List of Proposed Master's Thesis Topics

Sustainable Production Systems (SPS) in Agricultural Science	
Topics and further information	**Contact and Geography**
Crop production - Switzerland	
Sustainability assessment of Swiss flax production For decades the production of natural fibers was abandoned in Swiss agriculture due to replacement by cheaper cotton and synthetic fibers. However, several farmers in the Emmental region have recovered the cultivation of flax and several initiatives try to establish value chains for natural fibers in Switzerland covering not only agricultural production but also the industrial processing and retail. An important underlying principle of these initiatives is the establishment of an environmentally, economically and socially sustainable and, as far as possible, regional value chain. This master thesis will analyse and evaluate the sustainability of the flax value chain in Switzerland. The focus will be on the agricultural production, for which data are now available on inputs and yields over several years. This allows the quantitative analysis of the environmental impact of flax production by means of a life cycle assessment.	Matthias Meier, Dominik Flüglistaller Emmental
Soil mapping of grassland in mountain areas The productivity of grass production is linked to the water availability in the soil and the precipitations. Very few information is available on soils in Switzerland at a detail scale (>1:5000) in general but particularly in mountain areas. The project is to develop soil mapping methods adapted to the heterogeneity of this kind of soils and to evaluate their production potential in relation to the lithology of a given region. The most important factors are the available water and the organic C content. Correlation between grass yield and soil properties needs to be done. The plots will be chosen in BE, VD or Jura cantons.	Stéphane Burgos Bern, Vaud, Jura
Promoting biodiversity in extensively managed meadows with unmown stripes In extensively managed meadows, farmers can leave unmown strips to promote small animals and insects, which use these areas as refuges. It is recommended to leave 10% of the cut surface as old grass and it is advised to change the location with each cut to avoid bush encroachment. The question is, if changing or leaving the location of uncut stripes influences the plant community of the meadows? The results of this work can be used to give recommendations on the management of uncut grass stripes.	Silvia Zingg Swiss lowlands
Impact of soil compaction on the development of arable crops and cover crops In our fields, compacted wheel tracks are increasingly causing irregular growth of crops. However, the susceptibility seems to vary from species to species, although this observation has never been systematically investigated so far. For this reason, in the framework of a project it should be clarified how individual crops and/or cover crops react to prior compaction, especially of the topsoil.	Bernhard Streit Bern region

Mountain vs. Valley: Growth form of red clover ecotypes from different origins Red clover ecotypes from higher altitudes differ strongly in their growth (length and vertical orientation of tillers) as compared to ecotypes or bred varieties of the same species from the lowlands. The goal of the thesis will be to describe and quantifiy these growth differences based on field/growth chamber experiments in order to elucidate, wether the differences in growth are related to environmental (i.e. higher radiaton at higher altitudes) and/or genetical differences du to adaptation.	Beat Reidy
Verbesserung der N-Effizienz von Milchproduktionsbetrieben durch Optimierung der Hofdüngerwirtschaft Durch die Optimierung der Hofdüngerwirtschaft können die N-Verluste von Landwirtschaftsbetrieben deutlich reduziert werden. Wie gross ist dieses Potenzial und was sind die wichtigsten Faktoren, um die Effizienz zu verbessern? Im Emmental haben im Rahmen von Arbeitskreisen Betriebe während Jahren ihre Hofdüngerwirtschaft bewusst optimiert. Auf 70 dieser Betriebe sollen Daten zu N-Flüssen (inklusive Ammoniakverlusten) gesammelt und einzelbetrieblich analysiert werden. In Diskussionen mit den Landwirten werden diese Analysen mit ihren Strategien verglichen und daraus Erfolgsfaktoren abgeleitet.	Thomas Kupper, Beat Reidy Emmental
Does mulch from different cover crops suppress Fusarium graminearum inoculum in maize stalks? Fusarium Head Blight (FHB) is one of the most important cereal diseases worldwide causing significant reduc-tions in yield and severe contamination of the harvested products with mycotoxins jeopardising food and feed safety. The predominant species of FHB disease complex is Fusarium graminearum (FG). In maize-wheat rotations with reduced- or no-till systems, the remaining maize crop residues on the soil surface serve as overwintering substrate and thus represent an important inoculum source for infection of the subsequent wheat crop. Fast growing cover crops as interval in a maize-wheat rotation might contribute to sustainably control FHB. The main objective of this study is to examine the effects of mulch from different cover crop species on FG in-oculum in maize stalks under controlled conditions. This greenhouse study will be coupled with analogous in vitro experiments on selected FG strains testing the effects of emitted volatiles from the respective cover crop species on mycelium growth and conidia germination.	Andreas Keiser
Nutzhanfanbau in der Schweiz Der Anbau von Nutzhanf hat in den letzten 2-3 Jahren in der Schweiz stark zugenommen. Trotzdem sind noch viele Fragestellungen betreffend Sorten, N-Düngung, Ernte und Erntbarkeit, Wirtschaftlichkeit, Haltbarkeit der Samen (Nüsschen) offen. Mit der Masterthesis sollen ausgewählte offene Fragestellungen in wissenschaftlichen Versuchen und auf Praxisbetrieben abgeklärt werden.	Hans Ramseier
Cost-effectiveness evaluation of IPM strategies against Drosophila suzukii in Switzerland Drosophila suzukii Matsumura (Diptera: Drosophilidae) is an invasive pest of soft-skinned fruits native to Southeast Asia. Unlike most drosophilid flies that feed and oviposit on overripe, damaged or decomposing fruits, D. suzukii can feed and oviposit on sound ripening	Lindsey Norgrove Bern region

