

## Newsletter of the National Centre of Competence in Research (NCCR)

### Plant Survival in Natural and Agricultural Ecosystems

## Editorial

## Strengthening partnerships

The transition from fundamental research to a coordination position is always somewhat of a challenge for those confronted with this. One year ago, I undertook the position of Scientific Coordinator for the NCCR *Plant Survival*. Since then, our research network has continued to evolve in order to better carry out the objectives that were initially set out. Consequently, the Swiss National Science Foundation has asked us to orient part of our research towards areas with potential application. That is why the priority in 2004 will shift to the elaboration of CTI projects (Federal Innovation Promotion Agency). These projects are founded on the basis of a partnership between an academic research group and an industrial enterprise (SME or start-up).



communication officer, would like to be informed at least one month prior to the date that an article is to appear in a scientific journal so that he can plan an eventual press release. This is indispensable in order to show that our work addresses the preoccupations of society in general.

Finally, after this first year of work, I would like to thank all the researchers of the NCCR that have taken the time to explain to me their area of research and their objectives. Having not yet finished my rounds of the laboratories, I look forward to resuming them and to gather more convincing arguments that will strengthen our demand to prolong the NCCR for the second phase.

**Claire Arnold**

Scientific Coordinator of the NCCR *Plant Survival*  
University of Neuchâtel

To address this demand, the participants meetings will consist this year of meetings between members of the NCCR, research stations, universities, and industry, with the goal of developing «oriented» research projects. This year's first participants meeting organised in January at Agroscope FAL Reckenholz helped in establishing the basis for two CTI projects (see p.4).

To this day, some ten researchers from the NCCR have expressed their interest. The management team's role consists of organising coordination meetings that will lead to the submission of a project. However, even if we are capable of helping, it is preferable that the researcher carries out the search for an industrial partner, since he or she is in a better position to promote the research proposal. Subsequently, we will work in close collaboration with the project leader to help with the proposal's administrative tasks (collecting data, filling out forms, preparing and revising budgets). We will gladly do a critical review of the documents in order to ensure that the CTI's evaluation criteria are met. The submission of several CTI projects will represent without a doubt an asset for our transition into the second phase of the NCCR *Plant Survival*.

These future perspectives, however, could not have been so clearly drawn out without the data from the last annual report. In fact, this report not only summarized the scientific work accomplished by the NCCR since its launch in April 2001, but it also gives an appreciation for the numerous, high quality publications that have and will come out of it. At this point, I'd like to remind you that Igor Chlebny, our

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# Focus

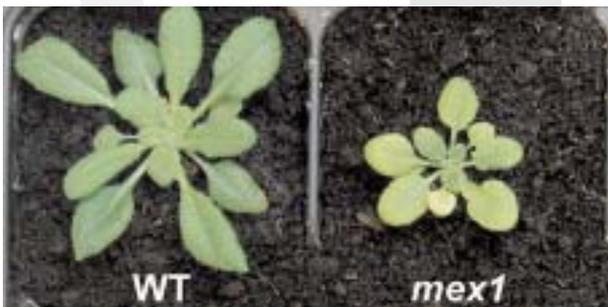
## Genetically controlled starch

On January 2<sup>nd</sup> the journal *Science* published the discovery made by a team of researchers from the NCCR that highlighted the essential role of a gene for the metabolism of starch in plants.

Samuel Zeeman, assistant professor at the University of Berne, his colleagues Gaëlle Messerli and Martine Trevisan have made a groundbreaking scientific discovery in collaboration with Alison Smith, a researcher at the John Innes Centre, Norwich, UK. The Swiss group participated in the discovery of a gene involved in the degradation of starch in *Arabidopsis thaliana*, the plant equivalent of the laboratory mouse. Starch degradation is a key process in plant metabolism that results in the production of a sugar: maltose. The newly-discovered gene (MEX1, which stands for 'maltose excess') produces a protein responsible for the export of maltose from the chloroplast, an organelle located inside plant cells. It is the first time that the protein MEX1 and its transport function in plants have been reported.

This discovery is significant because starch acts as a carbohydrate reserve necessary for normal plant growth and development. These reserves are accumulated throughout the day in plant cells during photosynthesis in the form of granules and subsequently transformed into sugar during the night with the help of specific proteins. According to the study published by the NCCR *Plant Survival* researchers and their colleagues, plants that are unable to translocate these sugars accumulate more starch than normal plants.

