

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

Plant Survival in Natural and Agricultural Ecosystems

Editorial

Riding the wave of success

The timing for an editorial on the Graduate School (GS) could not be better. We have, for the last few months, only positive news to report. This is, of course, mostly due to the large number of students that readily take advantage of what the school has to offer.

We now have 40 PhD students from 6 Swiss universities officially signed up, which is considerably more than expected. The courses are usually full, and judging from the evaluations, they are generally well appreciated. The evaluations are used to continue, improve on, or discontinue a specific course. It is not surprising, therefore, that the evaluations have become more and more positive.

It all started with the initial application for the NCCR *Plant Survival*, in which we put considerable emphasis on graduate education and proposed the creation of a novel Graduate School. Once the NCCR was granted, we were confronted with the challenge to keep our ambitious pledge to education. The only useful experience that I personally can rely on is that I have been through the process of obtaining a PhD myself. Luckily, we can count on many qualified and helpful people within the NCCR. Much of the credit for the smooth running of the GS goes to the efforts of our education officer, Christiane Bobillier, who wastes little time on diplomacy, but instead works with Swiss efficiency and rigour. The GS policies and the course programme are set by the GS committee, which is composed of faculty members of various universities and a representative from each of the NCCR post-docs and PhD students. Numerous other people within the NCCR provide advice and help in organizing courses.

During this year's evaluation of the NCCR *Plant Survival* the GS received special attention. The Review Panel was clearly impressed by the poster session and the quality of the work presented by the graduate students. A specific comment in their report says it all: "It was evident that the PhD and postdoctoral students are highly motivated and well educated". That the accomplishments and concept of the school are appreciated is also evident from the fact that it has received recognition from



the universities of Neuchâtel, Lausanne, Fribourg, Geneva, and very recently the University of Berne has joined their ranks. The concept of a GS is relatively new to the Swiss university system, but is rapidly being adopted by many institutions.

My favourite aspect of the GS is the emphasis on communicating science to peers as well as to the general public. Basically, science that is not presented to and understood by others never really took place and the broader the audience, the more valuable and accessible the science

becomes. It is satisfying to see that the various courses that we offer in communication are well-attended and appreciated. In the context of science communication, I am extremely pleased to announce that the NCCR directorship has set money aside to award competitive travel grants for PhD students. This will allow students to present their work at workshops and/or congresses. Please consult our website for details. Once again, I would like to encourage everybody to take advantage of this and all the other opportunities that the GS has to offer.

Ted Turlings

Director of Research

Head of the Graduate School *Plants and their Environment*

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Focus

A field day with the experts

All National Centres of Competence in Research (NCCRs) get to indulge in an annual evaluation visit by a panel of experts. On the 8th and 9th of May, NCCR *Plant Survival* was put under the magnifying glass. Here's a small overview of the objectives of this process.

"The evaluation report will be much better if it doesn't rain", jokes the biochemist from Rothamsted Research (UK) John Pickett while smiling mischievously as the grey clouds roll over the prairies of the *Col du Marchairuz*. This distinguished specialist is part of the group of international experts responsible for evaluating the scientific, financial and administrative aspects of the NCCR *Plant Survival*. The evaluation will be submitted to the Swiss National Research Council (SNRC) of the Swiss National Science Foundation and will serve as a base for future decisions concerning the NCCR.

These annual site visits are carried out among the 14 Swiss NCCRs with the aim, this time around, being to take stock of the 2nd year's operations by verifying that the individual research projects are integrated in the NCCR network, evaluating the educational components (graduate school, equal opportunities, etc.), and appraising the efforts aimed at integrating third parties (agricultural, non-governmental organisations, etc.).

Hence, an evaluation can carry consequences: "If the evaluation is extremely poor, a recommendation may be given to halt the projects, or in the worse case scenario, to close the NCCR", states Oreste Ghisalba, president of the group of nine experts chosen by the SNRC. However, these 'controllers' have also become consultants offering valuable constructive criticisms: "We take advantage of ideas put forth by the foreign experts who use as a reference point similar programmes established in other countries", confirms Mr. Ghisalba.

