Hungary-Romania
Cross-Border Co-operation
Programme 2007-2013

Two countries, one goal, joint success!

SOILMAP

Development and evaluation of a complex chemical – physical – microbiological approach for assessing the quality of soils

Project Workshop and Training Course

University of Szeged, Faculty of Science and Informatics (FSI),
Biology Building
Közép fasor 52., Szeged, Hungary
November 25-26, 2011

PROGRAMME AND ABSTRACTS

Edited by:

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European Union
European Regional Development Fund

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SOILMAP

Development and evaluation of a complex chemical-physical-microbiological approach for assessing the quality of soils

Project Training Course

November 25.

9.00-10.00	Registration of the participants
10.00-10.05	Welcome speech, Prof. Dr. Csaba Vágvölgyi, Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
10.05-10.45	Attila Oberschall, „Duo-flow system: a versatile approach for purification and analysis I.“, BioRad Ltd., Budapest, Hungary
10.45-11.15	Dr. Béla Ózsvári, „3D holographic microscopy“ ,Avidin Ltd., Szeged, Hungary
11.15-11.30	Attila Oberschall, „Duo-flow system: a versatile approach for purification and analysis II.“, BioRad Ltd., Budapest, Hungary
11.30-11.45	*Coffee break*
11.45-12.15	Márton Vass, "Microplate reader based fluorescence applications in microbiology”, Auroscience Ltd., Budapest, Hungary
12.15-13.00	Dr. László Galgóczy, „Application of pulsed-field electrophoresis in microbiology”, Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
13.00- 13.30	Attila Stamm, „Image analysis approaches for investigation of microbiological samples”, Auroscience Ltd., Budapest, Hungary
13.30-14.00	*Lunch break*
14.00-16.00	Consultuation of the project lecturers and the training course participants
16.00-16.05	Closing remarks, Prof. Dr. Csaba Vágvölgyi, Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
16.05-19.00	Group meeting: discussion and evaluation of the project results
19.00-22.00	Scientific round table discussion of the training course participants

Project Workshop

November 26.

9.00-9.30	Registration of the participants
9.30-9.35	Welcome speech, Prof. Dr. Csaba Vágvölgyi, Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
9.35-10.00	Dr. János Varga, „Role of soil- and airborne fungi in mycotoxin contamination of agricultural products", Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
10.00-10.30	Enikő Sajben „Ribosomal intergenic spacer analysis after preculturing (RISA-APC), a new method for the investigation of functional bacterial diversity in soil", Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
10.30-11.00	*Coffee break*
11.00-11.30	Prof. Dr. Csaba Vágvölgyi, „The interactions of pesticides with soil microorganisms", Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
11.30-12.00	Dr. Ferenc Somogyvári, „Melting-point analysis: a new approach in the identification of soil-borne bacterial species". Department of Medical Microbiology and Immunbiology, Faculty of Medicine, University of Szeged, Hungary
12.00- 12.30	Dr. András Szekeres, „Modern methods for analysis of pesticide-residues in agricultural samples", FumoPrep Ltd., Mórahalom, Hungary
12.30-13.00	*Lunch break*
13.00-15.00	Consultuation of the project lecturers and the workshop participants
15.00-15.05	Closing remarks, Prof. Dr. Csaba Vágvölgyi, Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
15.05-19.00	Group meeting: discussion and evaluation of the project results

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Participation of the representatives of the project target groups are highly welcomed:

1. *Researchers participating in the project (HU/RO).*
2. *PhD students participating in the project (HU/RO).*
3. *Undergraduate students participating in the project (HU/RO).*
4. *Representatives of associate partners in the project (HU/RO).*
5. *Non-participating scientists with interest to project achievements (HU/RO).*
6. *Non-participating PhD students with interest to project achievements (HU/RO).*
7. *Non-participating undergraduate students with interest to project achievements (HU/RO).*
8. *Farmers in the target (cross-border) region (HU/RO).*
9. *Representatives of SMEs in the target (cross-border) region (HU/RO).*
10. *Representatives of agriculture-connected authorities, official bodies, self-organised organisations in the target (cross-border) region (HU/RO).*
11. *Regional (political) decision makers (HU/RO).*
12. *Representatives of common public with interest to sustainable agriculture, environmental protection and life sciences (HU/RO).*
13. *Representatives of the media*

Participants Registration Pack involves the Project Leaflet (ENG/RO/HU) the Project Brochure (ENG/RO/HU) and the SOILMAP Conference CD with the Abstracts and the PDF files of the lectures presented at the conference.