The interest of this research resides in the fact that a counterpart to this gene has been discovered in other plants species, most notably potato and rice, which are known for their high starch content. By rendering the homologous genes 'out of commission' in these species, they may end up storing more starch than unaltered plants. These varieties could be of interest to the food industry, but also to non-food industries such as the paper and packaging industry in which starch is extensively used.



Arabidopsis plants lacking the MEX1 gene (right) are smaller than the normal variety (left) since they cannot use their starch reserves at night.

### A patent application filed

Aware of the economic potential, the authors of the study have filed a patent application to protect their discovery. This is a major step towards the genetic control of starch production in plants. Explanations by Sam Zeeman.

#### What exactly is the aim of this patent?

The patent aims to protect the ideas for novel biotechnological strategies made possible from discovering the function of the MEX1 gene. The outcome of altering the function of MEX1 in crop plants, either alone or in conjunction with other changes in starch metabolism, could be to improve the amount or quality of starch. In the long run, such changes would provide crops with added nutritional value (through higher starch levels) or containing starch with altered properties (for use in industry for example). The latter application is important because many industries use modified starches (modified chemically, physically or enzymatically), the production of which is both costly and waste generating. A modified starch produced in plants would be cleaner and far less expensive to produce.

#### Where are you at in the process of patent validation?

At the moment we have filed the patent application, and now need to provide some proof of concept by showing that the protein has a similar function in crop plants. With the help of an NCCR complementary research grant we are working to silence the MEX1 gene product in potato, allowing us to see if MEX1 functions in the tuber. We also plan, together with Prof. Jean-Marc Neuhaus (University of Neuchâtel), to silence the gene in grape vine.

#### What contacts have you already established with industry?

I have made contact with scientists from BASF Plant Sciences and had discussions with them with regard to developing the research on MEX1. In the near future, I also plan to discuss this topic with Syngenta, now that the paper is out and the patent filed. Furthermore, I have been invited to speak at an industry-focused starch conference in Germany in April 2004, where I expect to make more industrial contacts.

## At the crossroads of all disciplines

The leader of the modelling and statistics group of the NCCR Plant Survival, **Anthony Davison** could make himself useful in any scientific or economic domain. That is, as long as there are quantifiable data at hand.

It's difficult today to find a scientific subject that can do without statistics and modelling. It's not surprising, then, that Anthony Davison, professor at the Swiss Federal Institute of Technology Lausanne (EPFL) and his team (PS 12), collaborate with almost half of the projects of the NCCR. At the beginning, however, this British scientist showed no particular interest in biology. At the start of the 1980s, his PhD thesis steered him towards a rather explosive subject: the modelling of the route that a radioactive cloud covers after leaking from a nuclear plant – with prevention in mind, of course. Funded by the European community within the framework of a multinational research project, this research was intended to help determine the zones offering the least risk for constructing future nuclear plants. An irony of sorts, his model was completed in 1984 but was never applied. The blame lies on the Chernobyl disaster that occurred two years later.

Back then, Anthony Davison had no way of knowing that his skills would come in handy, twenty years down the road, in plant sciences and ecology. A success that he shares with the strong team that surrounds him: Louis-Felix Bersier and François Gillet in Neuchâtel, as well as Marie-Agnès Moravie at the EPFL, to name only the research fellows responsible for the accomplishments of PS 12 within the framework of the NCCR.

### Mostly active in ecology

Apart from developing statistical methods needed for plant genetics (Debjani Bhowmick's thesis), the group is mostly active in ecology. One example is soil contamination and its consequences on plants. They are trying to predict the route taken by heavy metals (cadmium, zinc, magnesium, cobalt and nickel) in wheat plants from the roots to the leaves. The model developed by François Gillet has helped to determine the rates of absorption, transportation and excretion of these pollutants along their route taken in the plant.



François Gillet is also active in themes that touch upon pasture woodlands, such as the population dynamics of trees or the distribution of cattle over the grazing area.

The entomologists of the NCCR also benefit from this know-how. With the aim of controlling the grapevine moth *Lobesia botrana* and grape berry moth *Eupoecilia ambiguella*, Marie-Agnès Moravie is developing a model to determine when these species are present in abundance in order to intervene at the optimal point. In addition,

Anthony Davison is also interested in another project involving insects: the attraction of wasps by maize under attack by an herbivorous caterpillar. Here the odours emitted by the plant in order to attract the beneficial wasp are inserted into the equations, part of Ingrid Ricard's doctoral work. Finally, Marie-Agnès Moravie and François Gillet are helping in the control of a well-known weed, creeping thistle. The control method includes a beetle that encourages the infection of the plant by the rust fungus. This threesome also merits a model, if only to see a little bit clearer.

