EkoForsk

Research projects within organic agriculture and horticulture

The Swedish University of Agricultural Sciences (SLU) coordinates a programme for research projects called 'SLU EkoForsk'. The aim is to improve the knowledge base for the development of crop cultivation, animal husbandry and the production of fruit, berries and vegetables.

Projects 2011-2013

Results from the projects are published at http://www.slu.se/ekoforsk
Updated 110516. Compiled by Ullalena Boström, coordinator.
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Resource efficient control of couch grass

Optimal timing of stubble cultivation and cutting of a grass/clover catch crop

Project manager: Lars Andersson, Department of Crop Production Ecology, SLU.
Co-applicants: Göran Bergkvist, Department of Crop Production Ecology, SLU; Helena Aronsson, Department of Soil and Environment, SLU; Anders Eriksson, Swedish Rural Economy and Agricultural Societies.

This project is integrated with a project financed by Swedish Farmers' Foundation for Agricultural Research (SLF: *Effective control of couch grass with reduced nutrient leaching - an adaptation to Integrated Pest Management*) with the main aim to develop strategies for non-chemical control of couch grass (*Elymus repens* L.) with reduced nutrient leaching and energy use. Strategies are based on optimal timing and minimized stubble cultivation, using the competitive effect of a catch crop in combination with cutting. The project encompasses two field studies, one of which includes registrations of nitrogen and phosphorous leaching. In addition, the project constitutes an important part of a PhD project, partly financed by SLU.

In the SLF project, we use a grass species as catch crop. In this complementary project we have added one more aspect, namely the ability to fixate nitrogen. We consider this multi-functionality very interesting as it at least partly offers a solution to one dilemma of organic cropping; the need to catch nitrogen, and at the same time reduce leaching and control the perennial weeds. In the field experiments we will therefore use a grass/clover mixture as catch crop. We hypothesize that the good ability of the mixture to reduce the soil nitrogen and its superior ability to produce large amount of biomass in autumn makes it at least as good a competitor against couch grass as a grass monoculture.

A reference group is linked to the project: Ann-Marie Dock-Gustavsson (Swedish Board of Agriculture), Per Ståhl (Swedish Rural Economy and Agricultural Societies), Erik Ekre (Växa), Angelika Neumann (post-doc, SLU), and Maria Stenberg and Gunnar Torstensson (SLU).

Northern highbush blueberries

Organic production systems

Project manager: Håkan Asp, Område Hortikultur, SLU.

The production of highbush blueberries is increasing worldwide. The world production is 330 000 tonnes and has been four-folded during the last three decades. In Sweden there are approximately 12 hectares of blueberries and some minor part in glasshouse production. Today organic production of blueberries is very limited, but is expected to have a great potential to expand as the berries are popular and have a good shelf life.

This project focuses on crop management of blueberries in high tunnel and in the open field with emphasis on substrate and nutrients. The fact that blueberries require acid soils raises several questions concerning suitable substrates in combination with mycorrhizal inoculation and fertilization in an organic production system. Field experiments will be conducted at Rånna Experimental Station, Skövde during 2011 - 2013 aiming to optimize a sustainable production of high quality blueberries.

Two or three cultivars of blueberries will be grown in two substrates:

- peat and bark or
- peat/bark mixed with forest soil.
- The effect of different organic fertilizers and mykorrhiza will be studied.

The project will investigate the possibilities of an optimized organic production of highbush blueberries in a Nordic climate and the main objectives are to:

1. Study plant performance in high tunnel and in open field, with regard to cultivars and substrates, differences in plant development, yield, pest problems and climatic adaption.
2. Investigate the importance of mycorrhizal inoculation for plant establishment and for the uptake of nutrients from organic fertilizers.

Tomatoes

Balanced fertilisation

Project manager: Birgitta Båth, Department of Crop Production Ecology, SLU

For the past ten years, a participatory research group has been working on issues relating to organic growing of greenhouse tomatoes. An important issue for the growers in the group is how to design their fertilisation strategy. Analyses of plant sap from commercial crops show

that the levels of phosphorus (P) are low. The nutrient deficiency in the plant is probably not primarily the result of deficiency in the soil, but rather of low nutrient release rate in relation to crop requirements. In turn, phosphorus deficiency can give rise to N deficiency. The experiments carried out by the participatory research group have investigated issues such as the effect on pH of adding four different fertilisers/soil improvers; and whether addition of citric acid together with irrigation water increases P availability (Figure 1).