fruits. The female D. suzukii possess a saw-like sclerotized ovipositor, enabling oviposition into healthy ripening fruits. In Switzerland, D. suzukii was first recorded in 2011. Since then, it has become a major pest in soft fruits crops causing consequent economic losses for growers. Worldwide, chemical pesticides are the main control methods, but their use has to be limited due to the high risk of residues on fruits, insect resistance development and their negative impacts on beneficials. Alternatives to chemical pesticides remain to be found. Switzerland has a functional approach to control Drosophila suzukii that relies on a combination of biological, cultural and chemical methods. The cost and the effectiveness of the different strategies needs to be evaluated to have a holistic description of the IPM strategies against D. suzukii in Switzerland helping growers to take decisions.	
Irrigation in Switzerland - any clue? Little is known about the extent of irrigation and irrigation practices in Switzerland. A first assessment by the Swiss Federal Office for Agriculture (FOAG) in 2006 has yielded unsatisfactory results, and clearly indicated the need for more systematic and comprehensive data acquisition regarding irrigation. This project aims at developing and testing an approach to assess irrigated areas and crops, irrigation systems, water sources and abstraction methods, and water quantities used for irrigation on a regular and systematic basis.	Christoph Studer

Topics and further information	Contact and Geography
Crop production - International	
Sustainable production and management of Indian Prickly Ash (*Zanthoxylum rhetsa*) for improving local livelihoods and increase biodiversity in Laos PDR A Regional Project on Biotrade (Vietnam, Lao PDR, and Myanmar) is implemented in three countries in Southeast Asia: Myanmar, Vietnam and Laos. Biotrade refers to the collection, production, transformation and market of products derived from native biodiversity under the criteria of environmental, social and economic sustainability. It looks at the interaction between producers/users of natural ingredients which increases the competitiveness of local exporters/producers as well as the livelihood benefits (income and jobs) of the rural population through the ethical Biotrade principles and criteria, by safeguarding the biodiversity. The thesis research in Laos will look at the sustainability of the production and management of the Indian Prickly Ash (*Zanthoxylum rhetsa*). this product has been identified as a potential BioTrade product from the point of view of the commercialisation supporting the local livelihoods. The thesis research will help understand what positive and negative impact this commercialisation under BioTrade principles will have on biodiversity conservation, and to draw conclusions about how to increase the positive impacts. The research will imply looking at the sustainability of current managing and harvesting practices of the wild, semi-domesticated and cultivate indian prickly ash.	Alessandra Giuliani Laos
Promouvoir l'agroécologie au Niger Le Programme SWISSAID Niger s'est engagé à promouvoir l'agroécologie comme approche holistique et durable de développement au Niger, dans un contexte sahélien/soudano-sahélien marqué par les effets du	Nathalie Oberson Niger