Două țări, un scop, succes comun!

SOIL*MAP*

Dezvoltarea şi evaluarea printr-o abordare complexă chimică – fizică – microbiologică a calității solurilor

Curs de Instruire

25 Noiembrie

9.00-10.00	Înregistrarea participanților
10.00-10.05	Discurs de „bun venit”, Prof. Dr. Csaba Vágvölgyi, Şeful Departamentului de Microbiologie al Facultății de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
10.05-10.45	Attila Oberschall, „Sistemul Duo-flow: o abordare versatilă a metodelor de purificare şi de analiză I.“ ,BioRad Ltd., Budapest, Ungaria
10.45-11.15	Dr. Béla Ózsvári, „Microscopia holografică 3D“, Avidin Ltd., Szeged, Ungaria
11.15-11.30	Attila Oberschall, „Sistemul Duo-flow: o abordare versatilă a metodelor de purificare şi de analiză II.“, BioRad Ltd., Budapest, Ungaria
11.30-11.45	*Pauză de cafea*
11.45-12.15	Márton Vass, „Aplicatia cititoarelor de microplăci bazate pe fluorescență în microbiologie”, Auroscience Ltd., Budapest, Ungaria
12.15-13.00	Dr. László Galgóczy, „Aplicații ale electroforezei în câmp pulsator în microbiologie”, Departamentul de Microbiologie, Facultatea de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
13.00- 13.30	Attila Stamm, „Abordarea analizei imaginilor în investigarea probelor microbiologice”, Auroscience Ltd., Budapest, Ungaria
13.30-14.00	*Pauza de prânz*
14.00-16.00	Consultarea cu participantii
16.00-16.05	Concluzii şi discuții, Prof. Dr. Csaba Vágvölgyi, Şeful Departamentului de Microbiologie al Facultății de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
16.05-19.00	Întâlnire cu membrii proiectului
19.00-22.00	Masa rotunda, discutii cu participantii

Workshop

26 Noiembrie

9.00-9.30	Înregistrare participanți
9.30-9.35	Discurs de „bun venit”, Prof. Dr. Csaba Vágvölgyi, Şeful Departamentului de Microbiologie al Facultății de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
9.35-10.00	Dr. János Varga, „Rolul ciupercilor din sol şi aer în contaminarea cu micotoxine a produselor agricole”, Departamentul de Microbiologie, Facultatea de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
10.00-10.30	Enikő Sajben, „Analiza spațială intergenică ribozomală după precultura (RISA-APC), o nouă metodă de investigare a diversității bacteriene funcționale în sol”, Departamentul de Microbiologie, Facultatea de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
10.30-11.00	*Pauză de cafea*
11.00-11.30	Prof. Dr. Csaba Vágvölgyi, „Interacțiunea pesticidelor cu microorganismele din sol”, Departamentul de Microbiologie, Facultatea de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
11.30-12.00	Dr. Ferenc Somogyvári, „Determinarea punctului de topire: o nouă abordare în identificarea speciilor de bacterii din sol”, Departamentul de Microbiologie Medicală şi Imunobiologie, Facultatea de Medicină, Universitatea din Szeged, Ungaria
12.00- 12.30	Dr. András Szekeres, „Metode moderne în analiza reziduurilor de pesticide din produsele agricole”, FumoPrep Ltd., Mórahalom, Ungaria
12.30-13.00	*Pauza de prânz*
13.00-15.00	Consultarea cu participantii
15.00-15.05	Concluzii şi discuții, Prof. Dr. Csaba Vágvölgyi, Şeful Departamentului de Microbiologie al Facultății de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
15.05-19.00	Întâlnire cu membrii proiectului

