ICOAS2013

International Conference on Organic Agriculture Sciences

9-13th October 2013
HUNGARY,
in Budapest and Eger

FINAL PROGRAM
ABSTRACTS
LIST OF PARTICIPANTS

Dear Conference Participant,

On behalf of the Organizing Committee, I would like to extend a warm welcome to you at the International Conference on Organic Agriculture Sciences (ICOAS).

ICOAS is a two-day scientific conference, covering the most current topics of organic agriculture research. It brings more than one hundred participants to Hungary, and with its joint professional events, such as the Organic Policy Summit, it attracts more than 350 attendants. As you will see in the program, the conference offers twenty panels in organic agriculture studies, plenary and parallel sessions, symposia and poster presentations.

ICOAS is particularly intended for researchers involved in organic agriculture and food production systems. It provides a platform for scientific exchange, international networking and peer reviewed publication of research results. You are now holding the peer reviewed *Book of Abstracts* containing all oral and poster presentations of the conference. Following the conference authors will be invited to submit full-papers for peer-reviewed publication.

We have prepared an interesting and colorful range of social events offering opportunities for you to network with associates as well as enjoy Hungarian cultural heritage. A fascinating field trip to the famous and now more and more organic vineyards of Tokaj, a welcome reception in Eger, a wine tasting in Noszvaj and a gala dinner with diverse cultural programs will also be arranged to highlight the best of what Hungary has to offer.

On behalf of all organizers I sincerely hope that you will have an enjoyable stay in Hungary and wish you a great conference!

Yours,

Dr. Dóra Drexler
President of the Organizing Committee
Managing director of ÖMKi

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GENERAL INFORMATION ABOUT THE ORGANIZERS

Chief Patron of the event

Dr. Sándor Fazekas, Minister of Rural Development, Hungary

Organizers:

The Hungarian Research Institute of Organic Agriculture (ÖMKi), in cooperation with the Czech Technology Platform for Organic Agriculture (CTPOA) and the following organizations:

- Research Institute of Organic Agriculture, FiBL (CH, A, D)
- Bioinstitut, CZ
- IFOAM EU Group
- Association of Organic Farmers in the Carpathian Basin (KÖSZ)
- Bioforsk – Norwegian Institute for Agricultural and Environmental Research
- Bioselena Foundation for Organic Agriculture, BG
- EkoConnect e. V.
- ICROFS – International Centre for Research in Organic Food Systems
- Institute for Sustainable Development, Slovenia
- Polish Ministry of Agriculture
- Hungarian Ministry of Rural Development

Committees

Scientific Committee

András Báldi, Centre for Ecological Research, HU
Dóra Drexler, Hungarian Research Institute of Organic Agriculture (ÖMKi), HU
Ed Garrett, Hungarian Research Institute of Organic Agriculture (ÖMKi), HU
László Radics, Corvinus University of Budapest, HU
Eszter Ruprecht, Babes-Bolyai University, RO
Otto Schmid, Forschungsinstitut für biologischen Landbau (FiBL), CH
Atle Wibe, Bioforsk, Norwegian Institute for Agricultural and Environmental Research, NO

Organizing Committee

Dóra Drexler, ÖMKi, HU
Ildikó Heim, ÖMKi, HU
Miloslava Kettnerova, CTPOA and Bioinstitut, CZ
Jiri Urban, Bioinstitut, CZ
Krisztián Havas, ÖMKi, HU
Klára Biszkupné Nánási, Altagra, HU

CONFERENCE INFORMATION

Venues of the conference

The Organic Policy Summit 2013 will take place in Budapest, Hungary while the ICOAS 2013 scientific conference will be held in Eger, Hungary.

The Organic Policy Summit will be held in the *Hungarian Parliament* building, *(Budapest)*.
The ICOAS conference venue will be the *Hotel Eger & Park, (Eger)*, Hungary.

Hungarian Parliament
Room of the Upper House
1055 Budapest, Kossuth tér 1-3.

Hotel Eger & Park
3300 Eger, Szálloda u. 1-3.
Eger's established hotel complex, the Hotel Eger & Park, is situated in the town centre, next to the renovated Gárdonyi Géza Theatre.

Lecture Halls:
The plenary sessions will take place in the middle section of Congress room; the parallel sessions will be accommodated in the right and left sections of the same room. Posters will be on display in Eger room.

Conference Secretariat before and after the conference

ALTAGRA Business Services and Travel Agency Ltd.
H-2100 GÖDÖLLŐ
Örösi Pál Zoltán sétány 0172/19 hrsz. Hungary
Phone: (36)-28-432-985
Fax: (36)-28-419-647
e-mail: office@altagra.hu
homepage: www.altagra.hu

Conference Secretariat during the conference

Venue 1.
Hungarian Parliament
Next to the room of the Upper House
1055 Budapest, Kossuth tér 1-3.
Phone: (36)- 20-321-5383

Opening hours
09 October, Wednesday 09.00 -12.30

Venue 2.
Hotel Eger & Park, Entrance Hall
H-3300 Eger
Szálloda u. 1-3.
Phone: (36)-30 -922-9680
e-mail: office@altagra.hu

Opening hours

09 October, Wednesday	17.00 -21.00
10 October, Thursday	08.00 -17.00
11 October, Friday	08.00 -17.00

Smoking
Smoking is banned in all enclosed spaces, including offices, restaurants and pubs as well as on public transportation, in playgrounds and in underpasses.
Please look for the smoking allowed sign if you need to indulge.

Telephone
Country code: 36. Outgoing international code: 00. Eger city code: 36.

Mobile telephone
GSM dual band 900/1800, coverage throughout the country.
Network operators include: Telenor, T-Mobile, Vodafone

Emergency
(ambulance, police): 112

Languages

Venue 1. - Hungarian Parliament
The official language of the Organic Policy Summit will be English and Hungarian. Simultaneous translation will be available. Ask for a device at the registration desk.

Venue 2. - Hotel Eger & Park
The official language of the ICOAS Conference will be English. No translation facilities will be available.

Bank and currency exchange
The local currency is the Hungarian Forint. Notes are in denominations of Ft: 20 000, 10 000, 5000, 2000, 1000, 500. Coins are in denominations of Ft: 200, 100, 50, 20, 10, 5.
Delegates may change foreign currency and travellers' cheques at the airport upon arrival in Budapest, at several banks located in Eger, and also many exchange Secretariats at the railway station or in most of hotels. International credit cards are accepted for payment in hotels, restaurants, and shops. Credit and debit cards can be used to withdraw money from ATMs. Beware of traffickers offering exchange services on the street!

Internet access
Free Wi-Fi is available at the conference venue in Eger. There are three e-points for fast mail checks available in the entrance hall, next to the drink bar.

Insurance
The organizers of the Conference recommend that participants arrange their own insurance for health, travel and property. The organizers will not accept any liability for personal injury or for loss of, or damage to property.

Electricity
220 volts AC, 50Hz, European two-pin plugs are used.

Clothing and weather
The high temperatures of the summer months drop to some extent in October, but early October is still a perfect time to take a trip to Hungary. Nights get colder and frost prevails more often than not as the month continues. Showers may occur. You are advised to bring warm clothing and an umbrella or a raincoat with you.

Delegate identification
Admission to scientific sessions and other events is permitted only to those wearing the official Conference badge.
Accompanying persons are kindly asked not to attend the scientific program.

REGISTRATION FEES

Organic Policy Summit: participation is free, but registration is required.

ICOAS: On-site registration fees are the following: 300 Euro for delegates, 120 Euro for students and 60 Euro for accompanying persons.

The registration fee for participants and students includes the following services:

- Unlimited access to all sessions and the poster area
- Welcome reception
- Wine tasting with dinner
- Coffee, tea and soft drinks during coffee breaks
- Lunches
- Printed copy of the final program and the abstract book
- Conference bag and badge

The registration fee for accompanying persons includes the following services:

- Welcome reception
- Wine tasting with dinner
- Coffee, tea and soft drinks during coffee breaks
- Conference badge

INFORMATION ABOUT HOTELS

Budapest:

Hotel NH Budapest ****
Vígszínház u. 3., Budapest, H-1137
Tel: +36 1 814 0000

City Hotel Mátyás ***
Március 15. tér 8., Budapest, H-1056
Tel: +36 1 318 0595

Eger:

Hotel Eger *** superior & Park ****
Szálloda u. 1-3., Eger, H-3300
Tel: +36 36 522 290

Hotel Aqua Eger***
3300 Eger, Maklári út 9. ,
Tel./Fax: +36 36 515 337

Hotel Minaret ***
Knézich Károly u. 2., Eger, H-3300
+36 36 517 000

Imola Udvarház
Dózsa György tér 4., Eger, H-3300
Tel: +36 30 207 8085

If you have not paid for the hotel room in advance, or if you have any modification in your reservation, please contact the Conference Secretariat. The price of the hotel room should be paid directly to the Conference Secretariat.

However, if you take advantage of any of the extra services provided by your hotel (minibar, telephone, fitness, etc), you should pay for these directly to the hotel before leaving.

MEALS

Breakfast
Breakfast is included in the hotel room price. Unless otherwise indicated, breakfast will be served in the hotel you are accommodated in. Your room card will be needed for breakfast.

Coffee and tea
Organic Policy Summit - Hungarian Parliament
Coffee, tea, refreshment and small snacks will be served before the summit and during the coffee break.

ICOAS - Hotel Eger & Park
In the morning and also in the afternoon, coffee, tea, refreshment and small cakes will be served for conference delegates and their accompanying persons in front of the conference rooms.

Lunches
Buffet lunch will be served in the restaurant of Hotel Eger & Park. When registering, you will receive the lunch tickets; the waiters will collect these in the restaurant.

Dinners
Only snacks will be offered at the Welcome Reception whereas complete dinner will be provided at the following events:

- Wine tasting on 10 October
- Gala dinner with cultural program on 11 October (optional program)

Vegetarians
Vegetarians and people with special dietary requirements will be given special attention. Please inform the organizers in advance or upon arrival.

Food and drink on your own
As indicated in the "Quick guide to Eger" chapter, a good range of restaurants and pubs is available near the conference venue. Table service is common, although there are many inexpensive self-service restaurants as well. A typical menu offers two or three courses at inexpensive rates. Fine dairy and pastry shops ('cukrászda') offer light meals. Specialties include 'halászlé' (fish soup) with pasta and Goulash 'gulyás' soup. Western goulash or stew is called 'pörkölt' or 'tokány'. Stuffed vegetables, sweet cakes, gundel 'palacsinta' (pancake) and pastries are also popular.
Coffee bars and Drink bars offer refreshments. Tokaji (strong dessert wine) or Bull's Blood (strong red cuvee wine of the Eger wine region) are recommended. Apricot, cherry, or plum pálinka (fruit brandies) are typical Hungarian schnapps. Unicum, a bitter liqueur made from natural herbs, roots, and spices, has been considered a national drink since 1790. Imported beers and soft drinks are also available.

SOCIAL EVENTS

Visit of the Parliament building

Time and date:	12.30 on 09 October 2013
Place:	Parliament building 1055 Budapest, Kossuth tér 1-3.
Meeting point:	in front of the Upper House room
Info:	there will be two groups; the first will have an English guide, the second one a Hungarian.
Admission:	badge
Price:	free

City sightseeing tour with boat trip on the Danube, including lunch

Time and date:	14.00-16.00 on 09 October 2013
Place:	Boat named Sailor
Meeting point:	Budapest, 1137 Jászai Mari tér (square), Paulaner moor, (6)
Transfer:	no transfer will be provided; it is possible to walk from the Parliament building to the boat
Admission:	Please bring your letter of confirmation with you
Price:	Euro 32,-

ICOAS Welcome Reception

Time and date:	19.30-21.30 on 09 October 2013
Place:	Hotel Eger & Park, Green Restaurant H-3300 Eger, Szálloda u. 1-3.
Transfer:	for transfer details from Budapest please see the next chapter
Admission:	ticket (the ticket should be picked up at the registration desk)
Price:	the price is included in the registration fee for delegates, students and registered accompanying persons

ICOAS Wine tasting with dinner

Time and date:	19.00-21.30 on 10 October 2013
Place:	Thummerer wine cellar 3325 Noszvaj, Szomolyai út 2101/3 hrsz
Transfer:	transfer will be provided from the conference venue to the wine cellar and back to the official conference hotels
Meeting time:	18.30
Meeting point:	lobby of Hotel Eger & Park
Admission:	ticket (the ticket should be picked up at the registration desk)
Price:	the price is included in the registration fee for delegates, students and registered accompanying persons

ICOAS Gala Dinner with cultural program

Time and date:	19.00-23.00 on 11 October 2013
Place:	Hotel Eger & Park, Conference room H-3300 Eger, Szálloda u. 1-3.
Transfer:	no transfer will be provided
Admission:	ticket (based on advance registration, a limited number of tickets will be available on site)
Price:	Euro 38,-

ICOAS Whole day excursion

Date:	12 October, Saturday
Topic:	Organic Viticulture in Northeast Hungary
To be visited:	Organic vineyard of the Pendits and the Oremus wine company
Route:	Eger-Abaújszántó-Tolcsva-Eger
Services provided:	transportation by bus, English speaking guide, entrance tickets, lunch, wine tasting in the famous Tokaji wine region
Meeting time:	08.45
Meeting point:	lobby of Hotel Eger & Park
Departure time:	09.00
Arrival:	Eger – approx. at 18.30 hrs *Please note, that no transfer to Budapest will be provided following the tour.*
Admission:	ticket (based on advance registration, a limited number of tickets will be available on site)
Price:	Euro 32,-

INFORMATION ABOUT TRANSFERS

Transfers upon arrival to Budapest

Liszt Ferenc International Airport is located 24 km (15 miles) southeast of Budapest. Eger, the conference venue, is situated approx. 130 kms away from Budapest, the capital of Hungary. In order to facilitate your arrival at Eger, conference transfer buses are available between Budapest and Eger as indicated in the schedule.

Budapest – Eger bus transfer			
Date	**From**	**DEPARTURE**	**Price** per person
9 October 2013	Liszt Ferenc Intl. Airport	12.00 hrs	€ 20
9 October 2013	Liszt Ferenc Intl. Airport	15.00 hrs	€ 20
9 October 2013	Jászai Mari sqr. *after boat trip*	16.00 hrs	€ 20

The travel time to Eger is approx. 3 hours.

Bus transfers should be reserved in advance!!! Please inform the Conference Secretariat about your flight details!

Upon arrival to the airport, look for the guide having an ICOAS2013 sign in hand. The guide will advise you where to find the bus. If your flight is cancelled or delayed, please inform the Conference Secretariat immediately.

In Eger the bus will take you to the conference venue and the official conference hotels.

Transfers after the conference

Transfer to Budapest (see the following table) will be provided only if you book the service in advance. If you have already booked transfer service and you received the letter of confirmation indicating this service, you do not need to contact the Conference Secretariat.

If you have not reserved a place for yourself prior to the conference, please contact the Conference Secretariat during the conference.

Please note that no transfer will be provided without previous booking.

Eger – Budapest bus transfer				
Date	**DEPARTURE from Eger** Conference Venue	**ARRIVAL at Liszt Ferenc** Intl. Airport	**ARRIVAL at Budapest** City Center	**Price** per person
12 October 2013	08.00 hrs	11.00	11.30	€ 20
13 October 2013	08.00 hrs	11.00	11.30	€ 20

Meeting point: lobby of Hotel Eger & Park

Those who have reserved accommodation in another hotel are kindly requested to take a taxi to the conference venue.

Meeting time: 15 minutes before departure

Transfer route: Budapest airport

Budapest city centre Erzsébet square

QUICK GUIDE TO EGER

One of the country's oldest cities, full of Baroque architecture and grand buildings, Eger has over 200 historical monuments, including Eger Castle, the Copf-style Lyceum with a magnificent frescoed library, the 14-sided, 40 meters high minaret, a reminder of almost 100 years of Turkish rule, and the Archbishop's Cathedral containing the country's largest musical organ. The striking pink and white structure on Dobó István Square is the twin-towered Minorite Church, Hungary's most beautiful Baroque building.

The small town centre is a pedestrian area that features many brightly painted houses with iron balconies lining narrow, twisting streets. Ornate lampposts and hanging baskets of flowers decorate the cobbled lanes and squares and sculptures representing the battle against the Turks are a proud reminder of the victorious saga.

Eger sits at the centre of the wine-growing region of northern Hungary. This enchanting town, along with its famous history, is where the much-publicized Egri Bikavér, or Bull's Blood, has its origins - the strong, fiery and spicy red wine that is characteristic of the area. Wine growing has been part of its history since the 11th century, started by monks and continued during the Turkish occupation. Wines can be tasted in numerous pubs in the city. The most famous is the centuries-old wine cellars of the Szépasszony Valley (Valley of the Beautiful Woman), where 200 cellars await to be discovered along the narrow valley road. It is approximately 2 km from the venue (20 minutes onwards, but may take a half night backwards....).

Eger is a colorful town known not only for its history, mellow charm and vineyards, but also for its thermal baths. Visitors looking for a bit of time-out can unwind in the peaceful Archbishop's Garden, a leafy park enclosing swimming pools and hot thermal baths.

Map of Eger

A map of Eger is included in your conference bag. The venue of the conference, the official conference hotels and some public institutions are indicated on this map. Should you need further help with your orientation, please contact the conference Secretariat at Hotel Eger & Park.

P R O G R A M

Wednesday, 09 October 2013

19:30 **Welcome Reception**

Thursday, 10 October 2013

08:45 **Opening of ICOAS**

09:00 **Plenary Session:**
Urs Niggli - ORGANIC AGRICULTURE IS THE NEW PARADIGM FOR DIVERSITY

Session A - Organic Farmers' Perceptions
Chair: András Jung

10:00 ASSESSMENT OF THE ENVIRONMENTAL AWARENESS AND ATTITUDES AMONG THE ORGANIC AND CONVENTIONAL FARMERS IN PODLASKIE VOIVODESHIP
E. Rembiałkowska, K. Lipińska-Górka, J. Golba

10:25 FARMERS' PERCEPTIONS OF BIODIVERSITY: RESULTS AND PRACTICAL IMPLICATIONS OF A DISCOURSE-BASED BIODIVERSITY VALUATION PROCESS
Eszter Kelemen, Geneviève Nguyen, Tiziano Gomiero, Eszter Kovács, Jean-Philippe Choisis, Norma Choisis, Maurizio G. Paoletti, László Podmaniczky, Julie Ryschawy, Jean-Pierre Sarthou, Felix Herzog, Peter Dennis, Katalin Balázs

Session B - Organic Animal Husbandry
Chair: Magdolna Tóth

10:00 COMPARING COW TYPES FOR THE OPTIMUM CALVING DATE IN AN ALPINE ORGANIC AND LOW-INPUT MILK PRODUCTION SYSTEM
Marco Horn, Andreas Steinwidder, Walter Starz, Rupert Pfister, Werner Zollitsch

10:25 ON-FARM RESEARCH PROGRAM FOR VARROA CONTROL IN ORGANIC BEEKEEPING
Tamás Csáki, Dóra Drexler

Session C - Practice Oriented Research I.
Chair: Jiri Urban

10:00 APPLICATION OF A FLUORESCENT PSEUDOMONAD INTO POTTING SOIL FOR BETTER PERFORMANCE OF TOMATO SEEDLINGS AGAINST *RALSTONIA SOLANACEARUM*
Triwidodo Arwiyanto, Bambang Hendro Sunarminto

10:25 THE INFLUENCE OF SEED AND SOIL TREATMENTS ON THE YIELD OF POPPY *(PAPAVER SOMNIFERUM L.)* ON ORGANIC FARM
Perla Kuchtová, Petr Dvořák, Miroslava Hájková, Eva Plachká, Jan Kazda

11:00 **Coffee break**

Session A - Novel Technologies in Organic Agriculture
Chair: András Jung

11:30 HIGH RESOLUTION REMOTE SENSING FOR ORGANIC FARMING
András Jung, Michael Vohland

11:55 BIOFUMIGATION IN ORGANIC POTATO PRODUCTION
Sebastian Grabendorfer

12:20 SUSTAINABLE DIETS: CLIMATE EFFECTS OF MEALS
Michaela C. Theurl, Axel Wirz, Thomas Lindenthal, Stefan Hörtenhuber, Theresia Markut

Session B – Organic Breeding and Propagation
Chair: Magdolna Tóth

11:30 AGRONOMIC PARAMETERS OF OPEN POLLINATED BROCCOLI GENOTYPES
Stefanie Wolf, Michael Fleck, Sabine Zikeli, Simone Graeff-Hönninger, Wilhelm Claupein