changement climatique. Dans ce contexte, l'agro écologie connaît une émergence et un intérêt de la part des producteurs face aux coûts des intrants, aux réalités climatiques et au besoin de conserver les légumes produits. Le BuCo SWISSAID encourage ainsi la transition vers une agriculture écologique dans les zones de concentration du programme Niger et mène des expérimentations-pilotes avec des organisations de producteurs et des groupes de promotion de l'agroécologie, selon une approche qui se démarque du transfert de techniques classiques et met le paysan au coeur de la diffusion et de la promotion des pratiques AE. Les interventions de SWISSAID en matière d'agro écologie sont principalement orientées vers l'appui à la diversification des cultures maraîchères et fruitières, au petit élevage pour la fertilisation organique des cultures, aux aménagements de conservation des eaux et des sols et plus récemment à l'agroforesterie.	
Pepper production in Kampot, Cambodia Kampot is famous for the outstanding quality of its pepper. Some even say that it is the best pepper in the world. Pepper production in Kampot is facing several problems such as poor water management, damages to the crop by termites, poor crop management resulting in low yields. On the other hand, the location is quite favourable,and the local conditions are rather goodunique and thefor the cultivation of pepper quality is good. That is why this small area in the south of Cambodia received a geographical indication. It is possible to produce four kinds of pepper from the same plant with exceptional quality: green, black, red and white. The pepper production in that region must be organic (because it is in a protected area). All pepper producers are members of a cooperative the role of which is to verify that its members comply with the rules relative to managing the protected area. The proposed MSc thesis may focus on the pepper agronomy, and propose improvements to overcome the mentioned problems, based on literature review, interviews with local pepper producers (including a specialized research centre in Cambodia). Looking into the sustainability of production is also part of the research	Dominique Guenat Cambodia
Identifying underlining reasons for an increasing weed pressure in the irrigated rice production systems in the Senegal River Valley The recent analysis of existing agronomic production has highlighted an increasing weed pressure as a major yield-limiting factor to rice production systems in the Senegal River Valley. This is not only reducing yields through resource competition, but also leading to a contamination of the actual harvest and thus a lower quality of the crop. This field assignment is envisaged to investigate the reasons for this increasing weed pressure and will be based on the analysis of locally available information (literature and extension), the assessment of farming practices through field observations, farmer and stakeholder interviews as well as an exchange with agronomy specialists from a number of designated organisations, such as Africa Rice, ISRA and the Syngenta Foundation. Furthermore, it is also the aim of this assignment to propose potential ways forward to improve integrated weed control measures in the region. The assignee would be supported both by the Syngenta Foundation's local and international team of agronomy experts as well as specialists from partner organisations. For the time of the field studies, the	Nancy Bourgeois Senegal

assignee would be based at the Syngenta Foundation offices in the city of Saint Louis in Northern Senegal.	
Application of biochar and activated biochar (Terra Preta) to improve soil fertility and to increase the water storing capacity The Cochabamba region has a semi-arid climate and soil degradation is a major issue. Around 150 smallholders set up an agroforest parcel with the help of several projects in this region. Fruits, vegetables, maize, fodder and many other crops are produced in these parcels. The application of biochar and activated biochar (Terra Preta) could helpt to improve soil fertility and to increase the water holding capacity. Different investigations could be led: a) Determination of the optimal amount of Terra Preta per m2 for the degraded soils in the inter-andean Valleys for the yield of different crops (fruits, arable crops) b) Description of a process to activate biochar suitable for smallholders	Ingrid Fromm Bolivia
Ring-Basin Infiltration Pits – Pilot implementation and feasibility study in eSwatini The goal is to conduct a feasibility study for ring-basin infiltration pits (RIPs) in eSwatini, together with a RIP expert from Ethiopia and the local partner organization ACAT (Africa Cooperative Action Trust) of sahee foundation. The student will first visit implemented RIPs in Ethiopia and collect economic data on RIP profitability. Then the student will travel to the eSwatini, where a pilot RIP shall be implemented. In eSwatini, the student will assess the feasibility of implementing the pilot RIP (location of the RIP, the availability of materials, etc.) and implement the RIP together with the RIP expert from Ethiopia. The student will document the entire process and draw relevant conclusions.	Christoph Studer eSwatini (Swaziland), Ethiopia

