NEWS-LETTER CORE organic

April 2013

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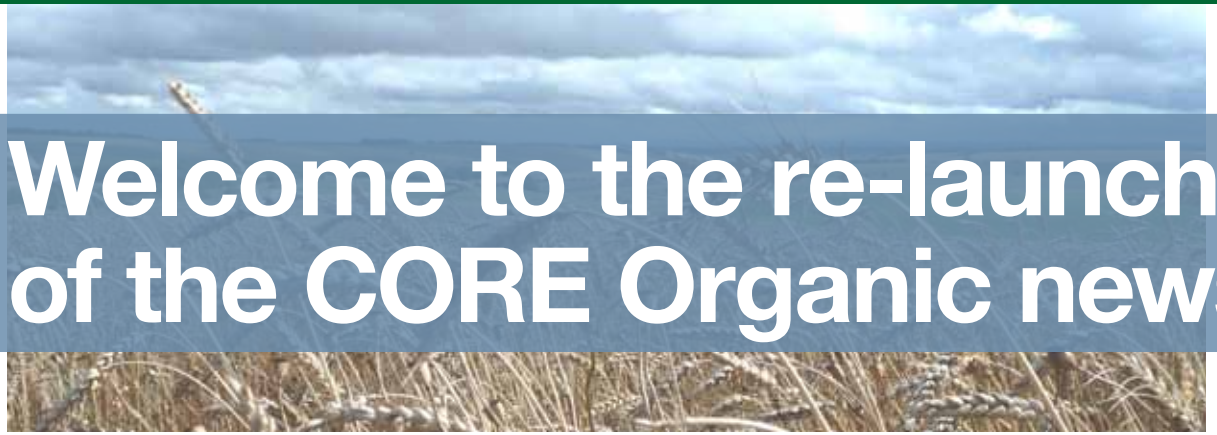


Welcome to the re-launch of the CORE Organic newsletter!

The ERA-Net CORE Organic II started in 2010 and the first transnational research projects were initiated in 2011. These projects are now ready to communicate their first results, and therefore we are now re-starting the CORE Organic newsletter. You can follow the 13 (soon 14) CORE Organic research projects via the website www.coreorganic2.org, and by subscribing to this newsletter on the website.

CORE Organic Research Seminar

The coordinators of the 13 CORE Organic research projects will present their results and plans at a research seminar **15 May 2013 in Amsterdam**. A key-note talk with the title 'Linking project results with stakeholders in the Agricultural Knowledge and Innovation System' will be given by Krijn Poppe, co-chair of the SCAR-AKIS WG, Wageningen University, Netherlands. The seminar is open for all. Please find more details and registration form on the CORE Organic website. www.coreorganic2.org

CORE Organic continuation

CORE Organic II will end in August and is applying for a third phase to launch an ERA-NET Plus call. The Plus implies that the European Commission will top up 33% of the funding with a maximum of 3 million euro.
If the application is successful, the network will launch the Plus call around January 2014. The partners in CORE Organic will continue except for Austria, Czech Republic, Ireland and Luxembourg. New countries/regions are Poland, Romania and Belgium (Wallonia).

We hope you will enjoy the newsletter!

Niels Halberg, coordinator and Ulla Sonne Bertelsen, project manager

Unleashing the potential of genetic diversity for organic plant breeding

COBRA

Organic farming, despite its past successes, faces major challenges. A key problem is the lack of suitable plant varieties adapted to the specific conditions of organic systems. This issue can only be resolved if organic plant breeding efforts are better coordinated and if the potential of plant genetic diversity is unlocked.

Over the past decades, mainstream plant breeding has focused on developing varieties for high-input (non-organic) systems. There is therefore currently not enough choice of varieties for organic producers.

Despite the known demand for varieties bred for organic systems, however, organic plant breeding enterprises are still struggling. Meanwhile agriculture is experiencing the continued loss of genetic diversity of cultivated plant species as landraces are being replaced by modern cultivars. However, agricultural productivity strongly depends on high genetic diversity of cultivated plants and on the availability and maintenance of suitable germplasm. For two reasons, this is particularly relevant for organic agriculture. First, the loss of plant genetic diversity mainly affects germplasm that would be especially suitable for organic conditions, because it stems from agriculture that did not use synthetic inputs for plant protection or plant nutrition. Second, the comparatively large environmental variability in organic systems needs to be buffered with higher levels of in-field diversity.