11:55 SUITABILITY OF OLD APPLE VARIETIES IN ECOLOGICAL ORCHARDS, BASED ON THEIR RESISTANCE TO APPLE SCAB AND POWDERY MILDEW
David Papp, Magdolna Tóth

12:20 SETTING NUTRITIONAL BASELINES IN ORGANIC WHEAT PRODUCTION THROUGH CHOICE OF GENETIC BREEDING FOUNDATIONS: THE EXAMPLE OF THE *NAM-B1* GENE IN SWITZERLAND
Janice Johnson

Session C – Practice Oriented Research II.
Chair: Jiri Urban

11:30 MULTI-FUNCTIONALITY OF LIVING MULCH IN ORGANIC VEGETABLE PRODUCTION SYSTEMS
Peter von Fragstein und Niemsdorff

11:55 ENHANCING MYCORRHIZAL SYMBIOSIS AND PRODUCTIVITY OF FIELD GROWN ORGANIC TOMATO THROUGH CROP AND MANAGEMENT DIVERSIFICATION
Ezekiel Mugendi Njeru, Luciano Avio, Cristiana Sbrana, Alessandra Turrini, Gionata Bocci, Paolo Bàrberi, Manuela Giovannetti

12:20 CHANGES IN ANTIOXIDANT-CAPACITY AND POLYPHENOL CONTENT OF HUNGARIAN TOMATO LANDRACES OVER A GROWING SEASON
László Csambalik, Éva Stefanovits-Bányai, Nóra Papp, Anna Divéky-Ertsey

13:00 **Lunch**

Session A – On-farm Research, Binding Practice and Scientific Enquiry I.
Chair: Andreas Kranzler

14:10 MANAGING DATA QUALITY IN ON-FARM RESEARCH: THE ADDED VALUE OF MULTIPLE VARIABLES
Ed Garrett, Boglárka Hegedűs, Dóra Drexler

14:35 A COMPARISON OF BIODIVERSITY ON ORGANIC AND CONVENTIONAL FIELDS IN CENTRAL HUNGARY
Andás Báldi, Zoltán Elek, Anikó Kovács-Hostyánszki

15:00 COMPARISON OF SPECIES-RICH COVER CROP MIXTURES IN HUNGARIAN VINEYARDS
Ádám Donkó, Péter Török, Orsolya Valkó, Tamás Miglécz, Gábor Zanathy, Dóra Drexler

Session B – Sustainable Food Supply Chains
Chair: Zoltán Dezsény

14:10 AGRICULTURE SUPPORTED COMMUNITIES: CONSUMER-PRODUCER RELATIONS IN ORGANIC BOX SCHEMES - EXPERIENCES FROM HUNGARY
Bálint Balázs

14:35 THE INDEX OF FOOD RELOCALIZATION IN HUNGARY
Zsófia Benedek, Bálint Balázs

15:00 EMERGENCE OF COMMUNITY SUPPORTED AGRICULTURE IN HUNGARY: ATTRIBUTES OF SUSTAINABLE RURAL ENTERPRISES
Zoltán Dezsény, Katalin Réthy

Session C – Avoiding Hazards, Organic Quality Control and Food
Chair: Ewa Rembiałkowska

14:10 AUTHENTICATION STRATEGIES OF ORGANIC CROPS AND ASSESSMENT OF THEIR QUALITY
Jana Hajšlová, Věra Schulzová

14:35 ECONOMIC EFFICIENCY OF FERTILIZATION AND ITS RESIDUAL-EFFECT DURING CONVERSION PERIOD TO ORGANIC FIELD CROP PRODUCTION
Vanya Manolova, Svetla Kostadinova, Ivan Manolov

15:00 ORGANIC FARMING IN RICE BASED CROPPING SYSTEM FOR HIGHER PRODUCTIVITY AND BETTER QUALITY OF PRODUCE, SOIL, WATER AND ENVIRONMENT
Y. V. Singh, S. Gaind, A. K. Saxena

15:30 **Coffee break**

Session A – On-farm Research, Binding Practice and Scientific Enquiry II.
Chair: Andreas Kranzler

16:00 QUALITATIVE AND QUANTITATIVE ANALYSIS OF POTATO VARIETIES IN ORGANIC FARMING
Orsolya Papp

16:25 CONTROL OF COLORADO POTATO BEETLE (*LEPTINOTASARA DECEMLINEATA* SAY) IN ORGANIC FARMING USING BIOLOGICAL INSECTICIDES (AZADIRACHTIN, *BACILLUS THURINGIENSIS* VAR. *TENEBRIONIS* AND SPINOSAD)
Stefan Kühne, Uta Priegnitz, Benjamin Hummel, Frank Ellmer

16:50 THE INTERNATIONAL SOCIETY OF ORGANIC AGRICULTURE RESEARCH (ISOFAR)
László Radics

Session B – Farmer Education
Chair: Zoltán Dezsény

16:20 DEVELOPMENT OF A VOCATIONAL TRAINING CURRICULA FOR ORGANIC FRUIT AND VEGETABLE PRODUCTION IN HUNGARY
Imre Tirczka, Matthew Hayes, Enikő Prokaj

16:45 ADVANCING TRAINING AND TEACHING OF ORGANIC AGRICULTURE IN SOUTHEAST EUROPE
Shukri Fetahu, Esma Velagic Habul, Ivan Manolov, Ardian Maci, Dóra Drexler, Urs Niggli

Session C – Sustainability Assessment for Improving Agricultural Practice
Chair: Ewa Rembiałkowska

16:00 THE RELEVANCE OF SUBSOIL C AND N FOR THE ASSESSMENT OF CROPPING SYSTEM IMPACT ON SOIL ORGANIC MATTER
Lucas Knebl, Guenter Leithold, Christopher Brock

16:25 A REPRODUCIBLE MODEL APPROACH TO HUMUS BALANCING IN (ORGANIC) FARMING SYSTEMS
Christopher Brock, Günter Leithold

19:00 **Wine Tasting with Dinner at the Tummerer Wine Cellar, Noszvaj**

Friday, 11 October 2013

09:00 **Plenary Session:**
András Székács – EXTERNAL RISKS, PRACTICAL IMPLICATIONS AND PITFALLS OF ECOLOGICAL AGRICULTURAL PRACTICES AND THEIR RELATION TO FOOD SAFETY

Symposium: Biodiversity Assessment on Agricultural Farms

10:00 FARM MANAGEMENT RELATED INDICATORS FOR BIODIVERSITY IN ORGANIC AND LOW-INPUT FARMING SYSTEMS IN EUROPE
J. K. Friedel, M. Arndorfer, K. Balázs, P. Dennis, S. Eiter, P. Jeanneret, R. Jongman, M. Kainz, G. Lüscher, G. Moreno, M. G. Paoletti, P. Pointereau, J. P. Sarthou, S. Stoyanova, F. Herzog

10:25 BIODIVERSITY ANALYSIS REVISED – AN EXAMPLE FROM GERMAN MIXED DAIRY FARMS
Sebastian Wolfrum, Norman Siebrecht, Maximilian Kainz, Kurt-Jürgen Hülsbergen

10.50 DEVELOPMENT OF A LIFE CYCLE IMPACT ASSESSMENT (LCIA) METHOD FOR BIODIVERSITY: A CASE STUDY ON WHEAT PRODUCTION IN SWITZERLAND
Vanessa Geier, Matthias S. Meier

11:15 NOVEL METHOD FOR FARMLAND BIODIVERSITY ASSESSMENT ON AGRICULTURAL FARMS
Thomas Drapela, Matthias S. Meier, Lukas Pfiffner, Theresia Markut, Christian Schader

11:50 **Coffee break**

Sponsor Session

12:10 20 YEARS OF HIPP IN HUNGARY
Csaba Bódi

12:35 INTRODUCING SONNENTOR
Zoltán Lehoczky

13:00 **Lunch**

14:00 **Poster Session**

P01 EDGE EFFECT ON APHID PREDATION RATE IN WINTER WHEAT FIELDS
Krisztina Bereczki, Tibor Kovács, Anikó Kovács-Hostyánszki, András Báldi

P02 SEASONAL NODULATION VARIABILITY OF ALFALFA (*MEDICAGO SATIVA* L.) AT DIFFERENT SITES IN ORGANIC FARMING
Lucie Chmelikova, Harald Schmid, Michal Hejcman, Kurt-Jürgen Hülsbergen

P03 EVALUATION OF METHODS ASSESSING THE BIOCONTROL OF WINTER WHEAT PESTS AS AN ECOSYSTEM SERVICE IN CENTRAL-HUNGARY
Orsolya Császár, Márk Szalai, Zita Dorner, Lilla Ottó, József Kiss

P04 MODELING THE CONTRIBUTION OF GREEN MANURE AND STRAW TO SOIL ORGANIC MATTER SUPPLY FOR PRACTICE APPLICATION
Theresa Dannehl, Günter Leithold, Christopher Brock

P05 CHANGES OF SOIL MICROBIAL ACTIVITIES IN ORGANIC AND CONVENTIONAL FARMING SYSTEMS ON SANDY SOILS IN NYÍRSÉG REGION OF HUNGARY
Ibolya Demeter, Marianna Makádi, Tibor Aranyos, Katalin Posta

P06 TENDENCY OF USE OF CONVENTIONAL SEEDS IN ORGANIC PLANT PRODUCTION IN HUNGARY FOR 2004-2012
Anna Divéky-Ertsey, Péter Pusztai, Péter Sztankovszky

P07 VALUE ADDED DIMENSIONS OF URBAN GARDENING: SELECTED CASES FROM THE CZECH REPUBLIC
Barbora Duží, Robert Stojanov

P08 TOWARDS EFFICIENT FERTILIZER USE: SOIL TURNOVER OF ORGANIC FERTILIZERS
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P37 MECHANISED PLANTING INTO MULCH COVERS IN ORGANIC VEGETABLE PRODUCTION
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P38 EFFECT OF MULCHING ON THE WEED INFESTATION AND YIELD OF BEETROOT *(BETA VULGARIS* SSP. *RAPACEAE ATRORUBRA* KRASS)
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15:30 **Coffee break**

16:00 **Plenary Session: Summary and Closing of the Conference**
Dóra Drexler

19:00 **Gala Dinner with Cultural Program**

Saturday, 12 October 2013

Whole Day Excursion to Tokaj Wine Region (arrival back to Eger)

PROGRAM OVERVIEW TABLE

09.10.2013.	ORGANIC POLICY SUMMIT IN THE PARLIAMENT OF HUNGARY, BUDAPEST (see extra program)					
19:30	ICOAS WELCOME RECEPTION IN EGER					
10.10.2013. 08:45	OPENING OF ICOAS					
09:00	PLENARY SESSION: URS NIGGLI – ORGANIC AGRICULTURE IS THE NEW PARADIGM FOR DIVERSITY					
	SESSION A: ORGANIC FARMERS' PERCEPTIONS		SESSION B: ORGANIC ANIMAL HUSBANDRY		SESSION C: PRACTICE ORIENTED RESEARCH I.	
10.00	*E. Rembiałkowska, K. Lipińska-Górka, J. Golba*	ASSESSMENT OF THE ENVIRONMENTAL AWARENESS AND ATTITUDES AMONG THE ORGANIC AND CONVENTIONAL FARMERS IN PODLASKIE VOIVODESHIP	*Marco Horn, Andreas Steinwidder, Walter Starz, Rupert Pfister, Werner Zollitsch*	COMPARING COW TYPES FOR THE OPTIMUM CALVING DATE IN AN ALPINE ORGANIC AND LOW-INPUT MILK PRODUCTION SYSTEM	*Triwidodo Arwiyanto, Bambang Hendro Sunarminto*	APPLICATION OF A FLUORESCENT PSEUDOMONAD INTO POTTING SOIL FOR BETTER PERFORMANCE OF TOMATO SEEDLINGS AGAINST *RALSTONIA SOLANACEARUM*
10.25	*Eszter Kelemen, Geneviève Nguyen, Tiziano Gomiero, Eszter Kovács, Jean-Philippe Choisis, Norma Choisis, Maurizio G. Paoletti, László Podmaniczky, Julie Ryschawy, Jean-Pierre Sarthou, Felix Herzog, Peter Dennis, Katalin Balázs*	FARMERS' PERCEPTIONS OF BIODIVERSITY: RESULTS AND PRACTICAL IMPLICATIONS OF A DISCOURSE-BASED BIODIVERSITY VALUATION PROCESS	*Tamás Csáki, Dóra Drexler*	ON-FARM RESEARCH PROGRAM FOR VARROA CONTROL IN ORGANIC BEEKEEPING	*Perla Kuchtová, Petr Dvořák, Miroslava Hájková, Eva Plachká, Jan Kazda*	THE INFLUENCE OF SEED AND SOIL TREATMENTS ON YIELD OF POPPY (PAPAVER SOMNIFERUM L.) ON ORGANIC FARM
11.00	COFFEE BREAK					
	SESSION A: NOVEL TECHNOLOGIES IN ORGANIC AGRICULTURE		SESSION B: ORGANIC BREEDING AND PROPAGATION		SESSION C: PRACTICE ORIENTED RESEARCH II.	
11.30	*András Jung, Michael Vohland*	HIGH RESOLUTION REMOTE SENSING FOR ORGANIC FARMING	*Stefanie Wolf, Michael Fleck, Sabine Zikeli, Simone Graeff-Hönninger, Wilhelm Claupein*	AGRONOMIC PARAMETERS OF OPEN POLLINATED BROCCOLI GENOTYPES	*Peter von Fragstein und Niemsdorff*	MULTIFUNCTIONALITY OF LIVING MULCH IN ORGANIC VEGETABLE PRODUCTION SYSTEMS
11.55	*Sebastian Grabendorfer*	BIOFUMIGATION IN ORGANIC POTATO PRODUCTION	*David Papp, Magdolna Tóth*	SUITABILITY OF OLD APPLE VARIETIES IN ECOLOGICAL ORCHARDS, BASED ON THEIR RESISTANCE AGAINST APPLE SCAB AND POWDERY MILDEW	*Ezekiel Mugendi Njeru, Luciano Avio, Cristiana Sbrana, Alessandra Turrini, Gionata Bocci, Paolo Bàrberi, Manuela Giovannetti*	ENHANCING MYCORRHIZAL SYMBIOSIS AND PRODUCTIVITY OF FIELD GROWN ORGANIC TOMATO THROUGH CROP AND MANAGEMENT DIVERSIFICATION
12.20	*Michaela C. Theurl, Axel Wirz, Thomas Lindenthal, Stefan Hörtenhuber, Theresia Markut*	SUSTAINABLE DIETS: CLIMATE EFFECTS OF MEALS	*Janice Johnson*	SETTING NUTRITIONAL BASELINES IN ORGANIC WHEAT PRODUCTION THROUGH CHOICE OF GENETIC BREEDING FOUNDATIONS: THE EXAMPLE OF THE *NAM-B1* GENE IN SWITZERLAND	*László Csambalik, Éva Stefanovits-Bányai, Nóra Papp, Anna Divéky-Ertsey*	CHANGES IN ANTIOXIDANT-CAPACITY AND POLYPHENOL CONTENT OF HUNGARIAN TOMATO LANDRACES OVER A GROWING SEASON
13.00	LUNCH					
	SESSION A: ON-FARM RESEARCH, BINDING PRACTICE AND SCIENTIFIC ENQUIRY I.		SESSION B: SUSTAINABLE FOOD SUPPLY CHAINS		SESSION C: AVOIDING HAZARDS, ORGANIC QUALITY CONTROL AND FOOD SAFETY	
14.10	*Ed Garrett, Boglárka Hegedűs, Dóra Drexler*	MANAGING DATA QUALITY IN ON-FARM RESEARCH: THE ADDED VALUE OF MULTIPLE VARIABLES	*Bálint Balázs*	AGRICULTURE SUPPORTED COMMUNITIES: CONSUMER-PRODUCER RELATIONS IN CSAS - EXPERIENCES FROM HUNGARY	*Jana Hajšlová, Věra Schulzová*	AUTHENTICATION STRATEGIES OF ORGANIC CROPS AND ASSESSMENT OF THEIR QUALITY
14.35	*Andás Báldi, Zoltán Elek, Anikó Kovács-Hostyánszki*	A COMPARISON OF BIODIVERSITY ON ORGANIC AND CONVENTIONAL FIELDS IN CENTRAL HUNGARY	*Zsófia Benedek, Bálint Balázs*	THE INDEX OF FOOD RELOCALIZATION IN HUNGARY	*Vanya Manolova, Svetla Kostadinova, Ivan Manolov*	ECONOMIC EFFICIENCY OF FERTILIZATION AND ITS RESIDUAL-EFFECT DURING CONVERSION PERIOD TO ORGANIC FIELD CROP PRODUCTION
15.00	*Ádám Donkó, Péter Török, Orsolya Valkó, Tamás Miglécz, Gábor Zanathy, Dóra Drexler*	COMPARISON OF SPECIES-RICH COVER CROP MIXTURES IN VINEYARDS	*Zoltán Dezsény, Katalin Réthy*	EMERGENCE OF COMMUNITY SUPPORTED AGRICULTURE IN HUNGARY: ATTRIBUTES OF SUSTAINABLE RURAL ENTERPRISES	*Y. V. Singh, S. Gaind, A. K. Saxena*	ORGANIC FARMING IN RICE BASED CROPPING SYSTEM FOR HIGHER PRODUCTIVITY AND BETTER QUALITY OF PRODUCE, SOIL, WATER AND ENVIRONMENT

15.30	COFFEE BREAK					
	SESSION A: ON-FARM RESEARCH, BINDING PRACTICE AND SCIENTIFIC ENQUIRY II.		SESSION B: FARMER EDUCATION		SESSION C: SUSTAINABILITY ASSESSMENT FOR IMPROVING AGRICULTURAL PRACTICE	
16.00	*Orsolya Papp*	QUALITATIVE AND QUANTITATIVE ANALYSIS OF POTATO VARIETIES IN ORGANIC FARMING	*Imre Tirczka, Matthew Hayes, Enikő Prokaj*	DEVELOPMENT OF A VOCATIONAL TRAINING CURRICULA FOR ORGANIC FRUIT AND VEGETABLE PRODUCTION IN HUNGARY	*Lucas Knebl, Guenter Leithold, Christopher Brock*	THE RELEVANCE OF SUBSOIL C AND N FOR THE ASSESSMENT OF CROPPING SYSTEM IMPACT ON SOIL ORGANIC MATTER
16.25	*Stefan Kühne, Uta Priegnitz, Benjamin Hummel, Frank Ellmer*	CONTROL OF COLORADO POTATO BEETLE (*LEPTINOTASARA DECEMLINEATA* SAY) IN ORGANIC FARMING USING BIOLOGICAL INSECTICIDES (AZADIRACHTIN, *BACILLUS THURINGIENSIS* VAR. *TENEBRIONIS* AND SPINOSAD)	*Shukri Fetahu, Esma Velagic Habul, Ivan Manolov, Ardian Maci, Dóra Drexler, Urs Niggli*	ADVANCING TRAINING AND TEACHING OF ORGANIC AGRICULTURE IN SOUTH EAST EUROPE	*Christopher Brock, Günter Leithold*	A REPRODUCIBLE MODEL APPROACH TO HUMUS BALANCING IN (ORGANIC) FARMING SYSTEMS
16.50	*László Radics*	INTERNATIONAL SOCIETY OF ORGANIC AGRICULTURE RESEARCH - ISOFAR				
19.00	WINE TASTING WITH DINNER AT THE TUMMERER WINE CELLAR, NOSZVAJ					
11.10.2013. 09.00	PLENARY SESSION: ANDRÁS SZÉKÁCS – EXTERNAL RISKS, PRACTICAL IMPLICATIONS AND PITFALLS OF ECOLOGICAL AGRICULTURAL PRACTICES AND THEIR RELATION TO FOOD SAFETY					
	SYMPOSIUM: BIODIVERSITY ASSESSMENT ON AGRICULTURAL FARMS					
10.00	*J. K. Friedel, M. Arndorfer, K. Balázs, P. Dennis, S. Eiter, P. Jeanneret, R. Jongman, M. Kainz, G. Lüscher, G. Moreno, M. G. Paoletti, P. Pointereau, J. P. Sarthou, S. Stoyanova, F. Herzog*	FARM MANAGEMENT RELATED INDICATORS FOR BIODIVERSITY, IN ORGANIC AND LOW-INPUT FARMING SYSTEMS IN EUROPE				
10.25	*Sebastian Wolfrum, Norman Siebrecht, Maximilian Kainz, Kurt-Jürgen Hülsbergen*	BIODIVERSITY ANALYSIS REVISED – AN EXAMPLE FROM GERMAN MIXED DAIRY FARMS				
10.50	*Vanessa Geier, Matthias S. Meier*	DEVELOPMENT OF A LIFE CYCLE IMPACT ASSESSMENT METHOD FOR BIODIVERSITY: A CASE STUDY ON WHEAT PRODUCTION IN SWITZERLAND.				
11.15	*Thomas Drapela, Matthias S. Meier, Lukas Pfiffner, Theresia Markut, Christian Schader*	NOVEL METHOD FOR FARMLAND BIODIVERSITY ASSESSMENT ON AGRICULTURAL FARMS				
11.50	COFFEE BREAK					
	SPONSOR SESSION:					
12.10	*Csaba Bódi*	20 YEARS OF HIPP IN HUNGARY				
12.35	*Zoltán Lehoczky*	INTRODUCING SONNENTOR				
13.00	LUNCH					
14.00	POSTER SESSION					
15.30	COFFEE BREAK					
16.00	PLENARY SESSION: SUMMARY AND CLOSING OF THE CONFERENCE, DÓRA DREXLER, ÖMKi					
19:00	GALA DINNER WITH CULTURAL PROGRAM					
12.10.2013.	WHOLE DAY EXCURSION TO TOKAJ WINE REGION (ARRIVAL BACK TO EGER)					
13.10.2013.	OPTIONAL TRANSFER TO BUDAPEST IN THE MORNING					

ABSTRACTS

Oral Presentations

ORGANIC AGRICULTURE IS THE NEW PARADIGM FOR DIVERSITY

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When organic agriculture is described, farmers and consumers often do it with a list of limits and restrictions. For scientists as well, organic is often perceived as being restrictive. However, organic agriculture represents the most advanced example of ecological or eco-functional intensification. Among agro-ecological scientist, ecological intensification is the only viable strategy to feed the world (Tittonell, 2013).