Topics and further information	**Contact and Geography**
Animal Science - Switzerland	
Physiologic concentrations of ZnO as prophylactic method to reduce post weaning diarrhea in piglets Antimicrobial resistance is a serious health threat requiring a One Health approach to counter - because humans, food and animals constitute overlapping reservoirs of antimicrobial resistance. In Switzerland, the most frequent indication for weaner treatment was diarrhea, and colistin was the most frequent antimicrobial prescribed. Post weaning diarrhea (PWD) is one of the major health issues in pig husbandry. This diarrhea is responsible for economic losses due to mortality, morbidity, decreased growth rate, and cost of medication. This master internship has three objectives: - To assess if the new ZnO formulation prevents post weaning diarrhea in infected piglets - To evaluate how ZnO formulation reduces the Zn content in feces when compared to ZnO given at 3000mg/kg feed - To test if the new ZnO formulation reduces the prevalence of AMR bacteria	Peter Spring

Conservation of local Swiss breeds: evaluation of the cryoconversation scheme To ensure the conservation of local breeds the set-up of an cryoconservation scheme is important. Semen doses of the local cattle and pig breeds are annually collected and stored. However for local goat, sheep and chicken no or very limited material is stored. The goals of this thesis are a) to evaluate the actual scheme and the stored material, and to present ways to collect and store material for the local small ruminant breeds.	Christine Flury
Überarbeitung des Neunfelderdiagramms in der Milchviehzucht In der Milchproduktion werden bei allen Zuchtverbänden die Ergebnisse der Milchkontrollen im sogenannten Neunfelderdiagramm dargestellt und zur Beurteilung der Fütterung herangezogen. Erfahrungen zeigen, dass die Aussagen gemäss Diagramm nicht immer mit den Beobachtungen am Tier übereinstimmen. Insbesondere ist ein starrer Eiweissgehalt als Grenzwert zur Beurteilung der Energieversorgung problematisch. Es gibt neue Ansätze aus Deutschland, wie der Nutzen für Milchviehhalter durch eine andere Auswertung der Milchinhaltsstoffe erhöht werden könnte. In dieser Arbeit sollen diese Ansätze für Schweizer Rationen untersucht und evaluiert werden.	Stefan Probst
Estrogens in husbandry animals and their potential environmental effects The regular detection of hormonally active substances in surface waters worldwide is alarming. A potentially important source of hormonal substances that has received only little attention so far is agriculture. Particularly important is the input of estrogens from livestock farming. Estrogens are natural steroid hormones that govern sexual reproduction and development in vertebrates. Already trace concentrations of these very potent endocrine disrupting chemicals in the environment can lead to negative and sometimes irreversible effects in exposed organisms. To estimate and to control the resulting exposition, it is important to know the prevalence of estrogens and estrogen-like compounds in the environment. Although it is assumed that estrogens from livestock contribute to the total estrogen load in the environment, the development of estrogen concentrations over an animal's lifetime is not fully understood to date. Furthermore, in depth research is needed to quantitatively determine estrogens in urine, blood plasma and faeces of husbandry animals by means of sensitive and specific LC-MS/MS. The Master's thesis aims at focusing on the analytical chemistry of estrogens, the output of estrogens from the endocrine organs of livestock and/or the environmental fate and behaviour of estrogens.	Thomas Kupper

Topics and further information	**Contact and Geography**
Animal Science - International	
Economic analysis of Silvopastoral systems in the tropics Linking to environmental sustainability. This MSc research takes place in the frame of a Life Cycle Assessment (LCA) of these systems	Nancy Bourgeois Peru
"Clever chicken" project together with Agricultural College of Obala	Pascale Wälti Cameroon