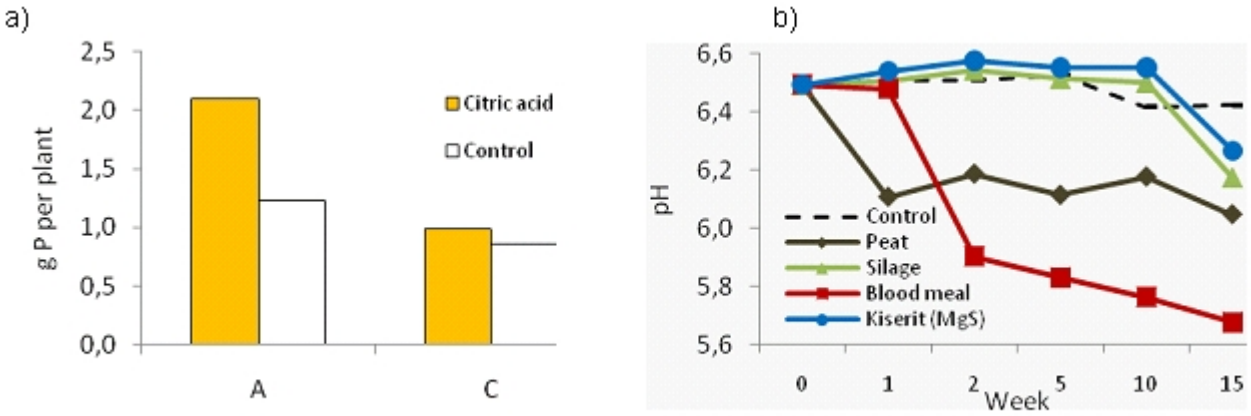


Figure 1. a) Uptake of P in tomato plants after 10 weeks, greenhouse experiments in boxes.
b) Change in pH in soil from culture A, incubation experiment without plants.

As the results are promising we want to continue with the task of drawing up a balanced fertilisation strategy for organic tomato production. Our research issues are:

- Can the effect of adding citric acid with the irrigation water be achieved at pH values higher than 3.6?
- Can the fertiliser dose be decreased when citric acid is added with the irrigation water?
- How is the pH in the soil affected by addition of fertiliser and soil improver to cultivation systems with and without plants?

Faba bean

Yield stability in varietal mixtures

Project manager: Georg Carlsson, Department of Agriculture – farming systems, technology and product quality, SLU

Spatial and temporal variation in growth and N_2 fixation is a major problem for the sustainability of legume cropping systems. In varietal mixtures, complementary tolerance to biotic and/or abiotic stress may lead to higher yield stability, while heterogeneity in chemical composition may be a potential disadvantage for the quality of harvested products.

To investigate the potential of varietal mixtures for increased legume cropping sustainability, three varieties of faba bean, *Vicia faba*, will be cultivated in field as single genotypes and in two- and three-varietal mixtures, with and without spring wheat as cereal intercrop. The experiments will be repeated in two seasons (2011 and 2012) at three locations: one at SLU Alnarp, one in Västra Götaland and one in Östergötland. This choice of field sites integrates climatic differences and includes regions in Sweden where *V. faba* cropping is large or increasing.

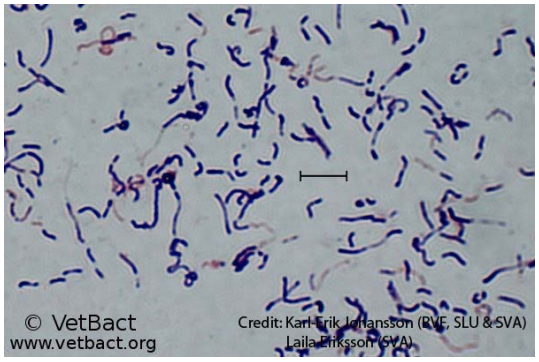
- Harvests of
    1. whole-crop forage will be performed in parts of the experimental plots at pod-fill, and
    2. harvest of grains will be done in remaining areas at full maturity.
- N_2 fixation will be measured with ^{15}N techniques, and
- product quality will be measured by contents of protein, starch and fiber in dried whole-crop and grain samples.
- Occurrence of the fungal pathogen *Botrytis fabae*, causing chocolate spot disease, will be estimated by repeated visual grading and complemented by sampling of plant material for DNA-based quantification of *B. fabae* infections.