### An Anglo-Saxon career

Whether he speaks French or English, his accent betrays his origins. The same goes for his scientific career. Anthony Davison can hardly hide the fact that he is a subject of Her Majesty The Queen. He undertook mathematical studies at Oxford, followed by a Masters and a PhD in statistics at the Imperial College of London, and then rejoined these two institutions as an accomplished researcher for a total of ten years. Only once was he unfaithful to his homeland, for a stint of 2 years in Texas immediately after his doctorate. He could have continued to live in the Anglo-Saxon world, but he felt that a change was in order. And change he did. The statistician decided to hang up his hat by the shores of Lac Léman, becoming a professor at the EPFL in 1996. Today, he holds the function of Director of its Mathematics Section and is a member of the Direction of its Faculty of Basic Sciences. He is also president of the graduate courses in statistics in French-speaking Switzerland and has finished a book on modelling, the culmination of twelve years of literary labour: 'Statistical Models' has just been published by Cambridge University Press.

# News from the labs

## Promoting CTI projects

On January 22, a new format for the Participants Meeting was held that is intended to support, within the NCCR *Plant Survival*, the development of projects that will be submitted to the CTI (Innovation Promotion Agency, an organisation that is dependant on the Federal Department of Economy). The meeting, entitled 'Introduced and Genetically Modified Plants', took place at Agroscope (the new name of the Federal Agricultural Research Stations) FAL Reckenholz.



*The study of the quality of seeds used in ecological compensation areas: a possible CTI project*

The purpose of the meeting was to go over the rules of the game concerning the CTI, an organisation whose mission is to financially support projects in applied sciences that also have an industrial partner bringing in part of the finance. Two groups from the NCCR *Plant Survival*, brought in by Heinz Müller-Schärer (University of Fribourg) and Franz Bigler (Agroscope FAL Reckenholz) have presented projects that should meet the requirements. The first is looking at ways to grow wildflower strips between fields in order to restore the biodiversity in agricultural areas. The quality of the seeds used in these strips is of utmost importance to prevent contamination by undesirable species. As for the second project, it deals with the biological control of *Diabrotica virgifera*, an important pest of maize originating from the USA and accidentally introduced into Europe in the 90s, whose impact is becoming more and more of a concern. This research subject is also aimed at testing whether the proposed control methods could also apply to Bt maize, a genetically modified variety resistant to this pest.

More than twenty people, of whom the majority were researchers from Agroscope FAL Reckenholz involved in one or the other of the two projects, took part in the meeting. Also present were Oreste Ghisalba, the director of the CTI, and Jeannie Casey, responsible for

practical questions concerning the promotion of biotechnologies via the CTI.

For more information on the CTI:  
[www.bbt.admin.ch/kti/aufgaben/e/index.htm](http://www.bbt.admin.ch/kti/aufgaben/e/index.htm)

## International conference on invasive species

The third international conference on invasive species NEOBIOTA will be held on September 30<sup>th</sup> and October 1<sup>st</sup>, 2004 at the Institute of Zoology of the University of Bern. Two members of the NCCR *Plant Survival*, Wolfgang Nentwig and Sven Bacher, are part of the organising committee.

Alerted by the increasing numbers of alien species that are invading little by little the biomes of Central Europe, the NEOBIOTA group (which stands for 'new species') was founded in 1999 to address these problems. The group includes ecologists, practitioners, legislators, and representatives from nature and environmental protection agencies. The NEOBIOTA group is interested in all types of organisms and habitats (marine, freshwater, and terrestrial ecosystems).

The discussions in Bern will revolve around invasive alien species of all taxa (animals, plants, fungi) in a broad sense, with focus on ecology, environmental, socio-economic and human health impacts. The risk assessment, prevention and control of these new species will also be brought up.

For further information: [www.neobiota.unibe.ch](http://www.neobiota.unibe.ch)  
Please register until May 31<sup>st</sup>, 2004.

## Welcome newborns!

A wind of fertility blew over the NCCR *Plant Survival* in 2003: no less than seven of its members (four men and three women) discovered the joys of being a parent. A perfect occasion for PS News to congratulate the proud parents and to announce something new that is aimed at encouraging academic careers for women.

