

ZIL Annual Report 2005

Report**Author(s):**

Swiss Centre for International Agriculture (ZIL)

Publication date:

2006

Permanent link:

<https://doi.org/10.3929/ethz-b-000307616>

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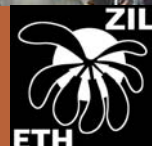
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Originally published in:

ZIL Annual Report



Swiss Centre for International Agriculture
Schweizerisches Zentrum für Internationale Landwirtschaft
Centre Suisse pour l'Agriculture Internationale



Annual Report 2005



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

A portrait of the Swiss Centre for International Agriculture ZIL

Vision, mission and objectives of ZIL

Vision

ZIL's vision is to enhance the contribution of agricultural research to sustainable development in order to achieve poverty alleviation, food security and environmentally sound management of natural resources for the benefit of present and future generations.

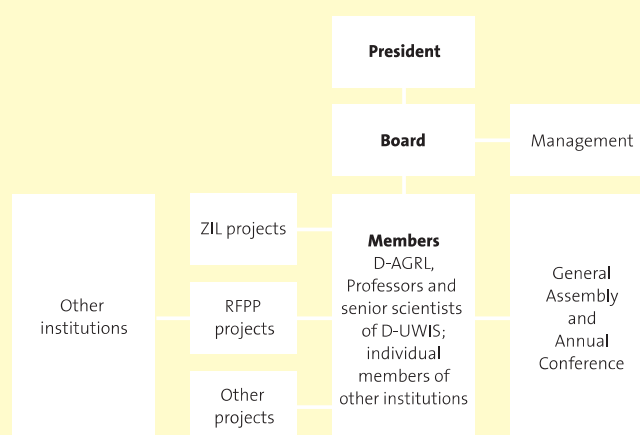
Mission

ZIL's mission is to initiate, support, and coordinate collaborative research by its members and partners that will enable resource-poor farmers in low-income countries to achieve sustainable improvements of their livelihoods. This includes the mobilisation of Swiss research capacity and the promotion of awareness about the role of agricultural and food science in meeting the human and environmental challenges of low-income countries.

Objectives

- Promoting high-quality research to overcome the constraints to sustainable development.
- Fostering interdisciplinary research collaboration and partnerships between scientists at the ETH Zurich and other actors involved in development-oriented agricultural research.
- Encouraging links and ensuring coordination among ETH Zurich researchers, and assisting in identifying research needs to pressing development problems.
- Building capacity and awareness among ETH Zurich students for their contribution to sustainable development.
- Providing policy support to Swiss decisionmakers on international agriculture and food security.
- Informing the Swiss public and ZIL's stakeholders about the contribution of strategic research to poverty alleviation, food security and environmentally sound management of natural resources.

Organisation of ZIL



Funding

ZIL is supported primarily by the SDC (Swiss Agency for Development and Cooperation), by the Swiss Federal Institute of Technology Zurich (ETH Zurich) and by its members. Other contributions come from various donors.

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ZIL members

President

Prof. Dr. Felix Escher
ILW, ETH Zurich

ZIL Board

Prof. Dr. Silvia Dorn
IPW, ETH Zurich

Prof. Dr. Emmanuel Frossard
IPW, ETH Zurich

Dr. Monika Gessler
Office of the Vice-President
for Research, ETH Zurich
(until June 2005)

Dr. Dominique Guenat
ACADE, Fontanezier

Prof. Dr. Richard Hurrell
ILW, ETH Zurich

Annette Kolff
Intercooperation, Berne

Prof. Dr. Michael Kreuzer
INW, ETH Zurich

Prof. Dr. Bernhard Lehmann
IAW, ETH Zurich

Dr. Jean-Pierre Sorg
D-UWIS, ETH Zurich

ZIL management

Dr. Barbara Becker
Executive Manager

Dr. Mathias Egloff
Scientific Assistant

Manfred Kaufmann
Scientific Assistant

Marc Zoss
Scientific Assistant

Dorota Niedzwiecka
Administrator

ZIL members

**Institute of
Agricultural Economics**

Prof. Dr. Bernard Lehmann

Prof. Dr. Peter Rieder
(retired, March 2005)

**Institute of
Animal Sciences**

Dr. Michael R. Goe

Dr. Hans-Dieter Hess
(until August 2005)

Prof. Dr. Haja Kadarmideen

Prof. Dr. Michael Kreuzer

Prof. Dr. Wolfgang Langhans

Prof. Dr. Gerald Stranzinger
(retired, March 2005)

Prof. Dr. Caspar Wenk

**Institute of Food Science
and Nutrition**

Prof. Dr. Renato Amadó

Prof. Dr. Felix Escher

Dr. Zakaria Farah

Prof. Dr. Richard Hurrell

Prof. Dr. Christophe Lacroix

Prof. Dr. Martin Loessner

Prof. Dr. Erich J. Windhab

**Institute of
Plant Sciences**

Prof. Dr. Nikolaus Amrhein
(D-BIOL)

Prof. Dr. Klaus Apel (D-BIOL)

Prof. Dr. Nina Buchmann

Prof. Dr. Geneviève Défago

Prof. Dr. Silvia Dorn

Prof. Dr. Emmanuel Frossard

Dr. Alain Gaume
(until October 2005)

Prof. Dr. Wilhelm Gruissem
(D-BIOL)

Dr. Jan Jansa

Prof. Dr. Bruce McDonald

Dr. Astrid Oberson

Dr. Christof Sautter (D-BIOL)

Prof. Dr. Peter Stamp

**Department of
Environmental Sciences**

Prof. Dr. Peter Bachmann
(retired, March 2005)

Dr. Claudia Binder

Prof. Dr. Harald Bugmann

Prof. Dr. Peter Edwards

Prof. Dr. Hans Rudolf Heinimann

Prof. Dr. Ottmar Holdenrieder

Prof. Dr. Franz Schmithüsen
(retired, March 2005)

Prof. Dr. Jean-Philippe Schütz
(retired, March 2005)

Prof. Dr. Klaus Seeland

Dr. Jean-Pierre Sorg

NADEL, ETH Zurich

Prof. Dr. Rolf Kappel

CABI Bioscience, Delaware

Dr. Matthew Cock

Dr. Ulrich Kuhlmann

SDC Representatives

Dr. Katharina Jenny
(until February 2005)

Dr. Willi Graf
(since March 2005)

Member institutes

All institutes of the
Department of Agricultural
and Food Sciences are
members of ZIL:

**Institute of
Agricultural Economics**
www.iaw.agrl.ethz.ch

Agri-food and
Agri-environmental Economics

Institute of Animal Sciences
www.inw.agrl.ethz.ch

Animal Nutrition
Nutrition Biology
Breeding Biology
Statistical Animal Genetics
Physiology and Animal Husbandry

**Institute of Food Science
and Nutrition**
www.ilw.agrl.ethz.ch

Food Biotechnology
Food Chemistry
Food Process Engineering
Food Microbiology
Food Technology
Human Nutrition

Institute of Plant Sciences
www.ipw.agrl.ethz.ch

Plant Nutrition
Plant Biotechnology
Plant Genetics
Grassland Science
Agronomy and Plant Breeding
Applied Entomology
Phytopathology
Plant Biochemistry and Physiology

Editorial

The Swiss Centre for International Agriculture (ZIL) is known as an association which promotes research in the area of agriculture, food, nutrition, forestry and environment in order to support development in poverty alleviation, food security and sustainable use of natural resources. Accordingly, visibility of the various ZIL research projects is high in academia as well as in national and international development cooperation organisations. Somewhat less known is that most research activities of ZIL invariably include institutional or personal capacity building, a task which is expressed clearly in the mission and objectives of ZIL. Such capacity building, also referred to in a more general way as capacity development, challenges students and faculty of the ETH Zurich to increase awareness, understanding and support of research in development cooperation. Capacity development has to aim equally at facilitating scientific and technical training through research in order to ensure adequately educated and experienced human resources.

Today, capacity development is a term which is included in almost any mention of civil society and has received an array of meanings and definitions. One fact seems to be clear: The term goes beyond the conventional perception of training. It includes tasks such as managing changes, enhancing coordination and fostering communication. The present Annual Report 2005 shows that ZIL is able to promote exactly this multiple approach of capacity development, especially in the Research Fellow Partnership Programme for Agriculture, Forestry and Natural Resources (RFPP). The international evaluation, conducted at the beginning of 2005, concluded that the RFPP programme was positive in content and scientific quality.

In addition, an international evaluation took place for ZIL at large in connection with the termination of the 4th contract period between ZIL and the Swiss Agency for Development and Cooperation (SDC) and the planning for the next contract period. The interaction with the two external reviewers was fruitful indeed, and many of their recommendations were taken up immediately in the planning process. It is encouraging to see that the achievements of ZIL are recognised and that the centre is on the right track for the future.



Felix Escher, President

When this editorial is being published, ZIL has already started the next activity phase which is the 5th phase since the foundation of the centre in 1993. The setup of the programme for the new phase was not only accompanied by the external evaluation. It was based on a well-structured planning procedure by individual research groups, expert consultations and interactions with many other groups. This was all done while the research projects of the 4th phase still were being carried on, and while the tri-annual conference of the European Forum on Agricultural Research for Development (EFARD) took place in Zurich. It goes without saying that the ZIL members and the collaborators of the ZIL Executive Office have experienced a very busy year. I extend my sincere appreciation to all individuals and institutions, in particular to SDC, for their great efforts and help which have made 2005 once again a prosperous year for ZIL.

Felix Escher, President of ZIL

ZIL's profile and programme

The preparation of the two new contracts with SDC (ZIL and RFPP) dominated the agenda of 2005. Both went together with external reviews of the respective programmes.

In April 2005, ZIL made two major public appearances. The tri-annual conference of the European Forum on Agricultural Research for Development (EFARD) was hosted by the ETH Zurich and prepared by the ZIL management. At the same time ZIL was present with a stand at the public exhibition “Worlds of Knowledge”, one of the manifold activities celebrating the 150th anniversary of the ETH Zurich. Both events are presented in a separate chapter (pp. 11 and 14).

ZIL research programme

The ZIL research programme was in full swing in 2005 with nine ongoing projects (pp. 19–27). The geographical distribution of all ZIL and RFPP projects is shown on the map on the following page.

Two seed money projects were accepted:

One project by Emmanuel Frossard on forage legumes in Latin America was an investment in the revision of an EU proposal in the 6th Framework Programme, which had been rejected with a good chance of acceptance after revision. Unfortunately this was finally not the case. Another seed money project by Zachariah Farah intending to improve the processing of the cassava product attiéké received partial funding as a contribution to an ongoing study.

Before concluding the actual funding phase of the SDC contract, ZIL could invest the remaining seed money in three projects. Out of seven applications received, the Board select-

ed these projects based on the recommendations of the Seed Money Committee (F. Escher, B. Lehmann, J.-P. Sorg, and B. Becker *ex officio*).

- The budget of the ZIL project by B. Lehmann (p. 33) could be topped up to the original level, which had not been possible at the time of its acceptance.
- Ashalew Zeleke, an Ethiopian doctoral candidate in the group of Michael Kreuzer, was funded for the conclusion of his doctoral study. The original promise of support from his home institution had unfortunately not materialised, and could be compensated by this grant.
- A pilot study on coastal forest resources affected by the Asian tsunami by Klaus Seeland and colleagues was selected as a seed money investment in a larger post-tsunami initiative coordinated by NIDECO. At the same time, this grant fosters the relationship between ZIL and NIDECO.

Livestock systems research in support of poor people

2005 was the last year of the three-year SDC funding phase with the programme focus on “Livestock systems research in support of poor people”. Therefore, the preparation of the new contract with SDC and the strategic direction for the next three to four years were in the focus of ZIL activities throughout 2005.

In November 2004, the ZIL Board concluded that ZIL should continue the programme on livestock systems research in support of poor people. The ZIL management launched a call for Notes of Intention (NoIs) to assess the potential programme portfolio of the next phase from the supply side perspective. This resulted in a total of 15 NoIs, 13 related to livestock systems and two independent proposals. This sur-



Barbara Becker,
Executive Manager



vey revealed that the ZIL members identified with the continuation of the livestock systems focus. It further indicated a shift towards the environmental dimension of fodder production and feeding strategies.

In March 2005, ZIL conducted a comprehensive planning week for further programme development. It combined the 2nd Progress Forum (p. 26) with the External Review of ZIL and an expert consultation with key international experts. The latter was intended to complement the ZIL internal

perspective with a demand-driven approach to defining the future research agenda.

This week proved very useful in fostering the dialogue between ZIL members and our external partners from Switzerland and abroad. Participants of the Progress Forum discussed potential programme adjustments based on the Nols. The two external reviewers had the opportunity to observe ZIL in action, and to interact with members and partners at the start of their review exercise.

The expert panel of the consultation was composed of the Directors General of CIAT, Joachim Voss, and of ILRI, Carlos Seré, respectively, and the Director of the Animal Production and Health Division of the FAO, Samuel Jutzi, as well as Fritz Schneider, Vice Director of the Swiss College of Agriculture, Zollikofen, and Jakob Zinnstag, Assistant Professor at the Department of Public Health and Epidemiology of the Swiss Tropical Institute, Basel, as national experts and partners. They were asked to respond to four questions:

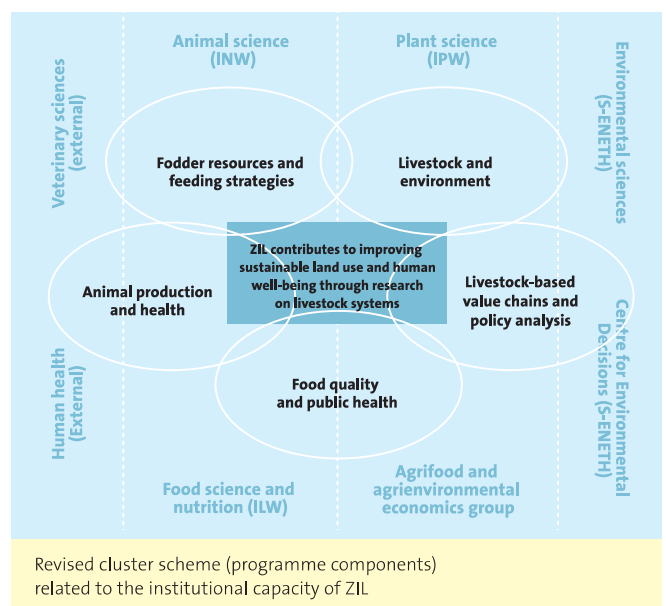
- What are current trends in livestock systems research and the international policy environment?
- What is the resulting research demand on livestock systems (continuing and evolving challenges)?
- What complementary strengths of ZIL and its partners could generate added value?
- Does the current programme structure adequately reflect these trends, challenges and complementarities? What would need to be adjusted or modified?

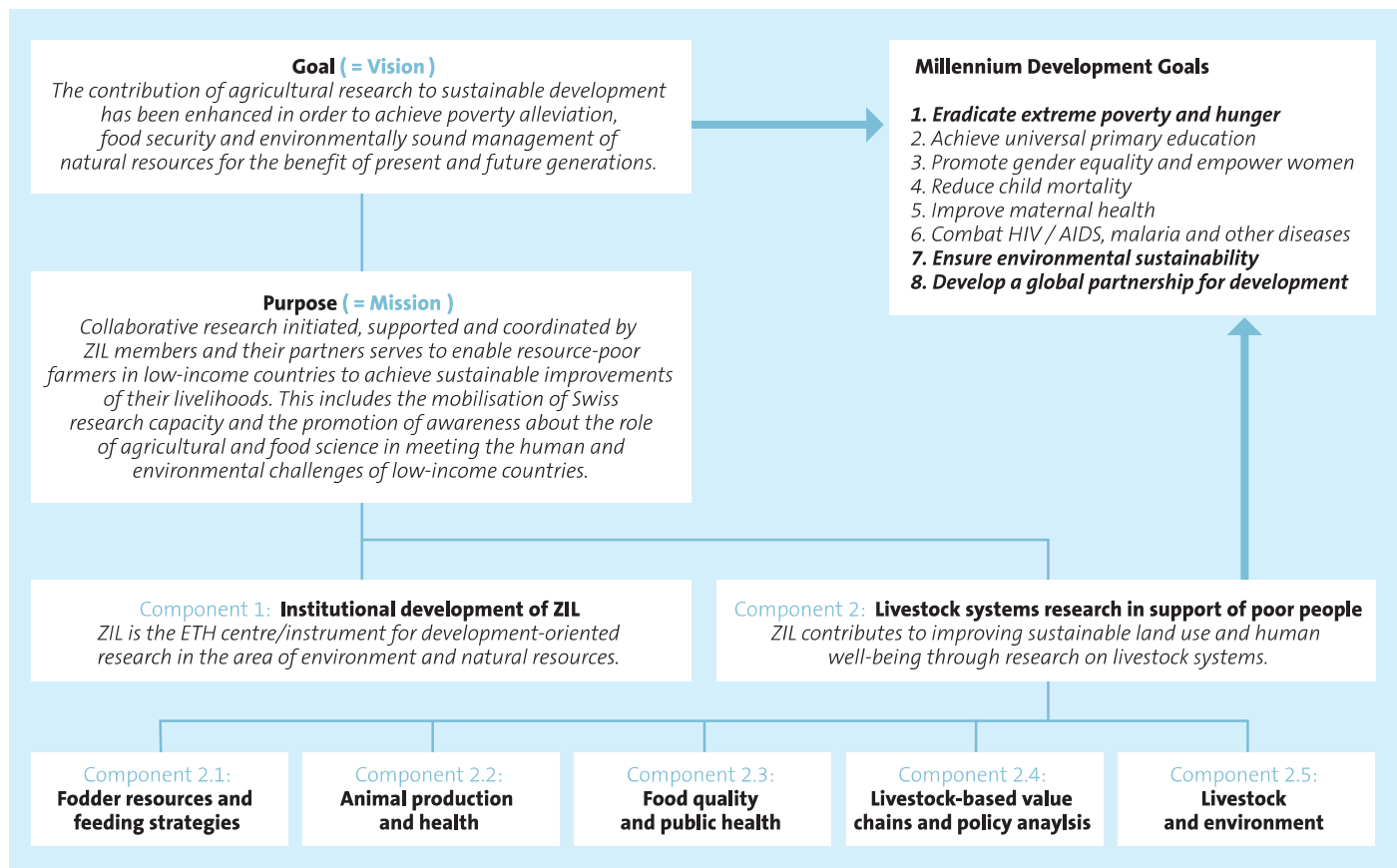
In essence, the need for livestock systems research is as great as when ZIL started this programme three years ago. The animal sector remains the fastest growing agricultural activity in developing countries, undergoing rapid structural changes. Therefore, research has to address technologies, institutions, and policies for poverty alleviation, environmental sustainability, and public health. The structural changes include the concentration of animal production in large industrialised units (mainly peri-urban), changes in consumer behaviour and demand (“supermarketisation”), and the expansion of ruminant production into marginal areas. The experts further pointed out that the environmental and social impact of these changing patterns of animal produc-

tion has to be addressed at different system levels and scales, and has to take into account cross-sectoral effects. The experts saw ZIL as being well-equipped to face these challenging research topics by adjusting the current programme structure to address these emerging issues.

This strategic planning process was concluded with a workshop in early September 2005, when the participating ZIL members converted the inputs of the earlier events and surveys into an adjusted programme structure and elements for a logical framework. The results of this workshop were compiled by the ZIL management into a project document which served as the basis for preparing the new SDC contract.

The programme structure of the ongoing projects is shown on p. 26. The new structure is given in the diagramme below, overlaying the new programme components with the disciplines and institutes of ZIL members.





Linking the logical framework to the ZIL vision and mission and the MDGs

Fighting poverty has become the overriding priority in the new millennium. Since 2000, the Millennium Development Goals (MDGs) have become guiding objectives for development cooperation. Although the ZIL vision and mission statement, as agreed in 2003, does not make an explicit reference to the MDGs, it is fully in line with this internationally accepted agenda. In particular, ZIL contributes to the MDGs 1 and 7 with the portfolio of its research programme, and to the MDG 8 by its efforts in capacity development and research partnerships with institutions in developing countries.

Research on livestock systems is highly relevant to the MDG 1, i.e. to eradicating poverty and hunger, enabling the economic benefits of livestock as an asset of poor rural households. Two-thirds of the rural poor keep livestock, and almost 60% of these rely on mixed crop-livestock systems. The consumption of animal source foods contributes to the

overcoming of malnutrition, thus resulting in a healthier and more productive population and increased school performance of children (MDGs 1, 2, 4, 5, 6). If managed properly, livestock-keeping contributes to environmental sustainability (MDG 7). However, in achieving the MDGs, adequate policy conditions are needed to avoid negative side-effects on equity and the environment. Research on livestock systems therefore has to respond to the challenges of technology development, increased understanding of system dynamics and institutional and policy development.

ZIL pursues the Millennium Development Goals and its own vision and mission by means of its research programme. At the same time it strives for its own institutional development to become an ever more reliable partner for its counterparts nationally and internationally. The figures above and on p. 6 show how the research components on “Livestock systems research in support of poor people” relate to the programme objective and to the overall goal of ZIL as expressed in its mission statement.

Institutional development of ZIL

During the entire planning process for the next funding phase, SDC was a most constructive partner in shaping the programme and strategy for the years to come. Without imposing restrictions on ZIL researchers in defining the research agenda, SDC emphasised its pro-poor policy and the strong focus on the MDGs as guiding principles. Furthermore, it demanded the incorporation of a new programme component for the institutional development of ZIL.

Inter alia, this request is based on the recommendations of the external review of ZIL. The review was conducted by Steve Thompson from New Zealand, who had chaired the last external review of ZIL in 2002. The second reviewer was Philippe Ankers, the Director of Vétérinaires sans frontières VSF-Suisse.

The two reviewers came to the overall conclusion that ZIL will have to define a broader role for itself:

ZIL cannot and does not stand still. It faces particular challenges, as it moves into its “teenage” years, to understand these international trends, to broaden its scope and funding base, increase the range of skills it can call upon, and as a consequence, develop a new flexibility with regard to accommodating the requirements of different funders and research performers. In particular, the ZIL Board will need to develop ways to allow, encourage, and even require, co-funding for ZIL at the programme and project levels. In order to access ZIL funding, we believe that ZIL members should expect to bring co-funding opportunities to the table.

We believe that these developments offer the chance for the ETH Zurich to bring together a network of excellence in international development matters. Our view is that the ETH

Zurich can best serve the long term interests of world development, aid agencies, and researchers by creating in one body a capacity which contains information exchange, networking, coordination and operating ability. Let us call this a ZIDECO – Centre for International Development and Cooperation.

..Our task in making recommendations as an external review panel is to see the currents of change, the challenges and the opportunities that face ZIL. We see an opportunity to grow into an organisation which can make a more significant contribution to developing world problems. Our recommendations are not tempered by the barriers that will have to be overcome. That stimulating challenge will rest with the Board and management of ZIL.

The ZIL Board welcomed the analysis and recommendations of the external review panel. It prepared a response indicating areas of immediate and future action of ZIL members, Board and management. It stressed that steps had been taken and will be taken pro-actively to seek the integration with related units of the ETH Zurich, in particular the Network for International Development and Cooperation (NIDECO). This was to be seen in the light of ongoing changes at the ETH Zurich, notably the creation of the School Domain of Earth, Environment and Natural Resources (S-ENETH).