The project will result in a holistic evaluation of cropping system sustainability, taking both possible advantages of increased plant diversity on yield stability and potential disadvantages of heterogeneous product quality into account. The results are expected to be of high significance to the scientific community interested in ecology of plant-plant and plant-microbe interactions as well as to stakeholders, especially organic farming associations, searching means to improve agricultural sustainability.

Erysipelas

Why are organic laying hen flocks affected?

Project manager: Claes Fellström, Department of Clinical Sciences, SLU.
Co-applicant: Helena Eriksson (PhD student), Department of Clinical Sciences,
SLU and Department of Animal Health and Antimicrobial Strategies, SVA.



Erysipelas, the disease caused by infection with the bacterium *Erysipelothrix rhusiopathiae*, is seen as high mortality and sometimes reduced egg production in affected laying hen flocks. According to Swedish experience the disease tends to be more common in organic laying hen flocks than in flocks housed in indoor litter based housing systems. Organic laying hens have been assumed to be a particularly vulnerable group because of the increased contacts with potential sources of infection in the surrounding environment and wildlife (e.g. birds and rodents).

This study is a part of a larger project, aiming at looking at different sources of *E. rhusiopathiae* infection for organic laying hen flocks. Through data collection, review of

procedures (*e.g.* biosecurity routines) and bacteriological sampling, herds experiencing outbreaks of erysipelas will be compared to herds free of the disease. In this particular study we intend to adapt and evaluate a PCR (Polymerase Chain Reaction) method in order to improve the sensitivity, speed up the diagnostics and lower the costs for analysis of the samples.

This PCR will then be run in parallel to traditional bacteriological culturing of the samples that have been taken during the investigations in the herds. Samples will be taken from potential sources of the infection, e.g. flies, rodents and other animals on the farm, and the environment, e.g. dust and soil. Since different types of soils contain substances that may inhibit PCRs, different protocols for DNA extraction from soils will be evaluated by analyzing soils contaminated with faeces mixed with *E. rhusiopathiae* organisms in different concentrations.

Cultivation of carrots

Improved weed control through prolonged germination period combined with false seedbed and delayed sowing

Project manager: David Hansson, Agriculture – farming systems, technology and product quality, SLU.
Co-applicant: Sven-Erik Svensson, Agriculture – farming systems, technology and product quality, SLU.

The project aims to decrease the hand weeding requirement in row-sown organic crops through encouraging as many weed seeds as possible to germinate and emerge before the crop and killing these off by flaming immediately before emergence of the crop. This weed control strategy differs from methods where flaming is not included, and where the aim is to give the crop a competitive advantage over weeds through rapid emergence. The experiments in the project will be carried out in controlled environment (greenhouse and climate chamber) and in practical field plots in organic carrots.

The project will comprise controlled, practical experiments that examine and evaluate the weed control effect of delaying the time of emergence of carrots in a system where false seedbed, delayed sowing and flaming are combined to decrease the hand weeding requirement (Fig. 1).

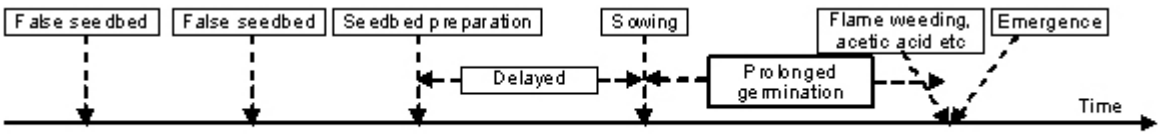


Figure 1. Various weed control methods before crop emergence to decrease the hand weeding requirement.

In the trials we aim to create a situation where the carrots emerge somewhat later than normal, but growing with full vigour. This will increase the opportunities for effective weed control

through flaming immediately before crop emergence without compromising crop growth and yield.

In previous trials in organic carrot crops in which flaming before crop emergence was delayed by three days, the amount of weeds present at the time of hand weeding was reduced by half. Another trial in organic carrots showed that every day of delay in flaming before emergence of the crop increased the weed control effect at the time of hand weeding by 10%. This in turn decreased the hand weeding requirement by 10-15 hours/ha.