Under certain conditions, it will now be possible for PhD students with preschoolers to obtain financial support to cover part of the costs of day-care. If a member of the NCCR is a woman, she will be granted help without any conditions attached. If the member is a

man, then his partner must also be pursuing an academic career in Switzerland (for example an undergraduate or graduate student) in order to be eligible for this benefit. In all cases, the amount will not exceed CHF 250 per month.

For further information, please write to the NCCR's equal opportunities officer Soraya El Kadiri-Jan at [tourya.elkadiri-jan@unine.ch](mailto:tourya.elkadiri-jan@unine.ch).

## New academician

Enrico Martinoia (University of Zürich) was elected in 2003 to the German Academy of Natural Scientists Leopoldina (Deutsche Akademie der Naturforscher Leopoldina). He joins the ranks of a prestigious association founded in 1652, which includes 1000 members. The scientists are elected members who have distinguished themselves by demonstrating scientific excellence. The association is grouped into 28 sections that range from mathematics to earth sciences, also including chemistry, biology, physics, medicine, and many more.

[www.leopoldina.uni-halle.de](http://www.leopoldina.uni-halle.de)

## Recent PhD graduates

Jérôme Hamelin (University of Neuchâtel), Christian Thalmann (University of Bern) and Patrik Kehrlí (University of Bern) have successfully completed their participation in the Graduate School of the NCCR *Plant Survival*. Bravo!

## Acknowledging the NCCR

Several of you have asked us how to acknowledge the NCCR *Plant Survival* in scientific articles. You can use the following formula:

***This project was (partially) funded by the National Centre of Competence in Research (NCCR) Plant Survival, a research programme of the Swiss National Science Foundation.***

## Bernese prize in environment

Sven Bacher, 'Privatdocent' at the Zoological Institute of the University of Berne and member of the NCCR *Plant Survival* received on December 6<sup>th</sup> the 2003 Bernese Prize for Environmental Research.

Accompanied by CHF 15,000, this award is handed out every two years by the University of Berne with a contribution from the Federation of Commerce and Industry (Handels- und Industrieverein) of the Canton Berne and Bernese SMEs. Last year the award recognised work dealing with the struggle against harmful organisms by using methods that do not rely on synthetic pesticides. The research concerns creeping thistle, *Cirsium arvense*, considered as one of the world's most invasive weeds. In Switzerland, this species is menacing the ecological compensation areas, which are strips that the farmers establish in order to develop biodiversity in rural areas.

The laureate's research, carried out within the framework of NCCR *Plant Survival*, has produced two methods capable of halting the proliferation of the weed. The first method calls upon the shield beetle, *Cassida rubiginosa*, which adores thistle leaves. Thanks to Bacher's studies, we now know the optimal population densities of the beetle that, along with the seeding of judiciously chosen wildflowers, are necessary to efficiently counter the invasive weed.

Moreover, a continuous remote video surveillance system in the field enabled the identification of *Cassida rubiginosa*'s enemies. It shows that in 99.4% of cases the death of the beetle can be attributed to the paper wasp, *Polistes dominulus*. Hence, so-called generalist predators (ants, nabid bugs, lacewing larvae etc.) are not responsible, as previously assumed, for the weak presence of the beetle.

The second control method against *Cirsium arvense* involves the stem-boring weevil, *Apion onopordi*, that promotes infections of the rust fungus, *Puccinia punctiformis*, on thistle. This discovery reveals the existence of a mutualistic interaction between the insect and the fungus, providing a first in the area of population ecology. "It is the first documented mutualistic interaction between a plant pathogen and an insect herbivore", states Sven Bacher. "Usually these groups have an antagonistic relationship. This discovery enables us for the first time to consider the rust fungus as a specific weed control agent."

# News from the labs

## Complementary research projects

As with last year, reserve research funds have been put towards complementary research projects. This year, the emphasis was on applied research proposals. Here is the list:

- Impact of soil properties on the resistance of grapevine against diseases and pests (Brigitte Mauch-Mani, University of Neuchâtel)

Seedlings will be grown in soil amended with different fertilizers or with compost in order to determine their influence on resistance against downy mildew and harmful insects.

- The role of oxalate-degrading bacteria in the protection of crops against pathogens (Jean-Pierre Métraux, University of Fribourg)

Several plant pathogenic fungi (such as *Botrytis cinerea*, responsible for grey mould) produce oxalic acid, an essential component of the infection process. However, there exist bacteria capable of degrading this acid, an effect that will be tested in greenhouses and in the field to verify its effectiveness on tomatoes and cucumbers against *B. cinerea*.