A very fruitful visit

The evaluation process makes use of specific criteria. Publications, participation at congresses and other scientific networks help to qualify the research. As for education, the experts look at the quality, the number of graduate students and their presentations during the visit, the institutions that employ those that have left the NCCR, and/or scientific distinctions. In this area, the NCCR in Neuchâtel has at its disposal a successful Graduate School. Many themes brought on questions from the experts such as: "Why is the graduate school not recognised by all Swiss universities?" "Because in the first stage we focused primarily on the

existing partnerships with the University of Neuchâtel (Geneva, Lausanne, Fribourg, Zurich)", responded Ted Turlings, Director of the Graduate School.

The technology transfer is judged by the collaborations, the licences, start-up companies or public relations, which brought about a question from another panel member: "What's the position of the NCCR regarding GMOs?" "There is no official stance. The researchers that are part of the network have diverse opinions, they speak for themselves and not on behalf of the NCCR", said Martine Rahier, Director of the NCCR. And what did this researcher think of this visit? "Such an evaluation is very important once one disposes of responsibilities with a lot of independence. Therefore, it is naive to think that there are no weak points in such a project. It will be interesting to see if my analysis is similar to that of the experts".

Olivier Dessibourg*

Service de presse du Fonds national suisse

A lab in the pastures

Consisting of the forest and the cattle that graze there, the pasture woodlands of the Jura are evolving under the influence of natural and agricultural constraints. There are studies, among others, on the regeneration of trees with the help of yellow gentians (*Gentiana lutea*). Research of the NCCR aims to demonstrate that these unpalatable plants keep the ruminants at a distance, therefore protecting the nearby saplings from being munched on by the cattle.

The research themes in question deal with specific concerns that worry groups such as cattle breeders and those involved with the protection of the landscape. This visit, notes Martine Rahier, reminds us that most of the NCCR projects are, to some extent, carried out in the field. An approach that complements the image we have of a biologist handling test tubes in the laboratory.



The experts visited the pasture woodlands of the Jura

O. Dessibourg

*Article taken from FNSinfo no2, June 2003

A lifetime devoted to plant health

Professor of phytopathology since 1990, **Geneviève Défago** began in 1969 at the Swiss Federal Institute of Technology in Zurich (ETHZ) and never left. Founder of the Swiss Society for Phytomedicine and member of the board of the International Society of Plant Pathology, her competences in the control of plant diseases are recognised worldwide.



“Even at a tender age I would amuse myself by applying bandages on trees to care for them”. That’s what answers Geneviève Défago when asked the origin of her vocation for plant pathology. Evidently faithful to her first passions, she carried out her studies in biology in Lausanne and obtained a degree from the ETHZ in plant pathology. Next came a PhD thesis, completed in 1967, dealing with the taxonomy of new species of fungi, of which some are found in Greenland. Following a postdoc in the Canadian prairies in Saskatoon, Geneviève Défago came back to the ETHZ in 1969 where she specialised in the fight against plant diseases caused by soilborne pathogens (fungi, viruses and bacteria).

However, if the soil spreads diseases, it also provides the means for defence, thanks to the presence of beneficial bacteria. In this case, the starring role goes to *Pseudomonas*. While colonising the plant roots, they produce metabolites –chemical substances of organic origin– which, depending on the geological features of the soil, help to protect the plants against pathogens. The advantage of this natural solution is that it reduces the use of pesticides.

Geneviève Défago and her colleagues have worked on this problem over the past ten years. They have succeeded in identifying varieties of *Pseudomonas* that contribute specifically towards the protection of tomato, cucumber and wheat. The goal of the research was to evaluate the diversity of genes that are responsible for the production of metabolites, with the aim to increase the quantity of this protective substance in order to better ensure plant health.

Regarding her contribution to the NCCR, other than her research dealing with wood diseases of the grapevine that one of her PhD students, Danilo Christen, is pursuing in collaboration with the University of Applied Sciences in Wädenswil (HSW) (see PS News no 3), Geneviève Défago is directing the project PS5, dealing with the microbial diversity in soils of vineyards. This is a unique study in itself, since it focuses on the historical importance of this monoculture. Certain vineyards in Switzerland date back 2000 years while others have been established for fifty years and some only for six years. This means that some very old vines are still producing fruit without any pathogens contaminating the soil, which is often the case in monocultures. In trying to explain such differences, one has to explore the microbial activity around root systems, which happens to be the research theme of Miroslav Svercel.