The starting hypothesis is that similarly to delayed sowing, delayed time of emergence of the cultivated crop allows more weed seeds to germinate and emerge before the crop. This means that a greater number of weeds can be removed just before crop emergence, e.g. through flaming, thereby decreasing the weed pressure at the time of hand weeding. The time of emergence can be delayed through increasing the sowing depth, using slow germinating cultivars, various seed treatments, etc.

Milk production

Optimisation of protein feeding – economy and environment

Project manager: Pekka Huhtanen, the Department of Agricultural Research for Northen Sweden (NJV), SLU.
Co-applicant: Mårten Hetta, NJV, SLU.

Organic dairy production in Sweden has a well balanced use of nutrients at farm level regarding the crop production. The milk production itself is though a component with relatively low nitrogen utilization, as small share of the feed nitrogen is retrieved in the milk. At many farms are the nitrogen efficiency and economic return even lower than expected, due to a general overestimation of the marginal response rate from protein feeding and high prices of protein feeds. Modern research has recently proven that additional energy has a higher impact on the dairy production in relation to the concentration and quality of the feed protein. Theories that has not yet, been evaluated with organic dairy diets.

The project consist of three production trails (2011-2013) who together builds up a broad base of knowledge for evaluation of feeding strategies in organic dairy production. The studies cover analysis of increased protein supply, comparison of different protein feeds and the effects of increased energy supply from the forage.

Laying hen farms

Pathways for roundworm infection

Project manager: Johan Höglund, Department of Biomedical Sciences and Veterinary Public Health, SLU.

Collaboration: Desiree Jansson, the National Veterinary Institute, SVA.

The chicken roundworm (*Ascaridia galli*) is a nematode parasite, which has increased in prevalence in litter-based housing systems including on organic farms in Sweden in recent years. In this project we are going to investigate key parameters for the *development, survival and spread* of the parasite eggs under different environmental conditions. Experiments will be performed in the laboratory environment and under simulated field conditions.

We will also investigate the sensitivity of the eggs for disinfectants, and in selected organic herds identify where and to what extent eggs with viable larvae are present. Laboratory experiments will be conducted to study how combinations of various factors, such as temperature, rainfall etc. affect the development and survival of the parasite eggs.

The results will be compared with published data, which are old and need to be complemented. In these studies, we will simulate the real conditions in poultry houses. We will also investigate the effect of freezing and thawing, as well as how egg age influences the development of the eggs into infectious viable stages. Furthermore, we will measure the effects of increasing concentrations of different disinfection or decontamination agents.

Fresh chicken faeces containing parasite eggs will be deposited directly on the ground to investigate seasonal effects. In addition, faeces and soil will be collected on two organic laying hen farms where the laying hens are infected, to identify where ascarid eggs are deposited, develop and survive. Samples will be obtained both before new pullets are introduced and on at least three occasions evenly distributed during the flock's life. Samples obtained before the arrival of pullets will indirectly reflect the effect of pasture rest and various remedial measures that have been introduced by the farmer.

Finally, we will apply a PCR-based subtyping method that may be used in future epidemiological studies.

Multifunctional cover crops

For stockless organic farming systems

Project manager: Erik Steen Jensen, Agriculture - Farming systems, Technology and Product quality, SLU.

Cover crops (CC) are essential components of arable systems which retain nitrogen (N) and other nutrients, supply organic matter to soils and deliver a series of other ecosystem services/functions *e.g.* prevent soil erosion. Stockless organic systems require special focus on soil mineral N retention and input of symbiotically fixed N_2 as well as supply of organic matter to build soil fertility and add nitrogen to the system to compensate for N in harvested food and feed crops. Cover crops can contribute to these services, but more knowledge is required on how to develop multifunctional of CC crops or crop mixtures and how to manage such crops to preserve the soil fertility, reduce nutrient loss to the environment, contribute to mitigation of climate change and recycle nutrients in the organic crop rotation.

The aim of the project is to:

- determine the efficiency of CCs in stockless organic systems for mineral N retention (N catch crops),
- for N_2 fixation in autumn and spring,
- organic matter supply to the soil and
- the effect of CCs on the subsequent crop in the rotation.