ZIL gratefully acknowledges the constructive role which SDC has played in this process. The SDC demonstrated its confidence in ZIL by signing the new contract for another four-year phase before the institutional restructuring could be concluded. Now the challenge for ZIL is to live up to these expectations in 2006.

Networking

Institutional integration as discussed above is impossible without a strong existing network within the ETH Zurich. The major players NIDECO, NADEL, S-ENETH and the School Board and management have already been mentioned. Naturally, the link with NIDECO is particularly strong due to the joint management of both units, and thanks to the participation of Emmanuel Frossard in the ZIL Board and the NIDECO Steering Committee. Unfortunately, Monika Gessler had to withdraw as representative of the ETH management from the ZIL Board due to a new assignment within the ETH Zurich. Her replacement was postponed to 2006, when the new ETH president has come into office.

Networking with Swiss partners

Networking with Swiss partners continued and intensified. This was the case for SFIAR, the **Swiss Forum for International Agricultural Research**, on whose behalf ZIL organised the EFARD conference (p. 11). The same holds true for LivestockNet, who held its inaugural meeting as a formal organisation in conjunction with the ZIL expert consultation, making use of the presence of the international experts for a symposium. The ZIL livestock coordinator is member of the LivestockNet Board.

SDC remains ZIL's most important partner. The representative of SDC to ZIL changed in March 2005: Katharina Jenny handed over this mandate to Willi Graf. He had been responsible for ZIL as SDC counterpart in its founding phase in the mid-90s. Having such a capable and experienced SDC partner was a great advantage for the preparation of the new contract.

Due to a change in SDC policy, SDC withdrew from the ZIL Board, which required adjusting the ZIL statutes. This adaptation was formalised at the ZIL General Assembly in June 2005. Although SDC no longer is a Board member, its representative has remained an active observer at the Board meetings.

Numerous other linkages were maintained, among others with the Swiss College of Agriculture SHL, InfoAgrar, Intercooperation, the Centre for Development and Environment CDE of the University of Berne, the Commission for Research Partnerships with Developing Countries KFPE, the Syngenta Foundation, and the Federal Office for Agriculture BLW.

Networking with international partners

2005 was the year of networking with European partners. The EFARD Conference (p. 11) brought more than 350 colleagues from Europe and other continents to the ETH Zurich. Associated with the EFARD Conference, ZIL hosted the General Assembly of NATURA, the Network of European Agricultural (Tropically and Subtropically Oriented) Universities and Scientific Complexes related with Agricultural Development. The launching of the ERA-ARD project has established a new strong platform for intensifying our European linkages (p. 14).

The EFARD conference was also an opportunity for direct interaction with the Secretariat of the CGIAR, which marked a strong presence at this event with an exhibition and a funding contribution. As in the years before, the ZIL Executive Manager attended the Annual General Meeting of the CGIAR in Morocco in December 2005, which again was an excellent networking platform. She is also a member of the Board of

Trustees of the International Institute for Tropical Agriculture IITA, based in Ibadan, Nigeria. The experience of this close insight into the affairs of the largest centre of the CGIAR is certainly cross-fertilising her ZIL engagement.

Many contacts are maintained through individual visits to the ETH Zurich by our international partners. Apart from the guests at the Progress Forum and the expert consultation on the future livestock systems programme, ZIL received a number of partners from the Centre Suisse de Recherche Scientifique in Côte d'Ivoire as well as from other partner institutions. As a matter of course, each individual ZIL member maintains his or her own network of partners, and visits these partner institutions for the supervision of projects and the development of new research ideas.



The ZIL management team from left to right: Roger Pfister (NIDECO), Barbara Becker, Dorota Niedzwiecka, Marc Zoss, Manfred Kaufmann, Mathias Egloff

Internal developments

ZIL is an association based at the ETH Zurich. Members are all institutes and professors of the Department of Agriculture and Food Sciences (D-AGRL), the Forestry chairs within the Department of Environmental Sciences (D-UWIS), and some individuals from other entities. Changes in membership composition due to retirements or new assignments can be seen on p. 2.

The General Assembly in June 2005 confirmed the composition of the ZIL Board and elected Michael Weber as new internal auditor, succeeding Werner Hediger.

The ZIL finance management was revised jointly with Willi Graf from SDC and his administrative assistant Denise Aeschbacher. This resulted in the choice of a new external auditor with new terms of reference. With this change the finance management of ZIL is now on a state-of-the-art level.

The ZIL management had a busy year in 2005. It was supported by a student assistant, Gaëlle Logeay, and Nanina Gubler, a student in her 9th semester who joined the ZIL office for the practical training as part of her agriculture curriculum. They supported the entire ZIL team in its efforts to smoothly and efficiently manage its activities.

Barbara Becker

EFARD 2005 Conference: European Responses to Changing Global Needs

The European Forum on Agricultural Research for Development

The European Forum on Agricultural Research for Development (EFARD) is a platform for strategic dialogue among European stakeholder groups to promote research partnerships between European and Southern research communities. The ETH Zurich hosted the third tri-annual EFARD Conference from April 27–29, 2005. On behalf of the Swiss Forum for International Agricultural Research (SFIAR), ZIL took the responsibility for organising and convening the conference.

EFARD is a joint undertaking by all stakeholders of Agricultural Research for Development (policy makers, researchers, farmer organisations, NGOs and the private sector) to mobilise the scientific community and to strengthen the contribution of European Agricultural Research for Development to poverty alleviation, food security and sustainable development. All Member States of the European Union, plus Norway and Switzerland, participate in this European Forum.

EFARD's mission follows the principles of the Global Forum on Agricultural Research (GFAR), and contributes to GFAR's Global Plan of Action, in partnership with the other regional fora of GFAR. In particular, EFARD has an important advocacy role to play in maintaining agricultural research for development as highest priority in the political agendas at European and international levels. The tri-annual EFARD Conferences constitute the core element of EFARD's activities in order to exchange and promote strategic planning among European partners and partners from the South.

Overview of the EFARD 2005 Conference programme

Under the title “Agricultural Research for Development (ARD): European Responses to Changing Global Needs”, the EFARD

2005 Conference focused on how current global trends imply changing needs for European ARD. The Conference served as a platform to discuss and elaborate a position on how European ARD should respond to these changing global needs.

A call for oral and poster contributions was launched in April 2004 to seek scientific inputs and case studies for the proposed conference themes. Due to the broad response, a total of 54 oral presentations and 68 poster presentations could be allocated to eleven thematically structured scientific parallel sessions and another 32 oral presentations were allotted to eleven parallel workshops. In addition, about twenty invited speakers gave keynote presentations in the plenary. In total, some 360 participants from 64 countries, representing all stakeholder groups, attended the EFARD 2005 Conference. A great number of full conference fellowships were granted to participants from developing countries and a few partial fellowships were given to participants from Eastern European countries.

The day-by-day Conference programme

The first day of the Conference was held under the motto “Global Challenges and Responses of Agricultural Research for Development (ARD)”. The opening session included a number of keynote presentations on the changing global needs for ARD – among them a keynote of Ian Johnson, Vice President of the World Bank and Chairman of the Consultative Group on International Agricultural Research. The second session was devoted to the various stakeholder perspectives on the ARD agenda: Invited speakers from farmer organisations, NGOs, small and medium enterprises, global players as well as private and public donors shared their views with the plenary.

In the afternoon, Hans Hurni, the Chair of EFARD, elaborated on the role of EFARD in the past and in the future. Barbara Becker, the ZIL Executive Manager, presented the draft Conference Issues Paper that had been commissioned to a drafting team in order to stimulate the discussion at the Conference, and to produce a final Conference Statement. The participants then split up into 50 small groups to discuss the listed issues.



Ian Johnson, Vice-President of the World Bank and Chairman of the CGIAR

In the final session of the first day, the various mechanisms and institutions for the coordination of ARD in Europe were presented and their competencies and inter-relations were outlined.

The theme of the second day – “**Innovation through partnerships in ARD**” – was introduced by three keynote presentations that highlighted the ecological, the social and the economic dimension of ARD.

For the rest of the day, the participants split into scientific parallel sessions and workshops to learn and discuss about ARD approaches and experiences in practice and innovations through ARD partnerships.

The second day ended with a guided tour through the exhibition “**Worlds of Knowledge**” (p. 13), followed by the conference dinner on the Uetliberg mountain.

Under the theme “**The future agenda of ARD**”, the third day opened with four keynotes on the promotion of ARD in Europe and the South: The role of ARD in the 7th Framework

Programme of the European Commission, the strengthened ARD contribution of the new EU member countries, the ARD agenda of GFAR and the regional fora, and the integration of ARD into the Poverty Reduction Strategy Papers.

During the closing session, Barbara Becker presented the revised Conference Issues Paper: The results of the group work two days before had been compiled by the drafting team and formed a separate chapter of the Conference Issues Paper. The essence of the group discussion was summarised in ten commitments, termed the “Zurich Declaration”, that are intended to guide the development of a new agenda for Europe’s contribution to ARD. Hans Hurni rounded off the Conference with a wrap-up and allowed for final statements of participants about the Issues Paper and the Zurich Declaration.

In the afternoon, interested participants could choose between three technical excursions to agricultural research stations and on Saturday, April 30, three parallel full-day post-conference excursions took place, each with a different agricultural focus.

The detailed Conference programme (including the abstracts of oral and poster presentations) can still be downloaded from the Conference homepage (www.efard2005.org/programme.htm), as well as the Conference Issues Paper (www.efard2005.org/proceedings.htm).

ZIL would like to thank everyone who contributed to the success of the EFARD 2005 Conference: On the national level, in particular the Organising Committee with SFIAR members from various stakeholder groups that supported the preparatory process from start to end, and on the international level

the Programme Committee members that provided the thematic framework of the Conference. The organisation of the EFARD 2005 Conference was only possible thanks to the generous support of the following institutions: The Swiss Agency for Development and Cooperation, the INCO Programme of

the European Commission, the Federal Office for Agriculture, the Consultative Group on International Agricultural Research, the Syngenta AG, and the Syngenta Foundation.

Manfred Kaufmann

Potato research for poverty reduction: Discover the Inca's treasures

In 2005 the ETH Zurich celebrated its 150th anniversary with a series of public events. The one which attracted most public attention was the exhibition “**Worlds of Knowledge**” from April 22 to May 8, 2005. More than 250 000 visitors saw this exhibition in the park of the Swiss National Museum in Zurich, in which ZIL presented two of its projects.

The ZIL stand showed how research can make a contribution towards sustainable development. It portrayed two collaborative projects between the ETH Zurich and the International Potato Center (CIP) in Peru (pp. 38, 39). They highlighted that both disciplinary and trans-disciplinary research is necessary to have a development impact.

The exhibition demonstrated that the basic science-oriented and the development-oriented projects complemented each other, both being based on the genetic diversity of potato: on the one hand as an essential factor in understanding the evolution of a pest in order to develop effective strategies against it, and on the other hand as a resource for improving the livelihoods of smallholders. Through this combination, the exhibition did not only emphasise the importance of biodiversity, but it also showed that conservation and development do not necessarily exclude each other, and that research such as that conducted by ZIL can play an important role in bringing them together.

With its attractive presentation, the diverse media used (potato plants, video-clips, films, Andean potato product degustations, posters, e-learning tools, etc.) and the thematic bridge from the Swiss staple food potato to development, the ZIL stall received considerable attention from the visitors. As the EFARD Conference took place at the same time, the occasion was used to present the ZIL stall to the participants on their way from the meeting venue at the ETH Zurich to the official conference dinner.

Marc Zoss



The European Research Area (ERA) in Agricultural Research for Development (ARD)

Promoting collaboration in European ARD to strengthen agricultural research for the world's poor

The European Research Area in Agricultural Research for Development (ERA-ARD) is a project within the ERA-NET scheme of the 6th Framework Programme of the European Commission. The objective of the ERA-NET scheme is to enhance the cooperation and coordination of research activities carried out at national or regional level in the EU Member States and Associated States through networking and by initiating joint national and regional research programmes.

ERA-ARD responds to the need to better understand how European ARD programmes are identified, selected, designed, funded and managed on the national level. 13 EU members plus Switzerland – represented by SDC – take part in this project. ZIL has been entrusted by SDC to manage and coordinate the Swiss contribution to the project.

The project seeks to improve synergies between the national ARD programmes in Europe, to increase the effectiveness and efficiency of European agricultural research planning, funding and implementation to fight poverty and hunger and to support more rapid and sustainable development in the poorest countries in the world.

ARD in Europe

Europe has a strong tradition in ARD. As many as 10 000 scientists are involved in projects in this field. The total amount of financial resources invested is estimated to exceed €500 million. Yet despite this substantial commitment, there is

very limited coordination between the ARD programmes of Member States, the various European Commission-funded projects, or the numerous European and international bodies currently addressing ARD research. Predictably, this fragmentation leads to duplication of efforts, conflicts of interest and an unnecessary competition. ERA-ARD has been formed to establish coherence and collaboration in European ARD. It brings together representatives from various ministries and national public research organisations. With 14 participating countries, ERA-ARD has the critical mass necessary to drive forward the harmonisation and integration of Europe's ARD effort.

ERA-ARD activities and expected outputs

Given the existing fragmentation of ARD in Europe, the participating countries of the ERA-ARD consortium are taking a pragmatic step-by-step approach to their work, starting with assembling and exchanging basic information. Initiated during the year 2005, ERA-ARD conducts national surveys to map ARD activities in each participating country. It will share the results among members and identify areas of complementarity, duplication and potential synergy between national programmes. By highlighting common themes, this exercise will enable ERA-ARD members to produce a shared vision and strategic agenda for ARD in Europe that could then drive decisionmaking on a national level, to help harmonise programme objectives and to rationalise planning. Innovative approaches and institutional arrangements will then be explored and used to implement joint and, during the second half of the project, transnational ARD activities. The ERA-NET will select two subprogrammes that will be open to joint activities. Subprogramme managers and

decisionmakers will meet to exchange information and agree on areas of cooperation and collaboration. It is expected that this “hands-on” coordination will pave the way towards wider transnational activities as the culmination of ERA-ARD’s work.

Before truly transnational activities can take place, however, the consortium members will have to agree on common methodologies for ARD programme management (planning, monitoring, evaluation and impact assessment). The partners will share best practices and publish an ARD Management Methodology Guidebook. Agreement on common mechanisms for resource allocation will also facilitate the pooling of funds and allow to launch ERA-ARD’s first transnational subprogramme. The ultimate goal of ERA-ARD is to enable Europe to provide collectively a strategic “European ARD offer” in terms of human, physical and financial resources, and a much more coordinated approach to North-South scientific and technological cooperation in ARD.

ERA-ARD is part of Europe’s effort to fight hunger and poverty and to support sustainable development across the globe. By improving the efficiency and effectiveness of ARD across Europe, the ERA-ARD project will contribute towards achieving the Millennium Development Goals. Furthermore, the project aims at facilitating the access to European ARD expertise and at strengthening of Europe’s contribution to, and impact on, regional and global ARD systems.

ZIL’s contribution to the project

ZIL leads the Swiss consortium for the ERA-ARD project, comprising the Swiss College of Agriculture (SHL, Zollikofen) and the Centre for Development and Environment (CDE, Berne). In the overall ERA-ARD project framework, ZIL manages the

work package “strategic activities” and together with CDE it will identify innovative approaches and institutional arrangements for implementing joint ARD subprogrammes. The ERA-ARD project started in April 2005 and will end in March 2009.

Manfred Kaufmann



Members of the task force for the design of common methodologies for ARD management during a workshop at the ETH Zurich

Capacity development

According to the OECD, **capacity** is the ability of people, organisations and society as a whole to manage their affairs successfully. **Capacity development** is understood as the process whereby people, organisations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time. (**The challenge of capacity development: Working towards good practice**, DAC Network on Governance, OECD, Paris, 2006)

Capacity development for research “is not research itself but helping create and reinforce appropriate sustainable institutions within developing countries to foster the emergence of well-trained professionals ready to contribute to policy making and teaching at home and compensate for the ‘brain drain’ of professionals from developing countries” (**Creating Partnerships for Capacity Building in Developing Countries**, World Bank Policy Report Working Paper 3099, 2003).

Capacity development encompasses three analytical levels:

- at the **individual** level, capacity development aims to strengthen the personal capabilities and competences of a selected group of individuals;
- at the **organisational** level, capacity development targets not only individuals, but whole institutions;
- at the level of the **enabling environment**, capacity development considers the structures of power and influence in which the targeted organisations are embedded.

What can an institution as ZIL contribute to capacity development for research, in view of this comprehensive perspective and the three analytical levels?

Individual capacity development

In the first place, ZIL is dedicated to the individual capacity development of students, doctoral candidates and post-docs

at the ETH Zurich. This is explicitly expressed in one of its objectives: **Building capacity and awareness among ETH students for their contribution to sustainable development**. However, this mandate goes beyond individuals at the ETH Zurich. It also includes students at our partner institutions, illustrating that, in practice, institutional and individual capacity development cannot be separated as institutions are always constituted of individuals.

In several ZIL projects, one or more doctoral candidates are from developing countries, some of them obtaining their degrees at universities in their home countries, e.g. Sergio Mejía Kerguelén in Columbia (p. 27), Emily Awuor Ouma from Kenya at Kiel University in Germany (p. 30), Yoseph Shiferaw in Ethiopia (p. 32), Athanase Youan Bi and Gisèle Sedia in Côte d'Ivoire (p. 33). Furthermore, in many projects, Master students from the partner countries obtain their degrees while at the same time performing important support functions for the project execution. In the new funding Phase V, the involvement of local Master students has been made one of the criteria in the project selection process.

Individual capacity development is the explicit objective of the SDC-funded Research Fellow Partnership Programme (RFPP) managed by ZIL. It is addressed to candidates from Switzerland or developing countries at the doctoral or post-doc level. A recent survey in 14 European countries (within the ERA-ARD project, p. 14) has revealed that most countries have programmes for capacity development at the doctoral level. However, there are only very few funding instruments supporting more advanced academic careers. In this sense, the RFPP fills an important niche by including post-doctoral fellowships in its mandate.

One reason for the lack of programmes at the post-doc level appears obvious: One post-doc fellowship may easily require

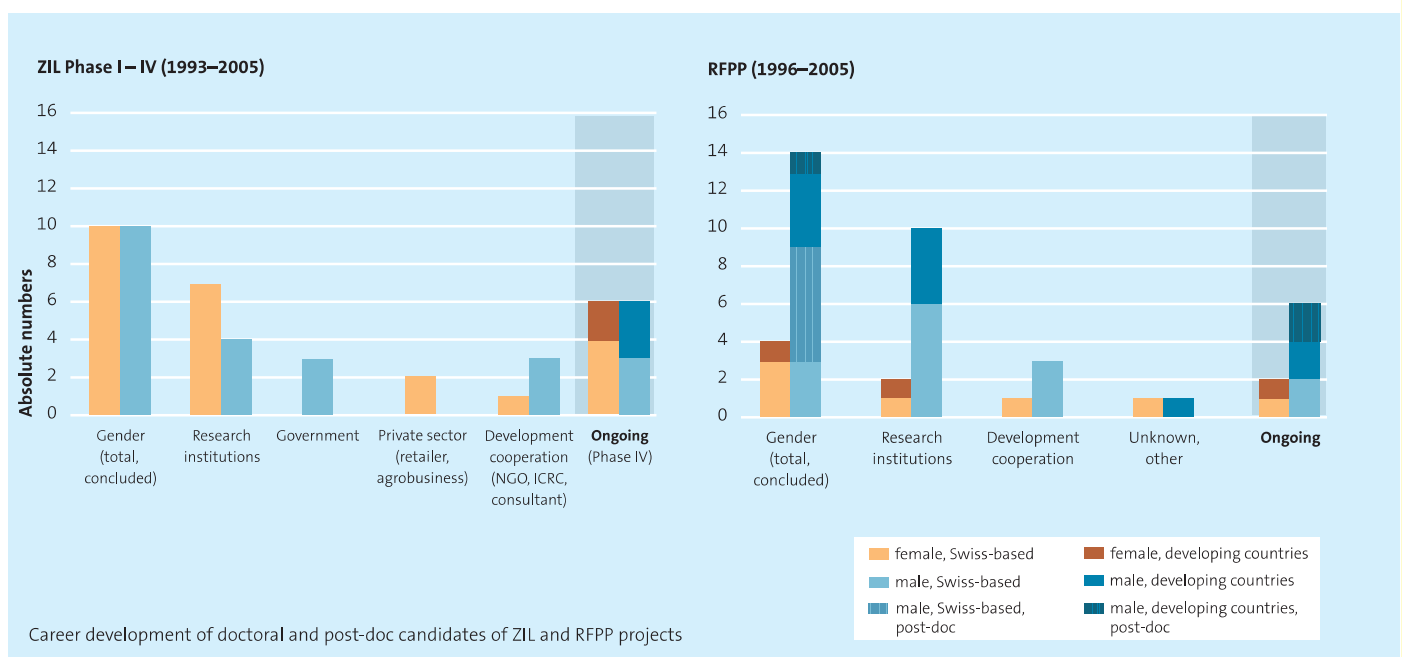
twice the financial resources of a doctoral fellowship. Therefore, even within the RFPP Selection Committee, difficult decisions on resource allocation have to be made when the choice is either to invest in two doctoral candidates or to fund one post-doc fellowship. In practical terms, the RFPP now restricts post-doc grants to two years as compared to three-year fellowships for doctoral students.

The diagrammes below show the career development as far as the former candidates could be tracked. Since 1993, 20 doctoral students obtained their degrees in ZIL projects, while 11 candidates are currently working in ZIL projects (pp. 27–35). Although ZIL projects are not *per se* capacity development instruments, but rather part of a research programme, they have always included this dimension to a large extent. In the ongoing phase, this aspect has been empha-

sised through the fact that in a few projects doctoral candidates from Switzerland and developing countries are employed together.

The RFPP, on the other hand, has been designed as a capacity development instrument. Since 1996, 24 young scientists have benefited from this programme so far, nine from developing countries and 15 Swiss-based fellows.

On pages 22–25, a number of former ZIL and RFPP fellows reflect on their careers and the contribution which the ZIL or RFPP project made to their personal and professional development. They form a mix of presentations of young scientists from Switzerland and developing countries, male and female, recently graduated or by now well-established professionals. This shows the wide variety of careers, although most of the contributors chose to remain in the scientific world.



Results of the external review of the RFPP

In January 2005, an external review of the RFPP was conducted. This was a good opportunity to reflect upon the contribution of ten years of SDC investment in individual capacity development. The panel was composed of Eric Tollens (Leuven University, Belgium) and Anne Crole-Rees (freelance consultant, former graduate of the Institute of Agricultural Economics, ETH Zurich). They observed that:

Capacity Building...is the foundation of the RFPP and its main justification. Certainly from the Swiss perspective, the programme has enabled the maintenance and enhancement of a Swiss research capacity in the field of agricultural development in the East and South in a broad sense. It has strengthened ZIL and ETH in particular, remaining prominent centres of excellence in international agriculture. Through partnerships and networking, it has helped to create a web of relations and exchanges, particularly with the science community at CGIAR centres. This has certainly benefited students of agricultural development in Switzerland, NGOs and probably also the Swiss private sector in agriculture.