Besides the need to breed specifically adapted pure line varieties for organic production, there is a complementary strategy, the use of plant material with High genetic Diversity (Hi-D) e.g. as in Composite Cross populations (CCPs) (see picture). Apart from buffering against environmental fluctuations and providing insurance in stressful environments, Hi-D-based approaches allow for evolutionary adaptation to organic farming conditions. But although Hi-D-based systems have shown promising results under organic management, their benefits can at present not be exploited, due to agronomic, technical, and regulatory hurdles. These constraints of Hi-D breeding approaches are shared with and linked to organic plant breeding in general.

Specifically, there are five problem areas that need to be addressed:
(1) issues of seed health;
(2) response to multiple stresses, acting simultaneously on the crops;
(3) improvements inbreeding efficiency;
(4) structural issues such as funding for breeding and the regulatory framework; and
(5) networking and coordination.
These five issues are going to be tackled in a new European research project called COBRA (Coordinating Organic plant Breeding Activities for Diversity), which is led by the Organic Research Centre (UK). Starting in March 2013, the € 3 million project brings together 41 partner organizations from 18 countries and focuses on four major arable crops: wheat, barley, pea and faba bean.

Thomas Döring, coordinator of the COBRA project.

SafeOrganic

– Can the restricted use of antibiotics in organic pig farming be documented to provide a safer, high quality meat product with less antibiotic resistant bacteria?

The project SafeOrganic aims to document that the restricted use of antimicrobials in organic pig production leads to lower levels of antibiotic resistant bacteria compared with the level in conventional pigs. However, the project will also address the risk of losing this quality parameter, due to a widespread practice of slaughtering organic pigs together with conventional pigs, implying a risk of cross-contamination.

Spread of antibiotic resistance along the food-chain is a major food safety concern due to the risk of treatment failure of human foodborne infections. Recent reports suggest that the restricted use of antibiotics in organic animal farming promotes lower levels of antibiotic resistant bacteria in organic animal products as compared to conventional. This offers an important quality parameter of organic meat, but this is currently only scarcely documented in the EU. The field-survey planned in SafeOrganic is expected to provide this documentation. Approximate 25 herds of organic as well as conventional origin have been selected in DK, FR, IT and SE for comparison of the antimicrobial resistance levels in organic and conventional pigs. Two animals from each herd will be examined with respect to the level of resistant Escherichia coli bacteria as well as resistance patterns. Only very limited results have been obtained yet, but it may seem that the antibiotic resistance levels in pigs will differ among the participating countries. If a lower level of antibiotic resistance can be documented it is an advanta-

geous quality parameter of organic pigs that holds the opportunity to be exploited in marketing of organic pork.

Does slaughtering of organic pigs together with conventional pig pose a cross-contamination problem?

Slaughtering of organic and conventional pigs at the same slaughter lines without special hygiene barriers to avoid cross-contamination is not unusual. This may threaten the quality parameter of organic meat obtained by the restricted drug politic in organic farming. Therefore, the project also aims to investigate to which degree antibiotic resistant bacteria from conventional raised animals are transferred to organic meat during processing. This is done by examination of intestinal content and carcass swabs from organic and conventional pigs along the slaughter line in DK, FR and SE. The results are still preliminary; however, the numbers of E. coli on the carcasses prior to freezing seems to be relatively low, indicating a good level of hygiene of the investigated slaughterhouses in general. Nevertheless, the results of SafeOrganic may provide knowledge allowing suggestions of preventive measures to avoid a potential cross-contamination of organic pork with resistant bacteria. ■

Swabbing of carcass for determination of the E. coli contamination level

Coordinator Søren Åbo and project manager Annette Nygaard Jensen, Technical University, National Food Institute, Denmark

How to improve disease control in European organic viticulture?