Eco-functional intensification requires diversity across all its dimensions. At the landscape level, diversity results from a mix of natural, semi-natural, intensively and extensively farmed land. On farm land, it is characterized by genetic diversity, species diversity and diversity of farm activities. Beyond the farm gate, diversity includes processing, distribution, consumption and disposal of food. It can be the variety of tastes, the qualities of foods, the variety of food processing technologies, the diversity of relationships between companies, producers and consumers and the variety of purchasing and eating habits.

Uniform production goals, high input levels and the pressure of the economy of scale have harmed diversity on all possible levels. Diversity in all dimensions is the playing field for organic scientists. It will require different strategies of innovation. Social innovation in the form of mutual learning between farmers and novel ways of communication with consumers, both enabled by novel media is one field of research. Ecological innovation is another; encompassing soil fertility building, crop rotation and crop mixture improvements and functional biodiversity and others. It also includes breeding innovation in crops and livestock as this can broaden genetic diversity and enhance resilience. Research on novel technologies that help to manage diverse systems will become relevant. And finally, research is needed on the interdependence between farm and farmstead diversity, food diversity and human health.

References:

Tittonell, P. A. (2013) Farming Systems Ecology. Towards ecological intensification of world agriculture. Inaugural lecture upon taking up the position of Chair in Farming Systems Ecology at Wageningen University on 16 May 2013. Wageningen University. ISBN 978-94-6173-617-8, 40 pages.

ASSESSMENT OF THE ENVIRONMENTAL AWARENESS AND ATTITUDES AMONG THE ORGANIC AND CONVENTIONAL FARMERS IN PODLASKIE VOIVODESHIP

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The aim of the work was to evaluate the environmental attitudes and the environmental awareness of the conventional and organic farmers from the Podlaskie voivodeship. The study has been conducted as a survey among 50 organic and 50 conventional farmers from the area. The results showed that most of the organic farmers presented relatively high level of the environmental awareness, but some of them still weren't conscious of threats resulting from the improper practices at their farms. The knowledge of the conventional farmers about the agricultural sources of pollution was lower compared to the organic farmers. The majority of the conventional farmers had a basic knowledge of the organic farming; only about 25% of conventional farmers had very small knowledge in this topic. This can partly explain low interest of the conventional farmers in converting their farms into organic method: only 16 % of them declared such interest.

It can be concluded that wide education of conventional farmers regarding the impact of agriculture on environment and organic methods of farming is necessary, it is also indispensable to increase the education of the organic farmers in this issue. The support for the organic farmers in the period of transition should be increased via financial help and individual advisory help. In order to increase the local sale of organic food and profitability of the organic production it is necessary to develop consumer awareness and interest, also to promote the organic farms in the Podlaskie voivodeship. By dint of the increased number of the local shops selling organic food the organic farmers could sell more products and gain higher income.

FARMERS' PERCEPTIONS OF BIODIVERSITY: RESULTS AND PRACTICAL IMPLICATIONS OF A DISCOURSE-BASED BIODIVERSITY VALUATION PROCESS

Eszter Kelemen[1], Geneviève Nguyen[2], Tiziano Gomiero[3], Eszter Kovács[1], Jean-Philippe Choisis[4], Norma Choisis[4], Maurizio G. Paoletti[5], László Podmaniczky[1], Julie Ryschawy[4], Jean-Pierre Sarthou[6,7], Felix Herzog[8], Peter Dennis[9], Katalin Balázs[1]

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In agricultural landscapes farmers have a large impact on biodiversity through the management decisions they apply on their fields. Farmers' perception on biodiversity and its values is one of the main factors that can influence their willingness to apply biodiversity friendly farming practices. Thus, a discourse-based, deliberative biodiversity valuation was carried out in three European countries. Focus group methodology was used to explore how organic and conventional farmers perceive biodiversity and how they assess its values.

Our results suggest that farmers' perceptions on biodiversity is strongly embedded in their everyday lives and linked to farming practices. Besides recognising the importance of species and habitat diversity, farmers also acknowledge wider landscape processes and attach value to the complexity of ecological systems. Organic farmers tended to have a more complex and philosophical approach to biodiversity and they were relatively homogeneous in this aspect, while conventional farmers showed larger heterogeneity. Ethical and social values were important for all farmers. Economic value was more dominant in the conventional focus groups.

The discourse based deliberative valuation method is worth applying in relation to biodiversity for two reasons. First, this method is able to reflect the heterogeneity of non-scientist participants and the context in which they are embedded, which both have a great impact on the results of the valuation. Second, deliberation upon the importance of biodiversity makes it possible to understand the competing perceptions on biodiversity and to include different value aspects in the valuation process. The policy oriented consequence of the research can be drawn from the observation that farmers have a strong acknowledgement of ethical and social biodiversity values. This suggests that soft policy tools could also foster pro-biodiversity farming, complementary to mainstream monetary incentives.

COMPARING COW TYPES FOR THE OPTIMUM CALVING DATE IN AN ALPINE ORGANIC AND LOW-INPUT MILK PRODUCTION SYSTEM

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Seasonal, pasture-based milk production systems might be of crucial importance for the future of organic dairy farming (Steinwidder, 2010). In contrast to typical pasture-based milk production regions, the harsher climatic conditions of the Alps require a longer barn feeding period and the commonly used dairy cow types (CT) have not been selected under low-input conditions. Therefore the objective of the present study was to investigate the impact of calving date (CD) on ration composition, productivity and body weight for two Alpine dairy CT. 73 lactations were compared for two contrasting CT, conventional Brown Swiss (BS) and a special strain of Holstein Friesian, selected for lifetime performance (HFL), in a seasonal, low-input system. Calvings were intended to take place between Nov. and Mar. and grazing season lasted from Apr. until Oct. For statistical analysis, CD was expressed relative to the date of turn out to pasture and was included as a co-variable in a mixed model. In comparison to autumn calving, spring calving significantly increased the contribution of pasture to the annual diet (43 and 56 %, resp.) and reduced concentrate consumption (630 and 270 kg, resp.). A significant interaction of CT and CD was found for ECM yield, which decreased for BS when comparing autumn and spring calving (6450 and 5281, resp.), while it remained relatively stable for HFL (5383 and 5284, resp.). However, the larger quantities of concentrates fed to cows calving in autumn, did not reduce mobilisation of body tissues of BS. These results indicate that BS lost its genetic advantage for milk production under spring calving conditions (Veerkamp, 1994). The fact that season of calving did not affect productivity of HFL, suggests that HFL is more suitable to exploit the full economic and ecological advantage of spring calving, while autumn calving might be beneficial for BS.

References:

Steinwidder, A., et al., 2010: Züchtungsk. 82, 241-252
Veerkamp, R.F., et al., 1994: Livest. Prod. Sci. 39, 229-241

ON-FARM RESEARCH PROGRAM FOR VARROA CONTROL IN ORGANIC BEEKEEPING

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Varroatosis as the current bane of the beekeepers is causing the biggest economic damage in the apicultural sector. Varroa mites have a vector role, distributing viruses and weakening bees that become more susceptible to other pathogens as well. Disorientation, robbing, and frame exchanging may transport mites from one colony to another (Oliver, 2011). There are no colonies without mites in Hungary. The infection level increases over time in colonies that are untreated or not managed regularly. The infection level should be kept as low as possible for a sustainable production. Consistent control of varroatosis should be provided without harmful effects such as the occurrence of toxic residues in the hive products. In the technology of organic beekeeping only natural materials are allowed to be used such as essential oils and organic acids. In 2013 within the beekeeping on-farm research program, ÖMKi is collaborating with beekeepers throughout Hungary in comparative trials for testing the efficacy of different types of varroa control treatments and management. The trials are set up in market operations. One essential task of the program is to monitor the infection level systematically with different mite-counting techniques. Throughout the season the different techniques are chosen that are matching with colonies' biological state and environmental conditions such as brood period, temperature, etc. Most of the treatments affect only the foretic mites. Therefore during the season some operations - where it is possible - they generate capped brood less state for treatments. The major part of the mite control is good timing of the closing treatment in the end of the beekeeping season in the brood less period.

References:

Randy Oliver, 2011: Miticides 2011, American Bee Journal February 2011

APPLICATION OF A FLUORESCENT PSEUDOMONAD INTO POTTING SOIL FOR BETTER PERFORMANCE OF TOMATO SEEDLINGS AGAINST *RALSTONIA SOLANACEARUM*

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Bacterial wilt of tomato caused by *Ralstonia solanacearum* is one of the important diseases in this crop. *R. solanacearum* is a soilborne plant pathogen. Host resistance in tomato is limited and the disease is very difficult to control. Preparation of healthy and vigorous seedlings without chemicals is needed for organic tomato production in the greenhouse. Steam sterilized and non-sterilized potting soils were infested separately with a water suspension of strain Pf-20 of *Pseudomonas putida* (30 ml/pot, 10^8 cfu/ml). Every week, rhizosphere population of fluorescent pseudomonad, *Bacillus* spp, and Streptomycetes were plated on King'S B medium + 100 pm cycloheximide, Yeast extract Peptone Dextrose medium, and Yeast Extract Water medium, respectively. At four weeks after sowing, the treated plants were inoculated with a water suspension of highly virulent of *R. solanacearum* (30 ml by drenching, 10^8 cfu/ml). The result indicated that the populations of rhizosphere microorganisms were increased after treatment with Pf-20. Two weeks after inoculation with *R. solanacearum*, all plants in sterilized soil + Pf-20 were wilting and dead. However, some plants in non-sterilized soil exhibit healthy appearance, no wilting symptom. There were no differences in the population of microorganisms in the soil except for *R. solanacearum* and fluorescent pseudomonads. The population of *R. solanacearum* in the rhizosphere of survived seedlings was $3X10^5$ cfu/g dry soil while in the soil where all plants died was $2X10^8$ cfu/g dry soil. Meanwhile, the population of fluorescent pseudomonads was two orders of magnitude higher in survived seedling compare with those in the soil where all plants died. The lowest population of *R. solanacearum* in the rhizosphere of survived seedlings indicated that some microorganisms exist and suppressed *R. solanacearum*. It was assumed that fluorescent pseudomonads along with other rhizosphere microorganisms played a role in pathogen population suppression.

THE INFLUENCE OF SEED AND SOIL TREATMENTS ON THE YIELD OF POPPY (*PAPAVER SOMNIFERUM L.*) ON ORGANIC FARM

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Field experiments on poppy seeds (*Papaver somniferum*, L.) cv. Orpheus were carried out on an organic farm in Vlčice (District Jeseník, Czech Republic) in 2011. The aim of this study was to test and verify the influence of seeds and soil treatments by bioagents based on mycoparasitic organisms on the parameters of crop cover, plant health and yield. Seeds of cv. Orpheus harvested in 2010 were used, originating from two growing systems: integrated and organic. Seeds were treated with biological preparations having a fungicidal effect, Gliorex and Polyversum (*Pythium oligandrum*), in accordance with the methodology. Before sowing, soil was treated using Gliorex (mixture of the mycoparasitic fungi *Clonostachys rosea* f. *rosea* and *Trichoderma* sp.), Polyversum and Supresivit (*Trichoderma harzianum*): the preparations mixed with dolomite limestone were applied to the soil surface and incorporated into the soil by harrowing. Vegetation parameters were monitored and recorded during vegetation. Yield and yield components were determined following manual harvesting.

A comparison with the results of the control variant showed that the use of biological preparations with fungicidal effect positively influenced the germination, crop stand integration, and plant health as well as yield. The best results were achieved namely by using the product Gliorex, separately and in combination.

HIGH RESOLUTION REMOTE SENSING FOR ORGANIC FARMING

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Remote sensing techniques have been widely used for farming applications. This technique was mainly dominated by space borne (satellites) platforms. Recent advances in UAV (Unmanned Aerial Vehicles) development have showed high flexibility and mobility in field with similar or better results than satellites achieved before. Unmanned multi-copters can carry optical sensors (like satellites) for spectral, thermal or NIR measurements enabling real-time or near real-time estimations for harvest dates, crop yield, pest and disease occurrence, weed infestation, abiotic stress and much more.
Imaging field spectroscopy is a technique that can provide biochemical measurements without wet chemistry using the spectrum of the sun and the reflectance spectrum of a detected object or surface. An imaging spectrometer can be mounted on a multi-copter to obtain spatial biochemical information (physiology maps) with a ground pixel size of a few centimeters. This tool can help organic farming researchers and farmers better understand the biochemical, physiological or morphological components of their fields without any invasive or destructive analysis. The availability of such field techniques and the growing interest in food quality and field monitoring have speeded up the technology transfer process. At the Leipzig University, Germany, first experiments have been started with national and international partners. This presentation gives an overview of available techniques, trends, future developments and present projects with special attention to organic farming.

BIOFUMIGATION IN ORGANIC POTATO PRODUCTION

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According to an own survey over 80 % of the German organic potato farmers cultivate cover crops. The reasons are not only N_2-fixation or preventing nitrogen leaching but also suppressing plant diseases. In this context also biofumigation is discussed to control phytopathogens. Thereby plants with high contents of glucosinolates are incorporated in the soil to support the development of isothiocyanates (Kirkegaard & Sarwar, 1998). Because there`s barely literature about the usability of biofumigation in organic potato cultivation, this method is tested in field trials in southern Germany for three years with the factor cover crop (*Brassica juncea, Raphanus sativus, Brassica rapa, Vicia villosa*) and incorporation time (autumn , spring). All cover crops were seeded in August 2011 and all potatoes were planted in April 2012. Soil nitrate contents, *Phytophthora infestans* and tuber yields were determined. In the following results of the first year 2012 are presented. Neither the factor cover crop nor the factor incorporation time had a significant effect on *P. infestans* (mean AUDPC 2282) and dry matter tuber yields (mean 4.2 t ha^{-1}). Both factors had a significant effect ($p < 0.01$) on the soil nitrate content 20 days after planting: autumn 172 kg N ha^{-1}, spring 201 kg N ha^{-1} and *B. juncea* 164 kg N ha^{-1}, *R. sativus* 192 kg N ha^{-1}, *B. rapa* 201 kg N ha^{-1}, *V. villosa* 189 kg N ha^{-1}. With rising soil nitrate contents the infestation with *P. infestans* increased and tuber yields decreased ($p < 0.05$). The first year results don`t state an effect of the cover crop or the incorporation time on the potato health and yields. Maybe effects couldn`t be observed due to an early and intensive *P. infestans* disease.

Supported by the Federal Ministry of Food, Agriculture and Consumer Protection (09OE114).

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SUSTAINABLE DIETS: CLIMATE EFFECTS OF MEALS

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In Germany, the food sector contributes to nearly 20 % to total greenhouse gas emissions. Public catering is an increasing market segment and there is a growing tendency to eat out-of-home. However, especially in the area of catering, the impacts on climate change and greenhouse gas emissions (GHGE) are not yet sufficiently clarified. Here, we analyse two standard dishes and compared vegetarian and meat preparation. GHGE were calculated from agricultural production and its upstream supply chain such as production of animal feed or fertilizers, to the canteen kitchen, where the food was prepared and served. Following a LCA (life cycle assessment) approach, we analysed the climate impacts of organic and conventional meat and vegetables and regional versus long-traded fixings. Data from producers and processing companies were collected using questionnaires and interviews. A catering company provided data on food preparation, chill technics, food wastes and energy consumption in the canteen kitchen. Our results show a range for total GHGE of meat dishes from 999 to 1897 g CO_2eq per portion, whereas vegetarian dishes, ranges from 330 to 962 g CO_2eq per portion. Energy consumption from food preparation is a major contributor to total GHGE, with maxima of 30 % in vegetarian to 65 % in meat dishes. Regional vegetables from heated greenhouses had higher GHGE than imported products from Southern Europe. We conclude that a shift in eating habits from meat towards less but high quality organic meat has the highest reduction potential. The choice of seasonal vegetables and products from organic cultivation obtains reduction potentials up to 50 %. The use of green electricity can reduce GHGE considerably. Therefore, depending on specific aims and efforts, food-service companies have several options for environmentally responsible choices in order to reduce the climate impact of their product range and services.

AGRONOMIC PARAMETERS OF OPEN POLLINATED BROCCOLI GENOTYPES

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The ban of CMS-hybrids based on cell fusion by some organic farming associations drew much attention to plants of the *Brassica* family as almost no alternative varieties, e.g. open pollinated (OP) varieties, are available. To meet the needs of commercial organic growers for broccoli varieties well adapted to organic conditions, without depending on conventionally bred broccoli hybrids, an independent breeding program is required.
11 OP genotypes, selected by on-farm breeders of Kultursaat e.V., were screened for their agronomic parameters in comparison with three OP broccoli varieties yet available on the market and five broccoli hybrids which are commonly used by farmers. The screening was carried out at the organic experimental station Kleinhohenheim, University of Hohenheim, Stuttgart, over three cultivation periods (autumn 2011, spring 2012 and autumn 2012) in field trials established using randomized block design. Broccoli was fertilized to a total of 300 kg N ha^{-1} with the organic fertilizer Bioilsa®, consisting of canola cake and milled feathers, directly before planting. Irrigation was used according to the requirements of the plants. 4 broccoli plants per m^2 were planted. Distinct agronomic parameters, like floret weight and screening of floret colour, shape and firmness were measured on three plants per genotype every week starting at the onset of harvesting. The data was statistically analysed using ANOVA (SAS 9.3) with the procedure 'proc mixed'.
Results indicated that some of the OP genotypes showed satisfactory agronomic traits similar to those of the hybrid varieties used in these trials, e.g. 'KSV-TH-CAN-FK-1'. Further selection may focus on the homogeneity of floret inset and floret appearance. This could be an important issue to produce OP broccoli not only for direct marketing but also for the retailers and food processors. Investigations focusing on postharvest quality and sensorial attributes are also necessary.

SUITABILITY OF OLD APPLE VARIETIES IN ECOLOGICAL ORCHARDS, BASED ON THEIR RESISTANCE TO APPLE SCAB AND POWDERY MILDEW

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A resistance breeding program was started in the 90's by the Department of Pomology of the Corvinus University, with the aim of producing new varieties with excellent fruit quality and resistance against several diseases. As part of the program many old apple varieties originating from the Carpathian basin has been collected, and the gene bank of fruit varieties located in Soroksár was established. Several varieties have been collected which could be useful not only for the breeding but also for ecological farming due to their good disease resistance.

Considering that the pesticides permitted in ecological farming have low efficiency compared to the chemicals usable in conventional growing, multiresistant varieties should be highly preferred in bio production.