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Participarea reprezentanților grupurilor țintă al proiectului sunt binevenite:

1. *Cercetători care participă la proiect (HU / RO).*
2. *Doctoranzi care participă la proiect (HU / RO).*
3. *Studenți care participă la proiect (HU / RO).*
4. *Reprezentanți ai partenerilor asociați in cadrul proiectului (HU / RO).*
5. *Cercetători interesați de rezultatele proiectului (HU / RO).*
6. *Doctoranzi interesați de rezultatele proiectului (HU / RO).*
7. *Studenți interesați de rezultatele proiectului (HU / RO).*
8. *Fermierii din regiunea transfrontalieră (HU / RO).*
9. *Reprezentanții IMM-urilor din regiunea transfrontalieră (HU / RO).*
10. *Organismele autoritare în domeniul agricol din regiuniea transfrontalieră. (HU / RO).*
11. *Factori regionali de decizie în domeniul agricol (HU / RO).*
12. *Reprezentanți ai comunității regionale cu interes pentru agricultura durabilă, protecția mediului şi ştiințele vieții (HU / RO).*
13. *Reprezentanții mass-media.*

Mapa participantilor conține invitatia proiectului, Brosura (ENG/RO/HU) şi CD-ul Workshop-ului şi a Cursului de instruire cu rezumatele prelegerilor şi prezentările în format PDF.

Két ország, egy cél, közös siker!

SOILMAP

Talajok minősítésére alkalmas, komplex kémiai – fizikai – mikrobiológiai eljárás kifejlesztése és értékelése

Projekt-tanfolyam

November 25.

9.00-10.00	Résztvevők regisztrációja
10.00-10.05	Nyitóbeszéd, Prof. Dr. Vágvölgyi Csaba, tanszékvezető egyetemi tanár, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
10.05-10.45	Oberschall Attila, „Duo-flow rendszer: sokoldalú módszer tisztítás és analízis céljára I.“, BioRad Ltd., Budapest, Magyarország
10.45-11.15	Dr. Ózsvári Béla, „3D holografikus képalkotás“ Avidin Kft., Szeged, Magyarország
11.15-11.30	Oberschall Attila, „Duo-flow rendszer: sokoldalú módszer tisztítás és analízis céljára II.“, BioRad Ltd., Budapest, Magyarország
11.30-11.45	*Kávészünet*
11.45-12.15	Vass Márton, "Mikrotiterlap-leolvasón alapuló fluoreszcenciás alkalmazások a mikrobiológiában”, Auroscience Kft., Budapest, Magyarország
12.15-13.00	Dr. Galgóczy László, „A pulzáltatott mezejű elektroforézis alkalmazása a mikrobiológiában” SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
13.00- 13.30	Stamm Attila, „Képanalízisen alapuló módszerek mikrobiológiai minták vizsgálatára”, Auroscience Kft., Budapest, Magyarország
13.30-14.00	*Ebédszünet*
14.00-16.00	A projekt-tanfolyam előadóinak és részvevőinek konzultációja
16.00-16.05	Zárszó, Prof. Dr. Vágvölgyi Csaba, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
16.05-19.00	Csoporttalálkozó : a projekteredmények összevetése és értékelése
19.00-22.00	A Projekt-tanfolyam résztvevőinek szakmai kerelkasztal-beszélgetése

Projekt Workshop

November 26.