In fact, preliminary results show that a greater quantity of *Pseudomonas* is present in older plantations, which explains in large part their longevity. Moreover, these beneficial bacteria have become specialised in the protection of the grapevine only. If one cultivates, as a comparison, tobacco for example, the population of these microorganisms is much smaller.

Still within the framework of NCCR, Geneviève Défago also supervises the research of Andreas Naef who is exploring whether Bt-maize, which is capable of killing an insect such as the European corn borer, may favour the development of a highly toxic fungus to both humans and animals: *Fusarium*. In fact, *Fusarium* often establishes itself and grows on plant material left in the fields after harvest. If wheat, a cereal that is very sensitive to mycotoxins, is grown the following year, the crop will be infected and ruined. It is therefore necessary to prevent *Fusarium* from finding plant material for reproduction purposes, and where that is not possible, there is a biological control method that uses another fungus, a beneficial one, *Trichoderma atroviride*.

News from the labs

NCCR at the Neuchâtel Botanical Garden

Sunday May 18th marked the opening day for the bilingual French/German exposition “When the cells go to the fields, variations around a plant”, the fruit of a collaboration between the Botanical Garden and the NCCR *Plant Survival*.



The exposition made the families happy

Under the golden rays of a springtime sun, but nevertheless disrupted by refreshing, intermittent downpours, the Botanical Garden festivity attracted hordes of people. The director of the institute, François Felber, had plenty to smile about, while in the scenery of the Orangerie, conceived by his colleague Edouard Jeanloz, young scientists were busy satisfying the curiosity of the visitors.

Swarms of people were clustered around the various posters and computers lending their ears to the PhD students while trying to grasp the crux of their explanations. The children had their eye-balls glued to the microscopes, joyfully exploring the invisible world where they witnessed microscopic outlines of lichen and observed the contortions of an herbivorous larva.

A fabulous story of plants in their environment unfolds among the various posters describing the research projects of the NCCR. The pollinators of petunia, diurnal bees or nocturnal but-

terflies, run alongside research on the rhizosphere and the role that bacteria play, which was presented in an instructive and entertaining short film. Understanding the plant storage mechanisms for starch, a substance of multiple usages in nutrition and in the packaging industry, is another fundamental question.

The visit continues with a look at the role that ruminants play in the equilibrium of pasture woodlands where the goal is to observe a natural ecosystem disturbed by human activity –in this case breeding. Next we come upon two subjects that deal with the strategies employed to ensure plant protection. One looks at the use of a parasitoid to destroy an herbivorous insect while the other explores the possible consequences on the environment of a genetically modified plant containing an introduced gene that controls the production of a toxin which specifically affects a target pest. The last poster explains the risk of introduced genes being transferred to wild plants.

*“Quand les cellules s’en vont aux champs, variations autour d’une plante”
“Von der Pflanzenzelle auf die Felder: Variationen einer Pflanze”.*

Concept and coordination: Igor Chlebny, François Felber, Edouard Jeanloz, Susanne Vogelgsang. With the support of the Loterie romande. Neuchâtel Botanical Garden.

Open every day from 9h to 20h, until October 5th, 2003.

The DEWS visits NCCR

The laboratories of NCCR *Plant Survival* opened their doors last April 30th to a delegation from DEWS (Développement Economique Western Switzerland), as part of an economic promotional activity of the cantons Neuchâtel, Vaud and Valais. Some twenty representatives from 14 countries were there to, according to the DEWS, “familiarise themselves with certain factors such as geographic, entrepreneurial, and economic” of the three cantons, in order to encourage the establishment of foreign enterprises in this region.

The visitors were able to witness first hand the efforts of NCCR in the area of technology transfer. They also received a briefing on the various research projects from Virginie Matera, Brigitte Mauch-Mani, and Ted Turlings. The first one presented a device capable of analysing the chemical composition of solid samples (the ICP-MS), the second one demonstrated how it was possible to introduce disease resistance in plants, and finally, the last person talked about the research on nematodes used in the biological control of an insect pest of maize, the *Diabrotica*.

Passing the torch

By the middle of July, Susanne Vogelgsang will have left the Management and Coordination Unit of the NCCR. Upon her arrival in September 2001, this agrobiologist had the delicate task of establishing links between the researchers of the NCCR, their partners, and the agricultural professionals. She was also responsible for the development of equal opportunities between women and men.