To evaluate the disease resistance of 10 old varieties against apple scab and powdery mildew, field evaluations were carried out 3 times per year for 4 years. Molecular marker analysis was also carried out, 6 different markers were used for the detection of 3 major scab resistance genes (Rvi2, Rvi4, Rvi6).

The results are suggesting that many old varieties have good field resistance against apple scab and powdery mildew, however the scab resistance could not be explained with the presence of major resistance genes in many cases. This suggests that a few varieties might possess polygenic resistance. The resistance gene Rvi6 could not be found in any old variety while the resistance genes Rvi2, Rvi4 were often detected.

On the basis of the promising results, we hope, following the previous recommendations in our later works, new suggestions can be made in the future concerning to the usability of the old varieties in ecological orchards.

SETTING NUTRITIONAL BASELINES IN ORGANIC WHEAT PRODUCTION THROUGH CHOICE OF GENETIC BREEDING FOUNDATIONS: THE EXAMPLE OF THE *NAM-B1* GENE IN SWITZERLAND

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Organic wheat production currently depends on cultivars from conventional agriculture either through the direct use of conventional seeds admitted for organic wheat production or indirectly *via* the use of suitable conventional germplasm in the breeding of organic cultivars. Wheat breeding in the 20th century focused mainly on yield and industrial processing quality and to a much lesser extent on nutritional quality, the latter playing nevertheless an equally important part in food security. This genetic bottleneck could have triggered erosion of traits not directly promoted by the market, but of potential nutritional importance. An example for this might be the *NAM-B1* gene, shown to be responsible for a higher accumulation of protein, iron and zinc in the wheat grain. Research suggests that it has been lost from the majority of wheat cultivars due to modern selection strategies for higher yield. It is investigated whether this gene loss scenario holds true in Switzerland. Representative landraces, obsolete cultivars from historic Swiss breeding stations, modern conventional cultivars, as well as organic cultivars were selected to be genotyped for the presence of the functional *NAM-B1* allele. While this research is still in progress, preliminary results suggest that the landraces and cultivars historically selected as foundations for breeding in the early 20th century do not carry the functional allele, whereas some landraces from Swiss mountain agriculture have been identified as carriers. The allele has, so far, not been found in organic cultivars and modern conventional cultivars used in organic production. When deciding on genetic foundations for the creation of organic lines, stakeholders of organic wheat breeding systems should therefore take into consideration potential genetic erosion events of nutritional relevance in the history of modern wheat and contemplate whether efforts for reintegration of lost traits ought to be undertaken. Landraces used prior to modern selection and cultivated in marginal environments, such as in the Swiss Alps, potentially carry valuable and diverse nutrition-relevant traits and could play a role in raising genetically-determined nutritional baselines of modern wheat.

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MULTI-FUNCTIONALITY OF LIVING MULCH IN ORGANIC VEGETABLE PRODUCTION SYSTEMS

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The research project as part of Core Organic II aims at studying the cash crop/cover crop intercropping in organic vegetable production systems. Following a multidisciplinary approach, the project will be simultaneously managed to develop and evaluate the potential advantages and disadvantages of intercropping techniques in terms of pest/beneficial interactions, weed and nutrient management (N, P and K, specifically) and their effect on crop growth, yield, product quality, environmental impact and ecological services within the field.
The hypothesis of research is that the introduction and the proper management of intercropping in vegetable production systems would allow comparable yields and produce higher quality in comparison to sole crop systems, reducing the use of external off-farm inputs (i.e. plant protections products and fertilizers) and non-renewable energy consumption (i.e. fossil fuel for mechanical weeding). The cover crop–vegetable cropping systems should then perform better in terms of environmental impact and profitability due to the reduction of production costs.
The project, located in four European countries – IT, DK, SI, DE – is based (a) on plot trials with the field vegetables cauliflower and leek (all non-Italian partners) and cauliflower and artichocke (Italy) - respectively, the response to undersowing-based systems will be investigated in two year trials - (b) in on-farm trials in order to test and demonstrate pest-predator interactions in undersowing-based systems.
The experimental design of the German scientific plot trial combines the investigation of additive and substitutive systems. Both species are tested with three cultivars which belong to hybrids and open pollinating cultvars.
Selected data of first year results of the German partner will be presented.

ENHANCING MYCORRHIZAL SYMBIOSIS AND PRODUCTIVITY OF FIELD GROWN ORGANIC TOMATO THROUGH CROP AND MANAGEMENT DIVERSIFICATION

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Arbuscular mycorrhizal fungi (AMF) associate with the majority of agricultural crops conferring their hosts with nutritional and protective benefits in exchange for photosynthetic carbohydrates. The potential of AMF to improve tomato production and quality has been previously demonstrated in glasshouse experiments although their application in the field remains relatively limited. The present study was conducted in a Mediterranean environment to elucidate the effects of AMF pre-transplant inoculation, tomato genotype and cover crop management on mycorrhizal symbiosis and production of organically managed field grown processing tomatoes. Three tomato cultivars with varying genetic diversity, pre-inoculated with two AMF isolates singly or mixed in the ratio of 1:1, were grown following four cover treatments: Indian mustard (*Brassica juncea* L. Czern.), hairy vetch (*Vicia villosa* Roth), a commercial mixture of seven cover crop species (Mix 7) and no-tilled fallow. Tomato crop was assessed for AMF root colonization, growth, yield quantity, and quality. Moreover, the diversity of the indigenous AMF communities was assessed using spore morphology at the end of cover crop and tomato cycles. Nursery AMF pre-inoculation increased field AMF colonization, which varied significantly based on tomato genotype but not on the preceding cover crop. A rich indigenous AMF biodiversity within 14 genera of Glomeromycota was detected. Most tomato growth, production and fruit quality parameters were significantly affected by the tomato genotype and by the cover crop treatments. Our present findings demonstrate the importance of AMF pre-inoculation and cover crops as fundamental tools that would promote mycorrhizal symbiosis of organically managed field-grown tomatoes.

CHANGES IN ANTIOXIDANT-CAPACITY AND POLYPHENOL CONTENT OF HUNGARIAN TOMATO LANDRACES OVER A GROWING SEASON

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The dietary importance of tomato (*Solanum lycopersicon* L.) is due to its vitamin A, C and E, carotenoid, polyphenol and flavonoid content as the positive effect of these antioxidants on human health seems to be supported by several studies against chronic problems, such as cardiovascular diseases and certain cancer types. As the evolution of these compounds strongly relates to the environment, the overall antioxidant capacity of the fruit is in permanent change. Therefore the aim of this study is to investigate the changes in antioxidant capacity and total polyphenolic content throughout the growing period in order to have a complex picture about the influence of harvesting time on nutritional contents, and, overall, on human health.

Tomato landraces having higher resistance to environmental stress due to their ability to react with the environment by producing different phytoalexins, are likely to have higher capacities for producing ascorbic acid, polyphenols, thiols and other constituents, from which the human body can also benefit.

For this study eight Hungarian landraces and old varieties were produced organically together with two recent commercial varieties in open-field conditions in 2012; over the growing season ten harvests were conducted weekly from mid-July until September. Landraces are grouped according to the shape and size of fruit i.e. cocktail, fresh consumed, pepper shaped and those for canning. Each group is represented by two accessions. The results will confer a better understanding of antioxidant changes in tomato over a growing period, especially in case of Hungarian landraces, which were not studied in such details before. According to the outcome of this study, suggestions can be put forward for the utilization of these forgotten and abandoned accessions *per se* or as breeding materials.

MANAGING DATA QUALITY IN ON-FARM RESEARCH: THE ADDED VALUE OF MULTIPLE VARIABLES

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Practitioners of on-farm research must quantify the larger setting of their studies to maintain validity or risk questioning of the scientific value of results. Although initially considered a cost and burden, the need to validate results provides opportunity for descriptive and scientific study beyond that of the original research goals. When properly managed, these data streams provide added scientific value and an extra benefit for the research institute.

Skeptics of laboratory and even controlled and replicated small plot experiments argue concepts tested or discovered in these conditions cannot work in *the real world*. This criticism has value, as many solutions to practical problems, effective in controlled conditions are known to loose effectiveness or have unpredicted adverse effects when scaled or exposed to natural conditions.

Farmers require greater proof before choosing to test or adopt new management practices, control measures, species or varieties, or even marketing channels. In response to this "*seeing is believing*" attitude in situ or on-farm research holds promise to both demonstrate and investigate viability of proposed practices in real life conditions.

On-farm research allows for demonstrating efficacy of practices by direct use in production fields under typical management in farm conditions. Production of meaningful data from these trials requires rethinking our ideas about conducting research. On-farm research occurs in rich information and knowledge spaces but this is also the weak point of the research. Lacking laboratory control of variables, researchers must standardize quantification of variables to establish comparable results between trials. We explain how this testing promotes greater understanding of the total farm context leading to new marketable opportunities.

A COMPARISON OF BIODIVERSITY ON ORGANIC AND CONVENTIONAL FIELDS IN CENTRAL HUNGARY

Andás Báldi, Zoltán Elek, Anikó Kovács-Hostyánszki

Organic farming was introduced to improve food safety and mitigate environmental pollution caused by agricultural activities. The area of farms under organic management is considerable both in Europe and elsewhere. It is often highlighted that as a „side effect", organic farming promotes biodiversity, with usually more species and individuals on organic than on intensively managed fields. Most of these studies, however, were conducted in the intensive agricultural landscapes of Western and Northern Europe. Recent papers showed that farmland biodiversity is significantly different in Central Europe due to different socio-economic history and context. In this presentation we show that organic farming practice is rather similar to the widespread low intensity management in the extensive region of Central Hungary. This is a consequence of low productivity farming and also the lack of resources of farmers to obtain certification as organic farms. The negligible difference in farming is reflected by similar biodiversity of bee, spider and earthworm assemblages in organic and low-intensity fields in this Central European study landscape. Therefore, organic farming is beneficial for biodiversity in the intensive European farmland's landscape and provide „biodiversity islands", however, in the extensive farmlands of Central Europe, organic farming promote similar biodiversity to that by the widespread agricultural management in the region. There is one crucial difference between organic and non-organic farms, however, that products from official organic farms can be sold at the international markets, resulting in more income for farmers. Thus, organic farming may be beneficial in Central Europe to maintain low-intensity farming, however, more effective promotion and support to small family farms to gain organic label are needed.

COMPARISON OF SPECIES-RICH COVER CROP MIXTURES IN HUNGARIAN VINEYARDS

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Intensive agricultural practices of past decades – like mechanical cultivation on steep vineyard slopes – can endanger vineyards. In addition, climate change scenarios predict heavier rainstorms, which can further accelerate soil degradation. Therefore, the use of cover crops in the inter-row has a special importance, particularly on steep slopes. A species-rich cover crop mixture helps not only in preventing erosion and providing easier cultivation, but also has a positive effect on soil structure, soil fertility and ecosystem functions. We began to compose, develop and apply several species-rich cover crop mixtures in the spring of 2012. During the experiments, three species-rich cover crop mixtures (Biocont-Ecovin mixture, mixture of legumes, mixture of grasses and herbs) were compared in vineyards of the Tokaj and Szekszárd wine regions. Each mixture was sown in three inter-rows at each place of the experiment. Besides botanical measurements, yield, must quality, and pruning weight was studied in every treatment. The botanical survey showed which species of the mixtures established successfully and survived the dry year of 2012. We found that cover of weeds was lower in every treatment compared to the unsown control plots, thus, cover crops suppressed the weeds of the inter-rows effectively. Most examined indices of grapevines were not significantly affected by the applied cover crop. However the results show that in our drier climate, every second inter-row sowing is more optimal provided erosion control is not required. The interest of winegrowers shows the importance of the topic, thus we involved other wine regions of Hungary in the experiment in 2013.

AGRICULTURE SUPPORTED COMMUNITIES: CONSUMER-PRODUCER RELATIONS IN ORGANIC BOX SCHEMES - EXPERIENCES FROM HUNGARY

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This article presents the case study of organic box schemes (often without certification) from Hungary, a relatively new sector which gained substantial recognition in recent crisis driven times. Although the new rural development policy has clearly recognised the beneficial existence of community supported agriculture (CSA) and several other short food supply chains, their socio-economic performance is mostly regarded as insignificant. Initiated by the Association of Conscious Customers, the Research Institute of Organic Agriculture and the Environmental Social Science Research Group this study examines the characteristics of farmer-led organic CSAs in Hungary to understand the economic, environmental and social motivations behind running or joining a box scheme. Our findings are based on qualitative interviews with CSA farmers and consumers as well as data from stakeholder meetings where we facilitated a structured vision to action workshop to identify the main mechanisms and strategies of building such alternative food networks. The article presents results on the shaky, non-self-sustaining foundations of CSAs to analyse how they catalyse socio-cultural change to enhance consumer-producer cooperation and regain control over the ways in which food is produced. Previous studies compared retail prices for organic produce with CSA share prices and recorded substantial cost savings for the CSA consumers. Our research found that current share prices of CSA farms do not reflect all of the costs of production, and hence might not be an economically viable approach to sustainable agriculture if CSA farms continue their current pricing strategy. This aspect has not received any attention from scholars and local food advocates who seek examples of sustainable food systems (Hinrichs 2000). The study concludes by pointing at what role box schemes could play in the democratization of the Hungarian food system by providing a model for more profound social transformation.

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THE INDEX OF FOOD RELOCALIZATION IN HUNGARY

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Local and organic food systems are closely intertwined. Many organic farmers use short food supply chains (SFSCs) to market their produce and also, many SFSC farmers adopt organic techniques (usually without certification). Thus, study of local food systems is needed to fully understand impacts, drivers and further potential of organic production.
Local food initiatives are often considered as tools for rural development that may also contribute to food security and sustainability. In spite of a growing body of literature; knowledge on geographical distribution is still sparse. Study of SFSCs has traditions in certain countries, such as US, Australia, UK, Italy, but patterns and processes in Central and Eastern Europe are still mostly unknown. The Index of Food Relocalization (IFR) introduced by Ricketts et al. (2006) is a complex and objective measure to quantify patterns and compare territorial differences. Most components of IFR can be interpreted only within the UK context; therefore we adapted the index for Hungarian application. We focused on indicators of local food production (such as the number of small-scale producers, the ratio of organic producers; number of local food labels, etc.) in all the 19 counties and Budapest to reveal the potential for further development of the local food sector.
Results show that the demand and supply is spatially separated; regions with less favourable conditions for production (such as Budapest region) enjoy the benefits of high consumer demand and also, flourishing NGO activity seems to be important in the development of local food systems. Research outputs may help shape policy in light of the National Rural Development Strategy. International comparison is limited due to local relevance of the composite indicators.

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EMERGENCE OF COMMUNITY SUPPORTED AGRICULTURE IN HUNGARY: ATTRIBUTES OF SUSTAINABLE RURAL ENTERPRISES

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Community Supported Agriculture (CSA) gained increasing attention and experienced rapid growth in the US and Western Europe over the past 25 years as a special form of direct marketing where producers and consumers form an alliance in a relationship based on mutual trust, openness, shared risk and shared rewards. This paper focuses on the development, state and opportunity of CSA in Hungary. In the Central Eastern European (CEE) region socio-economic conditions significantly differ compared with the countries CSA has already spread within, and, as a result, the adoption of CSA principles have led to special characteristics. Using interviews, participant observation and data from stakeholder meetings the paper evaluates Hungarian CSA farms as successful, small-scale mixed horticultural enterprises following organic production practices. The necessary attributes of success as elements of human and social capital are analyzed in the paper. The findings suggest that creative enterprises such as CSA can bring people together through food production and contribute to the emergence of stronger communities. As early adopters and leaders of the paradigm change in the agro-food sector, the interviewed CSA growers are often challenged as they are following not-yet-walked paths, but they have certain attributes which make them distinctive compared with other farmers and enable them to overcome difficulties and become financially viable. However, according to the international literature high profitability of the operation is often not an important priority for CSA farmers relative to other values (Ryan 2013) which stands for the Hungarian stakeholders as well. The conclusion notes that although CSA is not for every producer or consumer, it offers a sustainable opportunity for organic growers with strong communication and community building skills to employ a special niche market.

AUTHENTICATION STRATEGIES OF ORGANIC CROPS AND ASSESSMENT OF THEIR QUALITY

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Organic agriculture has been developing rapidly in the last decade, driven by increasing consumer demand. However, because of the higher prices of the organic products, they might be susceptible to fraud. For this reason, there is an increasing need for analytical methods, which may enable authenticity verification of food from organic farming. A wide range of analytical approaches has been tested for this purpose.
This presentation concentrates on one of the novel methods of food analysis, the metabolomic fingerprinting/profiling based the ambient mass spectrometry employing Direct Analysis in Real Time (DART) ion source coupled with high resolution mass spectrometer (HRMS). It should be noted, that instead of target analysis of individual "quality markers", metabolomics is based on non-target analysis; identification of all compounds occurring in sample metabolome is not necessarily needed in the first phase. The entire data set consisting of instrumental sample "signals" is classified by advanced chemometric techniques. In addition to metabolomic fingerprinting, identification of individual markers can be also conducted in the next step.
Several case studies illustrate the potential of this novel approach to examine food origin. Applicability of this technique will be demonstrated on some case studies based on authentication of tomatoes, peppers, wheat, potatoes, carrot etc. grown under organic, conventional, and low input conditions. The impact of other conditions such as variety, locality or crop year has also been studied.
Relevant databases of metabolomic profiles of well characterised samples should be established to have a larger data set for statistical processing thus obtaining recognition and prediction models.

This study was carried out within the AuthenticFood project (FP7 ERA-Net project no. 249667, CORE Organic II) partially supported by the Ministry of Agriculture of the Czech Republic.

ECONOMIC EFFICIENCY OF FERTILIZATION AND ITS RESIDUAL-EFFECT DURING CONVERSION PERIOD TO ORGANIC FIELD CROP PRODUCTION

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Transformation from conventional production system to an organic one passes through the obligatory period of conversion when the farmers are obliged to apply all restrictions for organic production. Most of the farmers bear losses because of the lower productivity of crops during period of conversion and the additional expenses necessary to be made (certification of production). At the same time their products are realized at the price of conventional crops. The study was based on a long term field fertilizer experiment conducted by the Department of Agrochemistry and Soil Science at the Agricultural University – Plovdiv. Since 2006, fertilization of crops in the rotation was excluded. The aims of the study were to determine the economic effectiveness of fertilization in conditions of conventional production and the residual-effect of fertilization during period of conversion to organic production. The following indicators were used: additional yield (kg/ha), cost of fertilization (BGN/ha), additional income from fertilization (BGN/ha), additional profit from fertilization (BGN/ha), cost-effectiveness of fertilization (%), residual effect of fertilization - additional profit (BGN/ha). The results of the study proved that systematic fertilization before the period of conversion, selection of a suitable rotation, and elimination of the expenses for fertilization generate incomes comparable to incomes accumulated from conventional production - from 1507.75 to 4596.97 BGN/ha.

ORGANIC FARMING IN RICE BASED CROPPING SYSTEM FOR HIGHER PRODUCTIVITY AND BETTER QUALITY OF PRODUCE, SOIL, WATER AND ENVIRONMENT

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Indiscriminate use of mineral fertilizers and pesticides has led to deterioration of the environment and natural resources and poses threats to human health. Studies in Punjab (India) showed that 20% of sampled drinking water in mineral fertilized intensive agriculture areas have nitrate levels above the WHO safety limit and cause increased incidences of blue-baby syndrome and cancer. Interest in organic production systems is increasing and organic production is growing at 20-25% annually in India. With this background, field experiments were conducted during 2003-12 at New Delhi, India where *Basmati* (aromatic) rice was grown in wet season followed by wheat and vegetables like cauliflower, broccoli, cabbage and carrot in winter season. Three crop nutrient practices *viz.* organic, integrated nutrient management (INM) and mineral fertilization were used in these crops. In organic nutrition biofertilizers, vermicompost and farmyard manure (FYM) were applied in combinations. In INM, FYM was supplemented with 90 kg N ha^{-1} through urea. In mineral fertilization, 120 Nha^{-1} was given through urea. Results showed that the rice grain yield was the highest (4.43 to 4.79 t ha^{-1}) under organic management followed by INM (4.31 to 4.42 t) and mineral fertilization (4.02 to 4.24 t). Yield of vegetables and wheat also showed similar trend. Organic produce were profitable when sold ≥ 10 % of market price. Incidence of pest/ disease was lower in organic management. No pesticides residue was found in organic produce and nutrient quality of all the crops was better. Soils under organic management became richer in organic matter, biological activity and soil physical characteristics improved. However, larger quantities of organic matter used in organic systems caused higher methane (CH_4) emission (35 kg ha^{-1}) as compared to mineral fertilization (21 kg ha^{-1}). However, when CO_2 emission (610 g CO_2 kg^{-1} urea) in urea production is taken into consideration, then effect of higher CH_4 flux in organic system is nullified. Nitrous oxide emission was lower in organic (0.52 kg ha^{-1}) compared to mineral fertilization (0.69 kg ha^{-1}). Thus organic farming had lower global warming potential (GWP). Thus, organic farming can be adopted for higher productivity, profitability, pesticide free better quality of produce, water, soil, air and lower GWP.