9.00-9.30	Résztvevők regisztrációja
9.30-9.35	Nyitóbeszéd, Prof. Dr. Vágvölgyi Csaba, tanszékvezető egyetemi tanár, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
9.35-10.00	Dr. Varga János, „Talaj- és levegő-eredetű gombák szerepe mezőgazdasági termékek mikotoxin-szennyezettségében”, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
10.00-10.30	Sajben Enikő, „A riboszomális intergénikus elválasztó régió előtenyésztés utáni analízise (*RISA-APC*), mint a talaj funkcionális baktérium-diverzitásának új vizsgálati módszere”, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
10.30-11.00	*Kávészünet*
11.00-11.30	Prof. Dr. Vágvölgyi Csaba, „Peszticidek kölcsönhatása talajban élő mikro-organizmusokkal”, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
11.30-12.00	Dr. Somogyvári Ferenc, „Olvadáspont-analízis: a talajeredetű baktériumfajok azonosításának új módszere”, SZTE ÁOK Orvosi Mikrobiológiai és Immunbiológiai Intézet, Szeged, Magyarország
12.00- 12.30	Dr. Szekeres András, „Peszticid-maradványok mezőgazdasági mintákban történő kimutatásának modern módszerei”, FumoPrep Kft., Mórahalom, Magyarország
12.30-13.00	*Ebédszünet*
13.00-15.00	A Projekt Workshop előadóinak és résztvevőinek konzultációja
15.00-15.05	Zárszó, Prof. Dr. Vágvölgyi Csaba, SZTE TTIK Mikrobiológiai Tanszék, Szeged, Magyarország
15.05-19.00	Csoporttalálkozó : A projekteredmények összevetése és értékelése

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Számítunk az alábbi projektcélcsoportok képviselőinek részvételére:

1. A projekt megvalósításában részt vevő kutatók (HU/RO).
2. A projekt megvalósításában részt vevő PhD-hallgatók (HU/RO).
3. A projekt megvalósításában részt vevő egyetemi hallgatók (HU/RO).
4. A projektben részt vevő társult partnerek képviselői (HU/RO).
5. A projektben részt nem vevő, de a projekt eredményei iránt érdeklődő kutatók (HU/RO).
6. A projektben részt nem vevő, de a projekt eredményei iránt érdeklődő PhD-hallgatók (HU/RO).
7. A projektben részt nem vevő, de a projekt eredményei iránt érdeklődő egyetemi hallgatók (HU/RO).
8. A határmenti célrégió gazdálkodói (HU/RO).
9. A határmenti célrégió kis- és középvállalkozásainak képviselői (HU/RO).
10. A határmenti célrégió mezőgazdasági testületeinek, hivatalainak, önálló szervezeteinek képviselői (HU/RO).
11. Regionális (politikai) döntéshozók (HU/RO).
12. A fenntartható mezőgazdaság, a környezetvédelem és az élettudományok iránt érdeklődő közönség (HU/RO).
13. A média képviselői

A Résztvevők Regsztrációs Csomagja tartalmazza a projekt szórólapját (ENG/RO/HU), brossúráját (ENG/RO/HU), valamint a SOILMAP Projekt-tanfolyamon és Workshopon bemutatott prezentációk absztrakjait és PDF-változatát tartalmazó CD-t.

SOIL*MAP*

Development and evaluation of a complex chemical – physical – microbiological approach for assessing the quality of soils

Project partners: Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
Banat University of Agricultural Sciences and Veterinary Medicine Timişoara, Romania
Cereal Research Non-Profit Co. Ltd., Szeged, Hungary
Office of Pedological and Agrochemical Studies, Timişoara, Romania

Associated partners: Agrarian Chamber of Csongrád County, Szeged, Hungary
Directorate for Agriculture of Timis County, Timişoara, Romania

Project implementation period: 01. 01. 2011. – 31. 05. 2012.

Background

Agricultural soils are natural, living bodies, which change in space and time. Soil protection is a multinational issue. The soils from the cross border region between Hungary and Romania play a major role in the long term sustainability of agriculture in the region. Therefore, there is a need to manage the increasing environmental pressure on agricultural soils (the largest carbon stores) due to changes in climate and land use, applied technologies which enhance the occurrence of soil erosion, organic matter decline, contamination, salinisation, compaction and soil biodiversity losses. These factors are damaging soil microbial life quality which is a common problem in the soils of the cross border region. There is a lack of: a) R+D cooperation in the cross-border region in soil analysis, b) knowledge on the soil microbiological properties, bio-geo-chemical processes and interrelations, c) bioindicators to monitor the soil quality at the cross-border level, and d) data on soil carbon content and soil carbon trends. Soil organic matter (SOM) plays a major role in the carbon cycle of the soil. Soil health is determined by the balance of the living macro- and microorganism. Their qualitative and quantitative assay is required for the application of sustainable (low input) agricultural practices, protection and mitigation of soil adverse effects. Salinisation is a special problem in the cross-border region which is taken in account. A survey of the target group needs and problems was performed and implemented in the project objectives and activities.