VINEMAN.ORG

Organic agriculture and, in particular, organic viticulture have grown considerably in the last decade, nonetheless organic farming still has a huge potential for innovation and improved solutions. The research project VineMan.org (www.vineman-org.eu) aims at improving disease control, which is one of the main and most difficult tasks in organic viticulture, by integrating plant resistance against fungal pathogens, vineyard management practices, and the use of biological control agents according to optimized outbreak forecasting systems.

Scaphoideus titanus second instar nymph parasitized by the entomopathogenic fungus Lecanicillium lecanii.

Bunch sampling in the Italian experimental vineyard.

Global consumption of organic wine continues to grow despite recent years of crisis and consequently, more and more grape growers are keen to adopt organic vine production. Organic viticulture faced more than a 4-fold increase world-wide between 1998 (48'600 ha) and 2010 (217'634 ha) (www.organic-world.net/); Europe covers most part of this surface. Nonetheless, organic grape-producers face several issues, one of the most crucial being how to maintain healthy plants. In organic viticulture, there are five main principles of plant protection (Trioli and Hofmann, 2009): i) soil fertility and health; ii) viticulture practices, selection of appropriate varieties and training systems; iii) timing of protection measures and application methods; iv) enhancement of natural defense mechanisms; and v) biological pest control and habitat management. Considering that the Council Regulation (EC) No 834/2007 requires the progressive reduction of copper fungicides, the development of new and efficient strategies for controlling grape diseases based on environmentally friendly and durable methods is necessary and will provide new opportunities for European grape growers in the organic sector. Achieving this is the main goal of the VineMan.org project. The different research topics of the project have been studied by different authors in the past, but have not yet been combined into an overall

vineyard management strategy. In addition, the project focuses on the impact of organic cropping methods on the general microbial community structure of the vineyard, which has been poorly investigated as well.

In the first year of the project, the partners carried out research on four different aspects of disease control in organic viticulture and a first overall strategy for organic vineyard management was proposed.

Enhancement of plant resistance

All plants have an innate immunity against pathogenic fungi and oomycetes that is triggered by pathogen associated molecular patterns (PAMPs) which comprise soluble molecules from the pathogen cell wall such as oligosaccharides, peptides, and lipids. Repeated application of these molecules or their structural analogues can activate and enhance the innate defense response against a following infection. This can lead to an early and effective defense response also in susceptible plants. Several methods have been developed to test PAMPs for triggering defense responses in grapevine and some resistance inducing molecules have already been characterized.

Modification of canopy and cluster structure

Different methods for manipulating vegetative growth, canopy density, and fruit exposure were evaluated as a means for making the microclimate less favorable to pathogens and more ideal for the ripeness of the grapes. Primary leaves and second shoots developing from nodes 1 to 6 were removed at pre-flowering (ELR) and at pre-veraison and compared to control vines, in Italian, Spanish and Austrian vineyards. ELR was effective in reducing bunch sensitivity to grey mold by reducing bunch compactness and increasing berry skin thickness. The beneficial effect of ELR was more evident in Austrian vineyard, where the weather was conducive to the disease. Both treatments did not affect the titratable acidity of the musts while ELR increased the tartaric acid suggesting the possibility to obtain more balanced wines by preserving acidity.

Above-bunch-zone leaf removal applied at pre- and post-veraison was also tested on potted vines and compared to untreated vines. The seasonal carbon/yield ratio did not differ between treatments and neither berry fresh mass nor relative growth of skin, flesh and seeds were affected by treatments. Above-bunch-zone defoliations were effective in temporarily delaying technological maturity without affecting bunch color and the content of phenoles.

Leaf removal in the Austrian experimental vineyard.

Vittorio Rossi and Sara Elisabetta Legler, coordinator and project manager, Università Cattolica del Sacro Cuore, Piacenza, Italy

Environment and disease development

Existing models for predicting plant disease outbreaks/epidemics were evaluated for their ability to support decision-making about crop protection, based on the presence of favorable environmental conditions and/or biological information concerning the disease and/or the host plant. Mechanistic, weather-driven models for downy and powdery mildews (Rossi et al., 2008; Caffi et al., 2011 and 2013) were implemented in a web-based platform provided by Horta s.r.l., able to produce decision aids for crop protection in organic viticulture. For downy mildew, the model was able to reduce the amount of copper by 20% as average of 18 vineyards, with a maximum of 73%.