Through her openness and quick-wittedness, Susanne Vogelgsang contributed to the NCCR's shine by organising, among others, meetings between winegrowers, farmers, and researchers. Her innate sense of coordination was an asset in the development of several key events, such as the participation of the NCCR in 2002 at the Expoagricole and *Fête la Terre*. Let's not forget, most recently, the success of the exhibition at the Neuchâtel Botanical Garden. We wish her all the best in her new duties at the Federal Research Station in Agroecology and Agriculture of Reckenholz (ZH).

The new coordinator of external affairs, Daniela Linder Basso, will begin in September. Her profile will appear in the next issue of PS News.

The sun shone on Changins

Over two days, despite the heatwave, more than 5'500 people visited the Federal Research Station in Plant Production of Changins near Nyon. A partner of NCCR *Plant Survival*, it organised last June 13th and 14th an open house. Schools, farmers, the industry, and families were all glad to have attended.

Among the numerous activities were projects developed within the framework of the NCCR. Olivier Viret, a plant pathologist, did not hide his enthusiasm. "What a spectacular event! We chose to raise the public awareness of the different levels of our work by using mildew as a central thread, a grapevine disease that we can study equally at various levels: molecular, gene, plant, vineyard and even weather stations." Hence, all of the plant protection areas were emphasised at Changins, thanks as well to the contributions from other NCCR members such as those from Pierre-Joseph Charmillot, Thomas Degen, and also the video produced by Roger Pezet on the biology of mildew.

Press release

A new theory on biodiversity co-authored by Louis-Félix Bersier, member of the NCCR *Plant Survival*, was published in the April 29th, 2003 issue of the American journal *Proceedings of the National Academy of Sciences (PNAS)*.

The full text can be found at www.unine.ch/nccr/ >press>press releases

Chloroplasts in full glory

On Tuesday, July 1st, a mini-symposium on chloroplasts, a key element of photosynthesis in plants, was held as part of the post-graduate studies in biology of French-speaking Switzerland. This event was organised by Jean-Marc Neuhaus and Felix Kessler, professors at the University of Neuchâtel and members of the NCCR. The meeting attracted some seventy researchers from Neuchâtel, Geneva, Lausanne, Fribourg, Berne, and Zurich. It was also an occasion to pay tribute to Peter Schürmann, associate professor in biochemistry who will be retiring from the University of Neuchâtel. He has done exceptional work, notably on the protein FTR that intervenes in the regulation of chloroplast activity in function of light intensity.

Congratulations

Dominique Schenk (University of Berne) successfully defended on June 19th her thesis work entitled "Predation on the shield beetle *Cassida rubiginosa*".

Sven Bacher (University of Berne) obtained in May the title of 'Privatdocent' for his work on "Alternatives to the chemical control of weeds and pests in Europe."

NCCR's chemistry

The Swiss journal CHIMIA (www.chimia.ch) will soon publish an article entitled "The NCCR *Plant Survival* at the University of Neuchâtel - the role of chemistry in an interdisciplinary Swiss research network". The authors are Susanne Vogelgsang, Eliane Abou-Mansour, Patrick Guerin, Maria Elena Hoballah, Ted Turlings, and Raffaele Tabacchi.

Graduate school

A morning to convince

On Friday May 9th, some fifty graduate students were gathered to present the fruits of their labour during a poster session. They met the demands of the Review Panel, who wished for a direct contact with the young scientists. What were the reactions of the students towards this meeting with the experts? Here's what Laure Weisskopf, their Graduate School Committee representative, had to say.

How important is this type of session for you?

It's an occasion for us to speak to scientists whose research activities lie beyond our area of interest. That is not the case at conferences where we deal with people who work more or less on the same subject. In this sense, it's a unique and enriching experience from a scientific point of view, compared to presenting our research to the general public. Unfortunately, because of the way the session was organised, we were somewhat 'glued' to our posters and did not have a chance to view the rest of the exposition.

How did the morning go in general?