Mixtures and sole CCs of common vetch, oil radish, hairy vetch and winter rye will be cultivated in an organic rotation after cultivation of spring barley and spring pea to obtain different levels of available soil N in the autumn in a 3-year project. Multifunctional annual CCs will be compared with an under-sown grass-clover CC. Dry matter production, mineral N in the soil profile, crop accumulation of mineral and symbiotically fixed N determined by stable isotope methodology as well as yield and N accumulation in subsequent crops will be determined.

Locally adapted cereal cultivars in organic farming

For quality in production and product

Project manager: Eva Johansson, Agriculture – farming systems, technology and product quality, SLU.
Co-applicant: Hans Larsson, Agriculture – farming systems, technology and product quality, SLU and Lennart Karlsson, Fältpool, Ekhaga, SLU.

Consumer demand in Sweden as well as in many countries around the world, is increasing as related to quality food, including organically produced food. For quality food, both the issues of how the crop has been grown, i.e. in a resource effective way and without for the environment harmful use of chemicals, and what nutritionally and health related values the food holds, has increased in importance lately. Further, transportation of food as related to a desire to consume locally produced food is an issue as well for the consumers. Thus, the aware consumer often prefers locally and organically produced food also with added value in terms of highly nutritious food that adds to health.

Organically produced food is of interest for those consumers of several reasons; it is thought to result in a more balanced cultivation of crops with improved plant nutrition values and lower energy consumption and decreased negative climatic influences.

Within the hereby applied project, we aim at increasing the option for sustainable cultivation of locally adopted cereals through organic cultivation. Four different localities will be used for the cultivation and our material will be included as part of the normally used crop rotation systems at each farm, mostly stable manure will be used. The plant material (around 50 cultivars) will be evaluated as related to adaptation and performance on each of the localities by the use of:

- grading of overwintering capacities,
- growth rythms,
- and diseases.

Further, the quality of the cultivars will be evaluated using

- falling number,
- protein content,
- thousand kernel weight,
- volume weight and
- essential minerals.

Within other projects, additional quality parameters will be evaluated within the material, such as baking quality, essential amino acids, antioxidants, heavy metals etc. The project is expected on a long term scale to lead to increased opportunities to recommend cultivars for local production of organic cereals for food production in different parts of Sweden.

Slow- and fast growing broilers

Mussel meal in 100% organic diets

Project manager: Lotta Jönsson, Department of Animal Nutrition and Management, SLU.

Co-applicant: Maria Eriksson, Department of Animal Nutrition and Management, SLU.

According to the organic standards, 100% of the feedstuffs in broiler diets must be organically approved from 2012. Since broilers have a high dietary requirement of sulphur amino acids and most organic feed stuff is characterized by low levels of such amino acids it is difficult to fulfil the birds' nutritional need with 100% organic diets. Recently, it has been shown that mussel meal is an excellent alternative protein source in poultry diets and might be a solution in 100% organic diets. However, no studies have yet been performed using mussels as a protein supply in order to balance a 100% organic diet for broiler chickens.

Also, the choice of broiler hybrids for organic production can be an issue. In Sweden, it is common to use fast-growing broilers and it has been shown that this implies a risk for the bird welfare and health. Therefore, other alternative hybrids need to be evaluated for Swedish organic production. Also, it has been indicated that female fast-growing broilers might be preferable in an organic production with long rearing period due to their lower growth rate compared to male birds.

The aims of this project are to:

- evaluate mussel meal as a protein source in a 100% organic diet,
- evaluating the use of only female fast-growing broiler hybrids and finally,
- studying the use of slow-growing hybrids under Swedish conditions.

The hypothesis is that mussel meal inclusion would make it possible to solve the challenge of fulfilling the birds' protein requirement when using a 100% organic diet.

Using only female birds of fast-growing hybrids is hypothesized to be a short-term solution in the Swedish organic broiler production. The combination of slow-growing hybrids and mussel meal in their diets is proposed to be a possible solution for organic production.

Seed-eating weevils in clover seed production

Development of odor-based strategies for control

Project manager: Åsa Lankinen, Plant protection biology, SLU.
Project group: Mattias Larsson och Göran Birgersson, Chemical Ecology , SLU; Olle Anderbrant och Glenn Svensson, Department of Biology, Lund University; Maj Rundlöf, Department of Ecology , SLU and Department of Biology, Lund University; Ola Lundin, Department of Ecology , SLU.