QUALITATIVE AND QUANTITATIVE ANALYSIS OF POTATO VARIETIES IN ORGANIC FARMING

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An essential step in organic potato production is to choose the right varieties that are suitable for organic farming. So far the organic farmers have been trying to meet the customers' need mainly with organic production of common varieties. The varieties grown under conventional conditions may not always be suitable for organic farming though. From the farmer's point of view resistance is important as well to avoid the risk of viral degradation when re-using the potato seed tubers for coming years' cultivation. Therefore ÖMKi initiated a potato on-farm research program in 2012 to examine the appropriate variety choice and parts of the cultivation technology, which essentially determine the quality. In the first year quantity and quality parameters were examined for six, Hungarian bred resistant varieties (*Balatoni Rózsa, Démon, Hópehely, Katica, Vénusz Gold, White Lady,* with control*: Desirée*) from 12 cooperating eco-farms, which represent 20% of the total eco-potato cultivation area of Hungary. The minimum size of the test parcels was 12 m² for each variety. The plantation and treatment methods were according to the farmer's own method. Quantity and quality assessments were done at the harvest. According to the results, the eco-farms reached the average of 2,78 kg/m² yield in 2012. Out of the nine assessed quality problems Streptomyces, Rhizoctonia and mechanical damages were the most frequently reported ones. The research is continued in 2013 and the goals are based on the results of the trials in 2012.

CONTROL OF COLORADO POTATO BEETLE (*LEPTINOTASARA DECEMLINEATA* SAY) IN ORGANIC FARMING USING BIOLOGICAL INSECTICIDES (AZADIRACHTIN, *BACILLUS THURINGIENSIS* VAR. *TENEBRIONIS* AND SPINOSAD)

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The results of our field studies showed that all tested application strategies were effective to control the Colorado potato beetle. Time-shifted application of neem (NeemAzal T/S) and *Bacillus thuringiensis* var. *tenebrionis* (*B.t.t*.) (Novodor FC) as well as double treatment with *B.t.t.* achieved under optimal weather conditions an effectiveness level of over 80 % and increased yields. Surprisingly, a single application of spinosad (SpinTor) also proved to be very effective (> 80 %) in the three years studied in spite of the difficult study conditions in 2009. Due to lower cost and a high efficacy of Spinosad it is likely farmers would prefer this plant protection product. Considering resistance of the Colorado potato beetle it is recommended to change the insecticides every year.

THE INTERNATIONAL SOCIETY OF ORGANIC AGRICULTURE RESEARCH (ISOFAR)

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- Encouraging conceptual, methodological and theoretical development respecting the ethos of organic agriculture in a systems/inter-disciplinary context;
- Encouraging active participation of users and stakeholders, with their accumulated knowledge and experience in prioritisation, development, conduct, evaluation and communication of research;
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DEVELOPMENT OF A VOCATIONAL TRAINING CURRICULA FOR ORGANIC FRUIT AND VEGETABLE PRODUCTION IN HUNGARY

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In response to the lack of vocational training opportunities in organic production in Hungary, colleagues at SZIE-MKK developed vocational training curricula for organic vegetable and fruit production. The work took place within the framework of the ECOVOC project, an innovation transfer project within the EU Leonardo da Vinci programme. The outcome was a curriculum for a potential 2000-hour, 2-year higher educational vocational training, and two 300-hour adult educational courses in practical organic horticulture (vegetable production and fruit production). The project took place over two years and involved 6 partners from 5 EU countries. The curricula will provide the basis to launch practically-based vocational training courses in organic fruit and vegetable production in Hungary to the target of secondary educated learners (school leavers, career changers and unemployed adults). Focus was on developing training courses with a practical bias as this was seen to be essential for this level of training and for the organic agricultural sector. Partner institutions involved all have experience in teaching ecological agriculture and horticulture at various levels. Countries involved in the project were: Hungary, Netherlands, Spain (Catalan), France and the UK.

ADVANCING TRAINING AND TEACHING OF ORGANIC AGRICULTURE IN SOUTHEAST EUROPE

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Five universities from southeastern Europe have joined the project: „Advancing training and teaching of organic agriculture in South East Europe" (2012-2014), sponsored by the Swiss National Science Foundation (SNSF) and coordinated by the Research Institute of Organic Agriculture FiBL, Switzerland. The project aims to substantially improve training in organic agriculture.

The survey on existing courses in organic agriculture at the partner institutions was the basis for the creation of the new, modern approach to knowledge management in organic agriculture. Two questionnaires, (offered to students from four universities and teachers from 13 universities in the Region) have indicated the need for a two cycles approach: one general, introductory module at BSc level, and one, profound module, adapted to the students profiles at MA level. The teaching materials (books, practicum, E-learning platform, literature) are also discussed in the project, and the following next steps are foreseen:

- Creation of modules on organic agriculture adapted to the BSc level that will be written by the project partners, including a general introduction that will focus on the philosophy and raison d'etre of organic agriculture.
- An interface with e-learning software.
- An International seminar on academic education in organic agriculture, which will be held in 2014 at Tirana University. There, the project partners will present the modules to the university's students. The feedback of the students will then be used to improve the material further.

THE RELEVANCE OF SUBSOIL C AND N FOR THE ASSESSMENT OF CROPPING SYSTEM IMPACT ON SOIL ORGANIC MATTER

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We will present the effect of different tillage systems and crop rotations on topsoil (0-30 cm) and subsoil (30-90 cm) organic matter, observed in the Organic Arable Farming Experiment Gladbacherhof (Schulz et al. 2013) after 14 years. Soil organic carbon (SOC) and soil total nitrogen (STN) changes between 1998 and 2012 were used as indicators. The experiment includes three different crop rotation/fertilization and four tillage treatments in a two-factorial design. Crop rotations correspond to mixed farming (MF), stockless cashcrop farming (SFC) and stockless cashcrop farming with rotational ley (SFL). The different tillage treatments comprise, full inversion tillage at 30 cm (FIT), two layer plow at 15/30 cm (TLP), reduced inversion tillage at 15 cm (RIT), and non-inversion tillage at 15 cm (NIT).
It can be shown that the crop rotations differ significantly in their effect on SOC and STN in the topsoil (0-30 cm). Further, significant SOM changes can be observed in the subsoil, even though they do not differ between treatments. The consideration of subsoil SOM changes therefore makes a quantitative difference in the interpretation of treatments compared to a topsoil-limited evaluation.
Tillage does not show any significant effects on SOC and STN in the topsoil, but influences their dynamics in the subsoil. In particular, SOC and STN decreases could be observed with all reduced tillage treatments, while FIT had no significant SOC change, and even showed a significant STN increase in the subsoil.

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A REPRODUCIBLE MODEL APPROACH TO HUMUS BALANCING IN (ORGANIC) FARMING SYSTEMS

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Humus balances provide a very practice-applicable approach to the assessment of soil organic matter management on farms (Brock et al. 2013). However, most humus balance methods have been developed under conditions of conventional farming, and there is an ongoing discussion on the suitability and /or demand for adaptation of such balances for application in organic farming systems. We present and discuss the improved HU-MOD method (based on Brock et al. 2012) as a fully reproducible approach to the calculation of humus/soil organic matter balances in farming systems. The model takes into account the different frame conditions and is therefore able to calculate humus balances for organic as well as conventional farming systems. Based on test runs in long-term field experiments, we will show that the demand of soils for organic matter to maintain humus levels is linked to net N removal with crop yields, and that the contribution of organic inputs to the supply of humus levels is dependent not only on C mass inputs, but also on N availability in the soil ecosystem.

Against this background, we will further discuss implications of the model results for the application of simplified spread sheet humus balance calculations with sets of static crop-related coefficients.

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EXTERNAL RISKS, PRACTICAL IMPLICATIONS AND PITFALLS OF ECOLOGICAL AGRICULTURAL PRACTICES AND THEIR RELATION TO FOOD SAFETY

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Ecological (organic) agriculture offers produce with no content of synthetic pesticides/metabolites or genetically modified organisms (GMOs) by avoidance of such pesticide preparations and zero tolerance to GMOs. Nonetheless, such drastically reduced content of organic microcontaminants and GMO-free status may be jeopardized by various agro-environmental conditions, including (*i*) widespread environmental pesticide contamination; (*ii*) possible effects of application of biocides for hygienic use; (*iii*) assumed occurrence of natural organic microcontaminants (e.g. mycotoxins); (*iv*) parallel application of organic agricultural practices and genetically modified (GM) crops. Worldwide occurrence of persistent pesticide residues (e.g. chlorinated hydrocarbons) in soil and of water-soluble or leaching pesticide residues (e.g. triazine, choloacetamide and phosphonomethylglycine herbicides) in surface waters may corrupt produce quality in affected regions through microcontaminant adsorption by crop cultivation and irrigation, respectively. Assessment of the possible local or regional role of such residues and their potential effects on food safety requires systematic monitoring of these contaminants in environmental matrices. Environmental or urban application of biocides may affect neighboring agricultural fields. This is of particular importance for organic agriculture as biocide substances, e.g. in mosquito control, may be identical to synthetic agricultural insecticide active ingredients. Mycotoxin contamination appears to be a minor problem in the European Union in organic produce: a recent survey of the European Rapid Alert Systems for Food and Feed indicated only a 0.2% incidence of mycotoxin related cases in organic food in an 8-year sampling regime. In contrast, co-existence of organic agriculture and cultivation of GM crops is crucial and occurs practically impossible due to hybrid formation by cross-pollination affecting produce quality already in the year of cultivation, as indicated in our experiments with insect resistant GM crops producing transgenic Cry toxins related to microbial endotoxins of *Bacillus thuringiensis* varieties, with up to 35% of unintended transegene expression. In addition, a key element in assessing true sustainability of organic agricultural practices is the application rate of fossil fuel.

SYMPOSIUM

BIODIVERSITY ASSESSMENT ON AGRICULTURAL FARMS

Halting the loss of biodiversity and promoting biodiversity are still top ranked issues on the priority lists of future challenges compiled by politics, society, and science. This is also reflected by biodiversity being included as one aspect contributing to global sustainability together with food security and climate change in the conference theme. On the one hand, the intensity of modern agricultural production systems has severe negative effects on biodiversity resulting in monotonous, species-poor agricultural landscapes. On the other hand, an adequate, low-input – and in the best case organic – agricultural production with specific measures such as diverse crop rotations; the ban of synthetic pesticides and mineral fertilizers and the conservation of semi-natural habitats constitutes a major precondition for maintaining, promoting and restoring diverse agricultural landscapes and the associated biodiversity and ecosystem functions.

However, biodiversity is a very complex issue and its measurement is usually difficult, laborious, and expensive – more than many other environmental indicators or measures. The direct measurement of biodiversity, i.e. conducting field surveys for determining species diversity of different groups of plants, animals and other organism groups or habitat diversity, on larger numbers of agricultural farms is usually not feasible because of the required funding and time. Thus, there is a need for feasible, cost- and time-efficient, and at the same time, reliable methods for assessing biodiversity on the farm or even product level. The contributions in this symposium cover very different approaches for analyzing and assessing biodiversity on agricultural farms. The first contribution by Friedel et al. presents a set of management indicators for biodiversity identified and tested in the EU-project BioBio (http://www.biobio-indicator.org). Wolfrum et al. present new statistical tools for analyzing species samples using spider data collected in Bavaria within the EU-project BioBio. Geier and Meier present a novel approach for assessing biodiversity of agricultural production in life cycle assessments (LCA) and the contribution by Drapela et al. is about a novel method for assessing the biodiversity potential of agricultural farms based on the biodiversity effect of farming practices and semi-natural areas.

FARM MANAGEMENT RELATED INDICATORS FOR BIODIVERSITY IN ORGANIC AND LOW-INPUT FARMING SYSTEMS IN EUROPE

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Farming practices are the key to maintaining and restoring farmland biodiversity. Selected farm management indicators, regarded as scientifically sound, practicable and attractive to stakeholders, were tested against species indicators – plants, bees, spiders, earthworms - in various farm types in 12 case studies across Europe. A set of eight farm management indicators was recommended. They reflect the pressure on biodiversity by farm management via energy (*Total Direct and Indirect Energy Input*), intensification (*Expenditure on Inputs*) and nutrient input (*Nitrogen Input; Area with Use of Minerals Nitrogen Fertilizer*), mechanical operations (*Number of Mechanized Field Operations*), pesticide use (*Frequency of Pesticide Use*) and livestock (*Average Stocking Rate; Grazing Intensity*). These indicators can assess the management intensity and overall pressure on species indicators. Indicators for the number of species mostly decreased with increasing intensification. However, these correlations were often insignificant because the relations were not close enough at low intensity level. Additional management related indicators like the number of crops or the average field size were regarded among a set of habitat indicators (Dennis et al. 2012).
Further information on the indicators is summarized in a Guidebook of the project (Herzog et al. 2012).

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BIODIVERSITY ANALYSIS REVISED – AN EXAMPLE FROM GERMAN MIXED DAIRY FARMS

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Agriculture and biodiversity are strongly related. To understand these relations and to develop optimized management or conservation strategies knowledge about species distribution and composition is crucial. Hence species samples are collected for which various diversity measures or multivariate distance measures are calculated. However, these measures have disadvantages like the need to choose an index in advance or misleading mathematical properties. Ordination methods suffer from the reduction of complex information to single measures of distance.
New methods by Pallmann et al. (2012) or Wang et al. (2012) provide tools to avoid those drawbacks and to improve inferences from species samples. We show the application to spider abundance data and discuss the potential for other agro ecological problems.
Data was collected for the EU FR7 project BioBio (www.biobio-indicator.org) in the south of Bavaria. 129 plots were sampled on 8 organic and 8 non-organic mixed dairy farms. Spiders were collected as described by Dennis et al. (2012). For the statistical analysis in R 2.15.2 the package „simboot 0.2-0“ and “mvabund 3.7.0” were used.
Diversity indices only show a difference due to habitat types. Model based analysis however shows significant effects of both management and habitat.

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DEVELOPMENT OF A LIFE CYCLE IMPACT ASSESSMENT (LCIA) METHOD FOR BIODIVERSITY: A CASE STUDY ON WHEAT PRODUCTION IN SWITZERLAND

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Life Cycle Assessment (LCA) has been increasingly used in recent years for calculating and comparing the ecological impacts of agricultural products. However, important environmental impacts of agriculture, such as biodiversity, soil quality, and animal welfare, are inadequately considered within LCAs. Here, we propose a concept for a LCIA method for biodiversity, which assesses biodiversity impacts in three different zones that are characterised by different land use intensities and different biodiversity targets. The three zones comprise natural areas with high biodiversity and low use intensity; rural areas with multifunctional landscapes; and built-up and industrial areas or intensively used agricultural land. The partitioning into these three zones allows the assessment of different biodiversity aspects in a transparent manner. We defined the biodiversity aspects, indicators, and reference situations, in combination with the biodiversity conservation targets relevant for each zone, to assess the biodiversity impacts of wheat production in Switzerland. Through this case study, the applicability of the model was tested and the necessary data quality and data requirements were identified. Characterisation factors that were calculated to describe biodiversity impacts were based on published field studies, which investigated the influence of different agricultural practices on biodiversity within wheat production in the biogeographic context relevant for Switzerland. Differentiation of transformation and occupation impacts was carried out in this study; as has been proposed for the assessment of land use impacts on biodiversity within LCAs. This contribution provides insights into the challenges of conducting LCAs, such as appropriate indicator choice and reference condition. Furthermore, the method demonstrates a new approach to biodiversity assessment within LCAs that allows a more comprehensive environmental assessment of agricultural products along the entire life cycle and enables a biodiversity assessment that is driven by biodiversity conservation targets.

NOVEL METHOD FOR FARMLAND BIODIVERSITY ASSESSMENT ON AGRICULTURAL FARMS

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This contribution presents a novel approach for assessing the potential for farmland biodiversity on agricultural farms. The core of the assessment method consists of 91 parameters covering agricultural practices and the presence and share of semi-natural habitats on farms that are assessed in terms of their impacts on species diversity (species number and abundance) of eleven indicator species groups (soil fauna, soil microorganisms, vascular plants, birds, small mammals, amphibians, spiders, carabid beetles, butterflies, wild bees and grasshoppers). The effectiveness of each parameter in increasing species diversity of each indicator species group was weighted by experts (biologists, ecologists and agronomists) from Austria, Switzerland and Germany. Aggregation to total biodiversity scores for each parameter across all eleven indicator species groups was done on the basis of food-web relationships between the indicator species groups in Austrian agricultural ecosystems. In the course of an assessment, a farm gets a share of these parameter scores according to the practices carried out on the farm. For each farm a biodiversity potential is calculated ranging from 0% to 100%, where 100% would be reached with the highest possible scores for all parameters.
This approach proved to be feasible and efficient for assessing a large number of farms in that it allows for representative conclusions on farming practices and farming systems. It provides plausible results at the farm level but also allows for aggregating results from the level of single farms to the product or regional level. However, the method still needs to be validated in the field and the applicability is currently restricted to Austria. This contribution will give an overview of accomplished assessments and practical aspects on conducting assessments as well as on adopting the method to other regions.

ABSTRACTS

Posters

LEAF BLOWER VAC – AN ALTERNATIVE METHOD TO DECREASE COLORADO POTATO BEETLE (*LEPTINOTARSA DECEMLINEATA* SAY) DAMAGE IN ORGANIC POTATO FIELDS

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The pest assemblage of potato contains a high number of species, but most of these pests cause no significant damage in every field and every year. The Colorado potato beetle (CPB) however, is a ubiquitous and significant pest in all areas, meaning that successful potato growing involves the control of this species. Our study aimed to test the common leaf blower vac as an alternative to the hand collecting of CPB adults and larvae. The time demand, the effectiveness and the leaf destroying effect of the machine was compared to those of hand collecting in 6 Hungarian potato varieties in Gödöllő, Hungary. Although the 6 varieties display different levels of susceptibility to CPB, all of them were accepted by the pest for egg-laying and foraging. We found that the blower vac had a fundamentally lower time demand than hand collecting, but the efficiency was lower: the suction machine could not collect eggs at all, and could hardly remove some of the individuals of last instar larvae from the leaves. It appears that the main targets of this tool are adults and young larvae. None of the methods had a significant leaf destroying effect. Both methods were appropriate to prevent yield loss. Plants of control potato rows (no hand- or blower vac collecting) were destroyed by the first generation of the pest. We have to note that while hand collecting is superselective (only the target pest is removed), the blower vac has the potential disadvantage to remove non-target, beneficial organisms (members of taxa Nabidae, Coccinellidae, Carabidae and Araneae). We consider the blower vac a potentially good control tool against CPB, but better timing and matching the collection to the phenology and activity of the target pest should improve its effectiveness and selectivity.

EDGE EFFECT ON APHID PREDATION RATE IN WINTER WHEAT FIELDS

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Generalist predator assemblages provide a major ecosystem service by consuming herbivore insects in agricultural landscapes. The intensive agriculture, however, leads to the decrease of natural enemy diversity and of biological control potential at local as well as at landscape scales. Therefore there is a need to study the effects of local and landscape scale factors on natural enemies and on their biological control potential in different farmland systems and locations. In this study, we examined how predator diversity and biological control potential was affected by the growing distance from the field edge and how these patterns were modified by the edge type. We selected eight winter wheat fields, four of them with forest edge and four fields adjacent to another cereal field. In each field, four transects were assigned parallel to the field edge at the distances of 0m, 10m, 25m and 50m. Along each transect, two unbaited yellow sticky traps were placed above the vegetation to sample flying predator populations. Along the same transects, the biological control potential was estimated as the predation rate of aphids glued on plastic labels. Along each transect, three plastic labels were placed on the ground to measure predation by ground-dwelling arthropods, and three labels were raised above the vegetation to measure predation by flying predators. The predation pressure on aphids was calculated from the number of aphids removed after 24h. According to our preliminary results the aphid predation rate was significantly higher on the ground than in the higher level of the vegetation, indicating the key role of ground-dwelling predators in aphid control. Therefore, increased density and/or diversity of natural enemies, e.g. carabids and spiders in the wheat fields is highly recommended to enhance biological control potential, which could be supported also by organic or low input management systems, providing favourable habitats.