- Interaction between *Petunia* and herbivorous insects (Cris Kuhlemeier, University of Berne)

After identifying the herbivores that feed on *Petunias* in their native habitat (Uruguay), the goal will be to determine the genetic and ecological characteristics that render these plants sensitive to these phytophagous insects.

- Investigating the link between starch metabolism and stress tolerance (Sam Zeeman, University of Berne)

Plants use starch as a carbohydrate reserve. When subjected to stress conditions (cold, drought), plants tap into these reserves and transform them into sugars, which help protect against the stress. The recent discovery of a protein in plants essential for starch breakdown (see page 2) paves the way to evaluating the role of starch metabolism in the tolerance of stress.

- The impact of foreign plants on soil microorganisms (Heinz Müller-Schärer, University of Fribourg)

Chicory (*Cichorium intybus*) and Blueweed (*Echium vulgare*), originating from 5 different regions, are grown on test plots. The aim of the experiment is to compare the populations of microorganisms that inhabit the soil of these parcels (mycorrhizal fungi, rhizobia, nematodes, plant pathogenic fungi) and determine to what extent the origin of these plants affects these populations.

- Investigating the causes of the high variability in thistle rust infections transmitted by the weevil *Apion onopordi* (Sven Bacher, University of Bern)

The rust fungus *Puccinia punctiformis*, which is transmitted with the help of *Apion onopordi*, constitutes a biological control method against creeping thistle, *Cirsium arvense*. However, the effectiveness of infection varies considerably depending on the season and location. And hence, there is interest in identifying the causes of such variability.

- Behavioural responses of grapevine and grape berry moths and their larvae to the odours emitted by the grapevine (Patrick Guerin, University of Neuchâtel)

Two species of moths (*Lobesia botrana* and *Eupoecilia ambiguella*), of which the larvae attack the grapevine, can be controlled by a method that consists of attracting the males to a trap containing an insecticide. This method is based on the use of synthetic products that imitate the sex pheromones of the females of these species. However, more research is required in order to determine how the odours emitted by the grapevine itself influence the behaviour of the males, females, and the larvae of both species, which would be used to reinforce the effects already obtained with pheromone traps.

- Soil quality and grapevine resistance to fungal diseases (Roger Pezet, Agroscope, Changins)

The biodynamic techniques applied to the grapevine require an efficient microbial activity in the soil. According to the winegrowers who use these techniques, the grapevine acquires greater disease resistance. Up until now, the comparative studies between Integrated Pest Management and Biodynamics conducted in Switzerland do not include soil quality analysis. This is due to the complexity of the rhizosphere that requires new methods of analysis, which we intend to develop.

## The Swiss Society of Agronomy, the guest of honour

Founded in 1992, the Swiss Society of Agronomy boasts more than 200 members. It will hold its 2004 annual conference on March 19<sup>th</sup> at the University of Neuchâtel.

The mission of this society is to bring the knowledge acquired in laboratories and the field within everyone's reach. The SSA is intended for researchers, teachers, as well as agricultural consultants. The two hundred members are for the most part agronomists. Their goal? To facilitate and encourage exchanges between the people working in the area of plant production. This association is also aimed at stimulating the collaboration between other institutions and disciplines (plant health, soil sciences, plant physiology). With the creation of the SSA, Switzerland has at its disposal an organisation that ensures contacts with the European Society of Agronomy, while also obtaining some international exposure.

The SSA has put forth two objectives for the March assembly. First of all, to familiarize itself further with the NCCR *Plant Survival*, and secondly, to present scientific research dealing with the theme «Plants' adaptation to their environment». The idea of hosting this meeting sprouted from a relationship between NCCR and a researcher at the Swiss College of Agriculture in Zollikofen, Harald Menzi (see PS News 3), who also happens to be the Vice-President of the SSA. As for its President, Bernard Jeangros, research scientist from Agroscope in Changins, he highlighted the importance of this association in terms of acting as a platform for exchanges between areas of activity that are too often partitioned off. "Plant selection specialists or plant protection specialists, for example, usually meet



*Drought resistance in the grapevine: a possible theme for the SSA's next conference in Neuchâtel*

within the framework of their respective associations, which bring together specialists from the same area of research. Our aim is not to supplant these scientific societies, but rather to promote fruitful meetings that might even bring about new solutions". Broadly-based, the March assembly will therefore deal as much with work concerning the selection of varieties as with problems related to the resistance of plants to stress. It will include an example of a hot topic that is not about to extinguish itself: the consequences of last summer's drought on the growth of pastures.