Regarding capacity building in the South and East, it is much less clear as the numbers involved are so small in comparison to the needs and demands. There is an issue of critical mass. The programme is no doubt very useful and necessary, but ideally one would like to see 3–4 fellows trained for each Swiss fellow. With the present budget, this is not possible. Impact in the South and East in terms of capacity building is certainly tangible, but isolated, very dispersed, a drop in a bucket. Of course the reality is that the South and East themselves should do much more capacity building and advanced training, but for various reasons it is wholly inadequate.

...a two-pronged approach will be proposed to deal with the problem of numbers of persons from the South and East trained: reducing the fellowship costs per person, and increasing the budget, particularly for fellows from the poorest countries and from priority countries and focus areas of SDC interventions.

... both [measures] may require innovative thinking, a strong commitment and in the end, a strategic reorientation. Quality and relevance of the programme are already very good, and should be maintained, while efficiency and effectiveness need to be made better if a larger impact is to be achieved in terms of capacity building.

In the new contract with SDC which came into force in July 2005, the overall level of SDC investment into RFPP could be maintained. Some measures have been introduced to reduce the cost per fellowship as explained on p. 36. The panel made some suggestions for increasing the impact of RFPP:

Several areas of attention are indicated in this report in order to improve RFPP, which focuses on the advanced, cutting-edge level of science and technology in natural resources, agriculture and forestry (PhD and post-doc). One could think of post-degree mentoring and professional development through short, e.g. three month, recycling fellowships or sabbaticals (at ETH Zurich in particular) for previous fellows from developing countries, twinning arrangements, short visit arrangements. In a life long learning perspective, and knowing that science and technology evolve at a very rapid pace, these become more and more imperative. Of course, such programmes also require additional resources but since RFPP fellowships represent such heavy investment, some "maintenance" financing for scientific upgrading or retooling could be justified. It is part of post-degree networking,

mentoring, access to the global scientific literature and state of the art. Particularly in universities and research centres in the South, one can witness scientific burnout, obsolescence, and non performance after a couple of years after return, due to inadequate work incentives, isolation and lack of a viable scientific infrastructure. Thus, some upkeep and “maintenance” support for the returned fellows may be necessary in the future.

The panel concluded that

There is a broad consensus among the stakeholders of the RFPP programme, as revealed in the survey and through interviews, that the programme is excellent, of very high scientific level. The main purpose and outcome of the programme is capacity building, which is excellent but at a relatively high cost. The programme is also very good in establishing partnerships, but they are personalised and not necessarily sustainable. Several projects have had long term spin-offs, increased networking, multiplier effects and synergies. Several local MScs and even occasionally local PhDs have been obtained as a result of collaboration with a RFPP fellow.

Comparison with similar programmes reveals that the programme is very flexible, generous, high quality but also rather limited in scope. Only 2.8 fellowships/year have been awarded on average since 1996, with a proportion of 60:40 PhD/post-doc and also Swiss/developing countries. Since 2002, the number of applications received is increasing. It is argued in the report that efforts should be made to reduce the cost per fellowship, while maintaining salaries and specific research costs, through a reduction of overheads, general research costs, fringe benefits, etc. At the same time, co-financing from other sources should be sought. In this way, more fellowships per year could be awarded, especially

for applicants from the South, thus increasing cost effectiveness and the scope of the programme. There is no doubt that the Swiss advanced research institutions, particularly ETH Zurich, and also the CGIAR centres, could accommodate the increased number of fellows. And maybe SDC, which finances RFPP, could also increase its budget on a matching grant basis in the case of co-financing from the private sector.

The programme is well-managed by ZIL, and it strengthens ZIL... The scientific support of ZIL as a honest broker between partners, and as a provider of seed money are well appreciated ...

The suggestions and recommendations of the Panel are well taken by ZIL. Although the resources remain limited, ZIL strives to complement the RFPP instrument with other funding and support mechanisms. ZIL is privileged to be managed in one unit with the Network for International Development and Cooperation (NIDECO) of the ETH Zurich. NIDECO manages a set of instruments to support the ETH exchange with partners from developing countries. These comprise the invitation of visiting scientists to the ETH Zurich, funding of teaching stays of ETH lecturers in developing countries, pre-doc grants, and small seed money grants. In 2005, four ZIL members were beneficiaries of NIDECO grants: one pre-doc from Ethiopia, later financed by ZIL for the completion of his PhD, one teaching stay at the University of Peradeniya, Sri Lanka, one visiting scientist from Cameroon who used his stay at the ETH Zurich to prepare a RFPP post-doc proposal, and one seed money investment to establish a partnership with the Chinese Academy of Tropical Agricultural Sciences (CATAS) in Shanghai. As these examples show, both programmes are complementary, and through joint membership in both units, ZIL and NIDECO, the scientists of the ETH Zurich can benefit from these synergistic instruments.



Audience at the lecture given by Caspar Wenk (INW) at the University of Peradeniya, Sri Lanka

Organisational capacity development

Two of these NIDECO examples may illustrate the ZIL efforts to go beyond individual capacity development to the level of institutional or organisational capacity development: The University of Peradeniya (UoP), Sri Lanka, and the Shanghai Institute of Plant Physiology and Ecology (SIPPE) of the Chinese Academy of Science.

The University of Peradeniya in Sri Lanka was among the earliest ZIL research partners (p. 24). Linkages with this university have been maintained for more than ten years in the fields of agricultural economics, animal sciences and agronomy. Several scientists from UoP come to the ETH Zurich annually for research and teaching, thus contributing to the capacity development of Swiss students. A new ZIL project will start in 2006 which will expand this partnership to the aspects of GIS

technology. We look forward to this strengthened mutual commitment and its impact on both partners.

It goes without saying that institutional capacity development through research partnerships is not possible without the personal commitment and dedication of the individual scientists on both sides. This was the topic of last year's ZIL Annual Report and does not have to be repeated here.

The cassava biotechnology laboratory in the Shanghai Institute of Plant Physiology and Ecology (SIPPE) of the Chinese Academy of Science is another good example of institutional capacity development. Over many years, the ZIL scientist Peng Zhang has acquired sound scientific, technical and managerial skills which he is currently investing in the establishment of the cassava biotechnology laboratory in Shanghai. Through joint employment at both institutions, he links the two laboratories, thus guaranteeing the same level of expertise at both institutions.

A third example has been the subject of earlier ZIL Annual Reports (2002 and 2004): The institutional partnership with the Centre Suisse de Recherche Scientifique (CSRS) in Côte

Peng Zhang (back row, centre) with students at the Shanghai Institute of Plant Physiology and Ecology



d'Ivoire. In spite of the unstable political environment, this partnership continues with close scientific collaboration, and the exchange of graduate and doctoral student in both directions in several disciplines.

One can conclude that long-term perspectives and the interest of several individuals on both sides are necessary for successful institutional development. ZIL is aware that its modest means allow only a few selected partner institutions to enjoy such a broad investment of human and financial resources.

Enabling environment

ZIL is conscious that this highest level of capacity development goes beyond its own possibilities. Yet, the content of some of the ZIL or RFPP projects address exactly this issue, e.g. research on production networks in Côte d'Ivoire (p. 33), forest management in Kyrgyzstan and Madagascar (pp. 37, 43, 51), or production chains in Peru (pp. 23 and 39).

And the vision is clear: ZIL's entire research agenda for generating knowledge for poverty alleviation has this ultimate goal of enabling and empowering the rural poor with products, technologies or knowledge for improving their livelihoods. This is expressed in the ZIL mission statement:

ZIL's mission is to initiate, support, and coordinate collaborative research by its members and partners that will enable resource-poor farmers in low-income countries to achieve sustainable improvements of their livelihoods. This includes the mobilisation of Swiss research capacity and the promotion of awareness about the role of agricultural and food science in meeting the human and environmental challenges of low-income countries.

Barbara Becker



Else Bünemann collecting soil samples during her post-doc research (p. 25)

Exploring maize genotypes for chemical attributes that promote the effectiveness of biological control agents

I carried out my PhD with financial support from the RFPP at the Laboratory of Animal Ecology and Entomology at the University of Neuchâtel in the group of Prof. Martine Rahier and Dr. Ted Turlings. Our principle objective was to find Integrated Pest Management (IPM)

methods to reduce damage of the caterpillar *Spodoptera frugiperda*, an important pest on maize crops in low-income countries in South America. For this purpose, the SDC-funded RFPP enabled me to carry out field experiments in Mexico, collaborating with scientists from the International Maize and Wheat Improvement Center (CIMMYT) and scientists of the University of Mexico City (UNAM). During these periods I was in contact with resource-poor farmers and gained an enormous amount of information about the logistic, economic and human problems that need to be solved.

**RFPP
Doctoral Fellowship
1997–2000**

**Research fellow
Supervisor**

Maria Elena Fritzsche-Hoballah
Ted Turlings,
Institute of Zoology,
University of Neuchâtel

Collaborator
David Bergvinson,
CIMMYT, Mexico



In the beginning, full of ideological and idealistic thoughts, I went to Mexico to “save the farmers” with my head full of theories about IPM. On the site, I understood that we were only at the beginning of introducing these methods in this country. During my PhD I realised how important the collaboration between farmers, local scientists and scientists from abroad was. I learned to communicate with collaborators and to coordinate field trials – which was the most precious skill that I brought home. In fact, during my post-doc at the Institute of Plant Sciences in the group of Prof. Cris Kuhlemeier at the University of Berne, I had to coordinate field experiments and set up the collaboration with scientists from Uruguay where my PhD experience helped me enormously. Without my RFPP grant I probably would have been working exclusively in the laboratory in Switzerland during my PhD and would never have learned to collaborate with people of other cultures and carry out complex field trials!

**Maria Elena Hoballah, Senior scientist,
University of Neuchâtel, Switzerland**

Establishing capacity for regeneration and transformation of cassava (*Manihot esculenta* Crantz) in Africa

**RFPP
Doctoral Fellowship
1998–2003**

Research fellow

Bertrand Bachaumont Hankoua

Supervisors

Shou Yong Choy Ng, IITA,
Nigeria / Johanna Puonti-
Kaerlas, EPO, Munich
(formerly IPW, ETH Zurich)

Collaborators

Iyi Fawole, University of Ibadan,
Nigeria / Alfred Dixon IITA,
Nigeria / Micheal Pillay,
IITA-ESARC, Kampala, Uganda /
Nigel J. Taylor and Claude M.
Fauquet, ILTAB/DDPSC,
St. Louis, MO, USA

Scientists and governments in sub-Saharan Africa will continue relying on funding and scientific expertise from their counterparts in industrialised countries to address the increasing gap in research and development between Africa and the developed world. The SDC-funded RFPP was set up to give young African scientists the opportunity to learn new science in advanced laboratories and return to

their home countries well-equipped to handle scientific research and contribute to the development of their countries.

My current career as plant scientist and cassava biotechnologist is one of the proofs that the RFPP is a central instrument for shaping and enhancing the scientific ability of African scientists. The RFPP fellowship helped me tremendously in learning advanced protocols in plant science and molecular biology. It also allowed me to interact with world-renowned biotechnologists, and to establish scientific linkages with world plant science research institutions. Therefore, the RFPP contribution to my intellectual manhood has been instrumental and will continue to stand as the backbone of my success as a plant scientist.

As an African originating from a very poor background, it would have just been a dream for me to obtain a PhD degree and qualify for two higher level positions in USA institutions, previously as a Post Doctoral Fellow at the Donald Danforth Plant Science Center, St. Louis, Missouri, and currently as Faculty Research



Associate in the Department of Biotechnology, Delaware State University, Dover, Delaware. The funding from SDC via the RFPP made this dream possible and prevented me from ending up in the undignified situation as an unproductive scientist, as is the case with most of my African colleagues. For all these reasons, I will personally remain an advocate of the Research Fellow Partnership Programme, and I will encourage policy makers in Switzerland to promote and sustain this programme by providing more funding to support its various activities.

**Bertrand Hankoua, Faculty research associate,
Delaware State University, USA**

Understanding and fomenting effective regional research and development processes in rural areas of the Andes

When I joined the International Potato Center (CIP) in Lima to assist different project part-

**RFPP
Post-doc Fellowship (p. 39)
2001–2005**

ners in developing and implementing research and development (R&D) methods that would allow them to effectively link poor farmers to markets, I was not aware how this partnership setting would affect my capacities and professional future. First, the clear demand from project partners for tangible approaches that add value to their work made me abandon conventional “supply-based thinking”, where researchers produce public goods that somehow are picked up by potential users. This new paradigm to strictly focus on and respond to user needs was reinforced with the participatory action research set in place within partners’ projects involving both public and private sector actors. Second, the exposure as a facilitator to this multi-stakeholder setting was a highly enriching experience, as not only essential insights were gained related to market chain constraints and opportunities, but also key skills were acquired on how to effectively design and manage such participatory R&D processes. Third, the methodologically strict targeting of market opportunities confronted me with an exciting new area: communication and marketing. How must a product be sold in an optimal fashion, so that its package communicates its real value to the potential consumer? In this area I greatly benefited from graphic designers and marketing experts who shared their knowledge with me as consultants to the project.

The lessons and skills learnt during this RFPP assignment inspired me to capitalise on them in the private sector where I would get a direct handle on marketing. So just recently, I formed an enterprise with a Peruvian colleague to take on this exciting task of market and product development for under-utilised (pro-poor) Andean crops. In close collaboration with



CIP, as a consultant, I will also keep up the work with the Participatory Market Chain Approach (PMCA), the main outcome of my RFPP project, where I will be involved in training activities in Uganda, Laos and Nicaragua. I thank ZIL, SDC and my project partners for all the support that have brought me so far!

Thomas Bernet, Independent consultant / founder and manager of a private company, Colcahausi, Lima, Peru

Improving resistance to barley scald through understanding the processes that govern the evolution of *Rhynchosporium secalis* populations

**RFPP
Post-doc Fellowship (p. 44)
2003–2006**

I was born and raised in Cameroon but received higher education in Nigeria and Germany. I started off in root and tuber crop pathology at the University of Nigeria (Nsukka) and IITA, working on pathogen characterisation and breeding for resistance to anthracnose disease of yam. I eventually obtained a PhD on the molecular identification and genetic structure of *Colletotrichum gloeosporioides* from yam. Soon after my PhD, I received an RFPP fellowship to conduct postdoctoral research on the evolutionary potential of the barley scald pathogen, *Rhynchosporium secalis*, with Prof. Bruce McDonald (ETH Zurich) and Dr. Amor Yahyaoui (ICARDA). This RFPP project gave me the rare opportunity to acquire skills in investigating pathogen population genetics that are vital for understanding pathogen evolution and for developing effective and sustainable strategies of breeding for disease resistance.

This postdoctoral training is a great asset in my current research at ICARDA, which seeks to harness knowledge of epidemiology and population genetics for integrated disease management in food legumes. The RFPP project afforded me an understanding of the underpinnings of international agricultural research, and the challenges and opportunities of research partnerships between collaborating institutions such as ICARDA and the ETH Zurich. I will certainly benefit from that knowledge as I explore opportunities for North-South research partnerships in my current assignment. A Memorandum of Understanding has been signed between ICARDA and the ETH Plant Pathology Group, which will further strengthen my collaboration with the ETH Zurich. Some highlights of my training include several contacts I made during international symposia and conferences, and trips to Mt Rigi (Switzerland) and Palmyra (Syria). My time was shared equally between Syria (field work) and Switzerland (microsatellite analyses) and I had the opportunity of a lifetime to discover the wonderful people and rich cultures of both countries while helping to improve the livelihood of farmers in the developing world.

Mathew Abang, Senior researcher,
ICARDA, Syria



Public acceptance of transgenic food in industrialised and developing countries under consideration of different economic and social backgrounds

What perspectives exist for a young mother of three small children, an agricultural economist interested in development questions? In 1996, ZIL offered me a grant for expanding my research on the public acceptance of genetically modified plants (GMOs) to developing countries. In industrialised countries the public reluctance to GMOs has often been explained by risks perceived as high, while the related benefits are perceived as comparatively small. But why is there a strong opposition towards genetic engineering in the Philippines, although perceived benefits of GMOs should be high in a country with a poor population? We developed a methodology to assess perceived risks and benefits within various stakeholder groups as well as their potential to influence the public discussion on this controversial issue. An important finding of our work was that GMOs were seen by many farmer organisations and NGOs mainly as a means to increase production without sustainable improvement in the agricultural sector. Most importantly, we learnt to establish fruitful long distance research collaboration with people we only knew virtually.



I left ZIL and the ETH Zurich five years ago and now am the Head of Public Affairs and Sustainability with a large retailer in Switzerland. Responsible sourcing is an increasingly important challenge both in Food as in Non-Food. And again, I have to build up long-distance collaborations with diverse organisations. An important project is GRASP (Good Risk-based Agricultural Practices in Agriculture), aiming at integrating legal compliance with labour

law in the European Standard for Good Agricultural Practice EurepGAP. Again, a concern of consumers in industrialised countries turns out to be an important issue in developing countries. The international and intercultural experience with ZIL has helped me in working successfully with a number of organisations and persons both in Europe as well as in developing countries in order to share experiences and common visions.

Sibyl Anwander Phan-Huy, Head of Public Affairs and Sustainability, Coop, Basel

**ZIL Project
Phase II, 1997–1999**

Project leader

Peter Rieder, IAW

Contact persons

Sibyl Anwander Phan-Huy
Philipp Aerni

Collaborators

C. Bogahawatte, University of Peradeniya, Sri Lanka /
O. B. Zamora, University of the Philippines, Los Baños

In 1996, I completed my graduate studies in Geography at the University of Zurich. Based on my Master’s thesis, Prof. Peter Rieder, then Head of the Institute of Agricultural Economics (IAW), hired me as a research assistant. He asked me to support Sibyl Anwander Phan-Huy with her ZIL funded

project on “Public acceptance of transgenic food in industrialised and developing countries”. Eventually, I was not just assisting S. Anwander Phan-Huy but had developed my own research project for a survey on public acceptance of transgenic rice in the Philippines. I was very fortunate to count on the confidence of S. Anwander Phan-Huy in the development of an unconventional survey design and methodology as well as her support during my seven-month stay in the Philippines. The data analysis of the survey highlighted different stakeholder perception patterns and revealed their assessed influence on political decisions and public opinion in the Philippines through the use of a policy network analysis. According to the feedback of the stakeholders one year after the survey, the results were found to reflect the situation in the Philippines reasonably well. I was able to publish a first article of the study in the **Biotechnology and Development Monitor**. Due to this success, Peter Rieder was willing to accept me as a doctoral candidate.

I completed my doctoral degree in Agricultural Economics in 1999 and continued my research career as a post-doctoral research fellow at the Kennedy School of Government at Harvard University from 2000–2002. After my return from the United States, I worked again as a senior research fellow at the IAW and at the Center for Comparative and International Studies (CIS) of the University and ETH Zurich. My experience in developing countries, the knowledge in science, technology and innovation policy gained at Harvard University and my broad academic background allowed me to establish a worldwide academic network related to agricultural biotechnology policy and sustainable development.



Philipp Aerni, Senior scientist, Centre for Comparative and International Studies, University and ETH Zurich

Influence of legume fallows on P transformations in tropical soils

Ideal version

How can you possibly summarise in just one paragraph what you have learned during the three or four years of your PhD, especially if the project involves working in a developing country? Many different skills may come to mind: research skills such as planning and conducting experiments, communication skills including oral presentations, written publications and the daily business in the group, as well as the personal experience of focusing on one project for several years. In addition to all of that, you may see images of a lush tropical landscape where every little patch is cultivated, images of beautiful dark faces and dusty suburbs with poorly constructed houses, and you may remember sad stories ...

After your PhD, you move on to your next research job. You may find that the analytical methods you learned are in demand, but that your interpersonal skills are valued even more. You are now responsible for steering a larger project. You supervise students from different parts of the world. You need to prevent or resolve conflicts that occur in a busy lab. You need good time management, both for yourself, a technician, and the students. You experience a variety of approaches to research by interacting with different senior academics. In addition to all of that, you experience a very dry country, you see vast areas of highly mechanised plant production with salinity and erosion problems, but you also experience true wilderness, and you get to know humorous and laid-back people ...

You have now developed a strong vision of high quality research with the potential of benefiting developing countries in the short- or long-term. It's time to put it into practice. You move on again, back to where you started!

ZIL Project Phase III, 1999–2003

Project leader

Emmanuel Frossard, IPW

Contact persons

Else Bünemann and
Astrid Oberson, IPW

Collaborators

Paul C. Smithson, Bashir Jama
and Deborah Bossio, ICRAF

Factual version

During my PhD, within a ZIL project, I acquired a range of different skills, above all research skills such as planning and conducting experiments, and communication skills including oral presentations, written publications, and the daily scientific and non-scientific talk in the group. I was grateful to be able to focus entirely on one project for several years – aware that this was unlikely to happen again. Two stays of a few months each at ICRAF, Kenya gave me a good exposure to working in a centre of the CGIAR and living in a developing country.

At the end of my PhD, I was keen to continue with research, and my previous work qualified me for a postdoctoral position in Adelaide, Australia. The methods that I had learned during my PhD were useful in this new position, but interpersonal skills were even more important. My duties were now more varied and included doing my own experiments, supervising various students, both from Australia and from Asia, managing the lab, chairing the project meetings and organising seminars within the discipline. The Waite campus in Adelaide hosts several institutions within agriculture and natural resource management, and I have benefited greatly from this impressive concentration of expertise in the areas of soil and plant science. In particular, the exposure to a range of scientific approaches has been highly stimulating. I feel privileged to return soon to the Group of Plant Nutrition at the ETH Zurich and to put the continuing vision of high-quality research with potential benefit for developing countries into practice.

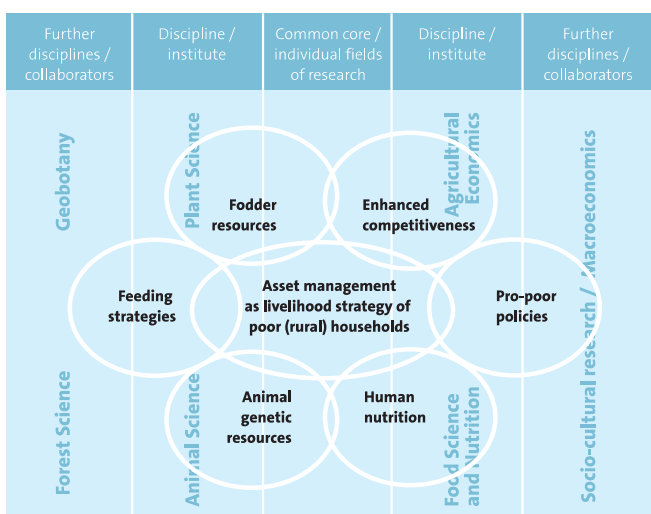
**Else Bünemann, Senior scientist,
Group of Plant Nutrition, IPW, ETH Zurich**



Livestock systems research in support of poor people – Overview

The year 2005 was characterised by the final phase of the ongoing projects. Thus, the time had come to evaluate the research programme, to check its justification, to define adjustments and if at all possible, to assess the impact it has had so far. Three major events were organised to develop the new research programme:

The first was the Progress Forum held on March 11. For the first time we were joined by some of our research partners from CIAT, ILRI and the CSRS (pp. 26, 27, 30, 33). While the event intended in the first place to review the project progress and to provide an opportunity for exchange, it also served as a step in the programme development, mainly through the analysis of the present situation. It became evident that our international partnerships are a main asset, but also that potentially conflicting agendas between research and development objectives need to be addressed continuously.