Experimental vineyard in Northern Italy.

Improve fitness and efficacy of BCAs

Fitness and efficacy of biocontrol agents, representing formulations of bacteria and fungi already registered in Europe, were evaluated in relation to grape pests and disease control under organic practices. For instance, the entomopathogenic fungus *Lecanicillium lecanii* was used against the leafhopper *Scaphoideus titanus*, the vector of the phytoplasma causing flavescence dorée. *L. lecanii* proved to be virulent to the second instar nymphs of the grasshopper.

Overall strategy for organic vineyard management

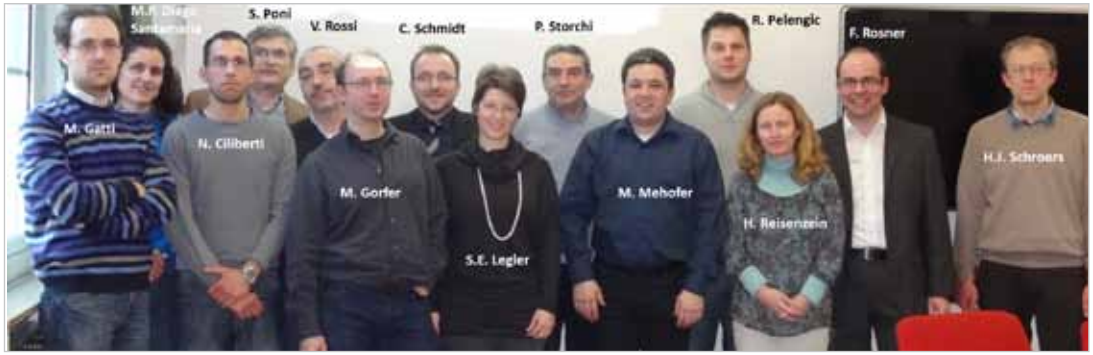
Based on the results obtained in the first year of the project, two innovative management strategies will be tested in the experimental vineyards in the second year. The first strategy is more conservative, i.e. risk-adverse strategy, while the second one is more risk-seeking.

The risk-adverse strategy is based on the combination of: i) fall treatments with the hyperparasite *Ampelomyces* spp. for the reduction of the over-wintering cleistothecia of *Erysiphe necator*, ii) the web-portal with models for the prediction of downy and powdery mildews to schedule copper and sulphur treatments at label dose during the season; iii) usage of BCAs for the control of grey mold. The risk-seeking strategy is based only on: i) dose minimized copper and sulphur applications according to the models and ii) early leaf removal for the control of grey mold.

Acknowledgments

The authors thank all the participants to the project for their contribution to the article.

Project partners at the Kick-off meeting, held in Piacenza (Italy) in January 2012.



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TILMAN

The Tilman workshop in Birmingham

The TILMAN-ORG project – Reduced tillage and green manures for sustainable organic cropping systems – held a workshop in Birmingham 22 and 23 January 2013.

Paul Mäder has started out with an introduction to the TILMAN project, which he leads, where 12 different countries are working together to develop robust and sustainable arable crop production systems, using reduced tillage techniques combined with the use of green manures. The main aims of the project are to design improved organic cropping systems with: enhanced productivity and nutrient use efficiency, more efficient weed management and increased biodiversity, but lower carbon footprints.

Marion Casagrande showed first results of the project's farmer survey in Europe, where the main challenges and motivations of conservation farming were identified. It could be concluded, that the main problem is weed control and technical problems. The main reason for applying no tillage methods was soil conservation. The results depend also on the region, climate and size of the farm. Therefor also local knowledge would be interesting for the survey, for example: what did you expect form your choice of green manure? Generally, two main types of farmers were identified, the 'soil conservationists' and the 'Agro-technically challenged', lacking technical skills or knowledge, which the TILMAN project will address.