SEASONAL NODULATION VARIABILITY OF ALFALFA (*MEDICAGO SATIVA* L.) AT DIFFERENT SITES IN ORGANIC FARMING

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Alfalfa (*Medicago sativa* L.) belongs to the significant part of legume pasture and is high-quality forage. In organic farming, it plays a pivotal role in contribution to a soil nitrogen balance. Nodulation of *Medicago* roots seems to vary largely with site conditions and is influenced by various biotic and abiotic factors.

The aim of this study was to evaluate the effect of the site and the time on nodulation of alfalfa in field experiments of organic farming. On six areas with different soil texture (clay content: 12-32%) in south Bavaria in Germany, plants were sampled with the monolith method to a depth of 30 cm. In May, July and August 2011, the yield, the number of nodules per plant, the shape of nodules, the size of nodules and the nodule colour were evaluated. The colour of nodules was described as pink (active), green (senescent) or brown (moribund).

The yield amounted to 8-12 t ha-1. The seasonal development of nodules was recorded at all sites. Simultaneously, the development differed according to the site. The nodule number decreased in time at all sites. The average number of nodules per plant ranged from 1.0 to 17.5. The highest number of nodules per plant was recorded in May, except one site. Cylindrical nodules were most commonly recorded at all sites (26.7-88.3% of plants). The branched nodules were bigger than the cylindrical. The nodule activity depended on photosynthesis supplied by the plant, the senescence of nodules was observed during flowering.

Alfalfa as legume is well known for its low mineral N requirements and high P and K requirements. The effect of soil nutrient supply on nodule creation was recorded as well.

EVALUATION OF METHODS ASSESSING THE BIOCONTROL OF WINTER WHEAT PESTS AS AN ECOSYSTEM SERVICE IN CENTRAL-HUNGARY

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In the absence of many chemical insecticides, successful crop production in organic farms is relying on ecosystem services such as the biocontrol of pests. Several studies have demonstrated that semi-natural habitats can provide this service; however, quantifying the ecosystem service delivered is still a great challenge. Our study aims to enlighten which method is appropriate to assess biocontrol as ecosystem service in organic winter wheat fields in Central Hungary.
General predation and general parasitism levels were estimated using seed cards, plasticine preys, *Calliphora* larvae, *Ephestia* eggs and sentinels of *Oulema* spp. larvae in organic winter wheat fields of Jászdózsa and Jászárokszállás. The *Ephestia* egg masses exposed on wheat plants glued on sandpaper, and the parasitism levels were recorded after 48 hours. To determine the general predation of natural enemies green and natural coloured plasticine preys and *Calliphora* sp. larvae were placed on the ground of wheat fields for 48 hours. Serious and abundant weed species were selected to assess seed predation: the seeds were mixed with soil and were placed in petri dishes. Moreover, seed cards made of sandpaper were exposed at the same locations. *Oulema* larvae were also exposed on wheat leaves with and without gauze exclusion cages. The recorded difference can be related to the ecosystem service. We will quantify the ecosystem service in terms of the loss of the exposed seeds, preys and the leaf damage of winter wheat caused by *Oulema* as well. We expect relationship between ecosystem service levels and density of semi-natural habitats surrounding the studied fields.
These results will be useful to quantify the value of this ecosystem service, and therefore, can provide input for decision making of preserving its sources.

This study is part of the QuESSA project (www.quessa.eu) funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under Grant Agreement n° 311879.

MODELING THE CONTRIBUTION OF GREEN MANURE AND STRAW TO SOIL ORGANIC MATTER SUPPLY FOR PRACTICE APPLICATION

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Green manure and straw are very important inputs for soil organic matter management in organic farming (and beyond). In sustainability assessments, the contribution of green manure and straw to soil organic matter supply usually is rated based on C input and turnover. Yet, the ability of the soil ecosystem to incorporate C is also dependent on N availability. With our contribution we explore this assumption based on modeling and measurements in field and lab experiments. Results from a preliminary survey in the Organic Arable Farming Experiment Gladbacherhof (Schulz et al 2012) show that a model approach that takes into account both C and N fluxes in the soil-plant system yields very good results (relative RMSE=5.08%). The model, an improved version of the HU-MOD (Brock et al. 2012), belongs to the humus-balance family of simple practice-applicable models, and the approach thus may provide valuable information for organic matter management on farms, and for sustainability assessments. Still, the model performance must further be evaluated including more data sets with different site conditions.

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CHANGES OF SOIL MICROBIAL ACTIVITIES IN ORGANIC AND CONVENTIONAL FARMING SYSTEMS ON SANDY SOILS IN NYÍRSÉG REGION OF HUNGARY

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Sustainable agriculture focuses on developing new comprehensive farming practices including management of soil microorganisms and organic farming systems that are safe and environmentally friendly. Different works have shown that organic matter influences the temperature, water- and nutrient-management of the soil, the development of soil structure and the soil fertility. Moreover, microbial biomass produces the available forms of essential nutrients for plants, and it takes part in transformation process of the organic matter, as well. The aim of present research was to determine the dynamics of organic matter and microbiological characteristics of typical sandy soils and meadow type soils in Hungary.
Lands under organic and conventional farming systems of the Research Institute of Nyíregyháza, University of Debrecen were sampled at different sampling times. The studied sandy soils were divided into top and bottom of hill. Samples were taken from 0-30 cm and 30-60 cm depths. Soil samples originated from different soil depth were characterized on the bases of different enzymes activities (invertase and catalase) and other soil parameters (pH, carbon and nitrogen content).
Our results measuring in samples of 2012 year showed that invertase and catalase enzyme activity, and the carbon and nitrogen content had higher values in 0-30 cm depth in each case compared to with 30-60 cm depth. The measured enzyme activities and C, N content of the soils were higher under organic management and on the top of hill, but these parameters of meadow type soils were higher in the conventional samples. The pH_{KCl} measured in depth of 0-30 cm was usually higher in the conventional than in organic samples.
Based on the correlations found between organic matter content, land use and vegetation on the bases of the applied agro-technical procedures and the development of vegetation, the effectiveness of the studied farming systems will be stated.

TENDENCY OF USE OF CONVENTIONAL SEEDS IN ORGANIC PLANT PRODUCTION IN HUNGARY FOR 2004-2012

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High quality seed is the basis of crop production. A fundamental principle in organic farming is the use of seeds produced organically by agricultural operations. The EU-regulation (*Council regulation (EC) No 889/2008*) requests organic seed be used if such seed is available. According the regulation the EU member states maintain an online database in order to facilitate the acquisition of such seeds. Suppliers can enter organically produced seeds and seed potatoes that are available for purchase in this list. The farmers should choose from this supply.

Non-organic seed use is only permitted where an organic alternative is not available. If the farmer wishes to use non-organic seed, he will need to confirm the reasons for doing so. Failure to do this may lead to the organic status of the crop being lost.

The farmer has to sign the reason for permission request.

The reasons could be:

a) no varieties of the crop that the farmer want to grow are registered in the organic seed database.

b) the seed supplier is unable to deliver the seed before sowing despite ordering the seed in reasonable time

c) the variety that the farmer want to use is not available organically and the farmer can demonstrate that none of the organically available varieties are suitable for his/her production.

d) research purposes to test in small-scale filed trials or for variety conservation

Currently in Hungary for many species or varieties there are still not enough organic seed and vegetative propagating material available and, in those cases, the use of non-organic seed and vegetative propagating material is allowed. The competent authority can permit the farmer to use conventional seed.

In our study we collected the applications to use non-organic seed from both organic certification bodies in Hungary from the last eight years 2004 to 2012. The 8492 application were analysed. The variation of number of application, the reasons for application of non-organic seed, the number of species and varieties, and the amount of seeds used were sorted and analysed.

The number of these applications is increasing which is correlated with the changes of the certified area in Hungary. By the species of arable crops the main reason was the “a) no varieties of the crop that the farmer want to grow are registered in the organic seed database”. By the vegetables the main reason was the c) the variety that the farmer want to use is not available organically and the farmer can demonstrate that none of the organically available varieties are suitable for his/her production. The number of varieties was varying by vegetables.

The amount of seed used was difficult to analyse because of the informal answers of the farmers.

VALUE ADDED DIMENSIONS OF URBAN GARDENING:
SELECTED CASES FROM THE CZECH REPUBLIC

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We explore the role of urban gardens managed mainly by nongovernmental organizations and other public initiatives in the Czech Republic as a unique example of the post-communist country. The Czech Republic has a strong tradition of household gardening and allotment gardens for self-provision purposes or school educational gardens. Recently, a vast diversity of gardens have been developing under the management of Environmental Educational Centers which focus on promotion of environmentally friendly and organic ways of gardening.

Based on investigation of selected urban gardens, we created practical typology of gardens while focusing on environmental, educational and innovative dimensions of urban gardens. Then we summarized the basic standards that are needed to fulfill so called "organic" - environmental and climate friendly gardening – within the urban environment. We also compared differences or similarities between "organic" and "environmental" gardens and look for other value added dimensions of urban gardening.

Besides other things, we found valuable perception change towards gardens. Gardening is not carried on just to provide food production, but includes a variety of value-added non-productive functions such as an educational tool, playground or relaxation place. Another important finding is promotion of organic food, invitation of natural elements into garden where „chaos", „wilderness" and the „lie fallow parts" are considered as regular parts of garden. Moreover, gardens could be located everywhere – in small balcony, shoe, baby-car or roof. Application of Internet instruments and GIS application show gardens to be a legitimate element within the urban environment in the 21st century.

TOWARDS EFFICIENT FERTILIZER USE: SOIL TURNOVER OF ORGANIC FERTILIZERS

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Organic vegetable production often depends strongly on fertilizer input from outside the farm. Within the framework of organic farming principles, a goal is the steady reduction of external fertilizer input and their substitution by fertilizers produced on the farm. Fertilization strategies combining basic fertilizers like compost or grass-clover silage that can be produced on the farm with external fertilizers used as additional top-dressing are required.

Applying organic fertilizers to soil affects microbial population and activity. This is of particular importance considering that soil microbes drive nutrient mineralization, a necessary step before nutrients become available for plant uptake. Additionally, the contribution of organic fertilizers may go beyond their nutrient value at the moment of application. Yet much remains unknown about their behavior when applied individually and in combination.

To help understand the effects of different organic fertilizers on N supply, an investigation was carried out using thirteen experimental treatments made up of three basic organic fertilizers, two organic fertilizers for top-dressing, six combination treatments and two different control treatments, mixed with soil from an organic-producing farm. The fertilizers were added in approximate N-equivalent amounts and the trial was set up as a randomized complete block design with four replicates. Nitrogen mineralization and CO_2 evolution were evaluated throughout the incubation. It is hypothesized that compared with the response of each of these fertilizers individually, there may exist a synergistic effect in the combination of basic plus top-dressing fertilizers.

Preliminary results show that grass-clover silage plus Biofert showed a significantly higher CO_2 release than the other fertilizer treatments at 3 days from the fertilizer addition. Final results will be presented at the conference.

ECOSYSTEM SERVICES OF SEMI-NATURAL HABITATS IN SELECTED AREA OF CENTRAL-HUNGARY AS PART OF "QUANTIFICATION OF ECOSYSTEM SERVICES FOR SUSTAINABLE AGRICULTURE" EU-7 RESEARCH PROJECT

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Several studies have demonstrated that semi-natural habitats (SNHs) also provide essential ecosystem services. These habitats provide services in all four categories distinguished since the Millennium Ecosystem Assessment: provisioning, regulating, habitat and cultural services; however, the contribution of the SNHs has not been evaluated simultaneously in all categories yet. Therefore, we aim to quantify these services on the role of SNH in a wide diversity of European cropping and farming systems in an EU FP7 QuESSA project (www.quessa.eu).
In a sample of the main crop production systems across Europe, i.e. in 16 different case studies placed in different agro-climatic zones over 3 years, we will identify the key SNHs according to their potential to provide selected ecosystem services based upon vegetation traits. Moreover, the delivered services will be verified, and the opportunities and trade-offs will be demonstrated. In each case study locally important cropping system will be investigated: in Hungary we evaluate (1) the contribution of natural enemies to reduce populations of certain pests in winter wheat, (2) the pollination efficiency in sunflower and the diversity of key pollinator groups and (3) ecosystem services provided by the soil of the SNHs. We study the mentioned services in fields under conventional and ecological managements.
Our results will be useful for decision makers at local, national and EU levels to preserve the ability of ecosystem services, and generate suitable protection of SNHs. Moreover, it will provide inputs for the monitoring of the implementation of the 2020 Biodiversity Strategy and the CAP 2013-2020.

This study is part of the QuESSA project funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under Grant Agreement n° 311879.

EFFECT OF ESSENTIAL OILS ON MYCOPATHOGENS OF *AGARICUS BISPORUS*

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The control of mycopathogens in mushroom cultivation is based on the usage of very limited chemicals, cultural protection practices and sanitation precautions. Lack of registered chemicals is a problem for mushroom farmers but the residuals of pesticides is another serious issue for mushroom cultivation. Integrated pest management and biological control systems have been used in mushroom cultivation, but the organic farms face many problems.

The main target of the present work is to find natural products which can control the major *Agaricus bisporus* fungal diseases at mushroom farms. In the trial essential oils were used *in vitro* with volatile fraction test. Tested essential oils were *Cinnamonium zeylandicum*, *Citrus aurantium*, *Matricaria chamomilla*, *Mentha spicata*, *Pelargonium graveolens*, *Salvia officinalis*, *Thymus vulgaris* plants' oil. The examined pathogens were *Dactylium dendroides*, *Mycogone perniciosa*, *Lecanicillium fungicola* and *Trichoderma aggressivum* f. *aggressivum.* The effect of essential oils on the growth of a cultivated hybrid variety of *A. bisporus* was also tested.

PDA media were slanted into petri-dishes then inoculated with fungus mycelia and turned down. Into the lid a sterilized paper was laid and sprayed with 500 ul essential oil in 0,01% concentration. As a negative control 500 ul of prochloraz-Mn (0,5g/l) solution was also tested, sterilized distilled water was used as positive control. Every treatment had four replicate. The petri-dishes were incubated at 25°C for 5 days then colony diameters were measured.

Among the tested oils *Cinnamonium, Mentha* and *Pelargonium* proved to be the most effective and completely inhibited the growth of all four mycopathogens. It can be concluded that *Citrus* and *Tyhmus* were not effective in this case. Further research is needed to determine correct application and concentrations, because almost all tested oils inhibited the growth of the cultivated mushroom hyphae as well.

Present research was supported by post-doc research program of the Research Institute of Organic Agriculture (ÖMKi, Hungary).

THE CONTENT OF CAROTENOIDS AND POLYPHENOLS IN PICKLED BELL PEPPER FROM ORGANIC AND CONVENTIONAL PRODUCTION

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Organic food is recognized by consumer as safer than conventional. The raw organic vegetables as well as their preserves are considered as attractive for the consumers. The opinion about organic food is based on the knowledge about the production system used in the organic farms and processing companies. The use of synthetic fertilizers and pesticides is forbidden in organic agriculture. Only the natural fertilizers are allowed. The plant protection is based on natural insect predators and different plants extracts. The sweet pepper is one of the best sources of vitamin C, polyphenols, also carotenoids. Some experiments indicated that fruit and vegetable from organic production contained more antioxidant compounds as polyphenols, carotenoids also vitamin C. Therefore it could be assumed that pickled organic vegetables would also contain more antioxidant compounds than conventional ones despite the processing. In Poland vegetable processing has a long tradition. Two cultivars of bell pepper (Roberta and Berceo) from organic and conventional cultivation have been used in the experiment. The bell pepper fruits were cultivated on two neighboring farms located in Mazovia region. The distance between organic and conventional farms was more that 500 m. The place of bell peppers cultivation was chosen to reduce as much as possible the impact of agricultural variability between experimental farms. The bell pepper fruits were collected in the same stage of maturity in the organic and conventional farms. The processing was the first step of the work (preparing the pickled red pepper) and after that the pieces of pickled red peppers were freeze-dried (to keep their quality) and chemically analyzed. The obtained data show that organic bell pepper contained significantly more total flavonoids, as well as myricetin and quercetin; they also contained more beta-carotene and alpha-carotene than conventional plants. On the other hand conventional bell pepper contained significantly more total phenolic acids, chlorogenic and gallic acids, kaempferol, apigenin, cryptoxantin and cryptoflavin. The examined pepper cultivars were different. The fruits of Berceo cv contained significantly more total phenolic acids, chlorogenic and gallic acids, apigenin and cryptoxantin in comparison to the second examined Roberta cv.

EVALUATION OF WALNUT (*JUGLANS REGIA* L.) LEAF COMPOST AS GROWING MEDIA

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It is essential, that the organic by-products produced in an organic farming system should be recycled entirely to sustain soil fertility. The usage of compost derived from walnut leaves has for a long time been a theme of contention, someone might not use it referring its inhibitory effects on germination and growth, but plenty of people apply it without any revulsion. In our experiments we examined what are the effects of walnut leaf compost, composting circumstances, and the use of compost on white mustard (*Sinapis alba*) as organic test plant. The experiments were carried out under the control of Szent István University, Faculty of Agricultural and Environmental Sciences, Institute of Environmental and Landscape Management, Department of Agro- Environmental Management on the field of Experimental Organic Garden in Gödöllő, Babatvölgy, maintained by GAK Nonprofit Ltd. According to our results we found, that the fresh walnut leaves and the immature (younger than six months) compost has negative effects on the germination and growth of test plant. Nevertheless, 9-10 months composting eliminated these negative effects. At the same time, the influence of nutrients in walnut leaf compost on the test plant was clearly visible. We recommend, that the walnut leaves should not be burnt but be piled up (in November or December) in to a composter bin or simply in a compost heap, then 10 months later (next autumn) we can use the matured compost. To get the best quality compost it is worthwhile to turn it up once or twice.

EFFECTS OF FOLIAR FERTILIZERS ON GRAIN QUALITY BY USING SPAD CHLOROPHYLL METER

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Crop nutrition in organic farming is indispensable for increased agricultural output. We study the importance of plant conditioners (foliar fertilizers) as substances used to enhance crop yields and nutritional quality through replacement of a possible lack of nutrient supply. Additionally the plant's use of soil-supplied nutrients may also be enhanced by these treatments along with the nutritional qualities of their grain. Products that were used in our experiments are all substances applied for increasing crop yields and currently available in trade. On-farm field experiments were conducted in 2013 around Hungary to evaluate the effect of natural foliar fertilizer applications on spelt yield and grain quality. Four different foliar applications and a control field were compared to monitor the efficacy of the treatments. The Minolta SPAD meter, which estimates chlorophyll concentration in leaves, was used as a potential indicator of effect. Data obtained using the SPAD meter were recorded and compared with the grain quality from each treatment and field. The following parameters were analyzed: SPAD indicated chlorophyll content, yield and grain quality (protein-, gluten-, moisture content and falling number). The aim is to see if the leaf total chlorophyll content can be related to grain quality when using foliar fertilizers. In some prior experiments we recognized that foliar applications might change leaf color (greenness). Leaf chlorophyll content (SPAD measurements) and remote sensing techniques (spectral analysis) may allow the early prediction of grain quality. Ongoing work includes correlation of SPAD measurements with estimates provided by remote sensing equipment in our experiments to forecast crop quality.

WATER-USE IN AUSTRIAN ORGANIC AND CONVENTIONAL FOOD SUPPLY CHAINS

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A water-use method was developed to compare an Austrian premium organic product line to a conventional reference. In order to meet the requirements of a LCA approach, system boundaries were expanded, including: 1) Effective or so called 'blue' water demand for irrigation, cleaning, livestock's drinking water, cooling systems in e.g. dairies or for the retailer. 2) 'Green' precipitation water, which is evapotranspirated on farmland. 3) 'Grey' water, which partly integrates an eutrophication potential into the WU. For its derivation, a detailed nitrogen (N) cycle model with various N-inputs and outputs from agricultural production and its upstream and downstream processes was used, as nitrate was detected as the main pollutant in Austrian (ground) water. Co-products from food and feed production or beef from cull cows were also considered.
Most of the overall water demands and the advantages for the organic products are related to grey water. For livestock products, results mainly depend on composition and quantity of the diet needed to produce one unit of product (milk or meat); ultimately, the water demands depend on the grey water content of the feedstuffs used. Water demands of the 220 different products considered in this study show a wide range from 115 to 13,105 litres per kg (organic apple juice to conventional beef meat, respectively). The advantages for overall water demands of organic products as compared to the conventional products from the same regions range from 2 to 25 percent.
Some general differences between results from literature and our study are obvious, such as 1) a higher proportion of grey water and 2) a smaller proportion of green water in our results; 3) additional processes were included. A potential for the reduction of the water demand was identified particularly for grey water by implementing some measures, e.g. greening and catch crops instead of bare fallow or decreasing the input of external production factors (mineral fertilisers).

