

UW COLLEGE OF AGRICULTURE AND NATURAL RESOURCES
GLOBAL PERSPECTIVES GRANT PROGRAM
Travel Report Due one month after the return (September 21st,2010)

GLOBAL PERSPECTIVES GRANT REPORT

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Project Title: Strengthening UW Sustainable Agriculture Research Program through International Collaboration with Scientists in Switzerland

Duration of Project: two one-week visits

Funds were requested to cover travel expenses of Urszula Norton (UW Plant Sciences Department) to visit Research Institute of Organic Agriculture (FiBL, <http://www.fibl.org/en/homepage.html>) in Frick, Switzerland and to host her collaborator, Paul Mäder, Ph.D. (FiBL) at the University of Wyoming. The first part of the grant (Urszula Norton's travel to Switzerland) was completed by August 21st 2010. The second part of the grant is still in preparatory phase of arranging the visit of Paul Mader at the University of Wyoming and hence, the funds are not yet disbursed.

RESEARCH

The visit to FiBL included a series of meetings with scientists and touring research sites and visiting with farmers involved in collaborative research projects. There are over 120 physical and social scientists at FiBL whose main mission is to conduct research on issues related to organic farming and sustainable agriculture. Specifically, I visited with Paul Mader, Head of the Soil Science Division. His group is actively involved in a variety of projects concentrated around four leading themes:

1. **Efficiency of agricultural systems.** Research within this topic concentrates on systems comparison. The main objectives of this module is to determine nutrient and energy efficiency (Life Cycle Analysis, LCA) of farming systems; to assess soil fertility of organic and conventional farming systems; to quantify the effects of farming systems on carbon sequestration; and, to assess the biodiversity in farming systems.

There are many experiments involved in this research task and all are a part of the network of European long-term research projects on organic farming. Specifically, the DOK experiment on FiBL station has been in place since 1978 and has so far generated data on many cropping systems during the entire length of the rotation cycle (5-11 years). The main

objective of this research is to assess the potential of organic farming to mitigate and adapt to climate change. Specific goals include assessment of soil microbial diversity and carbon fluxes, evaluation of nutrient efficient crops, the effect of GMO on soil fertility, soil, plant health, and weed diversity. Other experiments associated with this task involve tropical agriculture system assessment in Africa and India.

2. **Strategies for yield improvement.** Research within this topic concentrates on system optimization. The main objectives of this module is improve the effectiveness of reduced tillage systems under organic farming conditions; evaluate practices of biodynamic farming; improve the soil fertility with green manure; and, testing the efficiency of microbial inoculants for yield improvement.

There are numerous field trials established both on-station, private land and land trust near Basel. One set of trials I visited and discussed was under investigation of comparing biodynamic preparations, fertilization and soil tillage on soil fertility and yield in corn/winter wheat and green manure/sunflower/spelt/clover grass/clover grass rotation. The main treatments were reduced tillage and conventional plowing. Reduced tillage comprises of light cultivation of the field twice during the growing season to a depth of 50 cm. Plots established within main treatments comprised of two manure fertilizers applications: compost and slurry or slurry alone at the equivalent of 20 kg N ha⁻¹. The subplots laid over the plots were with or without biodynamic preparations. It is hypothesized that the biodynamic preparations will enhance plant resistance to pests and disease and will increase the ability to intercept more efficiently low angle sunlight during spring and fall seasons.

Other experiments involve the effects of mycorrhiza and plant growth promoting rhizobacteria on yield and quality of wheat, rice and black gram (India); management of mycorrhiza by green manure plants as hosts; and increasing net returns of organically produced cash crops by increasing the efficiency of soil nutrient management.

3. **Terrestrial risk indicators.** Research within this topic concentrates on developing soil quality indicators sensitive to contamination; assessment of the effects of biocontrol organisms (*Pseudomonas*) on soil fertility, determine potential effects of GMOs on soil fertility and development of the methods for safe food production on contaminated soils.
4. **Seeds and environment.** Research within this topic concentrates on assessment of interaction between Genotype x Environment; and evaluation of suitable maize and wheat cultivars for low-input reduced and organic farming systems. Specific projects include the assessment of nutrient use efficiency of wheat inoculated with mycorrhizal fungi under organic and conventional farming; evaluation of the genotype x environment interaction of wheat cultivars under reduced and conventional tillage; improvement of agronomic and technological quality of wheat in Europe, and development of organoleptic testing methods for wheat grown in organic and conventional farming systems.

POTENTIAL COLLABORATION

Project I discussed in depth with Paul Mader and other researchers in Soil Science group (Andreas Gattinger and Monika, Messmer) titled “ Sustainable Organic Agriculture and Climate Change – Methodology Development to quantify Carbon Sequestration and Greenhouse Gas Mitigation by converting to organic agriculture (CaLas project)” is a part of international collaboration of researchers from Europe, India and Africa. CaLas stands for Carbon credits for Sustainable Land

use Systems and aims at quantifying the potential of C sequestration in agricultural soils and mitigation of GHG emissions through organic farming practices in order to enable the participation in the trade in carbon credits from sustainable land use systems. Paul Mader and his group was very interested in exchanging research expertise and methodologies between their group and scientists at University of Wyoming who just received 3-year grant to study Soil Carbon and Nitrogen Dynamics in Organic Crop and Forage Production of the Northern High Plains Ecoregion, Wyoming and Nebraska (Norton U, Norton J, Ritten J, Garcia y Garcia A., Del Grosso, S, and Hergert, G). We discussed a possibility of research tools exchange and creating data inventory for agroecosystem comparative assessment.