Topics and further information	Contact and Geography
Rural Economics	
Internalizing the costs of sustainable production. Case study of fresh fruits, vegetables, meat or milk Many agri-food supply chains have undergone a strong consolidation process. At some steps of the chain, the market is dominated by few actors (inputs, retail) with huge bargaining power. Governments in many countries have pursued a policy of trade liberalization and the deregulation of agricultural and labor markets. One result has been a weakening of the bargaining power of farmers and workers. Yet we know that sustainable agricultural development requires investment, hence a strong economic position of the farmer. The student will investigate how the "real" cost of sustainable production can be included in product prices, using a fresh product as an example.	Jan Grenz, Daria Reisch Switzerland
Cost-benefit analysis of irrigated horticulture at smallholder level In Guatemala Aqua Alimenta and its partner organisation ASECSA are setting up a technical service for small-scale irrigation, based on appropriate technology that is produced in a local workshop. The systems aim to improve productivity during rainy seasons (where growing irregularity of rains is a major concern), extend the production period and establish irrigated horticulture production, especially during dry season. The thesis shall compare the investment needed to install an irrigation system with the benefits from the increase in productivity, in order to make a statement on the system's return on investment. This can be done on a case study basis on one or several farming sites or in an experimental setting. The case studies should further also describe the changes in production patterns towards more diversified production. These results shall then be used to review the current evaluation indicator set. The student could further support the local team in the implementation of mobile m&e tools and in systematization of the m&e data.	Christoph Studer Guatemala
Participatory Promotion of New Value Chains for the Diversification of Income FAO is developing, together with other actors such as SDC, an innovative approach of participatory watershed planning and management in the Atlas Mountains of Morocco (GIBV-MA). HAFL, together with the Centre for Environment and Development (CDE) of Bern University, is backstopping this project. The Midelt region, targeted by the project, is one of the poorest of the country. It is famous for its apple production, produced under irrigation. On the other hand, the level of degradation of the natural resources (erosion and deforestation) is extreme, leading to recurrent natural disasters such as floods and decreased productivity. One of the project's objectives is to develop promising or new value chains that will contribute to the diversification of income of the local population. Apple is the most important agricultural production, but there is no processing of this commodity and losses are important. Other promising value chains are aromatic and medicinal plants, beekeeping/honey and agrotourism. The Master student will support a process of participatory market chain approach to develop or improve one selected value chain.	Pascale Wälti Morocco

Topics and further information	Contact and Geography
Cross-cutting questions	
Assessment of measures reducing nitrate leaching in the Gäu region using a modelling approach Elevated nitrate concentrations in groundwater occur in agricultural regions throughout Switzerland and can impair drinking water quality. In the region Gäu-Olten since the year 2000, farmers manage their land according to management practices that are supposed to reduce nitrate leaching. In order to verify the effectiveness of these measures, FiBL (Research Institute of Organic Agriculture, Frick) together with several project partners is measuring nitrate leaching under arable and vegetable fields in the project NitroGäu. The aim of this MSc thesis is to upscale the results from single fields to the entire Gäu region and to assess the effectiveness of additional measures in a modelling approach. In a first step, a dynamic complex process-oriented simulation model will be used to predict nitrate leaching to groundwater for the entire Gäu region calibrated with the empiric data from NitroGäu. In a second step, the dynamic nitrate leaching model will be combined with the FiBL farm model, which is a model to assess the environmental impact of farming systems based on a life cycle assessment (LCA). The two models will then be used to assess the environmental impact of different measures within agricultural production to reduce nitrate leaching in the Gäu region with a focus on changes in eutrophication potential.	Matthias Meier Switzerland
Pass or fail vs. Continuous improvement of farms Generally, sustainability certifications assess the degree of sustainability using a checklist. If the farmer meets the required criteria, it gets the certification. With this approach, the farmer behaves passively and is told top down what to do. It is not astonishing that this has a negative effect on the farmer's willingness to deal with sustainability topics. RISE's approach is to ensure a real engagement with sustainability issues and continuous development. The greatest challenge here is to integrate the sustainability issues into the day-to-day management of the farm. In this work, answers to the following questions are to be found: 1) How should such a process ideally be designed and what elements does it contain (process, documents, consulting, etc.) so that a planned and continuous development can take place? 2) what is the experience of farmers participating in such a process and what are the effects at the farms?	Christian Thalmann Switzerland
MSAS: platform for the promotion of technologies for sustainable agriculture Studies as well as practical experience suggest that there is a substantial discrepancy between the existing technologies and knowledge for sustainable agriculture on the one hand, and the realities of farm-level production on the other hand. We hypothesize that the reasons for this "implementation gap" include a lack of knowledge of adapted technologies as well as a lack of finance. An internet-based "Marketplace for sustainable agricultural solutions" (MSAS) might contribute to reducing the implementation gap, by offering brokerage	Jan Grenz, Daria Reisch Switzerland, Ukraine