Long-term pest management is crucial in sustainable agriculture, assuring that both ecological and economical aspects are taken into account. In organic farming it would be of particular interest to use odor-based control methods, involving manipulation of the chemical signals used by the target species for communication. Such pest control also has the advantage that negative effects on beneficial insects, e.g. pollinators and natural enemies of the pest insects, will be reduced, which could result in higher and more stable yields.

Production of clover seed is fundamental within the agricultural sector, as clover is used in leys to produce animal fodder and as green manure. The latter is particularly important on organically managed farms where the use of inorganic fertilizers is prohibited. The clover seed yield in Sweden is very variable between farms and between years, which results in negative economical consequences for seed producers, such as unpredictable production, increased storage costs and seed shortage. The reason for the unpredictable seed yield is not fully understood, but it is confirmed that seed-eating pest insects, predominantly Apion weevils, can cause yield losses of over 50 %. The weevils are traditionally controlled by pyrethroid insecticides with limited success, while no established control measure exists within the organic sector. Pest management in clover seed production would thus be particularly well favored by developing odour-based strategies to control these weevils, which is the end goal of this project.

The project will focus on the specific goals:

1. Identify chemicals (pheromones, used for insect communication, and host plant volatiles) for different species of seed-eating weevils, and
2. Develop methods for monitoring and control of seed-eating weevils in clover fields using pheromones and/or plant volatiles.

New applications for the weed mower

Mowing of creeping thistle and scentless mayweed in winter wheat and leys for seed production

Project manager: Anneli Lundkvist, Department of Crop Production Ecology, SLU.
Co-applicants: Theo Verwijst, Department of Crop Production Ecology, SLU; Hugo Westlin, DataVäxt AB and Jonas Carlsson, JustCommonSense AB.

In organic farming, there is a strong need for more efficient weed control methods. A well balanced crop rotation is the most important indirect method to control weeds, but often, a combination with direct weed control methods like weed harrowing, row hoeing, and mowing is necessary.

Within the framework of a previous SLU EkoForsk research project, we obtained promising results with a selective weed cutter (Combcutt, http://www.jcs-innovation.se/enghem.html) employed to combat *Cirsium arvense* (L.) Scop. (Creeping Thistle) in growing spring cereals without damaging the crop. These results give an outlook for further development of weed control applications in cropping systems which are prone to weed problems in organic farming. In winter wheat and grass leys for seed production, *C. arvense* and the annual weed species *Tripleurospermum inodorum* (L.) Sch. Bip. (Scentless Mayweed) are causing both quantitative and qualitative yield losses. The weed cutter technique likely can be further developed to decrease pressure of those weeds and to enhance yields in winter wheat and grass seed leys.

The specific aims of this new research project are:

1. To further develop the selective mower and to test its effects on two weed species in different cropping systems.
2. To investigate the effects of timing and frequency of above ground biomass removal in two weed species on their reproductive capacity.
3. To investigate the effects of selective mowing on weed abundance and on crop yield and quality.

This project is envisaged to generate knowledge about long term weed population development in relation to integrated control measures.

Apples during storage

Protection against diseases

Project manager: Hilde Nybom, Plant Breeding and Biotechnology, SLU
Project group: Estera Dey, Kemicentrum, Lund University and Ibrahim Tahir, Plant Breeding and Biotechnology, SLU.
PhD-student: Masoud Ahmadi Afzadi, Plant Breeding and Biotechnology, SLU. Partly associated to the project.

Fungal storage diseases cause significant production losses in organic apple orchards compared to conventional or IP-production. The economical deficit is especially serious when already harvested and stored fruit is attacked and destroyed. Until now, organic apples have therefore been stored for a shortened time, leading to lower prices and insufficient availability for consumers desiring domestic, organically grown fruit.

In a co-operative project between SLU-Balsgård and the Chemistry Department, Lund University, we will develop a compound from rye bran (outermost layer of the rye kernel, an underutilized bi-product), and then investigate whether this can promote resistance in apples. The active ingredient is a type of phenolic lipid, alkylresorcinols (ARs), belonging to a group of antioxidants with proven positive human health effects. In addition, ARs from rye bran have shown to be effective against plant pathogenic fungi. In our project, we will use super-critical carbon dioxide extraction to develop a high quality AR-product from different types of rye bran. This product will be tested on two apple cultivars with documented high sensitivity to fungal storage diseases in 2011 and 2012. Newly harvested apples will be inoculated with spores of common storage diseases like:

- blue mould *Penicillium expansum*,
- bitter rot *Colletotrichum gloeosporioides* and
- bull's eye rot *Pezicula malicorticis*.