One of the methods the FiBL scientists were particularly interested in is field measurements of greenhouse gas emissions (GHG). During one of the visits to their research plots I was able to give a workshop on the methodology used in my lab, took field measurements on plots planted with sunflowers grown with conventional and reduced tillage practices and collected GHG samples using the equipment I brought with me. I am still processing the data and will be able to provide the results shortly. The results can provide interesting insights to help assess the impact of different management practices from the long-term trials on C and N flux and atmospheric trace gas concentrations.

In order to familiarize FiBL scientists with research my colleagues and me are doing at the University of Wyoming I gave a public seminar titled “Sustainable Agriculture Research at the University of Wyoming USA”. This lecture generated great discussions on possibilities for future collaboration and research exchange. We all identified few important areas of research and education foci that will deal with agroecosystem assessment from biogeochemical perspective (GHG emissions, soil C sequestration) and Life Cycle Assessment (LSA).

We also discussed a possibility of undergraduate student paid internships offered annually at FiBL that students from the University of Wyoming can apply for and learn various aspects of field and laboratory activities related to the research projects conducted on station. FiBL has a large group of international researchers on staff and continues to encourage international students to get involved in short-term (three months and more) internships offered through their research institute. They have housing (on-station dormitory or locally available room and board rentals) and dining facilities available to students doing their internship and provide transportation to local well-structured public bus and train transit. Information on internship availability will be posted on the FiBL webpage in January 2011 (<http://www.fibl.org/en/switzerland.html>) and the announcements will be emailed to me. One of the important outcomes of such internship exchange will be to increase the capacity of UW employees and students to appreciate cultural differences of the perception and the importance of research and research application to practice on sustainable agriculture and organic farming that are highly prioritized in the European Union.

We also extensively discussed the plans of Paul Mader’s visit to the University of Wyoming who, due to his prior commitments, is unable to come to Wyoming in the Fall of 2010 but is very interested in visiting the campus, give public lectures, meeting with UW scientists and touring our research sites in Spring of 2011. I am planning to host Dr. Mader’s seminar during Plant Sciences seminar series during the spring semester. We also discussed his involvement in AECL 4990 Capstone senior seminar on Issues in Sustainable Agriculture where we will have a panel discussion with Dr. Mader as our guest speaker. I will discuss the possibility of accommodating Dr. Mader’s visit with Dr. Hess in detail as the plan develops.

Attachments:

<http://www.fibl.org/en/homepage.html>

Research Institute of Organic Agriculture (FiBL)

The Swiss Research Institute of Organic Agriculture was constituted as a private foundation by organic farmers, scientists and politicians in 1973. It has established practice-oriented agronomic, ecological, veterinary medicine and economic research, and is making new findings available to the organic farmers in Switzerland and abroad. On-farm research is carried out within a network of about 200 pilot farms. Today, the institute has more than one hundred scientific and technical employees and has world-wide recognition as a competence centre for organic research, advice, development cooperation and documentation. In 2001 FiBL Berlin was founded. FiBL participates in several EU funded projects.



Research Institute of Organic Agriculture (FiBL, Switzerland)

Development and Cooperation

The mission of the Research Institute of Organic Agriculture, founded in 1973, is to contribute to the development and improvement of organic and sustainable agricultural practice worldwide. We do this through:

- Practice-oriented research and development to improve the understanding of organic farming systems and of farming's environmental, economic and social impacts.
- High quality extension services to make the latest organic farming methods easily accessible to farming communities, national and private extension services and other education centres throughout the world.

Our Development and Cooperation Team includes experts for Eastern Europe, the Mediterranean region, Africa, Asia and Latin America. We support you in making organic agriculture a viable alternative. Our goal is that you benefit from the advantages of organic agriculture:

- Risk limitation through diversification and low-input production
- Higher productivity through more efficient use of local inputs and lower levels of external inputs
- Additional income through new market opportunities
- Ecological and socio-economic sustainability
- Empowerment through strong organic farmer movements.

Research for farming practice

Since it was founded in 1973, FiBL has worked to establish scientific foundations for organic farming and species-appropriate livestock management.

Fruit, wine, vegetables and potatoes are the main subjects of crop research at FiBL. Trials have been conducted on resisting pests and diseases by promoting beneficial organisms, applying direct control measures, and improving cultivation techniques. Another key emphasis is to keep and to raise soil fertility. One division of the institute is dedicated to the quality of organic products and the processing involved.

Veterinarians are engaged in research into udder health and parasites. They optimize husbandry, feeding and pasture regimes and test homeopathic remedies and plant preparations. The socioeconomics division analyses business problems at organic farms, pricing of organic goods and cost recovery levels, agricultural support measures and marketing issues.

On the working farm in Frick the emphasis is on fruit, viticulture, arable farming, dairy livestock and bees. Furthermore numerous projects and data collection programmes are taking place on more than 200 working farms throughout Switzerland.



List of scientists I met with:



www.fibl.org

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Institut de recherche de l'agriculture biologique
Istituto di ricerche dell'agricoltura biologica
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Dr. Monika Messmer
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