One week later we held a consultation with an outstanding round of international experts*. They shared their insights on current developments and urgent needs in livestock-centred research topics. It was evident that livestock research can contribute to a great extent to the overall goal of poverty alleviation. This event was also the kick-off for the newly structured LivestockNet, the collaboration network of Swiss scientists and development experts.

In the beginning of September, we held a workshop where we developed the future research programme, broadening the basis of ZIL contributors and improving the scope, structure, and justification of the scientific programme.

The three events resulted in a new project document that serves as the basis for the new contract with the SDC as well as for ZIL's own institutional and scientific development. Throughout this entire process the Steering Committee** was involved in defining and structuring our research programme. It met twice in the course of 2005.

While the planning and preparation of the next programme phase was in the focus of the ZIL activities, in October 2005 the ongoing programme was presented again at the "Tropentag" conference in Hohenheim by a ZIL stall and several presentations. With more than 500 participants this conference has grown into the major event on international agriculture in Germany and the neighbouring countries. A group of seven ZIL members and collaborators presented their research through posters and an oral presentation, joined this year by the doctoral students of the beans and cassava projects.

Mathias Egloff

* Joachim Voss, Director General of CIAT, Cali; Carlos Sere, Director General of ILRI, Nairobi; Samuel Jutzi, Head of the FAO Animal Production and Health Division, Rome; Fritz Schneider, SHL Zollikofen; Jakob Zinnstag, STI Basel

** Members of the ZIL livestock systems programme Steering Committee are: Michael Kreuzer (Chair, INW), Emmanuel Frossard (IPW), Richard Hurrell (ILW), Annette Kolff (Intercooperation, Berne), and Bernard Lehmann (IAW).

Project leader

Emmanuel Frossard

Contact persons

Annabé Louw-Gaume

Alain Gaume

Sergio Mejía Kerguelén

Collaborators

Idupulapati Rao, Manabu Ishitani and

Carlos Lascano, CIAT, Colombia /

Michael Kreuzer, INW, ETH Zurich

Duration

August 2003 – August 2006

Adaptation of *Brachiaria* species to low-P soils

The breeding of nutrient-efficient genotypes adapted to low-input agricultural ecosystems has become a priority in the quest for sustainable agriculture. Growing phosphorus-efficient *Brachiaria* genotypes on tropical soils of low nutrient availability represents an environmentally friendly approach that would reduce land degradation by minimising the application of fertilisers. Recent research activities focused on the development of selection criteria for evaluating low-P tolerance in the *Brachiaria* genetic enhancement programme.

Two approaches permitted phenotypic analysis in *Brachiaria* grasses: the use of seedlings and the use of stem cuttings. Results from experiments in which seedlings were grown in a sand-based system to determine P acquisition and use effi-

ciency from soluble and less available P sources led to a conceptual model of understanding low-P tolerance in the two parentals, *B. decumbens* and *B. ruziziensis*. The model provides for the functional evaluation of the plant's investment pattern by considering not only biomass allocation patterns but also morphology and tissue structure, as variation in these traits might help to overcome the constraints imposed by biomass allocation. Overall, it highlights the importance of root plasticity in low-P adaptation of *Brachiaria decumbens*. A slow-P releasing nutrient-based growth system was also developed for simulating low- and high-P stress conditions to screen for physiological markers of low-P adaptation, e.g. exudation of organic acids and phosphatase enzymes.

Differences between the two parents when grown in nutrient solutions (without P) were not significant if stem cuttings were used, indicating that the effect of P deficiency was influenced by greater P concentrations in the stolons that were recycled for shoot and root development. Experiments are in progress to standardise the methodology of evaluation, using stem cuttings and nutrient solutions and soil systems. These experiments include testing low-P adaptation in the presence of aluminum toxicity that is very common in low-P acid soils.

The feeding value of selected *Brachiaria* hybrids adapted to low phosphorus has also been tested. Results from this project demonstrated that the milk yield of cows with limited milking genetic potential and mineral concentration in leaf tissue were similar in well-managed pastures of *Brachiaria* hybrids when compared with commercial cultivars. This is an important finding because the genetically improved hybrids combine both edaphic adaptation and animal nutrition aspects.

Hydroponically grown *Brachiaria* grasses are used for phenotypic as well as biochemical evaluation of low-P adaptation mechanisms. Uniform seedling selection is important in the standardisation of optimal growth conditions of *Brachiaria* grasses in nutrient solutions.



Project leadersHans-Dieter Hess / Michael Kreuzer /
Emmanuel Frossard**Contact person**

Tassilo Tiemann

CollaboratorsRolando Barahona, Fernando Rodríguez,
Corpoica, Colombia / Juan E. Carulla, Bárbara
Moreno, Universidad Nacional de Colombia,
Colombia / Federico Holmann, Carlos E.
Lascano and Michael Peters, CIAT, Colombia /
Carla Riccarda Soliva, ETH Zurich**Duration**

January 2004 – December 2006

The forage potential of tanniniferous legumes: Search for sustainable ways to cope with nutritional limitations in smallholder livestock

Many tropical forage legumes either show poor agronomic performance on acidic soils or contain high tannin levels that prevent an effective protein and fibre digestion by the ruminant. Previous experiments demonstrated a substantial impact of the growing site on the feeding value of tanniniferous legumes. Two field trials conducted this year delivered better insight into the effect of soil fertility and level and type

of fertilisation. The biomass yield of shrub legumes was affected by planting site and fertilisation, but the extent of the response varied widely among species. *Leucaena leucocephala* was by far the most affected species, while *Flemingia macrophylla* was not affected at all. On average, *Calliandra calothyrsus* showed a higher biomass production than the other shrub legumes. These results indicate that *Flemingia* and *Calliandra* are highly promising species for extensive production systems on acidic low-fertility soils where no fertilisers are applied.

The *in vitro* experiments carried out this year confirmed that there exist large differences in the effects of tannins from different legume species on ruminal fermentation. Tannins from *Leucaena* and *Flemingia* were found to be less effective in decreasing ruminal nutrient degradation than tannins from *Calliandra*. On the other hand, supplementation with tanniniferous legumes clearly increased the proportion of acid-pepsin digestible protein of dietary origin, which was assessed by a device simulating abomasal and small intestinal digestion *in vitro*. Overall, this indicates that a major part of the tannin-bound protein, which is protected from microbial degradation in the rumen, is available for later acid-pepsin digestion and suggests that the use of mixtures of legumes with and without tannins could effectively improve the supply of metabolisable protein. This hypothesis is currently tested in two extensive feeding experiments with sheep.



Sampling of rumen liquid for *in vitro* incubation experiments

Project leadersHans-Dieter Hess / Michael Kreuzer /
Annette Kolff, Intercooperation, Berne**Contact person**

Karin Bartl

CollaboratorsCarlos Gómez, La Molina, Peru / Federico
Holmann, Carlos E. Lascano, CIAT, Colombia /
Christoph Morger, IC, Switzerland / Carlos J.
Pérez, IC, Nicaragua / Urs Scheidegger, SHL,
Switzerland / Axel Schmidt, CIAT, Nicaragua /
Hans-Rudolf Wettstein, ETH Zurich**Duration**

July 2004 – June 2007

Improved feeding systems for smallholder dairy cattle with emphasis on dry season feeding and its effect on milk production and quality

The overall aim of this project is the development of feeding systems for dairy cattle that enable smallholders in Peru and Nicaragua to overcome feed restrictions during the dry season. Participatory approaches are being applied in most stages of the project. Twelve forage species and varieties have been evaluated at two sites in Peru. Differences in dry matter yield within species by fertiliser treatment and site were significant and mean protein yields of introduced and local varieties showed the superior quality of the introduced *Hordeum* varieties with 496 versus 292 kg/ha. The mean dry matter yields (kg/ha) with and without fertiliser application of the most promising species were 5460 and 3917 for *Avena sativa* var. Mantaro 15, 7233 and 2699 for *Hordeum vulgare* var. UNA 80 and 6601 and 2473 for *Triticosecale Wittmack*, respectively. In Nicaragua, *Hyparrhenia rufa* and *Andropogon gayanus* showed the best establishment among the local species, although being inferior to the introduced ones. Evaluations of pasture plots show higher dry matter yield in plots of *Brachiaria* hybrid CIAT 36061 cv. Mulato and *Brachiaria brizantha* CIAT 26110 cv. Toledo compared to the local check *Hyparrhenia rufa*.

In the Peruvian lowlands (100 m asl), the effects on milk yield and composition of three different diets were deter-



Above: Experimental plots four months after establishment at the farmers' community in Chalhuan, Peru

Below: Participants of a workshop held at the farmer community in Aramachay, Peru, in February 2005

mined in six indigenous (Criollo) and six Brown Swiss cows. Diets represented the quality of (i) typical dry season forage, (ii) typical rainy season forage or (iii) a diet completely covering the cows' requirements. The mean milk yield (kg/head/day) of Criollo and Brown Swiss cows on the three diets was (i) 1.91 and 3.86, (ii) 3.50 and 6.56, and (iii) 4.22 and 8.23, respectively.

56 Peruvian and 40 Nicaraguan farmers participated in a series of interviews aimed at gathering information about the local system of milk production. Several workshops and presentations were held to disseminate research results and integrate local knowledge in the project activities.

Project leader

Awudu Abdulai,
Kiel University, Germany

Contact person

Emily Awuor Ouma

Collaborator

Adam Drucker, ILRI, Kenya

Duration

September 2003 – September 2006

Developing optimised cattle breeding schemes, with a special focus on trypanotolerance, based on the demands and opportunities of poor livestock keepers – Economic aspects

The broad objective of this study is to assess the contribution of economic valuation of cattle keepers' trait preferences on the design of sustainable cattle breed improvement programmes, with a focus on trypanotolerance in pastoral and crop-livestock systems in Eastern Africa. The specific objectives are: (i) to determine the socio-economic reasons for keeping cattle in pastoral and crop-livestock systems in Eastern Africa, as well as the breeding practices and constraints, (ii) to estimate economic values of preferred cattle traits and identify possible existence of preference hetero-

geneity and the factors driving the preference structures, and (iii) to investigate pathways by which cattle keepers can access genetically improved cattle based on their preferred traits and identify obstacles to access. The research design has utilised cross-sectional farm-level choice experiment surveys covering 506 households in the Suba and Narok districts in Kenya and the Ghibe Valley in Ethiopia.

The results from the econometric analyses (mixed logit and latent class modelling) indicate existence of heterogeneity in preferences for cattle traits among cattle keepers. This is influenced by the livelihood functions of cattle and the production environments which determine the cattle production systems. Three distinct segments of producers emerge based on the production systems, i.e. pastoral, agro-pastoral and crop-livestock systems. In cropping systems, which include agro-pastoral and crop-livestock systems, fitness to traction in bulls is a highly valued trait, more valued than trypanotolerance while in the pastoral systems, traits associated with herd increase such as high fertility in bulls and good reproduction potential in cows are highly valued traits. These findings suggest that in order to be effective and sustainable, breed improvement programmes should not focus on trypanotolerance in isolation of other traits considered important by cattle keepers, since cattle keepers are willing to trade off trypanotolerance with traction fitness and high fertility. In addition, there is need to develop breed improvement programmes that target specific producer segments due to differences in preferences across producer segments.



Focus group discussion in the Narok District of Kenya

Project leader

Haja Kadarmideen

Contact person

Ulrike Janßen-Tapken

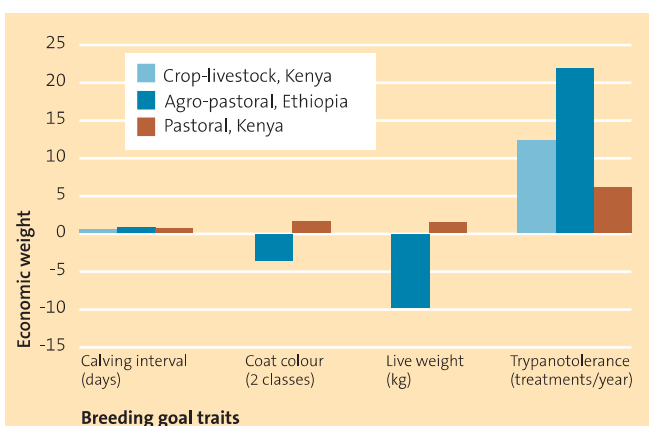
CollaboratorJack C. M. Dekkers,
Iowa State University, USA**Duration**

August 2003 – August 2006

Developing optimised cattle breeding schemes, with a special focus on trypanotolerance, based on the demands and opportunities of poor livestock keepers – Genetic aspects

Due to the many different demands livestock meets in marginal production systems, the major benefit of local livestock production remains with the producers who are responsible for the genetic development of their breeds. To identify, characterise and use their preferences in a breeding scheme, a participatory approach was chosen. First, the preferred cattle traits were identified in focus-group discussions with farmers. Second, choice-experiment studies were conducted in crop-livestock and pastoral production systems in Kenya and in agro-pastoral production systems in Ethiopia. This resulted in the estimation of socio-economic values for the most important cattle traits shared by bulls and cows; i.e. trypanotolerance, reproduction capacity, live weight, coat colour and watering frequency. Milk yield and feeding ease for cows as well as traction for bulls were evaluated separately.

Except watering frequency, which remains a factor mainly controlled by management with no variance in the phenotype that could be used for genetic selection, all other traits were included in a breeding goal using the socio-economic values from the field trial. The results from a simulation assuming a simple population structure with 20 cows over 10 age groups, a survival rate of 0.8 and a selection proportion of males and females of 2.27 % and 25 %, respectively, show major differences in the possible genetic changes per



F2-cross offspring from N'Dama and Boran breeds

trait both in size and direction for the production systems due to the different economic weights assigned (see figure below: “Economic weights for breeding goal traits”). The strong emphasis on disease resistance results in a genetic gain on trypanotolerance.

Collaborative research with Iowa State University, USA, in connection with supervision and exchange of their “maBLUP” (marker-assisted best linear unbiased prediction) programme aimed at simulating breeding schemes under marker-assisted selection addressing trypanotolerance as the major trait. This aspect of the research is still continuing and shall give an impression of the possibilities and value of modern techniques.

Project leaders

Richard Hurrell
Lena Davidsson, IAEA, Vienna, Austria

Contact persons

Stephanie Good
Yoseph Shiferaw

Collaborators

Thomas Fitz Randolph, ILRI, Kenya /
Belay Kassa, Alemaya University,
Ethiopia

Duration

September 2004 – August 2007

Animal source foods and nutrition during early life



Interviewing a head of household in Dire village, Ethiopia

In Ethiopia, as in most developing countries, most food supplies are derived from plant products, in particular cereals, pulses and root crops. Only 7% of the daily energy intake comes from animal products such as milk, eggs or meat. Animal source foods (ASF) provide not only energy and high quality protein but are also excellent sources of bioavailable micronutrients. The extremely low consumption of ASF (milk, eggs, meat and liver) can be assumed to be a contributing factor to the poor nutrition and health of Ethiopian infants and young children.

The ongoing, longitudinal study on animal source foods and nutrition during early life in Ethiopia evaluates the possible link between livestock keeping, food intake and nutritional status of young children (6 – 18 months old) in resource-poor areas. Fieldwork started in March 2005. A total of 302 low income families (with small livestock $n = 108$, without livestock $n = 194$) with six-month-old infants have been recruited for the study in the Debre Zeit area, 50 km from Addis Ababa. During the bi-monthly visits for the duration of the one-year study, information about dietary intake and, in particular, the introduction and consumption of ASF has been collected and the childrens' growth monitored. Parallel to this, information about agro-economic factors is collected in order to link the households' economies with the consumption of ASF. At the end of the study, a blood sample is drawn to assess the prevalence of anemia in the study population.

Preliminary analysis showed that the consumption of ASF is very low. Only cows' milk had been introduced to more than half of the children by the age of six months. The most common complementary foods are gruel, biscuits, and injera, a staple food made of fermented teff (*Eragrostis tef*).

The overall aim of this project is to provide the basis for subsequent intervention studies to determine the appropriate types, amounts, and frequency of consumption of ASF. With the understanding of the roles that livestock and animal source foods play in the nutritional status of young children, the results will help us to identify and create new livestock-based interventions to improve the nutrition and health of young children in Ethiopia.

Project leader

Bernard Lehmann

Contact personsMichel Dumondel, IAW /
Daouda Dao, CSRS and University of Cocody**Collaborators**Andres Tschannen, CSRS / Athanase Youan Bi,
CSRS and University of Cocody /
Gisèle Sedia, CSRS and University of Bouaké,
Côte d'Ivoire / Olivier Girardin, Délémont
Agricultural School, Switzerland /
Jakob Zinnstag, STI, Basel**Duration**

July 2004 – July 2007

Analysis of the potential contribution of improvements in the livestock production system to better livelihood of small farmers' households

In spite of the important role played by livestock production in the Ivorian economy, many constraints at the production level as well as poorly adapted and inefficient local, commercial networks characterise the system.

Acknowledging this inefficiency, this project aims to provide a detailed description, analysis and understanding of the local livestock system for small and large ruminants as well as for monogastrics.

We carry out a system-wide study using group mapping, which interlinks all participants in the livestock production process. Exploratory investigations in the two selected areas (Korhogo and Toumodi) have been completed. Qualitatively, focus discussion groups whose members include experienced livestock technicians and selected producers have been formed; the resulting verbal data has been transcribed and analysed.

To tackle supply chain constraints, the first phase comprised the method "Structure-Conduct-Performance (SCP)" which is aimed at identifying the actors of the system. The available survey data permit the identification of stakeholders and the categorisation of markets.

Concerning livestock system characterisation, livestock owners can be classified into two types based on their educational level, age, and production objectives. Older owners tend to be illiterate, and more interested in high numbers of animals rather than in good management. Their objectives seem not to be profit maximisation, though their real production goals remain to be elucidated. Younger and mostly literate produc-

ers have had training in livestock breeding, and their principal objective of production is profit maximisation.

The geographic location as well as the individual farm seem to influence the production objective, profit maximisation being the essential motivation determining livestock production practice for peri-urban producers.

In the following phase, we intend to better understand the breeders' behaviour. Focus group discussion has demonstrated the pre-eminent role played by the Peulh (Fulani) shepherds in the management of the herds. Additionally, social perceptions of livestock production activities seem to strongly influence the development of the sector.



Smallholder farming in transition: Traditional and improved production methods

Project leader

Wilhelm Gruissem

Contact persons

Peng Zhang

Herve Vanderschuren

Collaborators

Hernan Ceballos, CIAT, Colombia /

Alfred Dixon, IITA Nigeria /

Thomas Hohn, University of Basel /

Linda Hanley-Bowdoin, NCSU, USA

Duration

March 2003 – December 2005

Development and testing of cassava lines with improved resistance to African Cassava Mosaic Virus

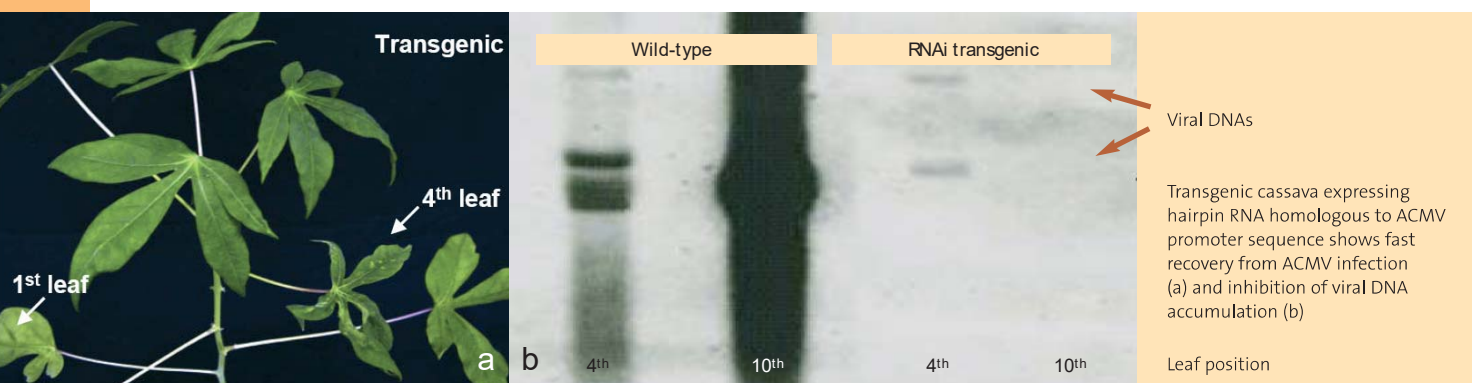
Cassava mosaic disease (CMD) is one of the major problems encountered in cassava fields in Africa where the disease can trigger overall yield losses up to to 25%. CMD is caused by whitefly-transmitted geminiviruses. Synergism, recombination and pseudorecombination between different cassava gemini-virus species have led to the recent pandemics of severe CMD in Africa. Our research aims at developing different CMD prevention strategies in transgenic cassava and therefore providing local farmers with geminivirus-resistant lines to secure cassava production in the subsistence farming system.

Using antisense technology, the first cassava lines resistant to African cassava mosaic virus (ACMV) have been produced in our lab and are about to be field-trialed in Africa.

We are now trying to engineer broad-spectrum geminivirus resistance in cassava. The new approach is based on down-regulation of viral protein production through the RNA interference (RNAi) pathway. RNA interference is a conserved

silencing mechanism which accounts for mRNA regulation via post-transcriptional gene silencing (PTGS) and/or transcriptional gene silencing (TGS). The specificity of this RNA regulation is based on homologous short double-stranded interfering RNAs (siRNA). Transgenic cassava expressing hairpin double-stranded RNA (dsRNA) homologous to geminiviral sequences are expected to reduce viral mRNA production leading to decreased levels of viral replication and movement in the infected plant. Highly conserved sequences amongst geminivirus species have been considered to be the best target candidates for a RNAi-based resistance.

We have successfully speeded up the recovery process in infected cassava plants by expressing hairpin dsRNA targeting the geminiviral promoter region. *In vitro* and *in vivo* studies suggest that CMD resistance could be due to a reduced level of virus replication in transgenic cassava plants. We are currently combining different potential viral mRNA targets in order to optimise the RNAi strategy in cassava.