WEED INFESTATION IN ORGANIC CROPLANDS IN THE SURROUNDINGS OF TARNA STREAM

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For more than 10 years our institute has been carrying out weed surveys in organic arable fields in several regions of Hungary. This paper is based on studies in the surroundings of Tarna stream, on areas of the Tarnamenti-2000 Ltd. ecological farm in spelt, sunflower and corn. The purpose was to obtain an overall view about the weed conditions, the species composition and the weed covering of the examined ecological farm.
This study was started in 2010. We examined 8 fields in this area, 4 spelt, 2 sunflower and 2 corn fields. In every survey, 8 pieces of 1m2 examination areas were assigned randomly three times a year. The average weed covering, the average number of species and total covering were used as parameters. Weed species were classified into the following life cycle categories: winter annuals, summer annuals, biennials, erect perennials and creeping perennials. Statistical analyses were done by SPSS program with 95% confidence level.
On the basis of the results, the average weed covering was around 5% by using single weed harrowing in spelt before harvest, while this value exceeded 10% on the stubble.
In the cornfields the weed cover was higher than spelt fields.
The average weed covering exceeded the critic level (10%). The most species was observed in the sunflower fields. The average level of the covering exceeded the critic level there, like in the maize.
The most dominant weeds were members of summer annuals (eg. *Ambrosia artemisiifolia, Echinochloa crus-galli*) in the maize and sunflower fields. The *Capsella bursa-pastoris, Veronica hederifolia, Consolida regalis, Tripleurospermum inodorum,* and *Ambrosia artemisiifolia* were important species in spelt fields.
Some interesting and uncommon species were also found in these areas e.g. *Chorispora tenella, Epilobium hirsutum* and *Potentilla supina.*
This study is a part of a long-term experiment for studying the weed composition of organic farming. This knowledge is essential for planning a good organic management.

INVESTIGATION OF BIODIVERSITY IN THE APPLE GENE BANK OF THE CORVINUS UNIVERSITY OF BUDAPEST

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The world's apple production is based on only a few dozen varieties. The disadvantage of growing such a small number of varieties is not only the limited choice in the market. In the case of an ecological catastrophe it would also increase the production risks and endanger profitability. In countries with an advanced food culture and growing environmental awareness, the demand for bio fruits and products is also increasing. The proportion of ecological orchards is quite low (1-2%) in Hungary. As regards variety use, there are two possible solutions. One is to introduce new resistant varieties from the national breeding programme into cultivation. The second is to evaluate old local varieties to decide if they could be used in modern production systems.

Our general aim is to characterize the varieties in the apple gene bank of the Corvinus University of Budapest using morphological and genetic markers, and to investigate the biodiversity of the collection. The morphological results are presented in this paper. Three-quarters of the 60 varieties examined were endemic varieties from various regions of the Carpathian Basin. Morphological and biological characterization was performed using the UPOV descriptions. This involved the examination of 56 different characters based on the vegetative and generative traits of the organs. The collection exhibited great genetic diversity. The morphological similarity indexes suggest great distances between the varieties. On the basis of hierarchical cluster analysis, all the varieties differed greatly from the others with the exception of varieties and variety groups which originated from bud mutations. The biodiversity of the varieties used by growers could be maintained or even widened by using the old varieties stored in the gene bank as parents during the breeding process. Old varieties possessing exceptional value and good pest and disease resistance can also be used in organic orchards.

DIVERSITY OF MICROBIAL SYMBIONTS UNDER ORGANIC AND CONVENTIONAL AGRICULTURAL SYSTEMS

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Soil microbial community is a key component of soil functionality and resilience. Soil management can either support or limit the diversity and activity of soil microorganisms. Our aim was to compare the effects of organic and conventional agricultural practice on the diversity and functioning of symbiotic nitrogen fixing bacteria and arbuscular mycorrhizal (AM) fungi.
A pot experiment was designed to compare diversity of symbiotic microbes to host plant and agricultural practice. Soil samples were collected from the organic and conventional plots of a long term field experiment in Martonvásár (Hungary). Soil samples in a 5 dilution MPN (Most Probable Number) method were tested with pea, (*Pisum sativum*) host plants. Pumice as a control media was used. Nodule number of pea plants were determined, *Rhizobium* bacteria were isolated and genetic diversity of isolates were determined by BOX-PCR method. Diversity indexes of isolates (*Shannon index*, *Margalef index* and *Pielou index*) were counted. The parameters of AMF root colonisation were investigated by staining the roots and microscopic analysis using the five class system method.
Pea plants were infected by *Rhizobium* bacteria both from organic and conventional soil samples and from seed surface as well. There were no significant differences in nodule number of different treatments comparing to the control and all of the nodules were active. Diversity indexes (*Shannon; Margalef* and *Pielou*) of *Rhizobium* isolates from pots with organic soil samples were higher, comparing to the conventional.
Number of AMF infective propagules in organic soils was one order of magnitude higher than in soils from conventional tillage. Fungi with the morphology of DSE (dark septate endophyte) were determined only in the soils of conventional farming system. The DSE may indicate an unbalanced status of soil microbiota.
We have concluded that organic agricultural practice may increase abundance and diversity of indigenous symbiotic soil microbial populations.

This research was financially supported by Hungarian Research Institute of Organic Agriculture (ÖMKi).

RESISTANCE OF WINTER WHEAT CULTIVARS TO YELLOW LEAF SPOT PATHOGEN

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Yellow leaf spot (*pyrenophora tritici-repentis* (Died.) Drechsler pathogen) is an economically significant wheat disease in the world. In Russia, it is most common in the North Caucasus, where it was registered in the 80-s for the first time and since then it has been found annually (Kremneva & Volkova, 2007a; Kremneva et al., 2011). Yield losses in the period of strong development of the pathogen can reach 50-60% (Hosford, 1971; Rees et al., 1987).

For the recovery and stabilization of the agroecosystem phytosanitary state it is necessary to raise the selection of resistant cultivars to the proper level that can give the maximum economic benefit.

The purpose of research is to determine the types of resistance to yellow leaf spot pathogen in zoned and promising winter wheat cultivars.

The assessment of 52 winter wheat cultivars for resistance to the pathogen in the field was carried out in 2006-2012. The cultivars were triple seeded on an area of 1 sq. m plots in two variants, one of which served as a control and was protected by fungicides. Inoculation of plants with disease pathogen was carried out by the method of Kremneva et al (2007b). The main criteria for resistance assessment of cultivars to the pathogen were: degree of plant lesion (%) and the area under the curve of disease development (Babayanz *et al.* 1988).

As a result of the field assessment according to the resistance index (Makarov et al, 2003) it was determined that 15 cultivars possessed a high level of race nonspecific resistance, 29 cultivars were with moderate level of race nonspecific resistance, 5 cultivars (or 10%) - with low level of race nonspecific resistance and 3 cultivars were highly susceptible.

Cultivars with a high degree of nonspecific resistance are valuable for their zoning production and in the development of new cultivars as the starting material for resistance to *P. tritici-repentis*.

EVALUATION OF ECOLOGICAL SERVICES SUPPORT IN SLOVAKIA

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Ecological services provide supportive activities and yield results beneficial to the environment and economic, social and cultural benefits to society. Providing of ecological services may be on a voluntary basis or it has to be economically motivated or regulated through legislation.

As the primary elements of the evaluation system there were determined: evaluation questions, evaluation criteria and indicators, mutually consistent and logically correctly concerted. Evaluation phases are structuring, observation, analysis and assessment. The basis for the composition of system and the methodology for evaluation is "intervention logic", which establishes a causal link from the budgetary input via outputs and measures results to reach them.

The most widely applied sub-measure within the measure Agri-environmental payments is Organic agriculture, in which the cumulative terms from 2007 to 2011 include 146 836.89 hectares of agricultural land. At the end of 2011 the cumulative data for overall agri-environmental measures showed that the fulfilment of target values indicator the number of supported farms increased by over 17 % year-on-year. The indicator of total supported area reached 107 %. Organic agriculture as well as other agri-environmental measures has contributed to maintenance of the ecosystem, species and genetic diversity by keeping the imposed ways of land management. Mainly activities implemented within area-related measures have contributed to maintenance and improvement of the quality of agricultural land and water by limitation or exclusion of fertilizers and pesticides use.

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FUSARIUM MYCOTOXIN CONTENT OF SLOVAKIAN ORGANIC AND CONVENTIONAL WINTER WHEAT

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A range of food quality issues need to be managed by organic and other farmers, including the presence of mycotoxins. Many species of *Fusarium* fungi can produce a number of different mycotoxins incl. trichothecenes such as deoxynivalenol, nivalenol and others, e.g. zearalenone. The complete elimination of mycotoxin contaminated commodities is not achievable at this time. The aim is to minimise the occurence of these toxins through good agricultural practices.

The contamination of winter wheat grain by toxins with focus on the genus *Fusarium* was monitored within the years 2009 – 2011 under the official control according to EC Regulation 401/2006 and 178/2010 in the territory of the Slovak Republic. The concentration of deoxynivalenol (DON) was determined by HPLC/DAD detector and concentration of zearalenone (ZON) by HPLC/FLD detector. 165 samples were analyzed from conventional and 24 samples from organic production.

Results of samples analyzed indicate that DON was the most prevalent *Fusarium* toxin. Measured concentrations in positive samples indicate the significant difference between organic and conventional wheat samples. Average concentrations of DON in organic system reached 34.88 $\mu g.kg^{-1}$; 336.04 $\mu g.kg^{-1}$ and 135.05 $\mu g.kg^{-1}$ in 2009, 2010 and 2011. In conventional wheat samples the average concentrations were higher, 158.96 $\mu g.kg^{-1}$; 502.91 $\mu g.kg^{-1}$ and 327.68 $\mu g.kg^{-1}$ in the same years. ZON concentration was also significantly higher in conventional wheat samples. Average concentrations of ZON in conventional samples were 7,01 $\mu g.kg^{-1}$; 14,56 $\mu g.kg^{-1}$ and 6,9 $\mu g.kg^{-1}$, but in organic samples reached lower values, 5,0 $\mu g.kg^{-1}$; 5,18 $\mu g.kg^{-1}$ and 7,0 $\mu g.kg^{-1}$ in 2009, 2010 and 2011. Weather conditions during years significantly influenced contamination of wheat samples. In 2010, excessive rainfalls and colder weather during wheat flowering resulted in higher concentration of DON. That year, also high infestation of wheat ears with *Fusarium* was recorded in the whole Slovak republic.

In the conditions of the Slovak Republic, organic farming contributed to the reduction of mycotoxins in the winter wheat. The most prevalent *Fusarium* toxin was DON. Factors related to the agricultural practice according to EC Regulation 834/2007 can reduce the risk of *Fusarium* toxin contamination. Primary producers should follow the principles to controll the key factors of *Fusarium* toxins contamination, according to recommendation of Commission 2006/583/ES.

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AN ANALYSIS OF ORGANIC SECTOR IN ALBANIAN AGRICULTURE

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The aim of the present research work is to present a descriptive analysis of the structural and productive indicators of the organic and, at large, the whole agriculture sector in Albania. The first part of the paper analyses the economical and social framework of today's Albanian farming, which is still far from the European Union standards. Although organic farming in Albania is not as regulated as it is in the EU, we tried to outline to what extent organic farming can reach a productive and economical perspectives for local development. In the second part of the paper we analysed the situation of the potential of organic farms by means of a SWOT analysis. The strength and weakness points for the farms, together with the possibilities and threats of the organic market pointed out by environmental analysis, are selected with the intention of addressing the main issues and attempting to delineate some peculiar policies and market intervention for overcoming the actual nodal points.

Albania has been and continues to be a typically "agrarian" country, in which over 50% of population lives and works in rural areas, and which has as its major activity, the agricultural sector in which roughly 75-80% of workdays are spent on farms. On the other hand, we find a country which exports 450-500 million Euros worth of agricultural and food products. This amount with 2008 in mind turns out to be approximately in the region of 500 million Euros (MAFCP, 2008). Every year, roughly 25-30% of the food needs are met by imports from overseas markets, which has brought a negative trade balance in this field. With reference to the same source the imports in agricultural and food products have been 10 times as high as the exports. So, Albania is classified under the group of "structurally importing" countries or, in other words, a group of countries which are considered to be the most vulnerable and the most exposed to the current situation and the prospective of price increases and the various turbulences of the international agrarian markets.

The average farm size is in the region of 1,2 ha per household (MAFCP, 2012) that appears to be fragmented into some 1.8-3 million strips of land. Out of a total of 22-23% of the impoverished population or extremely poor strata, 99% of such population dwells in rural areas. So it's logical for such poverty to be dubbed "rural poverty".

It is reasonable to argue that in Albania, as in other countries, there exist the proper conditions for the distribution and commercialization of organic products. This potential should be exploited to the advantage of the future perspective of development of organic agriculture (Leksinaj, 2007). By acting in such a manner we would most likely observe an increase in the export of agricultural products towards the EU countries, taking into account the current problems and the costly certification.

APPLICATION OF ARBUSCULAR MYCORRHIZAL FUNGI (AMF) AND DARK SEPTATE ENDOPHYTES (DSE) IN CULTIVATION OF VEGETABLE

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A majority of terrestrial plants live in mutualistic symbiosis with root-colonizing fungi like arbuscular mycorrhizal (AM) fungi and the so-called dark septate endophytes (DSE). AM fungi e.g. improve the nutrient and water uptake capacity of the plants and increase drought-tolerance. Several important vegetable crops (e.g. pepper, tomato) establish AM. DSE–plant interactions are not as well understood as mycorrhizal interactions, however there are several results showing the positive effect of DSE on host plants. This potential could have especial importance in non-mycorrhizal vegetable crops (e.g. cabbage).
The main aim of our work was to study how inoculation with AMF and DSE affects the biomass of vegetable crops.
The effect was tested in potting experiments. A generalist DSE (*Cadophora* sp.) isolate was chosen to test the effect on cabbage and cucumber. A commercial AM fungal inoculum was used to test the effect of AMF inoculation using pepper and tomato as host plants. The plantlets were grown on plant trays. After harvesting, the dry biomass was measured and the data were analyzed with ANOVA.
There was no significant effect of DSE inoculation on cabbage while the shoot biomass of the inoculated cucumbers was lower than the control. AMF inoculation had negative effect on total biomass of pepper and tomato during the early stage of cultivation.
Although these results suggest that the inoculation with DSE or AM fungi had no or negative effect on biomass of the vegetable crops tested, the effect during later developmental stages and on other factors like drought tolerance cannot be excluded. These will be tested in future experiments.

The work is supported by the Hungarian Research Institute of Organic Agriculture (ÖMKi).

EFFECTS OF BIOFERTILIZERS ON YIELD AND QUALITY OF 'BLUEFRANKISH' GRAPEVINE

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Nowadays, the main task of growers and scientists is to find natural ways of plant breeding and lead environmental friendly agriculture. Biofertilizers have a great potential to achieve this aim but unfortunately there is little information about its application, especially in Eastern Europe and Hungary. For this reason, a foliar nutrition experiment was made to investigate the effect of different biofertilizers (algae product and a biostimulator, contained amino acids) on yield, nutrient uptake and quality parameters of grapevine (*Vitis vinifera* L.).
The study was conducted in 2012 at Noszvaj in North-East Hungary in a 24 years old integrated grapevine plantation cv. 'Bluefrankish'.
All the grapevines received uniform management practices including pruning, fertilizer, insecticide and pesticide applications without irrigation and nutritional management. The grapevines were only sprayed with aqueous solutions of Activator Plus (AP) (a mixture of amino acids (1l/ha) and Organic Green Gold (OGG) containing living microorganisms (*Chlorella vulgaris algae)* ((10l/ha) and unsprayed grapevines were kept as control.
Treatments (application time and doses) were adjusted to the phonological phases of grapevine. Time of application were: at flowering stage (April 30, 2012); fruit setting stage (May 24, 2012); veraison stage (June 18, 2012) and cluster closing stage (July 17, 2012). All the grapevines were thoroughly sprayed using hand held knapsack sprayer. 0.1 hectare was taken as the experimental unit to record the data with three replicates.
In our trial, soil and leaf diagnostic, grape quality measurements and field observations were made to study the effectiveness of applied products in the very droughty conditions in 2012.
Our results pointed out that the applied treatments increased the yield, growing parameters and improved the qualifying inner parameters compared to the control. Used products significantly increased the bunch weight and size. Our leaf diagnostic results also confirmed that the applied biofertilizers had a favourable effect on nutrient uptake of grapevine and resulted vigorous development, greener and healthier leaves despite the unfavourable climatic conditions.

IMPROVED HERBICIDE EFFICACY FOR ORGANICALY GROWN VEGETABLES

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Weeds have a greater impact on crop yields than any other pests. In the past growers have turned to synthetic herbicides because they are the most effective deterrent against weeds. However, demand for organic food is rising, and public sentiment toward synthetic herbicides is increasingly negative. While demand for organic food has grown tremendously throughout the developed world, weed management remains the most significant agronomic problem associated with organic crop production. There is a need and a market for new, natural weed management tools. The objective of this study was to evaluate improved biological and lower-risk herbicides that are appropriate for use by organic growers to provide enhanced weed management in organic agriculture. The efficacy and safety of manuka oil, applied alone and tank-mixed with other organically-acceptable weed control products to control weeds in organic crop production was evaluated and the synergy/additive effect associated with tank-mix applications of manuka oil with currently approved essential oils was observed. Weed control with manuka oil (1%), tank mixed with Green Match Ex (10%), Weed Zap (5%) or Weed Pharm (30%), was superior to weed control with these products used alone. In most cases yields were also superior with tank-mix applications. The synergy/additive effect associated with tank-mix applications of manuka oil with currently approved essential oils has the potential to significantly improve weed management in organic crop production. Developing new natural weed control products with superior weed management properties to control or effectively suppress weeds will help the organic crop production industry remain competitive and sustainable into the future.

EVALUATION OF THE ECOSYSTEM SERVICE POTENTIAL OF SEMI-NATURAL HABITATS IN JÁSZSÁG REGION, CENTRAL HUNGARY

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Organic farming systems often depend on ecosystem services. These essential services are also provided by the semi-natural habitats (SNHs). We, therefore, aim to determine the potential ecosystem services of SNHs. The determination and evaluation are based on vegetation characteristics as well as the abundance of pollinators and natural enemies of pest species.
We selected 18 landscape sectors (LSs) of 1km radius with focal fields of winter wheat or sunflower on outskirt of Jászárokszállás and Jászdózsa, Central Hungary. We randomly selected and sampled SNHs within these LSs grouping into these categories: woody areal elements; woody linear elements; herbaceous linear elements; herbaceous areal element.
The vegetation of SNHs is the basis for provision of many ecosystem services. We will sample it in two scales once a year: (1) the measures of vegetation and functional traits of SNHs; (2) the attributes of the herbaceous layer in 1x5m plots.
Pollinators are sampled using standardized, 10 minutes long transect walks. We designate a transect at the internal and external part of a SNH (50x1.5m each). All individuals of bees, hoverflies and butterflies are recorded. Moreover, we measure the flower abundance in the transects by estimating the number of flower units of each flowering species. Flower abundance and pollinators are sampled 4 times a year.
Natural enemies of insect pests were monitored by using pitfall traps and transparent sticky traps placed in internal and external parts of SNHs.
Pollinator sampling, flower abundance estimation and vegetation sampling are always done on the same internal and external parts of the SNH. Thus, each 50x1.5m pollinator transect includes 2 of the 4 1x5m vegetation plots and 10 of the 20 1x1m flowering abundance plot.

This study is part of the QuESSA project (www.quessa.eu) funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under Grant Agreement n° 311879.