The fruit is subsequently treated by spraying 10 ml AR-containing liquid on the skin. Three different concentrations (corresponding to 2 µg, 10 µg and 50 µg active component per fruit) will be applied as well as a control with only the solvent and one without any liquid. The treated fruit will be kept in regular cold storage for 2–3 months. Symptoms of the storage diseases will be quantified immediately after taking out the fruit of storage, and after 5–10 days at ambient temperature to mimic shop conditions.

If these analyses yield promising results, we will then apply for funding to develop methods for large-scale production and application of the AR-containing preparation with a standard fruit spraying equipment.

Milk from cereals and high quality herbage only

The potential of a cereal based diet, especially after peak lactation.

Project manager: Eva Spörndly, The Department of Animal Nutrition and Management, SLU.

Only few protein feeds fulfil the requirements and rules for feeding in organic milk production and these feeds are often high in price and limited in supply. Starting 2008 organic milk producers in Sweden are required to supply the cows with 100% organically produced feed. As this feed is scarce on the market and holds a high price the new regulation makes it increasingly important for the organic producer to produce his/her own feed.

It is therefore important to investigate if today's high quality roughage, combined with only cereals can offer an economically interesting production alternative for the organic milk producer compared to the current rations where the cereals are supplemented with a considerable amount of purchased organic protein supplements.

The research question was studied in an earlier experiment financed by SLU EkoForsk. This first experiment took place during 2010 with cows in early lactation and the preliminary results show that the cereal based diet gave a considerable drop in milk production compared with the diet that also included protein supplements. Production level was 31 and 35 kg energy corrected milk (ECM) in the cereal and protein supplemented diet, respectively. However, closer look at the results showed that the cereal based diet had a comparatively large drop in production in directly after experimental start and this phase was followed by a period when the production in the two treatments was fairly similar.

This seems to indicate that the cereal based diet may be more advantageous when cows have passed the high production level in the early stage of lactation. The present project therefore has the objective to further explore the potential of a cereal based diet, especially after peak lactation.

It is hypothesised that:

- 100% home grown diets with only cereals and high quality silage is economically interesting for organic milk producers compared with diets that also include protein supplements especially at production levels below 40 kg ECM. Growing-finishing pigs

Animal welfare in organic pig production - does leg health improve by change of sire breed?

Project manager: Anna Wallenbeck, Department of Animal Breeding and Genetics, SLU.
Co-applicant: Maria Alarik, Swedish Rural Economy and Agricultural Societies
Collaboration: Eva Heldmer, Swedish Animal Health Service.

The overall aim with this project is to assess possibilities to improve pig leg health in organic production by change in sire breed.

Poor leg health has been identified as an important animal welfare problem in organic pig production in Sweden. The high proportion of pigs with leg problems in organic production is partly due to joint infection caused by the bacteria *Erysipelothrix rhusiopathiae,* a bacteria that is present in the soil where the pigs are rooting. However, a recent study showed that a majority of pigs with joints discarded at slaughter were affected by osteochondrosis. Osteochondrosis and leg weakness are partly heritable, implying that the choice of genetic material, e.g. breed, influence leg health.

In most cases, the pigs raised in organic herds are of the same breeds as used in conventional herds. These breeds are selected for high production in conventional production environments. The production environment partly differs between organic and conventional production and the stress on the joints are often higher for pigs in organic production environments, leading to more severe forms of osteochondrosis.

At present, the most commonly used sire breeds are Hampshire in Sweden and Duroc in Norway, but both breeds are available for producers in both countries. There are scientific and practical experiences indicating that progenies of Duroc boars have better leg health in outdoor production than progenies of Hampshire boars, and Duroc would thus be more suitable for organic production. In order to investigate this we will study:

- exterior,
- leg conformation and
- locomotion during the growing-finishing period,
- remarks related to leg health at slaughter and
- production

in 500 Hampsire- and 500 Duroc-offspring raised in organic herds.