Integrated Pest Management

Project leader

Silvia Dorn

Contact persons

Guido Velten

Anja S. Rott

Collaborators

Cesar Cardona, CIAT, Cali, Colombia /

Béatrice Conde Petit, ILW, ETH Zurich

Duration

January 2003 – January 2006

Food chain legumes: Combining natural resources for safe storage and favourable food processing

This project aims to elucidate favourable host-plant traits, which, in concert with a parasitic wasp, suppress post-harvest damage by the bruchid pest *Acanthoscelides obtectus*, and allow for good food processing. Using the tritrophic system of bean, the pest *A. obtectus* and the parasitoid *Dinarmus basalis*, the project investigates which bean plant resistance factors are optimal in combination with the parasitoid to suppress bruchid damage, and how they influence food processing. The host-plant related traits to be studied comprise physical traits, in particular seed coat parameters, and chemical traits, in particular the storage protein arcelin. Arcelin causes a considerable prolongation of the development of *A. obtectus*, independent of its relative concentration. Thus, suitable host stages for parasitisation persist over a longer period of time, with a chance for higher bruchid suppression.

In 2005, we evaluated the parasitoid's development and its efficiency in reducing its hosts on two commercially available arcelin-free varieties (Calima and Pijao) and seven arcelin-containing bean lines. We observed the reproduction rate per female and estimated parasitoid offspring fitness by means of body size. This study provides evidence for the selectiveness of the anti-herbivore protein arcelin. Results will contribute to a better understanding of the role of this plant resistance factor in tritrophic interactions between bean, pest insect and beneficial insect.

In general, *D. basalis* was able to parasitise hosts independently whether they were reared on bean lines with arcelin or on susceptible control seeds. No indications were found that the mean number of parasitoid offspring per female was affected by bean genotype. Our results indicate that host

quality was sufficient, since the sex ratio of parasitoid progeny was female-based, meaning that most hosts were accepted for oviposition of fertilised eggs. Hind tibia length, used as a measurement for parasitoid offspring fitness, was not significantly different between the treatments, indicating no direct negative effect of the anti-herbivore protein arcelin on the fitness of parasitoid progeny.

The parasitoid's performance was indirectly assessed through pest bruchid emergence. In two arcelin lines the emergence rate of *A. obtectus* was significantly reduced as compared to the susceptible control samples. A slight decrease with increasing relative arcelin concentration was found with the exception of the genotype with the highest relative arcelin concentration, which yielded also the highest number of parasitoid progeny. However, this line had the thinnest seed coat in the seed set used for the experiment, showing that the strong influence of physical properties such as seed coat overrides potential plant resistance effects.

Altogether the results of this project will be the first evidence revealing possible synergisms or incompatibilities between this type of plant resistance and the use of biological control.



The parasitoid *Dinarmus basalis* performed well in conjunction with arcelin-containing beans when added at a consistent development stage of the bruchid pest larvae *Acanthoscelides obtectus*, providing encouraging baseline data for future biological control programmes.

Research Fellow Partnership Programme for Agriculture, Forestry and Natural Resources – Overview

The ZIL-managed Research Fellow Partnership Programme (RFPP) is designed as a research capacity building instrument in the fields of agriculture, forestry and natural resources. Since its inception in 1996, RFPP has undergone several phases and the funds of the current Phase 1 of RFPP for Agriculture, Forestry and Natural Resources have been entirely committed. A successive phase was therefore negotiated. Based on the positive results of the external evaluation of RFPP conducted in January 2005 (p. 18), SDC agreed to fund a second phase of the current RFPP. These negotiations were successfully concluded by the signing of the new contract in July 2005. Phase 2 of the RFPP for Agriculture, Forestry and Natural Resources secures the continuation of RFPP until 2009 and implies some modifications to its predecessor phase, such as the introduction of a budget limit of CHF 200 000 and a minimum of 25 % co-funding. These measures aim at reducing the cost per fellowship which results in a larger number of beneficiaries and a greater potential for capacity development.

In 2005, four fellowships have commenced. **Clemence Dirac** and **Lanto Andriambelo** have begun their doctoral studies aiming at providing the scientific bases for participatory forest landscape management in Madagascar. The newly started fellowship of **Sajad Bukobero** is thematically and geographically closely related, as it analyses social practices and conservation policies in the Malagasy rainforest. By funding the PhD of **Kouame Hgaza** on the effect of fertiliser on yam, RFPP continues supporting the research partnership between the ETH Zurich's Institute of Plant Sciences and the Centre Suisse de Recherches Scientifiques in Côte d'Ivoire (CSRS) – despite the difficult political situation. The fellow-

ship granted to **Ricardo Oliva** explores the origin of **Phytophthora infestans**, the most important potato disease worldwide, and thereby aims at contributing to a more effective management of late blight. This project is based on the first results of the ongoing fellowship of Gabriela Chacón (p. 38).

Three fellowships have been successfully concluded in 2005. **Ralph Knuesel** has concluded his post-doctoral project by providing the first professional fish health service in South Africa. **Lucien Diby** obtained his doctoral degree from the University of Cocody, Côte d'Ivoire, for the study on the growth and yield potential of two different species of yam. In his post-doctoral fellowship, **Thomas Bernet** has developed the "Participatory Market Chain Approach" (PMCA), a methodology bringing together all actors along a market chain. Within the Peruvian context, PMCA has led to several newly introduced products and improved demand of native potatoes grown by resource-poor farmers in the Andes. The high demand of developing agencies to use PMCA in different spatial contexts is a clear indication of the fellowship's relevance and impact.

In May 2005, RFPP contributed to the stand entitled "Potato research for poverty reduction: Discover the Inca's treasures" as part of the ETH Zurich's 150-year anniversary exhibition (p. 13). More than 250 000 people visited the "Worlds of Knowledge" exhibition and hopefully for many of them, the RFPP exhibit demonstrated that capacity building through research partnership is an appropriate answer to the challenges in the developing world.

Marc Zoss

Research fellow

Kaspar Schmidt

Supervisors

John Northridge, IRDD, University of Reading, United Kingdom / Jean-Pierre Sorg, ETH Zurich / Bronislav I. Venglovsky, Forest Research Institute, Kyrgyzstan

Collaborators

Carol J. Colfer, CIFOR, Indonesia / Jean-Marie Samyn, Intercooperation, Switzerland / Gulnaz T. Jalilova, Forest Research Institute, Kyrgyzstan

Duration

May 2001 – December 2005

Knowledge and strategies of local people involved in forest management in the walnut-fruit forests in Kyrgyzstan

This project aimed at contributing to the development of participatory approaches to forest management in the walnut-fruit forests in Southern Kyrgyzstan, and was conducted in the following interlinked areas:

- local knowledge and forest use practices;
- the role of forest resources in local livelihood systems;
- the linkage between biodiversity conservation and forest management.

Opportunities and constraints for local people to participate in the management of these forests were identified and discussed. Field work for the research was conducted on four sites that differ in terms of the general conditions for forest management (e.g. pressure on natural resources, ethnic composition of the population).

Today, different leasehold schemes exist in the state-owned walnut-fruit forests. Hereby, local people, either as individuals or in small groups, are granted user rights for delimited forest plots. The results obtained from this study suggest that such leases have considerably increased ownership among the leaseholders for their forest plots and thus also improved forest protection. The leaseholders use their plots for a range of forest and agricultural products, either for subsistence or to generate much-needed cash income. Walnut and a few other non-timber forest products are particularly significant for the latter. The skills and the knowledge held by leaseholders constitute a major potential for the involvement of local people in forest management. Gaps in local knowledge, for instance

those regarding silvicultural treatments of forest stands, underline the importance of the advisory role of professional foresters in the future. The recommendations derived from the analysis focus on the future roles of the State Forest Service, local people and other stakeholders in the sustainable management of these remarkable forest ecosystems.



A leaseholder explains how he uses his agroforestry plot

Research fellow

Gabriela Chacón, CIP,
Quito, Ecuador

Supervisors

Cesare Gessler, IPW, ETH Zurich /
Gregory Forbes, CIP, Lima, Peru

Collaborator

Meridith Bonierbale,
CIP, Lima, Peru

Duration

August 2001 – June 2006

Variability in *Phytophthora infestans* and its potential role in breeding for resistance in potato

Late blight, caused by the oomycete *Phytophthora infestans*, is one of the most devastating potato and tomato diseases worldwide. The development of resistant varieties using resistance found in wild potato species has been an increasingly important factor in the integrated management of the disease. Nonetheless, several important research issues have impaired our ability to directly use wild sources of

resistance. For example, it was not clear that wild potatoes are attacked by the same pathogen population attacking the cultivated potato. Rather, it appears highly plausible that specific pathogen populations are adapted to particular species of potato. To answer this question and to have a better understanding of the existing variability in the pathogen population, isolates of *P. infestans* were collected in the highlands of Ecuador from various host plants and characterised with a set of phenotypic and genotypic markers. Results indicated that the variability of the pathogen in Ecuador is high. Five pathogen groups were found infecting at least twenty plant species of the *Solanaceae* family. Five of these species are cultivated crops. Among the pathogen groups, two include sexual forms that increase the risk of the development of more aggressive and adapted forms of the pathogen via sexual reproduction. Although the general pathogen variability was high, the pathogen population directly affecting the edible potato was not diverse. In fact, all cultivated and wild potato species are attacked by the same clonal lineage, EC-1. Studies on the aggressiveness of individual EC-1 isolates collected from various wild potatoes and inoculated on different potato species, did not produce evidence to confirm the existence of host specificity within this group. This is good news for local potato breeders since they can use wild potatoes as sources of desirable traits (including resistance to *P. infestans*) without worrying about the eventual effects of widely diverse and host-specific pathogen groups. Additionally, EC-1 isolates from any wild potato would be appropriate to screen for resistance in segregating host populations in areas where this pathogen lineage is dominant.



Tropical highlands of Ecuador, where *Phytophthora infestans* isolates were collected from solanaceous plants

Research fellow

Thomas Bernet, CIP, Lima, Peru

SupervisorsAndré Devaux and Oscar Ortiz,
CIP, Lima, Peru**Collaborators**Albéric Hibon, ASO-SDC, Lima, Peru /
Graham Thiele, CIP-Quito, Ecuador /
Thomas Zschocke, CIP-Training,
Lima, Peru / Ueli Scheuermeier,
LBL, Lindau, Switzerland /
Bernhard Lehmann, IAW, ETH Zurich**Duration**

August 2001 – March 2005

Understanding and fomenting effective regional research and development processes in rural areas of the Andes

The main objective of this RFPP project has been to develop new methods aiming to improve market linkages of small-scale farmers and rural areas. First, the “Marketing Approach to Conserve Agricultural Biodiversity” (MACAB) was designed, helping Research and Development (R&D) organisations to set in place the necessary steps to engage efficiently with the private sector when creating new products and markets for underutilised crops. Second, the “Participatory Market Chain Approach” (PMCA) was designed, a participatory method that helps R&D organisations to identify, analyse and implement marketing opportunities together with market chain actors and supporting organisations, including research centres, government agencies, NGOs and donors of development projects.

In collaboration with research colleagues of the International Potato Center (CIP), MACAB was used to create a marketing concept for coloured native potato varieties. This product was successfully launched in Lima’s duty-free shops with the help of a private company engaging with the Andean farmers who produce these exclusive potatoes. PMCA was developed and used in the context of the SDC-financed “INCOPA” potato project, where the two initial applications generated not only new commercial label products (e.g. yellow potato chips, standardised wholesale potatoes, fresh and freeze-dried native potatoes for supermarkets, mashed potatoes from native varieties, information bulletins), but also new technologies (e.g. a flexible potato grater) and new institutions (e.g. production arrangements for native potatoes and CAPAC PERU, a new market chain association that seeks to enhance quality production and commercialisation of agricultural produce in Peru).



PMCA workshop in the Andes with Ugandan participation

The promising results obtained in Peru have generated a wide interest in PMCA. Under the leadership of the Papa Andina project, PMCA was taught in Bolivia and Uganda, where it is currently used to stimulate innovations in the potato, sweetpotato and vegetable sectors. A user guide has been developed. Driven by concrete demand, PMCA will soon be applied in Asia (Laos) and Central America (Nicaragua).

Research fellow

Christine Zundel,
SHL, Zollikofen, Switzerland

Supervisor

Peter Nagel, NLU,
University of Basel, Switzerland

Collaborators

Rachid Hanna, IITA Cotonou, Benin /
Urs Scheidegger, SHL, Zollikofen,
Switzerland

Duration

March 2002 – November 2006
(extended)

Participatory development of cassava green mite biocontrol in the highlands of Cameroon



Farmers selecting cassava planting material for the next season

Typhlodromalus aripo (DeLeon) (Acari: Phytoseiidae) is a neotropical predator which was introduced into Africa for the control of cassava green mite *Mononychellus tanajoa* (Bondar) (Acari: Tetranychidae). At present, *T. aripo* is established in 20 countries of sub-Saharan Africa. But the predator has been slow in colonising and establishing in mid-altitude regions, particularly in latitudes above 4° N/S with cooler temperatures and drier conditions during the dry season. The objective of our project is to enhance establishment of *T. aripo* in the mid-altitudes.

In our field release study, population dynamics and establishment of a strain of *T. aripo* from the mid-altitudes (Minas Gerais, Brazil) was examined and compared to a lowland strain (Piritiba, Brazil) used earlier. We found that, unlike in other regions of sub-Saharan Africa, the seasonal cycles of *T. aripo* populations and its prey, *M. tanajoa*, are asynchronous. Still, *T. aripo* was able to persist for more than one year. However, the predators had difficulties to persist beyond one cropping cycle. No differences were found between the two strains.

Earlier studies had shown that *T. aripo* abundance is generally higher on cassava genotypes with pubescent apices, where *T. aripo* seeks refuge during the day. In view of establishing dry season predator reservoirs, the population dynamics of predator and pest were studied in three habitats, and on three cassava varieties with different levels of hairiness.

Humid and fertile habitats such as fields near settlements promoted vigorous plant growth which facilitated the persistence of *T. aripo* in the dry season. The more extreme the climatic conditions on dry hill slopes were, the more important host plants featuring hairy apices became for *T. aripo* survival. Therefore, fields near settlements planted with hairy cultivars could act as reservoirs for the dispersal of the predator into to the dry and marginal land, where, in NW Cameroon, the majority of cassava is grown. However, the effectiveness of *T. aripo* in suppressing *M. tanajoa* populations in our study area is doubtful, particularly in areas above 1100 m asl, because of its asynchronous cycle with the pest mite, and because of its apparent low dispersal capacity in cooler climates. For these areas cassava genotypes resistant to *M. tanajoa* may represent a better option.

Research fellow

Nicolas Roost,
IWMI, Sri Lanka

Supervisor

David Molden,
IWMI, Sri Lanka

Collaborators

Andre Musy, EPFL, Switzerland /
Yuanlai Cui and Bin Dong,
Wuhan University, China

Duration

November 2002 – May 2005

Water savings and improved productivity in water-scarce basins: A DSS for improved irrigation management

Saving water and increasing the productivity of water (achieving **more crop per drop**) in irrigated agriculture is the key to mitigate problems of scarcity in many areas. An innovative simulation model, designed to help water managers make a more efficient and productive use of water in irrigation, has been developed in this project. This model, OASIS, takes recycling of irrigation return flows and conjunctive use of multiple sources of water into account. It also factors in the influence of non-irrigated areas such as fallow lands and natural vegetation. These aspects are critical but not adequately addressed in water management decisions. The model was applied in China and Sri Lanka in order to learn lessons about water savings.

The most informative results were found when OASIS was applied in the Zhanghe Irrigation System (ZIS, Central China) to look at the impacts of farm reservoirs (ponds) and rice water-saving irrigation (WSI) practices. Simulations clearly showed that ponds, providing a major contribution to yields, have been instrumental in coping with the shrinking supplies from the Zhanghe reservoir. Results suggest that adoption of WSI practices such as alternate wetting and drying (AWD) is not the result of a deliberate choice made by farmers but the consequence of the water availability constraints they are dealing with. Because of the powerful recycling mechanisms in place, practices such as AWD do not create significant real water savings in ZIS. AWD is, however, an effective way to maintain water in storage in the upper reaches of the sys-

tem, thereby contributing to maximising the amount of rice produced per unit of water released from the Zhanghe reservoir. Because the issue of water savings is critical in China, local as well as provincial stakeholders have expressed strong interests for the results of this research. Extension to other areas in China is being discussed.



Rice nursery beds in the Zhanghe Irrigation System, Central China

Research fellows

Joachim Sell
Thomas Köllner

Supervisor

Roland Scholz, ETH Zurich

Collaborators

Lucio Pedroni CATIE, Turrialba, Costa Rica / Markku Kanninen, CIFOR, Bogor, Indonesia / Carmenza Robledo, EMPA, Dübendorf, Switzerland / Wendy Proctor, CSIRO Land and Water, Australia

Duration

January 2003 – January 2006

Demand and supply for ecosystem services from tropical forestry

Tropical forests provide valuable ecosystem services (ES) such as biodiversity or carbon sequestration. Besides their importance for human welfare, ES are usually considered to be public goods. In recent years it has been argued that market based approaches may substantially foster the sustainable use of tropical forests and their ecosystem services. Accordingly, institutional settings for private investments and corresponding markets are being developed. However, the requirements and preferences of market actors are not well known. In addition, there are deficiencies in the integrated assessment of project management (including sustainability dimensions) and the marketing of forestry projects that provide ES.

Our objectives are

- to determine and compare decision criteria, preferences and expected benefits of market actors from the supply and the demand side;
- to develop a multi-criteria based method that allows an integrated assessment of projects; and
- to propose marketing and project management measures that foster market activities and balance the needs of actors on the supply and demand sides.

Using three questionnaire surveys we investigated decision criteria, preferences and expected benefits of key market actors from tropical and non-tropical countries with regard to tropical forestry-based ES. The surveys reveal that both groups have distinct decisionmaking perspectives. Market actors from tropical countries emphasise criteria related to markets, profitability and information management, whereas the actors from non-tropical countries tend to stress criteria related to sustainability. Accordingly, the former group expects much higher market potential for ES than the latter group. A survey on marketing aspects revealed that this issue shows high potential for optimisation. In order to coordinate marketing-related research, an international network is being created, based on an international conference in January 2006 organised by the research fellows.



Final conference "Supply and Demand for Ecosystem Services from Tropical Forestry. Market Actors, Marketing and Institutions" on January 16, 2006 in Zurich

Research fellow

Frank Muttenter

SupervisorMarc Hufty,
IUED, Geneva, Switzerland**Collaborator**Bruno Ramamonjisoa,
University of Antananarivo,
Madagascar**Duration**

March 2003 – March 2006

Fiscal incentives for community forestry: Procedural legitimacy in co-management of forests by multiple stakeholders

Community forestry has become a key policy principle of biodiversity conservation in Madagascar. It continues, however, to be practiced much like in the 1980s to justify local aid projects. Although a contractual forest management law was enacted in 1996, no local management plan has been negotiated without external funding as yet. Transaction costs of resource access through customary institutions are in fact less significant than those of contractual forest management. When villagers express an interest in community contracts, they do so not to establish clear boundaries or to restrict access to common pool resources, but rather to secure access to forest lands and resources.

We studied two cases of agrarian colonisation of rainforest lands in the North and on the Eastern escarpment in order to understand how the property relations of production in different parts of the rural economy are established by social practice: The organisation of rural charcoal markets in the Western lowlands, as well as “raphia” palm fibre extraction on the Eastern coast. In each of the case studies, We researched how people secure, contest and justify institutionalised property relations by embedding these relations in a morally binding context of social representation. The issue of fiscal incentives has been analysed in the empirical context of energy wood management. To reduce transaction costs of community-based management of rural charcoal markets, the forest service is required to return tax revenues to village user associations that should create local incentives to implement contractual management plans. We found however, that the measure hardly affects the economy of illegal transactions and authorisations since legal powers to autho-



Charcoal production: A forest-related going concern

rise, tax and control the production of charcoal remain in the hands of the central administration.

Among the results of the comparison of a variety of cases is the finding that contractual community-based resource management cannot achieve sustainable management of forest resources because policy objectives and procedures are incompatible with prevailing social representation of labour, the ancestral domain and a common national identity. Another result is that the failure to effectively implement state forest law does not challenge its political legitimacy, given that contractual “recognition” of customary law leads to a repositioning of actors’ strategies and thus to a reinterpretation of integrated conservation policy as officially understood.

Research fellow

Mathew Musumbale Abang,
ICARDA, Syria

Supervisors

Bruce McDonald, ETH Zurich /
Celeste Linde, ANU, Australia

Collaborators

Amor Yahyaoui, Salvatore Ceccarelli,
Stephania Grando and Michael Baum,
ICARDA, Syria

Duration

March 2003 – February 2006

Improving resistance to barley scald through understanding the processes that govern the evolution of *Rhynchosporium secalis* populations

Major resistance genes deployed in barley to control scald (*Rhynchosporium secalis*) have frequently exhibited a finite life span due to shifts in the virulence structure of the pathogen population. One of the objectives of this project was to understand the evolution of *R. secalis* in response to host resistance genes by measuring the adaptive responses of experimental pathogen populations to host selection during both parasitic and saprophytic phases of the disease cycle. Competition among eight *Rhynchosporium secalis* isolates was assessed during both phases of the disease cycle in field experiments conducted at two locations and over two growing seasons. The eight isolates were inoculated onto six barley populations exhibiting varying degrees of resistance. Microsatellite analysis of 2866 isolates recovered from the

field experiments showed significant, and sometimes opposite, changes in the frequencies of *R. secalis* genotypes during the growing season (parasitic phase) and between growing seasons (saprophytic phase). Significant differences in isolate fitness were found on different host populations and in different environments. Selection coefficients were large, indicating that evolution can occur rapidly in field populations. These results provide the first direct evidence that *R. secalis* pathogen genotypes differ in their saprophytic ability and fitness under field conditions.

Individual assignment based on microsatellites was used to detect immigration of *R. secalis* from surrounding barley fields (source populations) into an experimental field (recipient population), which comprised barley host populations artificially inoculated with eight distinct *R. secalis* genotypes or left uninoculated (as a control) to be infected naturally with airborne ascospores. Thirty-nine isolates from the control plots had a multilocus haplotype that did not match that of the inoculants. Bayesian-based individual assignment confirmed that these novel isolates were immigrants. Infected seed, infected straw, and splash-dispersed conidia could be excluded as the source of the immigrants, leaving airborne ascospores as the most likely source of primary inoculum in our control plots and of the immigrants detected in the inoculated plots. These findings emphasise the important role that ascospore-mediated long-distance dispersal plays in the epidemiology of *R. secalis*. Recombinant strains were identified in the inoculated plots and additional tests are ongoing to ascertain which recombinants arose through sexual or parasexual recombination. Sexual recombination makes possible the emergence and dispersal of new *R. secalis* genotypes during the growing season.



Seedling assay conducted to compare the aggressiveness of *R. secalis* isolates in the greenhouse to their fitness on the same barley cultivars in the field

Research fellow

Ralph Knüsel

Supervisors

Helmut Segner and Thomas Wahli, FIWI,
University of Berne, Switzerland /
Louw Hoffmann and Danie Brink, University
of Stellenbosch, South Africa

Collaborators

Anna Mouton, Stanford, South Africa /
Hafizah Chenia, University of Stellenbosch,
South Africa / Daniel Jamu, National
Aquaculture Center, Zomba, Malawi

Duration

April 2003 – May 2005

Development and implementation of an aquaculture health management plan in support of the small-scale fish farming programme in rural communities of South Africa

Health status plays a major role in growth, survival and therefore overall production of cultured fish. High stocking densities of susceptible individuals favour the outbreak and spread of fish diseases which therefore represent a special threat to aquaculture. Fish disease knowledge, fish health management and diagnostic skills are therefore of particular importance for successful aquaculture. However, there is a substantial lack in all these fields of expertise throughout sub-Saharan Africa.