Last year conference was a notable success thanks to a wide-ranging subject, both intellectually and geographically speaking. It dealt with nitrogen in plant production and included speakers from France and the Netherlands. The talk from the Dutch scientist Jaap Schröder made an impression on Bernard Jeangros, since he brought a problem that is intensely researched in Switzerland, which is to determine the nitrogen loss from the storage and spreading of farmyard manures. In fact, herbivorous animals generate excrement that is rich in nitrogen in solid and liquid manures, which represent a source of natural fertilisers. Unfortunately, it is difficult to use this nitrogen efficiently since the nitrogen contained in these fertilisers is highly volatile and easily lost to the atmosphere.

### From science to politics

The history of the SSA has shown that its actions are not limited to exchanges between scientists, but also influence the agricultural policies of the country, as evidenced by the informal discussions that it organised at the end of 1999, from which the conclusions were heard at the highest level, that of the Federal Office of Agriculture. Among the measures to be taken and at the top of the list of priorities, is for the research bodies (Federal Institutes of Technology, universities, Federal Research Stations in Agriculture, Universities of Applied Sciences and also the Research Institute on Organic Agriculture-FIBL, etc.) to better take into account the interests of the "clients", such as the farmers, schools and agricultural consulting centres. An undertaking to exchange and communicate ideas that is quite similar to that of the NCCR *Plant Survival's*. The 1999 forum also aimed to clearly define the roles of the different research bodies in order render their work complementary and to avoid squandering their efforts.

# Upcoming events

## Special KTT event

Annual Conference of the Swiss Society of Agronomy (SSA/SGPW)  
March 19, 2004  
University of Neuchâtel

Information: [www.unine.ch/nccr/](http://www.unine.ch/nccr/)  
then click on Events>Meetings>Special KTT events

## Graduate School courses

**Genetics of Biodiversity and Applications**  
March 15-17, 2004 in Neuchâtel

Prof. Quentin Cronk, University of British Columbia, Vancouver (Canada)  
Prof. Maarten Koornneef, Wageningen Agricultural University (The Netherlands)  
Prof. Daniel Zamir, The Hebrew University of Jerusalem (Israel)

**Multivariate Statistics in Community Ecology**

Fully booked  
March 23-26, 2004 in Neuchâtel

Dr. Daniel Borcard, University of Montreal (Canada)

**Effective Public Speaking**

Fully booked  
April 19, 2004 and June 21, 2004

Prof. hon. Marcel Lucien Goldschmid, EPFL, Lausanne

**Environmental Control of Chloroplast Biogenesis and Function**

October 7-9, 2004  
Joint course with 3eme Cycle romand en sciences biologiques

Information and registration: [www.unine.ch/nccr/](http://www.unine.ch/nccr/)  
then click on Education>Graduate School>Courses

## Equal Opportunities course

**Self-Leadership and Time Management**

April 27 and May 18, 2004

Dr. Sarah Shephard, ETH Zurich

## NCCR events

**Review Panel Site Visit**

April 1-2, 2004  
University of Neuchâtel

**Annual Graduate School meeting**

May 14, 2004  
University of Neuchâtel

**Annual NCCR conference**

September 13-14, 2004  
University of Neuchâtel

## Public event

Papillorama, Kerzers (FR)

An exhibit of the Jardin botanique de Neuchâtel and NCCR *Plant Survival*

«Quand les cellules s'en vont aux champs, variations autour d'une plante»  
«Von der Pflanzenzelle auf die Felder: Variationen einer Pflanze»

Open daily from 10 a.m. to 5 p.m. Extended until further notice.

## Other events

3rd International Conference on Biological Invasions

NEOBIOTA - From Ecology to Control

30 September – 1 October 2004

Zoological Institute, University of Berne

Information and registration: [www.neobiota.unibe.ch](http://www.neobiota.unibe.ch)

## New press releases

Fundamental discovery on starch published in Science  
(02.01.2004)

Encouraging the research on an alternative to pesticides  
(06.12.2003)

Le Pôle de recherche national *Survie des plantes* au Papillorama  
(12.11.2003)

For further information: [www.unine.ch/nccr/](http://www.unine.ch/nccr/)  
then click on Press> Press releases

## PS News

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