Overall, it went very well, although I think that the session should have been divided into several viewings. The experts moved as a group from one poster to the other, which inevitably meant that those at the last posters had to wait a very long time, up to one and a half hour. It would have been more pertinent to establish a timetable for the viewing of each zone, which would have allowed those waiting their turn to roam around and see the other posters. Having said that, I was pleasantly surprised by the attendance of several 'senior' researchers of the NCCR who took the opportunity to ask questions.



Miroslav Svercel (left), PhD student, listens to the member of the Review Panel John Pickett's commentary

What did you retain from the comments of the Review Panel?

I found the experts were constructive and apparently impressed with the research that was presented. They were at times critical, but in a positive sense. They seemed to have appreciated the multiple collaborations between the biologists as well those established between chemists, such as in my case. We saw that some of them had a vast scientific knowledge and a good overall awareness of the NCCR projects. In fact, they also asked me questions concerning the integration of my research with the other projects.

Catch the "time thieves"

Teacher at the "Center for Teaching and Learning" at ETHZ, Sarah Shephard offers advice to those researchers who wish to improve their time management skills. She gave a course last May 21st and June 11th in Neuchâtel.

Educated in toxicology, Sarah Shephard was confronted with the situation of wanting to pursue an academic career while maintaining a harmonious family life. Hence, she was able to take from her personal experiences lessons that enable her today to counsel her peers.

However, let's not be misled, even if the course entitled "Self-Leadership and Time Management" makes us think of a marketing product, Sarah Shephard's philosophy is not how to increase one's productivity, but rather to help the researchers find the right balance in their lives.

Let's face it, in some respects, those doing thesis work are not as well off as those in the private sector. They cannot benefit from a structure enabling them to delegate part of their tasks to subordinates and have a hard time juggling their research, teaching, administrative tasks, and family.

Establishing priorities, that's the message Sarah Shephard wants her pupils to reflect upon when trying to get through their workload efficiently. The teacher offers several tricks to overcome what she aptly calls "time thieves": optimise the filing system, consult your e-mails during lost time, do not leave certain tasks half finished, and many more.

In her course, the emphasis is on sharing experiences and searching for common solutions. The course was received with enthusiasm from those who participated, of which the majority were women.

University of Applied Sciences in Wädenswil Learning about wine in school!

Situated on the hillside, the campus offers a splendid panorama of the 'Goldküste', which spreads out along the Lake Zürich. On a scorching June afternoon, a few young people are sweating profusely while working the flower plots equipped with hoes and shovels. They are part of the 350 students of the University of Applied Sciences of Wädenswil (HSW), which is currently experiencing growing success. In fact, at the start of the 2002 school year, the school boasted a 50% increase in enrolment compared with the previous year.



Years of experience in the field of winemaking and oenology

The 150 new arrivals were given the choice of four possible fields of study: Food Technology, Horticulture, Biotechnology, and Facility Management. They will receive the title of Engineer after having successfully completed six semesters as well as six months of thesis work. Geared towards applied sciences, this formation leads to a professional profile that is ideal for establishing a link between the academic world and technicians, through an expertise essentially acquired from experience and their exterior consulting.

That is the reason why, apart from the school curriculum that it offers, the HSW must be active in research. Partnerships with the industry are common, as shown by its projects accomplished with the support of the KTI/CTI, a confederation agency for the promotion of innovation. This encourages the transfer of technology to the market place, providing that a financial agreement is established between the school and a company.

However, the HSW is not solely oriented towards the business world. It also offers its competences to universities and specialised schools. For example, the viticulture section, led by Wolfgang Patzwahl, is collaborating with the NCCR through a project involving Danilo Christen and Geneviève Défago of the Swiss Federal

Institute of Technology (ETHZ) in Zürich. They are trying to determine if the fungal diseases, Esca and Eutypia, that attack the woody parts of the grapevine, influence the quality of the wine (see PS News no. 3).

It's important to study this aspect, since there exists a latent period of several years between the infection through pruning wounds and the appearance of the first symptoms visible on the leaves or the stems. The question is how long can an infected grapevine continue to produce grapes of sufficient quality for winemaking.

For this project, the choice of growing under glass caters to the need of isolating the grapevine from all other pathogens (such as grapevine mildew), of controlling light and preventing variations due to effects from other abiotic factors (water, salinity, heavy metals, etc.) that are capable of influencing the results.