Objectives of the project

- to improve the R+D cooperation activities in the cross border area and strengthen the economic cohesion
- to gain knowledge on the soil microbiological properties, bio-geo-chemical processes and interrelations
- to identify microbial bioindicators for the monitoring of soil quality at the cross-border level
- to collect data about soil carbon content and soil carbon trends

Description of the project activities

A soil testing plan will be developed by the project partners. Soils will be selected according to the available traceability records. Sampling will be performed from Hungarian and Romanian wheat field soils, both from intensive and organic production. Some grassland and forest soils will also be sampled as controls. The organic and inorganic matter quantity and quality in soil highly influence the soil structure and stability, water retention, cation exchange capacity, soil ecology and biodiversity. Methodologies will be developed to analyze the soil microbial diversity in relation to the content of organic carbon, other macroelements and polluting heavy metals. Physico-chemical properties of soil samples (pH, texture, compaction, salinity) as well as the biochemical and microbial diversity of the samples will be analysed. Phosphatase, β-glucosidase, cellobiohydrolase, β-xylosidase, trypsin- and chymotrypsin-like protease, lipase and chitinase enzyme activities will be measured. The microbiological analysis protocols target the soil bacterium genera *Pseudomonas*, *Bacillus, Actinomycetes, Azotobacter, Nitrosomonas, Nitrobacter, Paracoccus*, as well as the soil fungal species of *Trichoderma, Aspergillus, Penicillium, Acremonium, Fusarium* and *Zygomycetes*. The diversity of bacteria and fungi is directly linked to the decline of soil biodiversity. General microbial diversity will be assessed by polymerase chain reaction (PCR) based ribosomal RNA intergenic spacer analysis (RISA), while functional diversity investigations will be carried out by multiplex real time PCR with group-specific primer mixtures. The electrophoretic separation of the PCR products will result in soil microbial barcodes. The accumulated chemical, physical and microbiological data will be used to create matrices (soil maps). Furthermore, microbial bioindicators will be identified for the monitoring of soil quality at the cross border level.

Impact of the project

The mid-term impact of the project will be a) the development of a complex chemical – physical – microbiological approach for assessing the quality of soils, b) validation of the new methodology, c) soil maps based on the chemical – physical – microbiological data, d) guidance for decision makers for reducing the negative impact of human activities, e) assistance for development of guidelines for new low input cropping technologies for farmers and f) new training materials for higher education. The long-term impact of the project is the involvement of other regions, cooperation in new R+D project, deepening the international cooperation with project partners having R+D synergy and planned capitalization of the project results by starting the development of soil-specific microbial products based on the soil maps.

SOILMAP

Dezvoltarea şi evaluarea printr-o abordare complexă chimică – fizică – microbiologică a calităţii solurilor

Partenerii proiectului: Departamentul de Microbiologie, Facultatea de Stiințe şi Informatică, Universitatea din Szeged, Ungaria
Universitatea de Ştiințe Agricole şi Medicină Veterinară a Banatului Timişoara, Romania
Institutul de Cercetare pentru Cereale Ltd., Szeged, Ungaria
Oficiul de Studii Pedologice şi Agrochimice, Timişoara, Romania

Partenerii asociaţi: Camera Agrar Csongrád din judet, Szeged, Ungaria
Direcția Agricolă Județeană Timiş, Timişoara, Romania

Punerea in aplicare proiectul perioada: 01. 01. 2011. – 31. 05. 2012.

