

Kollmann, J., Dietz, H. & Edwards, P.J. Editorial – recent developments in the journal.

Aarssen, L. W. & Schamp, B. S. Predicting distributions of species richness and species size in regional floras: applying the species pool hypothesis to the habitat templet model.

Imbert, E. Ecological consequences and ontogeny of seed heteromorphism.

Güsewell, S. & Koerselman, W. Variation in nitrogen and phosphorus concentrations of wetland plants.

Leite, E. J. State-of-knowledge on *Astronium fraxinifolium* Schott (Anacardiaceae) for genetic conservation in Brazil.

Issue 2/02

Sabater, B., Martin, M., Schmitz-Linneweber, Ch. & Maier, R. M. Is clustering of plastid RNA editing sites a consequence of transitory loss of gene function? Implications for past environmental and evolutionary events in plants.

Lumbsch, H.T. How objective are genera in euascomycetes?

Stagegaard, J., Sørensen, M. & Kvist, L. P. Estimations of the importance of plant resources extracted by inhabitants of the Peruvian Amazon flood plains.

Lopez, F., Fungairino, S. G., Serrano, J. M., de las Heras, P. & Acosta, F. J. Analysing hierarchically-structured fitness and modular dynamics in plants: integration of concepts from population dynamics.

Dietz, H., Kollmann, J. & Edwards, P. J. Editorial comment – Forum section.

Looijen, R. C. & van Andel, J. A reply to Thomas Parker's critique of the CI community concept.

Parker, T. V. The concept of the ecological community and a clash of perspectives: A reply to Looijen and van Andel.

Issue 3/02

Ehrlén, J. Assessing the lifetime consequences of plant-animal interactions for the perennial herb *Lathyrus*

vernus (Fabaceae).

Woitke, M., Dietz, H. Shifts in dominance of native and invasive plants in experimental patches of vegetation.

Loreto, F. Distribution of isoprenoid emitters in the *Quercus* genus around the world: chemotaxonomical implications and evolutionary considerations based on the ecological function of the trait.

Leite, E. J. State-of-knowledge on *Myracrodruon urundeuva* Fr. Allemao (Anacardiaceae) for genetic conservation in Brazil.

Issue 4/02

Greogius, H.-R., Bergmann, F. & Wehenkel, C. Analysis of biodiversity across levels of biological organization: a problem of defining traits

Rixen, C., Stöckli, V. & Ammann, W. Does artificial snow production affect soil and vegetation of ski pistes? A review

Kaitaniemi, P. & Ruohomäki, K. Factors controlling resource allocation in mountain birch

4.2 BULLETIN OF THE GEOBOTANICAL INSTITUTE ETH, 68 (2002)

Articles

Von Arx, G., Bosshard, A. & Dietz, H. Land-use intensity and border structures as determinants of vegetation diversity in an agricultural area.

Poinar, G. O., Bonnicksen, R. & Hedlund, C. Reconstruction and climatic interpretation of a late Pleistocene peat deposit in northwestern Oregon.

Studer, S. & Edwards, P.J. Morphological variation of plant populations from differently managed grasslands.

Billeter, R., Schneller, J. & Diemer M. Genetic diversity of *Carex davalliana* and *Succisa pratensis* in mown and abandoned fen meadows.

Research Projects and Notes

Schiestl, F.P. Odor communication and the evolution of pollination syndromes in orchids.

Schwienbacher, E. & Erschbamer, B. Longevity of seeds in a glacier foreland of the Central Alps – a burial experiment.

Buschmann, H., Edwards, P.J. & Dietz, H. Does herbivory by slugs influence the invasiveness of perennial Brassicaceae?

Fischer, H.S. & Gilgen, H. DACHRad – Berechnung der direkten Sonneneinstrahlung in Deutschland, Österreich und der Schweiz.

Bratteler, M., Widmer, A., Baltisberger, M. & Edwards, P.J. Genetic architecture of traits associated with habitat adaptation in *Silene vulgaris* (Caryophyllaceae).

4.3 FURTHER PUBLICATIONS

A Publications in refereed journals or books

Baltisberger, M., Dähler, D. & Horat, S. (2002) Karyologische Untersuchungen an den schweizerischen Arten der Gattung *Polygonatum*. *Botanica Helvetica*, **112**, 91–101.

Berry, N.R., Büeler, T., Jewell, P.L., Sutter, F., & Kreuzer, M. (2001) The effect of supplementary feeding on composition and renneting properties of milk from cows rotationally grazed at high altitude. *Milchwissenschaft*, **56**, 123–126.

Berry, N.R., Jewell, P.L., Sutter, F., Edwards, P.J. & Kreuzer, M. (2002) Selection, intake and excretion of nutrients by Scottish Highland suckler beef cows and calves and Brown Swiss dairy cows in contrasting Alpine grazing systems. *Journal of Agricultural Science*, **139**, 437–453

Bigler, F., Babendreier, D. & Kuske, S. (2002) Risiken bei der Maiszünsler-Bekämpfung mit Schlupfwespen. *Agrarforschung*, **9**, 316–321.

Brem, D. & Leuchtman, A. (2002) Interspecific competition of endophyte infected vs. uninfected plants of two woodland grass species. *Oikos*, **69**, 281–290.

Buschmann, H. (2002) Fecundity of yellow-bellied toads *Bombina variegata* under free-range conditions: an indication of risk-spreading strategy. *Amphibia-Reptilia*, **23**, 362–369.

Dietz, H. & Fattorini, M. (2002) Comparative analysis of growth rings in perennial forbs grown in an alpine restoration experiment. *Annals of Botany*, **90**, 663–668.

Dietz, H., Köhler, A. & Ullmann, I. (2002) Regeneration growth of the invasive perennial forb *Rorippa austriaca* (Brassicaceae) in relation to fertilization and interspecific competition. *Plant Ecology*, **158**, 171–182.

Dietz, H. & Schweingruber, F.H. (2002) Annual rings in native and introduced forbs of lower Michigan, USA. *Canadian Journal of Botany*, **80**, 642–649.

Dietz, H. (2002) Plant invasion patches – reconstructing pattern and process by means of herb-chronology. *Biological Invasions*, **4**, 211–222.

Edwards, P.J., Kollmann, J. & Fleischmann, K. (2002) Life history evolution in *Lodoicea maldivica* (Gmel.) Pers. *Nordic Journal of Botany*, **22**, 227–237.

Garibay, S.V., Richner, W., Stamp, P., Nakamoto, T., Yamagishi, J., Abivardi, C., & Edwards, P.J. (2001) Extent and implications of weed spatial

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- Kollmann, J. & Pflugshaupt, K. (2001) Flower and fruit characteristics in small and isolated populations of a fleshy-fruited shrub. *Plant Biology*, **3**, 62–71.
- Kollmann, J. & Buschor, M. (2002) Edges effects on seed predation by rodents in deciduous forests of northern Switzerland. *Plant Ecology*, **164**, 249–261.
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- Wong, B. & Schiestl, F.P. (2002) How an orchid harms its pollinator. *Proceedings of the Royal Society, London Series B*, **269**, 1529–1532.
- B Publications in other scientific journals, book chapters and books**
- Baltisberger M. (2002) Cytological investigations on some Albanian plant species. *Candollea*, **56**, 245–259.
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