The team from HSW has acquired years of experience in the area of winemaking and oenology, which becomes evident to visitors when they see the stacks of bottles covering the walls of the university's storeroom. The school makes use of an experimental vineyard established on the Au peninsula, which is located in the middle of the southern hillside of the Lake Zürich, where it tests production methods that are economically favourable for German-speaking Switzerland. In 2002, 13 varieties were cultivated there. The Blauburgunder takes up 29% of the land available, followed by Riesling Silvaner and Sauvignon Blanc. The choice of varieties corresponds to the types of grapevine traditionally cultivated in eastern Switzerland.

Please take notice

On Thursday, August 21st, the NCCR is organising in collaboration with the ETHZ, the LBL (Swiss Center for Agricultural Extension, Lindau) and the HSW of Wädenswil, a day to exchange ideas and thoughts concerning the quality of Swiss wines. A topic of discussion will be the stress factors that the grapevine is exposed to, with emphasis on the consequences of two grapevine diseases, Esca and Eutypia. The meeting, entitled "Weinqualität - Chancen für den CH-Weinbau und Risiken durch Stressfaktoren", is for the benefit of professionals in the area of winegrowing, including both producers and viticulture consultants, in order to establish constructive exchanges with the researchers. There are no participation fees. Please register before August 4th, 2003.

For further information: www.unine.ch/nccr/
then click on Events>Meetings>Special KTT events

Upcoming events

Special KTT event

Meeting between winegrowers, viticulture consultants and scientists of NCCR *Plant Survival*

“Weinqualität – Chancen für den CH-Weinbau und Risiken durch Stressfaktoren”

21. August 2003

Wädenswil (ZH)

In collaboration with:

the Institute of Plant Sciences at the ETHZ

the University of Applied Sciences in Wädenswil (ZH)

the Swiss Center for Agricultural Extension, Lindau (ZH) - LBL

Information and registration: www.unine.ch/nccr

then click on Events>Meetings>Special KTT events

Graduate School courses

Handling both: Academic Career and Family (Workshop offered by the NCCR Equal Opportunities office)

September 24, 2003

University of Neuchâtel

Dr. Betty Benrey, Maître-assistante and Research Leader,
Université de Neuchâtel (Switzerland)

Prof. Henriette Herwig, Lehrstuhlinhaberin Neuere Germanistik,
Heinrich-Heine-Universität, Düsseldorf (Germany)

Dr. Judith Hohlfeld, Head of Pediatric Surgery, CHUV,
Lausanne (Switzerland)

Prof. Barbara Koch, Head of the Department of Remote Sensing
and Landscape Information Systems,
Albert-Ludwigs-Universität Freiburg (Germany)

Prof. Pierre Perrochet, Hydrogéologie quantitative,
Université de Neuchâtel (Switzerland)

Dr. Philippe Renard, Maître-assistant,
Université de Neuchâtel (Switzerland)

Prof. Susanne Suter, Cheffe de Service de la Clinique et
Polyclinique de Pédiatrie,
Hôpitaux Universitaires de Genève (Switzerland)



Université de Neuchâtel

Joint course Illeme Cycle Romand and NCCR Plant Survival

Biodiversity and Species Interactions:

October 15-17, 2003

University of Neuchâtel

Invited speakers:

Jordi Bascompte, Estación Biológica de Doñana, Sevilla, Spain

Charles Godfray, Imperial College at Silwood Park, Ascot, UK

Stephen Hubbell, University of Georgia, Athens, USA

Michel Loreau, Ecole Normale Supérieure, Paris, France

David Tilman, University of Minnesota, St. Paul, USA

Dynamic modelling with STELLA

November 12-14, 2003

University of Neuchâtel

Dr. Alexey Voinov, University of Vermont (USA)

Information and registration: www.unine.ch/nccr

then click on Education>Graduate School>Courses

Participants and Annual Meeting

September 17, 2003

“Genes & Plants”

University of Neuchâtel

Public Event

Until October 5, 2003

Jardin botanique de l'Université et de la Ville de Neuchâtel

“Quand les cellules s'en vont aux champs,
variations autour d'une plante”

“Von der Pflanzenzelle auf die Felder:
Variationen einer Pflanze”

An exposition organised in collaboration

with NCCR *Plant Survival*.

PS News

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