The aim of the present project was to promote joint research and practical measures to reduce the impact of this important bottleneck in current aquaculture production in Southern Africa, i.e. fish losses due to disease.

Achievements of the project were:

- The project provided the first **professional fish health service** to fish farmers in South Africa;
- the project performed the first fish disease survey in South Africa. More than 2000 fish from **South Africa and Malawi were analysed**;
- **information on fish diseases** prevalent in farmed fish in Southern Africa was updated and disseminated. Results were communicated in scientific and popular papers; manuals on fish diseases were published, lectures and presentations held for both academics and non-academics with the aim of promoting knowledge on fish diseases, their diagnosis, prevention and treatment;
- the identification of the Koi Herpes Virus (KHV) was the **first description of this serious fish pathogen** in Africa;
- several workshops including **hands-on training** were organised. Fish diseases and health management has now its proper place in the training of future small-scale farmers and students at the University of Stellenbosch;
- an **improvement of fish health management** was further achieved by introducing effective prophylactic fish health products and performing trials under farm conditions;
- the detection of KHV and other results of the surveys motivated a private laboratory to establish **diagnostic test methods** for several fish diseases;
- the project provided connections and interactions for various specialists (microbiologists, parasitologists, veterinarians, nutritionists) in the field of fish diseases that resulted in intensified **local, regional and international collaboration**;
- contacts between the WorldFish Centre (Malawi) and the Universities of Stellenbosch and Grahamstown (RSA) were strengthened; and
- two South African candidates will attend a **training stay at the FIWI in Berne** in 2006.



A typical harvest from a small-scale fish farmer's pond in Malawi

Research fellow

Frank Eyhorn, NADEL, ETH Zurich

Supervisors

Urs Wiesmann, University of Berne, Switzerland / Ruedi Baumgartner, NADEL, ETH Zurich

Collaborators

Mahesh Ramakrishnan, International Competence Centre for Organic Agriculture, Bangalore, India / Tushaar Shah, IWMI, Anand, India / Uma Rani, Gujarat Institute of Development Research, Gujarat, India

Duration

December 2003 – December 2006

The impact of organic cotton cultivation on the livelihood of Indian smallholders



The trade fair "India Organic 2005" in Bangalore, during which the organic cotton stakeholder workshop was held

The aim of this project is to assess to what extent organic farming can be a way to improve the livelihoods of smallholders in developing countries in general and of Indian cotton farmers in particular. The specific project objectives are:

- To provide a framework for a livelihood-oriented design and analysis of organic cotton production projects;
- to generate profound data and knowledge on the agronomic performance and the socio-economic impact of organic cotton cultivation on farm households in the Maikaal project, Central India (compared to the prevailing conventional production system); and
- to explore ways of utilising the potential of organic cotton farming as a development option for smallholders.

In April 2005, the Indo-Swiss research team completed the data collection on 120 organic and conventional farms, covering two cropping periods. Interviews with selected farmers in the Maikaal project and in organic cotton projects in the State of Andhra Pradesh complemented the quantitative results. The agronomic findings were documented in a research report and submitted as a paper to an agricultural journal. In November 2005, the results were presented in an organic cotton stakeholder workshop in Bangalore, India, and in a symposium in Lucerne, Switzerland. Altogether, the presentations were attended by almost 300 participants and received considerable media coverage. Subsequently, the Agricultural Department of the Indian state Maharashtra invited the researchers to present the results, and to support the Department in a planning process for a programme to promote organic cotton farming.

The doctoral thesis is linked to a research project mandated by the Swiss Agency for Development and Cooperation (SDC) and WWF Switzerland. The reports and extension tools on organic cotton elaborated by the research team are available on the website <http://www.organiccotton.fibl.org>.

Research partner Dr. Uma Rani in an interview with an organic cotton farmer in Andhra Pradesh



Research fellow

Atti Tchabi

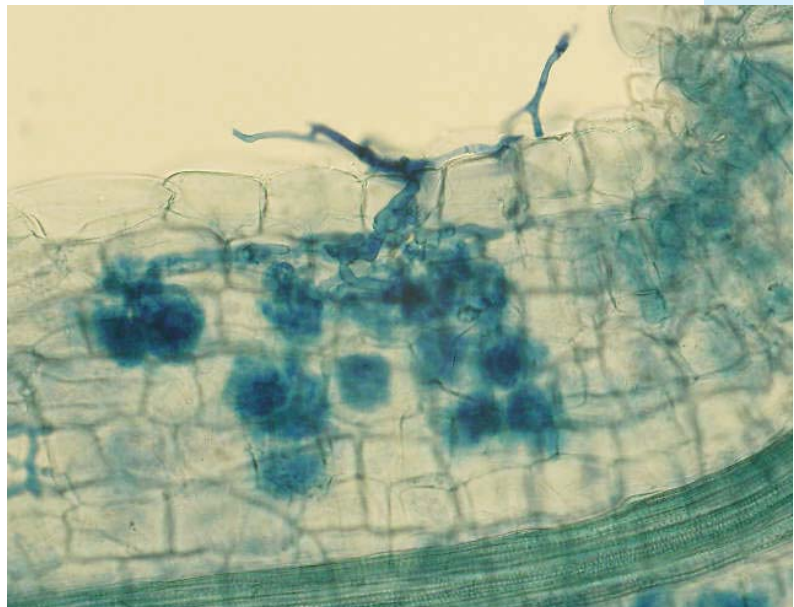
SupervisorsAndres Wiemken and Fritz Oehl,
University of Basel, Switzerland /
Danny Coyne, IITA, Nigeria**Collaborators**Fabien Hountondji, IITA,
Cotonou, Benin / Paul Mäder,
FiBL, Frick, Switzerland /
Robert Asiedu, IITA, Nigeria**Duration**

September 2004 – August 2007

Indigenous arbuscular mycorrhizal fungi (AMF) from the “yam belt” for improved yam growth and reduced yam nematodes infestation in West Africa

The arbuscular mycorrhiza (AM) is the most widely occurring microbial symbiosis with higher plants. It is known for facilitating plant mineral nutrient uptake, particularly of phosphorus under conditions of P-limitation common in tropical soils due to leaching and/or severe immobilisation. Furthermore, it is believed to improve plant-water relations and to provide resistance against pathogens. Yam (*Dioscorea* spp.) is the most important tuber crop in terms of area coverage in West Africa, particularly in Benin and Togo. Alarmingly, over the last years, the annual yam production per hectare has been decreasing considerably due to a loss of soil fertility and nematode damage. This study aims at exploring indigenous AM fungi and assessing their effect on yam growth and yam nematode infestation. The specific goal of the first year was to isolate and identify AM fungi from soils of various agro-ecosystems of the “yam belt” in Togo and Benin. AM fungal species were identified based on spore morphology. Our findings show that there is a high diversity of species in the soils of the “yam belt”. Representatives of almost all known AM fungal genera so far described were detected comprising over 40 different AM fungal species. In AM fungal trap cultures established with soil samples from all agro-ecosystems examined, the most common species recovered was *Glomus etunicatum*. In general, species diversity decreased parallel to increasing land use intensity. Greatest species diversity was observed in natural forest soils followed by soils from yam fields, which were planted in the first year following primary forest clearance. Lowest AM fungal species diversity was found in the intensively managed cotton fields. The species diversity appears to restore, however, during fallow periods and secondary forest regeneration, but only partly so. Most importantly for our project, we discovered that

roots of *Dioscorea* spp. are highly mycorrhizal and more than 20 different AM fungal species formed spores in trap cultures using yam as host plant. The most abundant species that sporulated in association with yam were *G. etunicatum* and *Acaulospora scrobiculata*. Currently, single spore derived *G. etunicatum* isolates recovered from the survey and, for comparison, commercially available AM fungi, are being assessed in the greenhouse at IITA-Benin for their impact on yam growth and nematode suppression, using both yam sets and tubers produced from tissue-cultured yam plantlets as starting material.



Yam root cortex colonised by arbuscular mycorrhizal fungi

Research fellow

David Odongo, ILRI, Kenya

Supervisors

Claudia Daubenberger,
STI, Basel, Switzerland /
Richard Bishop, ILRI, Kenya

Collaborators

Gerd Pluschke, STI, Switzerland /
Rinaldo E. Zurbriggen,
Pevion Biotech, Switzerland /
Evans Taracha, ILRI, Kenya

Duration

September 2004 – August 2006

Development of a second generation anti-tick vaccine using a mimotope-virosome approach

This project is pursuing a novel approach to synthetic vaccine design, optimisation and delivery by using a virosome strategy with the aim of improving TickGARD, an already existing commercial anti-tick vaccine in terms of its efficiency, handling, user-friendliness and pricing for farmers. TickGARD vaccine protects cattle against tick infestation with *Boophilus microplus* and *B. decoloratus*, which are major ecto-parasites

extended to protect cattle from infestation with other tick species. Using a Pepscan methodology, we identified and selected immuno-dominant peptide regions recognised by sera from TickGARD-immunised and -protected animals but not with pre-immunisation sera, and have generated synthetic mimotopes to be tested on their capacity to induce tick gut-cell binding antibodies initially in mice and later in cattle. We also evaluated the performance of extended versions of three previously described short peptide candidates coupled to virosomes. Two of these three mimotopes produced high antibody titres in mice that were immunised. By immuno-histochemical and immuno-fluorescence staining, we demonstrated the capacity of the mimotope-induced mouse polyclonal antibodies to bind to native Bm86 protein which is expressed on the mid-gut cell surface of semi-engorged female ticks, this compared to a lack of reactivity with sera from mice that were immunised with virosomes alone. One of these mice was then used to generate a hybridoma cell line by cell fusion for production of monoclonal antibodies capable of binding to the recombinant protein in ELISA and to tick gut cells expressing the native protein. We are currently evaluating the levels of protection initially against laboratory *Boophilus* tick challenge in cattle, induced by these two short structurally modified synthetic peptide candidates, in conjunction with a novel antigen delivery system for use in cattle based on virosomes that is usable in African settings. The experience gained during this pilot project should establish the suitability of this technology platform for vaccine development for control of a range of livestock diseases.



Cattle vaccination against ticks

and a veterinary problem affecting cattle health, causing important economic losses due to the diseases they transmit and high costs of control. This vaccine could be improved and

Research fellow

Changhu Wang, CIAT, Colombia

Supervisors

Zaida Lentini, CIAT, Colombia /

Peng Zhang, ETH Zurich

Collaborators

Hernán Ceballos, CIAT, Colombia /

Jan Custer, University of Wageningen,

The Netherlands

Duration

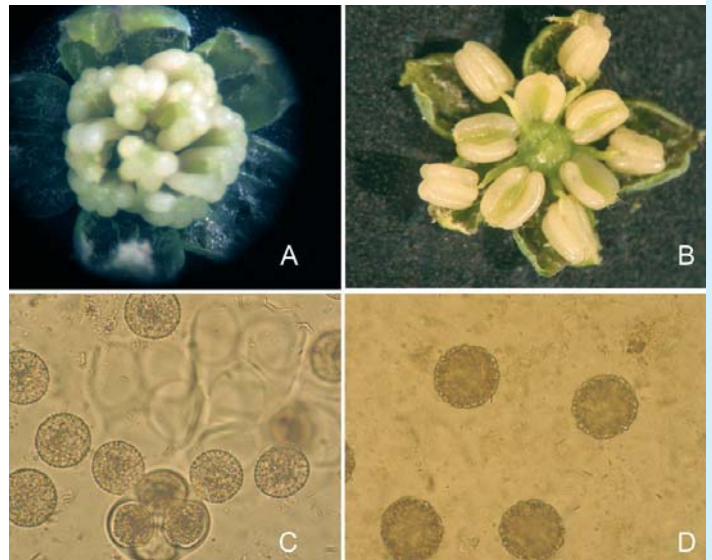
January 2005 – December 2007

Development of an *in vitro* protocol for the production of cassava doubled haploids and its use in breeding

The *in vitro* production of doubled haploids (DHs) lines would serve as a baseline for the development of populations allowing the identification of valuable recessive traits and providing the opportunity for the incorporation of molecular tools. In 2005, the project was focused on: i) improving further the microspore isolation protocol to obtain homogenous microspore preparations (i. e. of similar developmental stage); ii) optimising conditions for high viability of microspores over time upon isolation; iii) analysing the effect of field sites on the development of microspores from donor plants; and iv) identifying parameters allowing a close association between morphological characteristics of flower buds/inflorescences and the developmental stage of microspores.

Main results and conclusions include:

- Two of the main bottlenecks affecting microspore culture in cassava have been elucidated: i) obtaining homogenous microspore suspensions according to their developmental stage; and ii) obtaining high yielding microspore suspensions to allow culture at 10^5 cells/ml by careful selecting of flower bud size, the inflorescence used and their position within the inflorescence. Meanwhile, the standardisation of protocols used for donor plant and flower bud selection, flower bud harvest and storage until processing, viability monitoring and microspore isolation has been accomplished.
- By using tetrads as indicators, low temperature has been proven to be a crucial factor for keeping viability of cassava microspores.



Male flower pattern and developmental difference between inner and outer whorl of anthers. A: Ten anthers arranged in two whorls. B: Anthers from inner whorl with longer filaments alternated with anthers from the outer whorl. C: Microspores and old tetrads from outer whorl. D: Microspores from the same bud, but located in outer whorl. The size of the microspores is bigger than those in C and the exine wall is further developed with visible particles on the surface.

- Percoll gradient 30–40–50 % allowed a cleaner and better separation of microspores by size and developmental stages than the 50–60–70 % gradient.
- Putative cell divisions aroused from pre-chilled SM1219-9 tetrads cultured at 10^4 cell/ml in B5 liquid medium at 26°C in the darkness.

Next year, work will be mainly devoted to improve culture conditions with various pre-treatments, media as well as culture conditions.

Research fellow

Ricardo Oliva,
CIP, Quito, Ecuador

Supervisors

Cesare Gessler, IPW, ETH Zurich /
Gregory Forbes, CIP, Lima, Peru

Collaborator

Wilbert Flier,
PRI, Wageningen, The Netherlands

Duration

January 2005 – December 2007

Exotic strains of *Phytophthora infestans* in the Andes – Genetically isolated curiosities or time bombs for native *Solanaceous* crops?



Solanum quitoense plants growing in the CIP greenhouse

Late blight of potatoes is caused by the pathogen *Phytophthora infestans*, a heterothallic oomycete that needs the presence of both mating types (A1 and A2) to produce long-living structures called oospores and to complete the sexual stage of propagation. In the highlands of Ecuador, the population genetic structure of this pathogen is being influenced by the existence of multiple host species. Recent studies revealed that the pathogen populations comprise both mating types within several genetic subgroups. Although certain

levels of host specificity have been demonstrated and might be acting as reproductive isolating barriers between A1 and A2 populations, sporadic events of cross infection and gene flow might be occurring. In this context, the possible appearance of new aggressive strains resulting from sexual recombination is an important threat for *Solanum*-dependent farmers. The main objective of this project is to predict possible changes in the genetic structure of *P. infestans* populations in Ecuador due to sexual reproduction or other forms of genetic recombination.

During the first stages of the research, we have focused on several subjects, including genetic structure of populations, gene flow, sexual reproduction *in vitro* and infectivity of oospores *in planta*. Isolates of different mating types were able to interact *in vitro* and produce viable oospores. Furthermore, oospores could be produced in leaf tissues of wild and cultivated *Solanum* hosts. Although the rate of germination *in vitro* was low, it appears to be enough to produce populations in nature resulting from sexual reproduction. Preliminary data suggest that the genetic diversity of *P. infestans* in the highlands of Ecuador could be increased through sexual reproduction, and this might have an important effect on population dynamics and aggressiveness. All these parameters should allow us to predict the overall potential of the sexual reproduction of the pathogen in the Andean highlands, ensuring that disease control strategies are based on access to accurate knowledge on pathogen dynamics.

Research fellow

Sajad Bukobero

Supervisors

Marc Hufty,
IUED, Geneva, Switzerland /
Jean-Pierre Sorg, ETH Zurich

Collaborators

Bruce Campbell,
CIFOR, Indonesia /
Bruno Ramamonjisoa,
ESSA, Madagascar

Duration

May 2005 – May 2008

Social practices and conservation policies: Enhancing livelihoods through sustainable forests management in Madagascar

This research project aims to analyse how forest-related policies impact local practices and livelihoods of forest-dependent people. It will develop an explanatory model of the relationship between people and forests. Recommendations will then be formulated to allow policy makers to elaborate conservation strategies that contribute to enhance livelihoods.

From June to October 2005, a series of interviews, group discussions, household surveys and field observations were carried out in two study sites Mahajanga and Moramanga. The data collection was centred on (i) the types and quantities of forest products commonly used, (ii) the institutions governing access to and control over these resources, (iii) the impact of devolution* on the resource use pattern, on institutions, and on the status of forests.

Preliminary results:

Wood, fruits and tubers are the most important forest products harvested. The most striking change is with regard to the governance of forest resources. Since devolution was implemented, there is a significant decrease in forest conversion and settlement in the transferred forests. Yet, devolution resulted in the reconfiguration of power relations in the community, most often at the expense of the lower tiers. As a consequence, one can observe an oligopsony trend in charcoal trading (i.e. a market with very few buyers), the emergence of money lenders, and an increase in sharecropping that retains the poorest in hardship. Furthermore, some types of products (e.g. cashew nuts) are harvested in an unsustainable manner.

Conclusion:

Devolution benefits the local communities but there is lack of equity. Its effects on forest conservation are a mixed blessing: although settlement in and conversion of forests are slowing down, there is overharvesting of forest products which remains a threat to the forests.

Perspectives:

The emerging “rules of the game” and the contextual factors need deeper understanding. The next phase of field work will be focussed on the “rules of the game” and perceptions regarding deforestation and livelihoods.



The free-rider behaviour in harvesting forest products has become commonplace: Children harvesting cashew apples and nuts in an unsustainable manner

* “Devolution” is defined here as the transfer of rights and responsibilities over natural resources from the state to user groups at the local level.

Research fellow

Markus Schneider

Supervisors

Ian W. Marison, EPFL, Switzerland /
Tolly S. A. Mbwette, University
of Dar-es-Salaam (UDSM), Tanzania

Collaborators

Jamidu H. Y. Katima, UDSM, Tanzania /
Peter Lüthy, ETH Zurich /
Ahmed Hassanali, ICIPE, Kenya /
Sixtus Kayombo and Harishchandra
B. Pratap, UDSM, Tanzania

Duration

October 2005 – September 2008

Drinking water treatment in Tanzania using seed extracts from the pan-tropical tree *Moringa oleifera*

The project started in October 2005 in East Africa and aims at verifying the transfer of a sustainable drinking water treatment technology developed in Switzerland to tropical developing countries.

Water treatment in tropical developing countries depends heavily on water treatment agents. Until now, however, these cannot be produced locally and therefore must be imported using scarce foreign currency.



A woman harvesting *M. oleifera* pods

Over the past six years, the Swiss Federal Institute of Technology in Lausanne (EPFL) has developed an innovative procedure for a robust and cost-effective large-scale production of *Moringa oleifera* seed extracts. These extracts show highly promising coagulation and antimicrobial activities in laboratory experiments which emphasise their sustainable use in drinking water treatment processes in countries, where the pan-tropical tree *M. oleifera* is naturally abundant.

Our research objectives are:

- to evaluate the effectiveness of the seed extracts under actual conditions (i.e. the tropics) according to international (WHO) drinking water quality standards;
- to assess the risk of *M. oleifera* seed extracts; and
- to develop a method for extract implementation into local water treatment plants.

The main research activities will be carried out at the prospective College of Engineering and Technology of the University of Dar-es-Salaam (UDSM) in Tanzania. Both the laboratory testings and the consecutive large-scale water treatment trials in a containerised water treatment plant are believed to result in valuable data for a thorough assessment of the *M. oleifera* extracts.

The project will also considerably enhance a previously signed Memorandum of Understanding between Switzerland and Tanzania in the field of research and education.

Research fellows

Lanto Herilala Andriambelo / Clémence Dirac

SupervisorsAlexandre Buttler, EPFL, Switzerland /
Jean-Pierre Sorg, ETH Zurich, Switzerland /
Gabrielle Rajoelison, ESSA, Madagascar**Collaborators**Samuel Razanaka, Centre National de
Recherche sur l'Environnement, Madagascar /
Menabe Saha, Intercooperation, Madagascar /
Albert Rivoarijaona, Centre de Formation
Professionnelle Forestière, Madagascar**Duration**

November 2005 – October 2008

Enhancing the livelihood of the local population in a biodiversity hotspot in Madagascar: Scientific bases for a participatory forest landscape management

In the dry region of Central Menabe, along the west coast of Madagascar, clearing has drastically reduced the once large forests. If the deforestation continues at the present rate, the forest will disappear and no longer be capable of ensuring the different services and products it provides to the villagers. It is therefore urgent to intervene in this region with a view to ensuring the sustainability of all forest functions and to filling the needs of a range of stakeholders.

With these goals in mind, the main objective of the project is to set up scientific bases for a sustainable multifunctional and participatory management of a forest landscape in Central Menabe.

The specific objectives are:

- to assess the role of forest products and local knowledge about forest and tree management in the livelihood strategies (human-forest interface);
- to determine production potential and regeneration capacity of the most important forest products that underpin livelihoods; and
- to deduce opportunities and constraints for sustainable management of a landscape with a major forest component.

The project is based on a consultative and an active participatory approach that integrates scientific and indigenous knowledge. Starting from present-day local knowledge on

land use, it aims to provide, at a landscape level, scientific management bases respecting forest biodiversity. In particular, the project aims to improve strategies in the market chains of forest products, to integrate agriculture (agro-forestry) and livestock in forestry and to establish the potential in biodiversity conservation of payments or compensations for ecological services.

As the project is being carried out in an area representative of the dry forest zone, it is likely that research results can be applied to other regions of Menabe in the future.

The project has begun in November 2005 and will be concluded in October 2008. During the first months, the doctoral students have conducted a bibliographical review on similar international studies and on previous research in the Menabe region. An article describing the project has already been proposed to a journal and a review on Madagascar human-forest interface with a special view on the Central Menabe region is being prepared and should be presented for publication in March 2006. In February 2006, the two doctoral students will begin their one-year field period for the first part of data collection.



A baobab, symbol of the dry forest landscapes

Projects at the ETH Zurich related to agriculture, food and nutrition, and forestry in developing countries

Animal Sciences (INW)

Impact of natural and human-induced disasters on livestock production, including Animal Genetic Resources (AnGR) and HIV/AIDS

Project leader: Michael R. Goe
Project partner: FAO, Rome, Italy
Supervisor: Gerald Stranzinger
Funding sources: Velux Foundation / ETH Zurich

Disaster risk management and livestock in urban planning

Project leader: Michael R. Goe
Project partner: Massachusetts Institute of Technology (MIT), Cambridge, MA, USA
Supervisor: Gerald Stranzinger
Funding sources: Velux Foundation / ETH Zurich

The “one medicine”: Molecular epidemiology of zoonotic *Mycobacterium bovis* in relation to host genetic variation in African animal hosts.