Julia Cooper has compiled the results of a network of 12 long-term trials around Europe, where conventional tillage and reduced/no tillage systems were compared. She mentioned however, that data is scarce for many parameters but for yield, pH, carbon or weed pressure the analysis was possible. Her results showed a slight trend for a reduction in yield (independent of crop rotation) for reduced tillage systems in the first years. Other experiments at Nafferton compared the yield of organic wheat with the yield of herbicide-treated wheat under reduced tillage; no significant difference could be found. Even if the organic plots showed a much higher weed pressure.

www.coreorganic2.org/tilman-org
and www.tilman-org.net

Key conclusions

The discussion that followed the presentations brought out the following points:

- Conversion Effect: during the first 2-3 years, reduced tillage leads to a decrease in yield; relationships change as the soil structure changes, N-mineralisation for example. But after this initial phase, field trials have shown that yield, soil organic matter and biomass of soil organisms is increased by 10-20% (50% for earthworms).
- Commenting on soybeans sawn directly in flattened (drum roll) winter rye in one of the field trials shown during the presentation, it was mentioned that this method protects the beans from birds and prevents weeds from germinating, while providing the crop with 5t/ha mulch. Depending on the climate, this is suitable for crops sawn in April/May, once the winter rye has reached the generative phase.
- A summary of the project survey results is published in the Organic Farming magazine, and the complete analysis of the results are expected to be published soon, check regularly on www.tilman-org.net

Watch the video from the workshop:
www.tilman-org.net/to-videos.html#c8820

Joséphine Peigné
Marion Casagrande
Julia Cooper
Paul Mäder

BIO-INCROP

BIO-INCROP project - Innovative cropping techniques to increase soil health in organic fruit tree crops – in 2012 focused on: I. validation of the biotic origin of replant disorders in the European apple orchards and identification of pests and pathogens agents of replant disease in main EU apple growing regions. II. Selection of cropping practices for reducing degradation of replanted citrus orchards and contrasting the natural depletion of soil organic matter content in Mediterranean environment; III. Investigation on potentiality of organic amendments and bio-formulates to increase soil suppressiveness and overcome replant disorders affecting fruit orchards. The biotic component of apple replant disease was confirmed with bioassay tests on soil samples from apple growing region of Germany, Austria and Italy and correspondent sterilized samples. Effectiveness of innovative cropping practices in inducing changes of soil biological parameters is being evaluated in a degraded citrus orchard of Valencia region, Spain. Biologically-active products, selected according to interest from the organic fruit production sectors in Europe, are being evaluated in pot experiments.

Read about the BIO-INCROP project:
www.coreorganic2.org/bio-incrop and
http://www.bio-incrop.org

AUTHENTIC-FOOD

News update from AuthenticFood - Fast methods for authentication of organic plant based foods: The first status meeting was held in March 2013. Here all WP leaders gave an overview of methodological developments. The novel analytical methods will be applied to samples from the first harvest year during the coming 6 months. In 2012 the AuthenticFood activities was focused on method development and production and preparation of durum wheat and tomato samples in Italian field trials. The first samples are being analysed in laboratories across Europe. In parallel, the second year of Italian sample production has been initiated. A joint press release from the project in all 11 European partner countries in January 2011 resulted in >30 newspaper and internet articles and several radio and TV interviews and conference presentations.

Read about the AuthenticFood project:
www.coreorganic2.org/authenticfood ■

HEALTHY HENS

Activities in the HealthyHens project - Promoting good health and welfare in European organic laying hens: In the first months of the project we developed data collection protocols for our four main topics: (1) parasite burden, (2) use of the outdoor run, (3) feather- and injurious pecking and (4) health problems like keel bone deformation and health of the birds' feet. The data collection protocols are based on experiences from former international (LayWel, Welfare Quality®) and national projects and compatibility with the ongoing projects LowInputBreeds and ICOPP was ensured. For data collection, we recruited more than 107 organic layer farms in the eight participating countries. After an assessor training in Sweden and validation of observer agreement, farm visits started. By the end of this first year, most farms have been visited ones at the peak of lay of their hens. We now start visiting the farms a second time when hens are about 60 to 65 weeks old.

Read about the HealthyHens project:
www.coreorganic2.org/healthyhens ■