between farmers and ag advisors, technology and knowledge providers, and investors. The MSc student will create a concept for MSAS, collecting and putting together information on user demands, technical solutions and platforms in other sectors. This is a thesis for creative, IT-affine students	
Technologies mitigating ammonia emissions during storage or field application of slurry and manure Measurement of ammonia emissions will be carried out by means of static chambers and/or wind tunnels. Different mitigation options such as slurry separation, addition of biochar etc. will be examined.	Thomas Kupper Switzerland
Do plant traits indicate grassland eutrophication over a period of 30 years of regular cutting without fertilization? Post-drought nitrogen pulses ("Birch effect") and nitrogen deposition ("eutrophication") may affect grassland species compositions. Shifts in vegetation structure may result in an increased abundance of species with resource-acquisitive traits and in a decreased abundance of species with resource conservative traits, as reflected by specific leaf area, SLA. Specific information on SLA or other plant traits will be collated from a global data base and used together with species abundance data over 30+ years (1988-2017, 2018) to calculate community weighted means (CWM) of plant traits for nine permanent plots of the species-rich hay meadow at Negrentino (site listed as a TWW of Swiss national importance). Local precipitation data will be used to quantify growing season droughts for 1988-2017. Thirty-year trends for CWM SLA and for single dominant species, and species groups (grasses, forbs, legumes) will be analyzed to test the hypothesis that nitrogen deposition and post-drought nitrogen pulses affect grassland productivity and species compositions despite of regular harvesting without use of fertilizer.	Andreas Stampfli Switzerland
Impact de la médaille du Concours des produits du terroir - Impact technico économique des produits médaillés du Concours (étude consommateur) - Impact des médailles et du Concours des produits du terroir sur les producteurs (évaluation économique, qualité, procès de production, etc.) - Le Concours des produits du terroir comme moyen d'intégration des filières ou produit : adhésion des différents acteurs et impact - Accompagnement d'un médaillé pour l'amélioration d'un ou de plusieurs aspects pour une meilleure commercialisation de son produit : DLC, emballage….. - Formulation et caractérisation d'un produit de terroir : ex : Bsissa à base de blé germé	Nancy Bourgeois Lüthi Tunesia
Analysing the influence of agricultural practices in the Gulf of Mottama, Myanmar, on the Ramsar site for the conservation of wetlands and agriculture The research topic will have the following objectives; 1. Analyze the current agricultural practices (rice and green gram) especially with regards to the use of agricultural inputs (fertilizers, pesticides etc). 2. survey a number of farmers (between 50 and 100) assessing their chemical use (all type of pesticides): what type, which quantity for what	Alessandra Giuliani Myanmar

area and crop, effects (positive and negative) observed. There is lack of data on this issue, it is known that hazardous chemicals are used but there is no knowledge of which ones, how much, why and how'' 3. investigate on the cultural a social aspects which determine the farmers' knowledge in term of use of inputs and choice of the products, also on their knowledge about the Ramsar site and its protected areas.	
Impact of the invasive aster, *Ageratina adenophora* (Spreng.) King. & H. Rob. (Compositae) in the Rio Chillar valley in southern Spain The invasive aster, a thermophilic species, was first detected in the Nerja area of southern Spain in the 1990s. The River Chillar rises in the Sierra Nevada and discharges into the Mediterranean near Nerja, Malaga Province. The Nerja area has experienced a greater than 0.5 degrees increase in mean annual temperature since 1970 with most of this attributed to an increase in the minimum night temperatures. Observations of changes in the distribution or growth of plants and establishing this relationship with temperature can be used to estimate how plant distributions might alter with increasing temperatures in other parts of Spain.	Lindsey Norgrove Spain

Last updated: 27.11.2019 (knl1)