Project leaders: Jakob Zinsstag, Swiss Tropical Institute, Basel / Haja Kadarmideen, ETH Zurich
Project partner: Rudovick Kazwala, Sokoine University of Agriculture, Morogoro, Tanzania
Collaborators: Morocco, Mauritania, Senegal, Mali, Nigeria, Chad, Tanzania
Funding source: Swiss National Science Foundation (SNF)

Development and use of rumen molecular techniques for predicting and enhancing livestock productivity

Project leaders: Michael Kreuzer, Hans-Dieter Hess, Carla R. Soliva (Research Agreement Holders)
Project partners: Nadide Hulya Ozdemir, Turkey / Keith Joblin, New Zealand / Roderick Mackie, USA / Makoto Mitsumori, Japan / Devki Nandan Kamra, India / Charles J. Newbold, UK / Jian-Xin Liu, China / Adibe L. Abdalla, Brazil / Denia C. Delgado Fernandez, Cuba / Rolando Barahona Rosales, Colombia / A.B. Zeleke, Ethiopia / Rui-Jun Long, China / C. Wachirapakorn, Thailand
Supervisor: Michael Kreuzer
Collaborator: Harinder M.P. Makkar, IAEA, Austria
Funding source: International Atomic Energy Agency (IAEA), Vienna, Austria
Project type: Coordinated research project of IAEA

Characterisation of the value and utilisation of forage plants on tropical wood pastures: The case of the Bolivian Chaco and Subandino

Project leader: A.C. Mayer
Project partners: Eidgenössisches Institut für Schnee und Lawinenforschung (SLF) / Universidad Católica de Bolivia / Herbario Nacional de Bolivia
Supervisor: Michael Kreuzer
Collaborators: S. Marquardt / H. Alzérrecá / S. Beck / C. Vacaflores / M. Mendoza
Funding source: Velux Foundation
Project type: Doctoral dissertation

Investigation of the anti-methanogenic potential of foliage from African multipurpose trees used as supplements to improve livestock productivity

Project leader: Carla R. Soliva
Project partners: National Veterinary Institute of Ethiopia / International Livestock Research Institute (ILRI), Ethiopia
Supervisor: Michael Kreuzer
Collaborator: A.B. Zeleke
Funding sources: NIDECO / International Atomic Energy Agency (IAEA), Vienna, Austria
Project type: Doctoral dissertation

Condensed tannins as part of an integrated concept to control gastrointestinal parasites in ruminants in organic farming: Effects on palatability and nutrient utilisation

Project leader: F. Dohme
Project partners: Swiss Federal Research Station for Animal Production and Dairy Products (ALP) / Swiss Federal Research Station for Agro-ecology and Agriculture (FAL) / Research Institute of Organic Agriculture (FiBL)
Supervisor: Michael Kreuzer
Collaborators: A. Scharenberg / A. Gutzwiller / U. Wyss
Funding sources: Public institutions
Project type: Doctoral dissertation

Food Science and Human Nutrition (ILW)**Structure, texture and processing of yam (*Dioscorea* spp.)**

Project leaders: Jeannette Nuessli / Béatrice Conde-Petit / Felix Escher
Project partner: Centre Suisse de Recherche Scientifique (CSRS), Abidjan, Côte d'Ivoire
Supervisor: Judith Brunnschweiler
Funding source: Internal funding, Group of Food Technology and Sensory Science
Project type: Post-doctoral research project

Dual fortification of salt with iron and iodine in Kenya

Project leader: Mary Harrington
Project partner: KEMRI, Nairobi, Kenya
Supervisor: Richard Hurrell
Funding source: Micronutrient Initiative
Project type: Post-doc

Efficacy of elemental iron powders as cereal food fortificants

Project leader: Richard Hurrell
Project partner: Mahidol University, Bangkok, Thailand
Supervisor: Richard Hurrell
Collaborator: Michael Zimmermann
Funding source: Micronutrient Initiative
Project type: Research project

Iron fortification of rice

Project leader: Michael Zimmermann
Project partner: St. John's Medical College, Bangalore, India
Supervisor: Richard Hurrell
Collaborator: Diego Moretti
Funding source: Micronutrient Initiative
Project type: Doctoral dissertation

Content and bioavailability of phytoferritin-bound iron in major food staples

Project leader: Thomas Walczyk
Supervisor: Richard Hurrell
Collaborator: Matthias Hoppler
Funding source: ETH Zurich

Method for measuring thyroglobulin on dried blood spots

Project leader: Michael Zimmermann
Project partner: Ministry of Health, Morocco
Supervisor: Richard Hurrell
Collaborator: Diego Moretti
Project type: Diploma thesis

The impact of vitamin A deficiency on iodine metabolism and thyroid function

Project leader: Michael Zimmermann
Project partner: Ministry of Health, South Africa
Supervisor: Richard Hurrell
Collaborator: Swiss National Science Foundation (SNF)
Project type: Research project

Effect of calcium, ascorbic acid and iron status on iron absorption in humans

Project leader: Thomas Walczyk
Project partner: St. John's Medical College, Bangalore, India
Supervisor: Richard Hurrell
Collaborator: Rita Wegmüller
Funding source: Unilever
Project type: Doctoral dissertation

Effect of spices and herbs on iron absorption in humans

Project leader: Thomas Walczyk
Project partner: Mahidol University, Bangkok, Thailand
Supervisors: Richard Hurrell
Collaborator: Siriporn Tuntipopipat
Funding source: International Atomic Energy Agency (IAEA), Vienna, Austria
Project type: Doctoral dissertation

Identification of iron-rich varieties of common beans (*Phaseolus vulgaris*) for iron biofortification

Project leader: Thomas Walczyk
Project partner: HarvestPlus
Supervisors: Richard Hurrell
Collaborator: Anna Kiene
Funding source: HarvestPlus
Project type: Research project

Plant Sciences (IPW)**The eco-hydrological significance of fog in the eastern Sierra Madre, Central Veracruz, Mexico**

Project leader: L. A. Bruijnzeel, VU Amsterdam, The Netherlands
Project partner: Guadalupe Williams-Linera, Instituto de Ecología, Xalapa, Veracruz, Mexico
Supervisors: Miguel Equihua Zamora, Instituto de Ecología, Xalapa, Veracruz, Mexico / Nina Buchmann
Funding source: Wotro, The Netherlands

The Sardinilla project: Biodiversity and ecosystem

Project leader: Michael Scherer-Lorenzen, Nina Buchmann
Project partners: C. Potvin, McGill University, Montreal, Canada / Smithsonian Tropical Research Institute, Panama
Collaborator: Nina Buchmann
Funding sources: McGill University, Montreal / Smithsonian Tropical Research Institute Panama / ETH Zurich internal funds

Sustainable codling moth management: Mobility and SIT

Project leader: Silvia Dorn
Project partner: Stephanie Bloem, Florida A&M, USA
Collaborator: Marc Vreysen, FAO/IAEA, Vienna, Austria
Funding source: ETH Zurich
Project type: Visiting professor to the ETH Zurich

Influence of arbuscular mycorrhizal (AM) fungal diversity on plant growth and phosphorus (P) uptake in crop plants

Project leader: Mathimaran Natarajan
Project partner: ICRAF
Supervisors: Emmanuel Frossard / Jan Jansa
Collaborator: ICRAF
Funding source: ETH Zurich
Project type: Doctoral dissertation

BioCassava Plus – Improving cassava for nutrition, health and sustainable development

Project leader: Peng Zhang
Project partner: BioCassava Plus Consortium
Supervisor: Wilhelm Gruissem
Collaborator: BioCassava Plus Consortium
Funding source: The Bill & Melinda Gates Foundation through the Grand Challenges in Global Health Initiative
Project type: Doctoral dissertations

Improving cassava for human nutrition and sustainable production

Project leaders: Peng Zhang and Wilhelm Gruissem
Project partners: CIAT / IITA
Supervisor: Wilhelm Gruissem
Funding source: Eiselen Foundation Ulm
Project type: Part of a doctoral dissertation

Green manure integration in upland cropping systems

Project leader: Ravi Sangakkara, Peradeniya University, Sri Lanka
Project partner: Peter Stamp
Funding source: Internal, mainly from the project leader
Project type: Research

Drought tolerance of tropical maize (*Zea mays* L.) as affected by pre-anthesis drought

Project leader: Sansern Jampatong, Kasetsart University, Thailand
Project partner: Peter Stamp
Funding source: Internal
Project type: Research

Evolution of flowering pattern along maize ear

Project leader: Surapol Chowchong, National Corn and Sorghum Research Center, Thailand
Project partners: Ingrid Aulinger / Peter Stamp
Funding source: Internal
Project type: Research

Environmental Sciences (D-UWIS)

Reducing human health and environmental risks from pesticide use: Integrating decisionmaking with spatially explicit risk assessment models

Project leader: Claudia R. Binder
Project partner: UNIBOYACA, Colombia
Collaborators: Ministry of Health, Colombia / International Potato Center (CIP), Peru / Chair for Food Economics and Food Policy, University of Kiel, Germany
Funding sources: Syngenta / KFPE / ZIL seed money
Project type: Research

ORECH-LES: Biodiversity and sustainable management of Kyrgyzstan's walnut-fruit forests. Development of new silvicultural approaches

Project leaders: Jean-Pierre Sorg / Bronislav Ivanovitch Venglovsky
Project partners: Chair of Landscape Ecology, ETH Zurich / Forest Research Institute Bishkek / Academy of Agriculture, Bishkek / KIRFOR / Intercooperation
Funding sources: Various sources
Project type: Applied research

Aménagement et gestion de la forêt dense sèche à Madagascar

Project leaders: Jean-Pierre Sorg / Gabrielle Rajoelison
Project partners: Chair of Landscape Ecology, ETH Zurich / Ecole Supérieure des Sciences Agronomiques Antananarivo / Centre de Formation Professionnelle Forestière, Madagascar
Funding sources: Various sources
Project type: Applied research

Teaching activities at the ETH Zurich related to agriculture in developing countries

Title of teaching unit	Key words	Type of teaching unit	% related to dev. countries	Responsible person(s)
<i>Animal Sciences (INW)</i>				
Sustainable livestock production in non-European countries	Smallholder livestock production systems	Lecture	100 %	M. R. Goe
Systems for sustainable livestock production (Systeme zur nachhaltigen Erzeugung tierischer Produkte)	Tropical livestock systems, environment, sustainability, development	Seminar	90 %	M. Kreuzer W. Langhans H. Kadarmideen C. Wenk G. Stranzinger
Animal nutrition and environment (Tierernährung und Ökologie)	Secondary plant constituents, tropical plants	Lecture	10 %	M. Kreuzer C. Wenk C. Soliva
Animal nutrition in the tropics	Tropics, animal nutrition, feed resources	Block course	100 %	K. Samarasinghe C. Wenk
Rindviehzucht (Rinderzucht in den Tropen)	Rinderzucht, Tropen	Lecture	10 % (2 h)	U. Janßen-Tapken H.N. Kadarmideen (M. Schneeberger)
<i>Food Science and Nutrition (ILW)</i>				
Nutrition in developing countries	Undernutrition, micronutrient deficiencies, vulnerable population groups, breast feeding, complementary foods	Lecture	100 %	I. Egli
Human nutrition (Undergraduates in Food Science Engineering, Agriculture and Pharmacy)	Micronutrients in nutrition, food processing and nutrition, nutrition of different population groups, diet and health	Lecture	10%	R. Hurrell

Title of teaching unit	Key words	Type of teaching unit	% related to dev. countries	Responsible person(s)
Plant Sciences (IPW)				
Plant protection in the tropics: Entomology	Subsistence agriculture and cash crops	Lecture	100 %	S. Dorn
Seminar in applied entomology	Food chain legumes	Seminar	20 %	S. Dorn
Ökologische und ökonomische Problemfelder der Entwicklungsländer II	Bodendegradierung und Massnahmen zur Wiederherstellung der Bodenfruchtbarkeit in den Tropen	Lecture	100 %	E. Frossard A. Oberson Dräyer
Crop Science (Kulturpflanzen) I	Rice production	Lecture	10 %	P. Stamp
Crop Science (Kulturpflanzen) II	Tropical legumes, oil and fibre crops	Lecture	18 %	R. Sangakkara P. Stamp
Environmental Sciences (D-UWIS)				
Markets for ecosystem services: Developing an integrated framework for analysis	Markets, ecosystem services	Seminar (Yale School of Forestry and Environmental Studies, FES)	2 h	T. Köllner (guest lecturer) B. Gentry, Yale FES
Weltforstwirtschaft I	Waldtypen, -flächen, Fragen der Walderhaltung und -bewirtschaftung, Holzproduktion, Handelsströme	Lecture	70 %	J.-P. Sorg
Weltforstwirtschaft II	Mensch, Wald und Baum im Süden und Osten, Agroforstwirtschaft, Brennholzkrise, Entwicklungspolitik, Forschung, Fallbeispiele	Colloquium	80 %	J.-P. Sorg
Erd- und Produktionssysteme	Übersicht über die Bedeutung von Wald und Baum weltweit. Waldverteilung, Gründe der eintretenden Veränderungen. Multifunktionalität, Produktionssysteme.	Lecture	50 %	J.-P. Sorg
Interdisciplinary				
Ernährungssicherung in Entwicklungsländern und tropische Landwirtschaft	Food security, development scenarios, resource management, biotechnology	Seminar	100 %	B. Becker U. Egger C. Sautter

Supervision of theses and practical work related to agriculture in developing countries

Supervisor	Candidate	Title of thesis	Key words	Study type	Country
Agricultural Economics (IAW)					
B. Lehmann	Hermann Daisy N'nhon Comoe	Analyse de la performance de la filière bétail/viande et lait local en Côte d'Ivoire	Chaîne d'approvisionnement, marché, l'efficacité du système de commercialisation, filière bétail/viande	Doctoral dissertation	Côte d'Ivoire
Animal Sciences (INW)					
H.-D. Hess	Christoph Stürm	Effect of combinations of legumes with contrasting contents of tannins on <i>in vitro</i> ruminal fermentation	Tannins, legumes, protein, ruminal fermentation	Post-graduate practical	Colombia
M. Kreuzer	Svenja Marquardt	Characterisation of the value and utilisation of forage plants on tropical wood pastures: The case of the Bolivian Chaco and Subandino	Wood pasture, transhumance, dry season, forage	Doctoral dissertation	Bolivia
M. Kreuzer	Aschalew Bekele Zeleke	Investigation on the anti-methanogenic potential of foliage from African multipurpose trees used as supplements to improve livestock production	Multipurpose trees, methane, rumen physiology, rumen microbes, methanogens	Doctoral dissertation	Ethiopia
H.-D. Hess	Rahel Kilchsperger	Economic and biophysical characterisation of dairy production systems in the hillsides of Nicaragua	Milk quality, hillsides, dairy cattle, dry season	Semester study	Nicaragua
H.-D. Hess	Nicole Milena Locher	Economic and biophysical characterisation of dairy production systems in the hillsides of Nicaragua	Milk quality, hillsides, dairy cattle, dry season	Practical work	Nicaragua
H.-D. Hess	Lina Maria Monsalve Castro	Suplementación con leguminosas mixtas para aumentar la fermentación ruminal, el flujo de proteína duodenal y la absorción de nitrógeno en ovejas	Tannins, tree legumes, supplementation, nitrogen, rumen fermentation, sheep	Master thesis	Colombia
F. Rodríguez / T. Tiemann	Claudia Patricia / Sanabria Galindo	Monitoreo de las poblaciones del ecosistema ruminal en ovinos alimentados con dietas variables en el contenido de taninos por PCR en tiempo real	Tannins, tree legumes, rumen microbes	Master thesis	Colombia
J. Carulla / T. Tiemann	Javier Cortés Cortés	Efecto de diferentes niveles de inclusión de leguminosas taníferas y no taníferas a <i>Brachiaria dyctioneura</i> sobre la degradación de la MS, la MO, la proteína y la liberación de amonio <i>in vitro</i>	Tannins, tree legumes, rumen fermentation, protein digestion	Master thesis	Colombia

Supervisor	Candidate	Title of thesis	Key words	Study type	Country
C. Lascano / T. Tiemann	Laila Cristina Bernal Bechara	Evaluación in vivo e in vitro del efecto de taninos asociados en Paspalum notatum , Vigna unguiculatum y Calliandra calothyrsus en bovinos de leche	Tannins, tree legumes, rumen fermentation, milk production, methane, RUSITEC, forage conservation	Master thesis	Colombia
H.-D. Hess	Markus Spuhler	Determination of prices and feeding value of locally available feeds and supplements for dairy cattle in the central highlands of Peru	High altitude, milk composition, cattle feeding, economics, dry season	Semester study	Peru
C. Gómez / K. Bartl	Elias Muños	Characterisation of the dairy production systems of four communities in the central highlands of Peru	High altitude, cattle feeding, economics, milk production	Diploma thesis	Peru
J. Gamarra / K. Bartl	Alfredo Puell	Determination of productivity and feeding value of perennial forage varieties for dairy cattle in the central highlands of Peru	High altitude, milk composition, cattle feeding, economics, dry season	Diploma thesis	Peru
J. Gamarra / K. Bartl	Milton Medina	Determination of productivity and feeding value of annual forage varieties for dairy cattle in the central highlands of Peru	High altitude, milk composition, cattle feeding, economics, dry season	Diploma thesis	Peru
J. Gamarra / K. Bartl	Hector Llantoy	Determination of productivity and feeding value of annual forage varieties and their hay and silage in the central highlands of Peru	High altitude, milk composition, cattle feeding, economics, dry season, hay, silage	Diploma thesis	Peru
C. Gómez / K. Bartl	Miriam Garcia	Determination of the response in milk components and fatty acid profile of milk of two breeds of cows to three types of feeds	Milk composition, fatty acids, cattle feeding	Master thesis	Peru
C. Turin	Justina E. Barros / Pamela Caldas / Anthony Tenorio Eusebio / Ana Watson	Workshop: Good practices for the establishment of forage species for dairy cattle	Forage species, dry season, high altitude, rural extension	Practical training	Peru
H.-R. Wettstein	Silvia Schicht	Milchqualität in den Tropen: Bestimmung der Einflussfaktoren und Charakterisierung der Produktionssysteme	Milk quality, tropical milk production, production systems, dairy cows	Bachelor thesis	Brazil
C. R. Soliva	Céline Clément	In vitro Untersuchung der antiprotozoären und antimethanogenen Wirkung afrikanischer Futterbäume im Pansen sowie deren Auswirkungen auf den ruminalen Stickstoffumsatz	Multipurpose trees, methane, rumen physiology, nitrogen	Diploma thesis	Switzerland, Ethiopia

Supervisor	Candidate	Title of thesis	Key words	Study type	Country
Food Science and Nutrition (ILW)					
R. Hurrell	Valeria Galetti	Installation and optimisation of the EGRAC method for determination of riboflavin status in Bangalore, South India, and measurement of riboflavin status in children from low socio-economic strata in Bangalore		Diploma thesis	India
R. Hurrell	Daniela Hediger	Vitamin losses and preventive measures of vitamin A-fortified cooking oil distributed and cooked under different conditions		Diploma thesis	Thailand
R. Hurrell	Tina Spiess	Installation of the Sandell-Kolthoff method for determination of urine and measurement of iodine status in school children in urban and rural schools in Bangalore, India		Diploma thesis	India
R. Hurrell / M. Zimmermann	Rita Wegmueller	Dual fortification of salt with iron and iodine in Côte d'Ivoire	Dual fortification, salt, iron, iodine, Côte d'Ivoire, anemia, goiter	Doctoral dissertation	Côte d'Ivoire
R. Hurrell	Simone Westphal	Phytic acid content of foods and dietary iron bioavailability in Bangalore, India		Diploma thesis	India
Plant Sciences (IPW)					
E. Frossard	H. Bouillot	Effects of the use of KH_2PO_4 as phosphorus fertiliser on the growth of <i>Brachiaria decumbens</i> and <i>Brachiaria ruziensis</i>		Semester study	
E. Frossard	A. Jordan	Effects of the use of low soluble CaHPO_4 as phosphorus fertiliser on the growth of <i>Brachiaria decumbens</i> and <i>Brachiaria ruziensis</i>		Semester study	
P. Zhang / W. Gruissem	Dario Copetti	Cassava biotechnology practice	Cassava, plant transformation, gene cloning	Semester study	Italy
R. Sangakkara / P. Stamp	Helen Rast	Early root establishment of maize (<i>Zea mays</i>), crotalaria (<i>Crotalaria juncea</i>) and tithonia (<i>Tithonia diversifolia</i>) as affected by soil type (low and high fertility) and P fertiliser	Rooting systems of cover crops	Diploma thesis	Sri Lanka
R. Sangakkara / P. Stamp	Salome Schneider	Impact of organic matter on early growth of rice	Green manure in rice production	Semester study	Sri Lanka
Le Huy Ham / P. Stamp	Adrian Alder	Expression of gene encoding surface protein of bird flu virus H5N1 in Lemna species in order to produce edible vaccine against bird flu	Lemna transformation	Semester study	Vietnam
P. Stamp	Theres Székely	Versuchskonzept zum Vergleich biologischer und konventioneller Anbausysteme in Kenia	Biologischer Landbau	Diploma thesis	Kenya

Supervisor	Candidate	Title of thesis	Key words	Study type	Country
Environmental Sciences (D-UWIS)					
C. Binder	Marianne Leuenberger	Environmental and health risk assessment of cultivation strategies in Tunja, Colombia	Pesticides, dynamic modelling, risk assessment	Diploma thesis	Colombia
T. Köllner / C. Binder	Laura Würtenberger	Import and export of agricultural land use. Quantification and sustainability assessment	Sustainability, food imports, land use impacts	Diploma thesis	Switzerland
L. Pedroni	Pablo Imbach	GIS for environmental services	GIS, biodiversity, CO ₂ , scenic beauty, water	Diploma thesis	Costa Rica
T. Köllner / J. Sell / G. Navarro, CATIE, Costa Rica	Sandro Glanzmann / Madeleine Guyer	Quantification of companies' demand for ecosystem services from tropical forestry	Ecosystem services, contingent valuation method	Diploma thesis	Costa Rica / Switzerland
J. Sell / T. Köllner	Thomas Ziltener	Modelling the carbon sink potential of selected tropical forestry projects	Carbon sequestration, tropical forestry	Diploma thesis	Costa Rica / Switzerland
T. Köllner / O. Weber	Manuela Gähwiler	Marketing for ecosystem services from tropical forestry	Marketing, ecosystem services	Diploma thesis	Latin America
J. Sell / T. Köllner / T. Ziltener	Oliver Gardi	Modellierung der Wirtschaftlichkeit von Teak Plantagen in Costa Rica – Holzproduktion versus CO ₂ -Senkenleistung	Teak plantations, carbon sequestration, economic performance	Semester study	Switzerland
J. Sell / T. Köllner	Christian Dannecker	Risk assessment for tropical forestry projects that provide biodiversity	Tropical forestry, risk assessment	Semester study	Switzerland
K. Seeland	Dhan Bahadur Gurung	Ecotourism in protected areas in Bhutan	Ecotourism, national park policy, tourism policy, rural development	Doctoral dissertation	Bhutan
G. Rajoelison / J.-P. Sorg	Eliane L. Raminoarisoa	Analyse de l'interface homme-forêt. Elaboration de modèles de gestion participative de forêts secondaires très dégradées dans le nord-ouest de Madagascar	Secondary forests, forest management, non-timber forest products	Doctoral dissertation	Madagascar
P. Van Damme / J.-P. Sorg	Amadou M. Kouyaté	Une monographie de Detarium microcarpum	Sudan-Sahelian zone, native species	Doctoral dissertation	Mali
J.-P. Sorg / D. Raveloson	G. L. Rajoelison	Les forêts littorales de la région orientale de Madagascar: vestiges à conserver et à valoriser	Rainforests, human-forest interface, Madagascar	Habilitation	Madagascar
J.-P. Sorg / B.I. Venglovsky	Davlet K. Mamadjanov	Investigation and selection of promising varieties and forms of European walnut for the purpose of plantation in the walnut fruit forest area of Southern Kyrgyzstan	Silviculture, selection, provenances, afforestation, walnut fruit forests	Doctoral dissertation	Kyrgyzstan
B. Lehmann / J.-P. Sorg / R. Steppacher	Isabelle Gambetta	L'importance des produits forestiers non ligneux pour les communautés villageoises des environs de la cordillère Huacamayos, province de Tena, Amazonie équatorienne	Non-timber forest products, forest management, man-forest interface	Doctoral dissertation	Ecuador

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- ### Posters
- #### ZIL funded projects
- Bartl, K., Medina, M., Puell, A., Gamarra, J., Gómez, C. A., Wettstein, H.-R., Kreuzer, M., Hess, H. D., 2005: Forage alternatives for dry-season feeding of dairy cattle in tropical smallholder farms in the Peruvian Andes. The Global Food and Product Chain: Dynamics, Innovations, Conflicts, Strategies, Deutscher Tropentag 2005, University of Hohenheim, Stuttgart, Germany, October 11–13.
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Oral presentations

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Dorn, S., 2005: Gesunde Ernährung für Menschen in Industrie- und Entwicklungsländern. Aktion “150 Jahre ETH: ETH unterwegs”, Urdorf, Switzerland, April 12.