WINTER WHEAT – SEED TREATMENT WITH *CLONOSTACHYS ROSEA*

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The effect of seed treatment of winter wheat (variety Potenzial) with *Clonostachys rosea* was tested in field trials (conventional field) in order to evaluate the possibility of using this means of biological control under field conditions, in organic as well as conventional agriculture. Variants of the experiment: nontreated control, seed treated with *Clonostachys rosea* (a mixture of four strains of *C. rosea*, the biopesticide in wettable powder form, wet application) and, for comparison, seed treated with Celest Extra (fludioxonil + difenoconazole) was also evaluated. The emergence, overwintering, weight and length of plants were evaluated. The health of plants was also observed. The trials followed the results of laboratory and glasshouse experiments and we obtained results, which confirmed the efficacy of tested isolates of *C. rosea* against a few seedborne pathogens of wheat. Depending on the specific experiment, we found seed treatment with *C. rosea* had either no influence on emergence or a positive one, and a positive influence on the length and weight of plants. We have not observed any difference among the varieties concerning plant health; in all three variants, the plants showed no symptoms of disease in any of the experiments. The effect of *C. rosea* on plants was fully comparable with the effect of Celest Extra. These results indicate a real possibility of using biological seed treatment of winter wheat with *C. rosea*.

*S*upported by the Ministry of Agriculture of the Czech Republic, Projects No. QI111C039

FREE RANGE POULTRY RISKS AND RESULTS

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It is highly recommended for all organic farmers to build a complex farming unit. It has to be organised with the whole circle of nutrient in soil – plant – animal system. The total area of this experiment is 6000 m^2 surrounded with physical and electric fence system to keep the predators away and was divided into 5 equal parts as rotation sections. The poultry species and breeds that were invested into the rotation are table and laying chickens. Live weight of the birds was continuously registered in each tests and egg production was recorded in case of laying hens.

Spring shift, was the table chicken test on only one-fifth part of the whole area. The other four parts were utilised with the fodder/horticultural rotation. This test showed that the average growing intensity was only outstripped by only one fifth of the chickens. The preferred ideal growing rate could be reach by only less than 3 percent. Among the tested varieties the best was Yellow Hungarian breed, where 35 percent of the total in this variety could have higher growing rate than the ideal 500g per whole fattening term.

Second shift was started its fattening phase with a limited live weight. The growing rate was higher than first shift's but the slaughter weight was only 60 percent of the spring shift's. After the twelve weeks fattening term roosters were slaughtered and the hens plus 10% roosters were left for over wintering. All the birds could keep their weight wintertime and the egg laying period started early in January and stopped in mid-April. Despite the section being covered with net and the fence and electric fence setup and working, the shift was totally demolished by red fox. This situation resulted in only 1949 eggs from the 97 hens during the whole experiment period's 101 feeding days.

A free range mobile housing system for poultry production could be fitted into a crop rotation, but systematic predator monitoring and control projects has to be set up to provide more effective protection.

AUTHENTICATION AND QUALITY ASSESSMENT OF ORGANIC CARROT

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With regard to a growing concern in organic foodstuffs, the control of their quality and authenticity becomes an urgent issue. In order to have a free and informed choice between organic and conventional foods, an objective assessment of a product quality based on a sound scientific knowledge is needed.
The carrot (*Daucus carota* subsp. *sativus*) is a member of the Umbeliferae family. Carrots are jam-packed with carotenes, particularly beta-carotene, they are also a good source of dietary fiber, manganese, niacin, potassium, vitamin B6 and vitamin C.
The aim of this project was an investigation of the influence of farming conditions on the carrot quality. Carrot varieties Afalon and Cortina were grown at two different localities in Czech Republic. To determine a possible inter-annual variability, the experiments are carried out on crops from two consecutive years (2012 – 2013).
In this two-year pilot study, concerned with classification of organic, integrated and conventional crops, ambient mass spectrometry was employed. The instrumental system consisted of a Direct Analysis in Real Time (DART) ion source and a High Resolution Mass Spectrometer (HRMS). To calculate statistical models, the obtained data (mass spectra) were processed by relevant statistical tools. The highest content of vitamin C (49.5 mg/kg) was found in samples from integrated production. No significant differences in carotenoids content (average levels 240 mg/kg) between varieties and way of farming were found. The ratio of α and β carotene was constant (44:56). The effect of mold infestation by *Alternaria dauci* was investigated; the induction of phytoalexine 6-methoxymelein was observed in organic samples.
DART-MS method enabled differentiation between organic, low input, and conventional samples, the recognition ability of the model obtained by LDA was 92% for crop year 2012. Establishing long-term databases may further help to improve the quality of statistical classification models.

IDENTIFICATION OF PLANTS THAT ACCUMULATE Hg IN THE MOST POLLUTED AREA IN ALBANIA

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Mercury and its compounds are cumulative toxins and in small quantities are hazardous to human health. Currently, phytoremediation is an effective and affordable technological solution used to extract or remove inactive metals and metal pollutants from contaminated soil and water.

The aim of this publication is to assess the environmental impact of mercury disposal to surface soils and local vegetation in the area of a former factory of Soda –PVC in Vlora and to develop the necessary steps for the elimination or minimization of these effect using phytoremedation techniques. Soil and plant samples were analyzed for Hg content using the CV-AAS method. Obtained results showed that the highest Hg concentration was in the samples close to the factory, reaching values of 41.9 mg/kg.

Different plant species growing in the area were collected and analyzed for the Hg content. The results showed that the highest Hg content in the aerial portion were found in *Equisetum arvense* L. plant (14 mg/kg) and the lowest in *Salix babylonica* L. (0.51) mg/kg. The Biologyc Accumulation Factor values showed that the accumulation abbility of a species is not directly related to its level in soil, but with the specific characteristics of the plants.

Plants showed the ability to tolerate and accumulate very high concentration level of mercury present in the Hg contaminated soil.The results can be useful to select species for phytoremedation in the area of PVC – factory of Vlora.

SALE OF ORGANIC FOOD IN SPECIALIST SHOPS IN POLAND

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The aim of the paper is to analyse the structure and range of the organic food offer in specialist shops in Poland and their supply sources. In order to achieve this goal, results of research conducted in 2011 on retail of organic products were presented. It covered 131 specialist shops in the eight largest agglomerations in Poland. The research was funded by the Polish Ministry of Science and Higher Education as part of the research project No NN112 385440 "State and Condition of the Development of the Organic Food Retail".
The majority of the retailers questioned (almost 86%) offered over 100 organic products and nearly 2/5 over 300. About 2/3 provided almost all product groups except meat and sausages. Most products were offered in such groups as herbs, spices and cereals, whereas the fewest articles were provided in eggs, meat and bread.
The retailers were aware that their offers do not entirely meet consumers' expectations. Over 2/3 of the responders indicated that they sometimes lacked certain products in their shops, while nearly 10% answered that they often or very often lacked some wanted articles. In order to explain this situation they indicated narrow suppliers' product range and high prices as reasons for insufficient organic offer. The retailers also assigned some meaning to seasonality of supply and necessity to assure the most complex offer of fresh products possible.
Most retailers (over 92%) wanted to extend the range of organics in future. However, they conditioned their decision on such factors as demand growth, price of organics or wider suppliers' offer. It is worthwhile to mention that they assigned more meaning to determinants of supply character, which resulted from the need for assuring wider offer of organic food in their shops.

ADAPTATION OF GARDENING TO CLIMATE EXTREMES IMPACTS: THE CASE STUDY OF BECVA RIVER BASIN IN THE CZECH REPUBLIC

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We investigated perceptions of climate extreme impacts on household livelihoods including gardening in the region frequently affected by floods. In this study we focus on impacts of extreme hydrological and meteorological events occurring since 1997 to 2012 at selected municipalities in the middle and lower reaches of Becva River and its tributaries and canal. Target area selected is located in the east part of the Czech Republic, which is affected by annual floods or flash floods, heavy rainfalls events and occasionally by mudslides. We apply mixed qualitative and quantitative research methods and case study approach. We conducted in-depths interviews with 22 relevant stakeholders, and 604 door-to-door questionnaires with household residents in high, low and no risk areas in relation to flood occurrence. The population of interest was stratified by the level of the past exposure to floods (two or more times, one time, no exposure) in particular municipalities. Within each stratum a fixed quota of interviews is allocated. We identified a set of household-level coping and adaptation strategies to climate extreme impacts relating with gardening. They depends on risks perception of households members, for some of them annual flooding of gardens and buildings with necessary equipment is not problem, others use couple of adaptation strategies such as terraces construction, water canals building, any weather and landslides risk related insurance purchase, etc.

ON FARM RESEARCH ON THE MANAGEMENT OF ORGANIC APIARIES AND COMPARISON OF CONTROL TOOLS AGAINST VARROA DESTRUCTOR

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In Hungary the apicultural sector has a long tradition, there are over one million conventional colonies in the country, that means the highest colony density per square km in Europe. Transition to organic beekeeping has started in the mid nineties, however only one percent of the conventional beekeepers are certified at present, based on 834/2007 EU Council Regulation, 889/2008 Commission Regulation and the past present national organic legislation 34/2013 VM (MRD). The purpose of the on farm survey was to get data on the most important management practices (type of hives, number of migration, varroa control) in three counties including 62 apiaries with 5164 colonies. Paralell with the survey we studied the possibilities of Varroa destructor control with accepted materials in the organic system. The aim was to compare methods in experiment under field conditions. The successful varroa control is one key factor of organic operation as well. Results suggest that traditional horizontal hives are over represented in the east part of Hungary (91%). Migration/year varied between 1-5 depending on the region. In the paper the experimental results (three sites in Hungary, with 20 colonies) of thymol and oxalic acid treatments are presented with the efficacy values. The results show that the efficacy varied between 47,9-96,4%. The results suggest that the only thymol based control strategy can ensure a limited (1-3 year) sustainability of the treated colonies concerning commercial organic production. The difference, oxalic acid based control resulted in significantly higher mite mortality. Other technological factors may have important roles in the control strategy against Varroa destructor especially in organic apiculture.

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DEVELOPING FLOWERING STRIPS TO HELP FUNCTIONAL BIODIVERSITY IN PRODUCTIVE AREAS OF EXPERIMENTAL AND RESEARCH FARM OF CORVINUS UNIVERSITY

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The aim of the experiment was to select plant species suitable for ecological conditions of the site that will provide nectar and pollen for beneficials on the productive area of the experiment field of Department of Ecological Farming and Sustainable Production Systems.
12 plots were established in the forest garden with the 9 species in four repetitions, and 3 flowering strips in the vegetable garden with 18 species. There was no irrigation only in the vegetable garden.
Host plant species were evaluated according to flowering period, soil covering, and attractiveness to the beneficials: phenological stages were recorded. Attractiveness to foraging beneficials was assessed by timed observations of feeding-visits. The most promising species were: *Facelia tanacetifolia* L, *Sinapis alba* L, *Centaurea cianus* L, *Fagopyrum esculentum* M. In the second year we focused on species with Hoverfly (Syrphidae) preference. This resulted in an increased number of visitations. Most visited additional host plant species were: *Anethum graveolens* L, *Foeniculum vulgare* L., *Petunia hybrida*, *Hyssopus officinalis* L. Hoverfly species most often visited: *Episyrphus balteatus* De Geer, *Sphaerophoria scripta* L, and *Syrphus ribesii* L.
It was concluded that the position of the flowering plots played an important role in the performance of the species. Shaded narrow strips were not visited often. There was a positive relationship between abundance of beneficials (Syrphidae) and the amount of available floral resources. The higher flower density had positive influence on the number of visits of beneficial insects.
Creating of flowering strips composed from different number (4-9) plant species helped the development of functional biodiversity on the experimental field.

EXTENSIVE FARMING PROMOTES GRASSLAND RECOVERY ON LUCERNE FIELDS

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Spontaneous succession after the cessation of intensive crop production is an economic way of grassland restoration on ex-arable fields with little implementation costs. We studied the spontaneous recovery of loess grasslands in extensively managed lucerne fields (*Medicago sativa*) mown twice a year using space for time substitutions to highlight the importance of spontaneous processes in grassland restoration. With increasing field age a gradual replacement of lucerne by perennial native grasses and forbs and increase of mean species richness was detected. As the age of fields increased, the cover of lucerne decreased considerably, whereas the cover of perennial grasses increased from significantly. Total vegetation cover showed no significant differences between the age groups; weed cover was low in every age group. The biomass of lucerne was negatively correlated with grass biomass. As the age of the fields increased, the biomass of lucerne decreased and that of grasses increased. There was no litter accumulation and no increase of total biomass with increasing field age. Native grasses of loess grasslands recovered within 10 years, but characteristic native forbs remained rare. An advantage of spontaneous succession compared to technical reclamation include that the cover of lucerne decreases with time. In addition, farmers can be more involved in mowing management because of the high forage value of lucerne in the first years.

VOCATIONAL TRAINING IN ORGANIC VEGETABLE AND FRUIT PRODUCTION - SUPPORT FOR IMPROVING ORGANIC FARMING EDUCATION BASED ON INTERNATIONAL COOPERATION (ECOVOC)

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The importance of the organic sector is recognized by the EU action plan on Organic Farming. In Hungary, the new national strategy for agriculture underlines the importance of sustainability, with the need to provide job opportunities and secure living in the countryside and the need to promote local food and food sovereignty whilst protecting the environment. It is essential for this very practical sector that new organic growers are able to receive a practice-oriented vocational training. In the ECOVOC project we focus on the education of farmers, career changers, and secondary school leavers in the field of organic gardening. 5 prominent institutes with different institutional structure brought into the project their own particular area of expertise. A common feature of all partner institutions is their strength in practical and vocational teaching. The main result of our common work is the fully elaborated curriculum in vocational education in organic vegetable and fruit production completed with the collection of pedagogical methodology. In this work our education related activities are discussed and the results of our pilot courses are also presented.

EFFECTS OF VARIOUS SOIL CULTIVATION METHODS IN AREAS EXPOSED TO EROSION

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Soil protection, including erosion prevention, plays a predominant role in tillage systems applied in environment friendly viticultural technologies. In addition to erosion control saving water may become a priority in growing areas of dryer ecological conditions (in some vintages). Lake Balaton Region is also characterized by such ecological features. Nowadays when new stress factors occur caused by climate change as a result of global warming, environment friendly grape growing increasingly highlights the necessity of harmonious nutrient supply, the selection of proper soil cultivation methods adapted to the growing area, the application of purposeful pest management, and the appropriate – not excessive – loading of vines in order to have better chances of producing virus-free merchandise and propagation material of good quality. According to forecasts, climate change will cause more frequent droughts, an increase in temperature and more frequent occurrences of heavy rainfall. Abiotic stress effects due to inappropriate tillage will negatively influence the growth of vines. Mulch and cover plants help protect the soil from erosion and deflation; however the benefits and favourable effects on weed control should not be neglected either. Mechanical soil cultivation carried out using the appropriate cultivation equipment at the right time is equally justified in soil cultivation systems. Long-term cultivation experiments have been carried out at the Badacsony Research Institute for Viticulture and Oenology for almost a decade. In our experiments (with a renewed and increased number of treatments in 2013) soil coverage with organic plant debris, long-term and temporary plant coverage and mechanical soil cultivation are compared in a sloping (peak-to-valley direction) system. Our aim is to examine the effects of different soil cultivation methods on erosion, soil- and plant nutrient supply, harvest parameters, and on soil moisture. We were able to observe the effects of the different soil cultivation methods on erosion protection under high rainfall in 2010 and under less than average rainfall in 2012. Concerning the examined soil cultivation methods, we measured the most favourable soil moisture, nutrient supply condition and harvest results in the rows covered with organic plant debris, every year of the project. It can be stated, that each year, with both temporary and long-term plant covering treatments, less moisture remained in the soil, than at parcels treated with organic plant debris.

Present article was published in the frame of the project TÁMOP-4.2.2.A-11/1/KONV-2012-0064. The project is realized with the support of the European Union, with the co-funding of the European Social Fund.

MECHANISED PLANTING INTO MULCH COVERS IN ORGANIC VEGETABLE PRODUCTION

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Mulching in the context of commercial crop cultivation is a serious challenge especially for the implementation of transplants. Such a machine for combined cutting of mulch covers and appropriate planting of seedlings into the protected soil was developed by SAG-Gesundkost, recently patented, and contracted by the Company Baertschi Perma-Agrartecnic for industrial construction under licence. Examples from first experiences with selected vegetables will be presented.
Key questions of such a system have to be clarified: (a) type of biomass, (b) biomass quantity for sufficient weed suppression and nutrient supply, (c) type of machine for direct planting into a mulch cover, (d) crop performance in reaction to mulches, (e) potential disadvantages of mulching systems. On the other hand effects e.g. prevention of soil erosion, less contamination by soil aggregates and microbes, and additional nutrient and carbon supply are clear indicators of beneficial contributions to cropping systems. Different donor-receiver-systems are studied: (a) donor (D) & receiver (R) are different plots, *grass-clover as part of a rotational system can be used as donor by transferring the swards to the receiver plot*, (b) D & R are the same plot, *D precedes the main crop as green manure without final turning under of biomass, but providing above-ground biomass for mulching*. Material for mulching could be either fresh biomass or fermented biomass for bridging periods of insufficient amounts of biomass as soil cover which is mainly true for spring cultivation. Key factor for the degradation of mulch covers is the C/N ratio and the share of lignification. Key question for realisation in commercial practice is the availability of suitable machines, less for the mulch cover itself by spreading crop harvest from other plots or by rolling and segmenting the precrop of the plot, but for the planting process.

EFFECT OF MULCHING ON THE WEED INFESTATION AND YIELD OF BEETROOT *(BETA VULGARIS* SSP. *RAPACEAE ATRORUBRA* KRASS)

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The aim of this field experiment was to study the effect of two different organic mulches on weed infestation and yield of beetroot.The field experiment was carried out in the period 2010-2011 in the experimental field at University of Forestry – Sofia. Two different mulching materials – barley straw mulch (BSM) and mulch from spent mushroom compost (SMCM) were compared with two control variants – non mulching, but weeding control (WC) and non mulching and non weeding control (NWC). The mulching materials were spread manually in a 5 cm thick layer, at the 3-rd leaf growing stage of beetroot. On the 60th day after mulching the number of weeds in each plot was recorded. It was found that mulching with BSM and SMCM have a significant depressing effect on weeds, especially on *Echinochloa crus-galli* L., *Digitaria sanguinalis* (L.) Scop., *Amaranthus retroflexus* L. and *Galinsoga parviflora* Cav. The yields were increased from 8 to 10 times when the beetroot was grown with mulches, compared with NWC. In comparison with WC the beetroot yield was higher by 7.8-9.3% on plots with BSM, during these two years, and by 22.8% on plots with SMCM for 2010 year. Statistical analyses were performed by using the ANOVA. It was found that growing beetroot by mulching with barley straw or spent mushroom compost reduces weed infestation. The yields obtained in mulching plots with these studied mulches are similar or higher than those of the weeding plots. This indicates that the mulching is suitable for growing beetroot through reduced tillage.

ORGANIC FARMING IN HUNGARIAN VINEYARDS BY SPECIES RICH COVER CROP SEED MIXTURES

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Organic winegrowers do not use synthetically processed herbicides; thus, the development of alternative weed control measures is crucial in organic viticulture. Sustaining soil fertility, promoting soil microbial biodiversity and erosion control are also high priority issues in organic viticulture. Using native cover crops can be a promising solution to fulfil these issues and to improve the biodiversity and sustain ecosystem services in vineyards. Mainly non-native or low diversity seed mixtures are used for cover crop containing some grass, grain or Fabaceae species. We studied vegetation development after sowing high-diversity seed mixtures in 10 vineyards of Tokaj and Szekszárd vine-regions in a multi-site on-farm field trial. We compared the effects of 4 treatments: (i) Biocont-Ecowin mixture (12 species), (ii) Fabaceae mixture (9 species), (iii) Grass-herb mixture (16 species) and control (no seed sowing). Seed mixtures were sown in March 2012 and we surveyed the vegetation in June 2012 in altogether 200 permanent plots. We found that species richness was higher in sown plots, than in control ones which means that most of the sown species germinated and established successfully already in the first year. We found that Biocont-Ecowin and Fabaceae mixtures were the most effective in weed suppression, the cover of weeds were considerably lower in plots sown with these mixtures than in the control ones. We did not observe weed suppression in case of Grass-herb mixture in the first year. Most sown species in this mixture have an autumn germination period, thus for the second year after sowing, higher weed suppression rate is expected. Our trial to develop species rich cover crop in vineyards was successful and our results suggest that cover cropping is an important component in organic winegrowing systems. The farmers involved in the experiment were satisfied with the establishment success of the cover crop mixtures.

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