Dorn, S., 2005: Perspektiven der Agrarforschung. Arbeitsgruppe Agrarforschung des Deutschen Wissenschaftsrats, Köln, Germany, May 23.

Dorn, S., Schmale, I., 2005: Biological control of storage pests with parasitoids: Quick kill or long duration of effect? 10th European Meeting of the IOBC/WPRS (International Organisation for Biological and Integrated Control of Noxious Animals and Plants/West Palaearctic Regional Section) Working Group “Insect Pathogens and Insect Parasitic Nematodes” in cooperation with the COST Actions 842 “Entomophthorales” and 850 “Biocontrol Symbiosis”, Locorotondo, Italy, June 10–15.

Gómez, C., Gamarra, J., Bartl, K., 2005: Presentation of the project. Chalhuas, Peru, January 17.

Grüsssem, W., 2005: Plant biotechnology: Beyond Bt-corn and round-upready soya. Symposium, University of Tel Aviv, Israel, October 27.

Grüsssem, W., 2005: Pflanzenbiotechnologie – Herausforderungen und Chancen. Generalversammlung SGCI Chemie Pharma Schweiz, Lucerne, Switzerland, June 24.

Grüsssem, W., 2005: Pflanzenbiotechnologie – Von der Konzeptentwicklung zur klinischen Relevanz. Verein Forschung für Leben, Landesmuseum Zurich, Switzerland, May 9.

Grüsssem, W., 2005: Genterapie in Cassava: Vom Konzept zur strategischen “Therapie” und klinischer Relevanz. 111. Kongress der Deutschen Gesellschaft für Innere Medizin, Wiesbaden, Germany, April 4.

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- Molina, J. A., 2005: Mejoramiento de sistemas de alimentación de ganado vacuno durante la estación seca en fincas de pequeños ganaderos. 2004–2007 – Los avances en la región de Las Segovias: 2004–2005, Feedback Workshop, Esteli, Nicaragua.
- Muñoz, E., Bartl, K., 2005: Workshop on description of the local milk production system. Aramachay, Peru, February 23.
- Puell, A., Bartl, K., 2005: Presentation of project results. Chalhuan, Peru, August 22.
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- Rott, A. S., Zurbuchen, A., Velten, G., Dorn, S., 2005: How do plant and host traits influence the reproductive success of a bruchid parasitoid, *Dinarmus basalis*? International Symposium on Biological Control of Arthropods, Davos, Switzerland, September 12–16.
- Salazar, I., Spuhler, M., Muñoz, E., Bartl, K., 2005: Workshop on the description of the local milk production system. Chalhuan, Peru, February 21.
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- Schmidt, A., 2005: Mejoramiento de sistemas de alimentación de ganado vacuno durante la estación seca en fincas de pequeños ganaderos – Los Avances del proyecto en Nicaragua. Annual Planning Workshop, Managua, Nicaragua, April 13.
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- Stupak, M., Gruissem, W., Sautter, C., Zhang, P., 2005: Improving the protein content in staple crops via biofortification. The Global Food and Product Chain: Dynamics, Innovations, Conflicts, Strategies, Deutscher Tropentag, University of Hohenheim, Stuttgart, Germany, October 11–13.
- Turin, C., Bartl, K., Barros, E., Caldas, J., Eusebio, P., Tenorio, A., Watson, A., 2005: Workshop on the installation of pastures. Chalhuan, Peru, November 11.
- Vanderschuren, H., 2005: Cassava mosaic disease resistance in transgenic cassava. Selected Aspects of Sustainable Development, Colloquium of the Network for International Development and Cooperation (NIDECO), ETH Zurich, Switzerland, May 12 and June 9.
- Zhang, P., 2005: Cassava biotechnology: From proof-of-concept to application. Institute of Plant Physiology and Ecology, Shanghai Institute for Biological Sciences, CAS, Shanghai, China, June 23.
- Zhang, P., 2005: Cassava utilisation and biotechnology. Shanghai Sci-Tech Forum, Xinghu Library, Shanghai, China, May 27–28.
- Zhang, P., 2005: Cassava biotechnology: From gene discovery to function. National Congress on Plant Molecular Biology and Biotechnology and IAPTC&B, Shandong Agricultural University, Taiwan, China, May 22–24.
- Zhang, P., 2005: Development and application of transgenic technologies in cassava. Guangxi Key Laboratory for Subtropical Bioresource Conservation and Utilization, Guangxi University, Nanning, China, January 6.
- Zhang, P., 2005: Progress of cassava biotechnology. Institute of Tropical Biosciences and Biotechnology (ITBB), State Key Laboratory of Tropical Crop Biotechnology, Chinese Academy of Tropical Agricultural Sciences (CATAS), Haikou, China, January 4.
- Zhang, P., Stupak, M., Gruissem, W., 2005: Genetic improvement of cassava for prolonged leaf life and improved protein content. 2nd International Symposium on Sweetpotato and Cassava, Kuala Lumpur, Malaysia, June 14–17.
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- Chacón, G., Gessler, C., Forbes, G. A., 2005: Especificidad de hospedero en el mejoramiento para resistencia al tizón tardío en papa. Encuentro Ecuatoriano de la Papa, Universidad Central del Ecuador, Quito, Ecuador, April 14–15.
- Schmidt, K., 2005: NTFPs and poverty alleviation in Kyrgyzstan: Potential and critical issues. Between market forces and poverty alleviation: The contribution of non-timber forest products. Workshop of the Trees and Forests in Development Cooperation Group, Swiss Agency for Development and Cooperation (SDC) and the Swiss State Secretariat for Economic Affairs (seco), Berne, Switzerland, January 31.
- Schmidt, K., 2005: Challenges for the sustainable management of forests in a country in transition, the example of the walnut-fruit forests in Kyrgyzstan. Department of Environmental Sciences, ETH Zurich, Switzerland, January 11.
- Sell, J., 2005: Decision criteria and preferences of market actors for ecosystem services from tropical forestry. 6th International Conference of the European Society for Ecological Economics, Lisbon, Portugal, June 14–17.

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- Bloem, S., Dorn, S., 2005: Potential mobility difference between codling moths mass-reared using standard and diapause production protocols. FAO/IAEA International Conference on Area-Wide Control of Insect Pests, Vienna, Austria, May 9–13.
- Bloem, S., Carpenter, J., Dorn, S., 2005: Mobility of mass-reared diapaused and non-diapaused *Cydia pomonella*: Effect of mating status and treatment with gamma radiation. 3rd FAO/IAEA Research coordination meeting on "Improvement of Codling moth SIT to facilitate expansion of field application", Mendoza, Argentina, September 16–20.
- Buchmann, N., 2005: Wie global denkt die Schweizerische Forschung? KFPE Jahrestagung 2005, Berne, Switzerland, September 22.

- Brunnschweiler, J., 2005: Evaluation of structure-texture relationship of processed yam (*Dioscorea* spp.). Seminar CIRAD Montpellier, France, June 6.
- Dorn, S., Gu, H., 2005: Codling moth dispersal, demographic parameters and mating preference: Optimisation for SIT. 3rd FAO/IAEA research coordination meeting on "Improvement of codling moth SIT to facilitate expansion of field application", Mendoza, Argentina, September 16–20.
- Frossard, E., Sinaj, S., 2005: Press conference on soil degradation issues. Tirana, Albania, March 18.
- Frossard, E., 2005: Nachhaltige Entwicklung in Afrika; globale Agenda und lokales Wissen. Die Degradation landwirtschaftlich genutzter Böden in Afrika und die Wiederherstellung von deren Fruchtbarkeit. Interdisciplinary lecture series, University of Zurich and ETH Zurich, December 15.
- Goe, M.R., 2005: Role of livestock in mitigating the effects of HIV/AIDS. Symposium on the occasion of World Food Day "Poor health, food security and poverty – How to break the vicious circle?", Berne, Switzerland, October 13.
- Hilfiker, K., Lüthi, R., Zingerli, C., Sorg, J.-P., 2005: NTFPs to mitigate poverty in the northern uplands of Vietnam? The XXII IUFRO World Congress, International Union of Forest Research Organizations (IUFRO), Brisbane, Australia, August 8–13.
- Hurrell, R. F., 2005: Measuring iron bioavailability in biofortified crops using stable isotopes. Coordination Meeting, International Atomic Energy Agency (IAEA), Bali, Indonesia, February 21–25.
- Hurrell, R. F., 2005: Issues and challenges in iron fortification. Partnering and Programme Developing Workshop, Global Alliance for Improved Nutrition (GAIN), Geneva, Switzerland, May 27–31.
- Hurrell, R. F., 2005: Factors influencing iron bioavailability in biofortified crops. HarvestPlus Coordination Workshop Group Meeting, International Maize and Wheat Improvement Center (CIMMYT), Mexico, May 24–27.
- Hurrell, R. F., 2005: This house believes that iron fortification is murder with a rusty knife. 12th International Symposium on Trace Elements in Man and Animals (TEMA), University of Ulster, Coleraine, Ireland, June 19–23.
- Hurrell, R. F., 2005: Interaction between vitamins and trace elements. 10. Symposium "Vitamine und Zusatzstoffe", Institut für Ernährungswissenschaften, Friedrich-Schiller-Universität Jena, Jena, Germany, September 28–29.
- Hurrell, R. F., 2005: Recent developments in iron fortification of foods. First Annual Forum of the Business Alliance for Food Fortification (BAFF), Global Alliance for Improved Nutrition (GAIN) and World Bank Institute, Beijing, China, October 22–23.
- Hurrell, R. F., 2005: Implementation of food fortification programmes at national level: The GAIN experience. Nutrition Safari for Innovative Solutions 2005, International Union of Nutritional Sciences (IUNS), Durban, South Africa, September 19–23.
- Jansa, J., Natarajan, M., Thonar, C., Frossard, E., 2005: Multispecies AMF communities – What do they all do in there? Management Committee and Final Meeting on "Achievements and Future Landscape for Arbuscular Mycorrhiza Research", COST 8.38. Meeting, European Cooperation in the Field of Scientific and Technical Research, Dijon, France, June 2–4.
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- Kreuzer, M., 2005: Mitigation of the greenhouse gas methane: How can tropical livestock nutrition contribute? Universidad La Molina, Lima, Peru, September 2.
- Kreuzer, M., 2005: Potential of plants of tropical origin in methane mitigation. Workshop on Methane Research at the Institute of Animal Science of ETH Zurich. BASF, Mannheim, Germany, October 12.
- Kreuzer, M., 2005: System-wide methane emission research: The role of livestock nutrition. Planning Meeting of the Food and Agriculture of the United States (FAO) and International Atomic Energy Agency (IAEA): Coordinated Research Project on Development and Use of Rumen Molecular Techniques for Predicting and Enhancing Livestock Productivity, ETH Zurich, Switzerland, September 12–16.
- Mayer, A. C., Marquardt, S., Beck, S., Alzérreca, H., Kreuzer, M., 2005: A manual for the sustainable use of silvopastoral systems in the Bolivian "Subandino". Conference on the Stability of Tropical Rainforest Margins: Linking Ecological, Economic and Social Constraints of Land Use and Conservation, University of Göttingen, Germany, September 19–23.
- Natarajan, M., Ruh, R., Jama, B., Vulliod, P., Frossard, E., Jansa, J., 2005: Arbuscular mycorrhizal fungi functionally adapt to phosphorus fertilisation of soil. Management Committee and Final Meeting on "Achievements and Future Landscape for Arbuscular Mycorrhiza Research", COST 8.38. Meeting, European Cooperation in the Field of Scientific and Technical Research, Dijon, France, June 2–4.
- Scherer-Lorenzen, M., 2005: Forest biodiversity and C sequestration. DIVERSITAS Open Science Conference – Integrating Biodiversity Science for Human Well-being, Oaxaca, Mexico, November 9–12.
- Sherif, L., Sulce, S., Qilimi, B., Zdruli, P., Sinaj, S., 2005: Land resources of Albania: Current problems and future trends. International Conference on Element Balances as a Tool for Sustainable Land Use and Management, Tirana, Albania, March 13–18.
- Soliva, C. R., 2005: Nutritive inhibition of ruminal methanogenesis and implications for methane formation in manure. International Conference on Integrated Livestock-Crop Systems to Meet the Challenges of Globalisation, The British Society of Animal Science (BSAS) and the Animal Husbandry Association of Thailand (AHAT), Khon Kaen University, Thailand, November 14–18.
- Sorg, J.-P., 2005: Allocation de remerciement pour l'octroi du titre de Docteur h.c.. University of Forestry, Sophia, Bulgaria, April 4.
- Sorg, J.-P., 2005: Transdisciplinarity – A new approach. University of Forestry, Sophia, Bulgaria, April 4.
- Sorg, J.-P., 2005: Linking research with policy and practice. Presentation of case studies on "Lothar follow-up, Switzerland" and "The NGO Pro Natura, Switzerland". Workshop with NGO's and Regional Forestry Boards from Eastern Bulgaria, Nessebar, Bulgaria, September 14–16.
- Walczyk, T., Hurrell, R. F., 2005: Sampling issues for losses and bioavailability. HarvestPlus Coordination Working Group Meeting, International Maize and Wheat Improvement Center (CIMMYT), Mexico, May 24–27.
- Zelege, A. B., 2005: Investigation on the anti-methanogenic potential of foliage from African multipurpose trees. Selected Aspects of Sustainable Development, Colloquium of the Network for International Development and Cooperation (NIDECO), ETH Zurich, Switzerland, June 9.
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Zimmermann, M. B., 2005: Triple fortification of salt with microcapsules of iodine, iron and vitamin A. Congress, Gesellschaft für Chemische Technik und Biotechnologies e.V. (DECHEMA), Wiesbaden, Germany, September 6–7.

Zimmermann, M. B., 2005: The effects of vitamin A deficiency and vitamin A supplementation on thyroid function in goitrous children. Nutrition Symposium, Medical Research Council, Cape Town, South Africa, November 11.

Zimmermann, M. B., 2005: Iodine supplementation in infancy and pregnancy. Technical Consultation, UNICEF, New York, USA, November 17–18.

PhD dissertations

RFPF projects

Diby, N.L., 2005: Etude de l'élaboration du rendement chez deux espèces d'igname (*Dioscorea* spp.) Thèse Unique de Doctorat, Université de Cocody, Abidjan, Côte d'Ivoire. Supervised by E. Frossard.

Other international projects (non ZIL funded)

Natarajan, M., 2005: Communities and functions of arbuscular mycorrhizal fungi are affected by phosphorus fertilisation and crop rotation, Diss. ETH Nr. 16305. Supervised by E. Frossard.

Master and diploma theses

RFPF projects

Glanzmann, S., 2005: Quantification of companies' demand for ecosystem services from tropical forestry. ETH-NSSI, No. 23/05. Supervised by T. Köllner.

Salvador-Pinos, C. A., 2005: Variabilidad morfológica y molecular en nueve especies de *Solanum*. Escuela de Biología, Universidad Central del Ecuador, Quito, Ecuador. Supervised by G. Chacón.

Ziltener, T., 2005: Modelling the carbon sink potential of selected tropical forestry projects. ETH-NSSI, No. 4/05. Supervised by T. Köllner.

Other international projects (non ZIL funded)

Clément, C., 2005: *In vitro* Untersuchung der antiprotozoären und antimethanogenen Wirkung afrikanischer Futterbäume im Pansen sowie deren Auswirkungen auf den ruminalen Stickstoffumsatz. Supervised by C.R. Soliva.

Zurbuchen, A., 2005: Host location behavior of *Dinarmis basalis*. Supervised by S. Dorn and A. Rott.

Semester theses

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Bouillot, H., 2005: Effects of the use of KH_2PO_4 as phosphorus fertiliser on the growth of *Brachiaria decumbens* and *Brachiria ruziziensis*. Supervised by E. Frossard.

Jordan, A., 2005: Effects of the use of low soluble CaHPO_4 as phosphorus fertilizer on the growth of *Brachiaria decumbens* and *Brachiraria ruziziensis*. Supervised by E. Frossard.

Schweizer, N., 2005: Investigation of the growth responses of *Brachiaria* grasses to low-phosphorus conditions. Supervised by E. Frossard.

Spuhler, M., 2005: Determination of prices and feeding value of locally available feeds and supplements for dairy cattle in the central highlands of Peru. Supervised by K. Bartl, H.R. Wettstein, H.D. Hess, C. Gómez.

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Balance, December 31, 2005		CHF
Activa		
Cash		300.00
ETH account		409 240.02
Credit, third parties		465 000.00
Total activa		874 540.02
Passiva		
ZIL capital		710 093.15
Liabilities, third parties		100 760.50
Surplus		63 686.37
Total passiva		874 540.02

Balance, December 31, 2005		
	Expenses	Income
Expenditures		
Livestock systems projects, Phase IV	590 315.00	
Other projects, Phase IV	62 280.00	
Project administration (4%)	27 636.60	
External Evaluation	31 947.40	
Conferences and studies	18 661.62	
Exposition "Worlds of Knowledge"	0.00	
Programme and partnership development	39 653.50	
Personnel	204 707.15	
Travel expenses	4 363.99	
Material	9 461.85	
Outsourcing	6 712.20	
Public relations	32 935.82	
Total expenditures	1 028 675.13	
Income		
SDC contribution		900 000.00
Membership fees		56 000.00
Administrative overhead RFPP, project overhead		24 361.50
Administrative overhead RFPP, new contract		62 000.00
Administrative overhead RFPP, fixed contribution		50 000.00
Total income		1 092 361.50
Surplus		63 686.37

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Publisher

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Schweizerisches Zentrum für Internationale Landwirtschaft
Swiss Centre for International Agriculture
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Barbara Becker, Executive Manager ZIL

Design and Layout

Art Direction Stacy Müller, Zurich

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Printing

Druckerei Feldegg AG, Zollikerberg.
Printed with a 74KARAT water-free offset machine,
which substantially reduces the emission of
volatile organic compounds, and on chlorine-free paper
produced from selected waste woods without the
use of acids and whitening agents.

List of acronyms

All units of the ETH Zurich are in italics.

ANU	Australian National University
ARD	Agricultural Research for Development
BLW	Swiss Federal Office for Agriculture
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CDE	Centre for Development and Environment, University of Berne
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
Corpoica	Corporación Colombiana de Investigación Agropecuaria
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSRS	Centre Suisse de Recherche Scientifique, Côte d'Ivoire
D-AGRL	Department of Agricultural and Food Sciences
D-BIOL	Department of Biology
DNA	Deoxyribonucleic acid
DSS	Decision support system
D-UWIS	Department of Environmental Sciences
EFARD	European Forum on Agricultural Research for Development
ELISA	Enzyme linked immunosorbent assay
EMPA	Eidgenössische Materialprüfungs- und Forschungs-Anstalt
EPFL	Federal Institute of Technology Lausanne
EPO	European Patent Office
ERA-ARD	European Research Area on Agricultural Research for Development
ERA-NET	European Research Area Networks
ESSA	Ecole supérieure des sciences agronomiques, Université d'Antananarivo
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations
FIBL	Forschungsinstitut für biologischen Landbau
FIWI	Centre for Fish and Wildlife Health, University of Berne
GFAR	Global Forum on Agricultural Research
GIS	Geographical Information System
IAEA	International Atomic Energy Agency
IAW	Institute of Agricultural Economics
IC	Intercooperation
ICARDA	International Center for Agricultural Research in the Dry Areas
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	World Agroforestry Centre (ICRAF)
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
ILTAB	International Laboratory for Tropical Agricultural Biotechnology
ILW	Institute of Food Science and Nutrition
INW	Institute of Animal Sciences
IPM	Integrated Pest Management
IRDD	International and Rural Development Department
IPW	Institute of Plant Sciences
IUED	Institut universitaire d'études du développement
IWMI	International Water Management Institute
KEMRI	Kenya Medical Research Institute
KFPE	Commission for Research Partnerships with Developing Countries
KIRFOR	Kyrgyz-Swiss Forestry Support Programme
LBL	Landwirtschaftliche Beratungszentrale Lindau
m asl	metres above sea level
MDGs	Millennium Development Goals
MAGEL	Postgraduate Studies on Developing Countries
NATURA	Network of European Agricultural (Tropically and Subtropically Oriented) Universities and Scientific Complexes related with Agricultural Development
NCSU	North Carolina State University
NGO	Non-governmental organisation
NIDECO	Network for International Development and Cooperation
NLU	Institut für Natur- Landschafts- und Umweltschutz
NoI	Note of Intention
OECD	Organisation for Economic Co-operation and Development
P	Phosphorus
R&D	Research and Development
RFPP	Research Fellow Partnership Programme
RNA	Ribonucleic acid
SDC	Swiss Agency for Development and Cooperation
S-ENETH	School Domain of Earth, Environment and Natural Resources
SFIAR	Swiss Forum for International Agricultural Research
SHL	Swiss College of Agriculture
SNF	Swiss National Science Foundation
STI	Swiss Tropical Institute
VSF	Vétérinaires sans frontières
WHO	World Health Organisation



**Swiss Centre for International Agriculture
Schweizerisches Zentrum für Internationale Landwirtschaft
Centre Suisse pour l'Agriculture Internationale**

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