Context

Solurile sunt resurse naturale, alcătuite din compuşi solizi minerali şi organici, apă, aer şi organisme vii, care se schimbă în timp şi spaţiu, fapt pentru care protecția acestora reprezintă o problemă de interes multinațional. Reprezintând mediul pentru creşterea şi dezvoltarea plantelor solurile din regiunea transfrontalieră, între Ungaria şi România, joacă un rol major în sustenabilitatea pe termen lung a agriculturii din regiune. Prin urmare, este necesar de a cunoaşte şi gestiona presiunea crescândă asupra mediului pe terenurile agricole (cele mai mari depozite de carbon), datorită modificărilor climatice şi utilizarea terenurilor, prin aplicarea de tehnologii care sporesc apariția eroziunii solului, reducerea materiei organice, contaminarea, salinizarea, compactarea şi pierderi ale biodiversității solului. Aceşti factori sunt dăunători calității solului afectând viața microbiană, care este o problem comună pentru solurile din regiunea transfrontalieră. Dar există o lipsă de: a) cooperare R + D în regiunea transfrontalieră în analiza solului, b) a cunoştințelor privind proprietățile microbiologice ale solului, procesele bio-geo-chimice şi interrelațiile dintre acestea, c) a lipsei bioindicatorilor determinați ai echilibrului dintre macro-şi microorganisme şi d) date privind conținutul şi a formelor de carbon din sol. Materia organică din sol (SOM) joacă un rol important în ciclul carbonului din sol. Starea de sănătate a solului este determinată de echilibrul dintre macro-şi microorganisme, analiza lor calitativă şi cantitativă fiind necesară pentru punerea în aplicare a practicilor agricole durabile (input scăzut), protecția şi atenuarea efectelor adverse solului. Deasemenea salinizare este o problemă specială în regiunea transfrontalieră, care este luată în considerare în prezentul proiect. Un sondaj privind nevoile şi probleme grupului țintă a fost realizat şi implementat în cadrul obiectivelor şi activităților proiectului.

Obiectivele proiectului

- îmbunătățirea activităților de cooperare R + D în zona transfrontalieră şi consolidarea coeziunii economice,
- dobândire de cunoştinţe despre proprietățile microbiologice ale solului, procesele bio-geo-chimice şi interrelațiile dintre acestea,
- identificarea unor bioindicatori microbieni de monitorizare a calității solului,
- colectarea de date cu privire la conținutul şi formele de carbon din sol din spațiul transfrontalier.

Descrierea activitatior proiectului

Partenerii de proiect vor dezvolta un plan de testare a solulurilor. Solurile vor fi selectate în funcție de înregistrările disponibile cât şi de trasabilitatea acestora. Prelevarea probelor de sol se va realiza din spațiul maghiar şi român din culturile de grâu, atât din sistemul intensiv cât şi din cel ecologic. Unele soluri de sub păşuni sau vegetație forestieră vor fi folosite ca eşantione de control. Cantitatea de materie organică şi anorganică şi calitatea acesteia din sol influențează structura solului şi stabilitate acesteia, capacitatea de reținere a apei, capacitatea de schimb cationic, ecologia solului şi bineânțeles biodiversitățatea. În raport cu acestea vor fi dezvoltatate metodologii pentru a analiza diversității microbiene din sol, în funcție de conținutul de carbon organic, macroelemente, substanțe poluante şi metale grele. Proprietățile fizico-chimice ale probelor de sol (pH-ul, compactarea, textura, salinitatea), precum şi cele biochimice şi diversitatea microbiană a probelor vor fi analizate. Fosfataza, β-glucozidaza, cellobiohydrolase, β-xylosidase, tripsina-şi protează chemotripsina-cum ar fi, lipazei şi activitățile chitinase ale enzimelor vor fi măsurate. Determinările microbiologic vor avea ca obiective țintă genurile: bacteria *Pseudomonas, Bacillus*, actinomicete, *Azotobacter, Nitrosomonas, Nitrobacter, Paracoccus*, precum şi specii fungice de *Trichoderma, Aspergillus, Acremonium Penicillium, Fusarium* şi *Zygomycetes*, cunoscut fiind faptul că diversitatea de bacterii si ciuperci este direct legată de declinul biodiversității solului. În general diversitatea activivăților microbiane vor fi evaluate de către PCR-a în baza analizei ARNr spacer intergenic (RISA), în timp ce investigațiile funcționale ale diversității l vor fi efectuate de către PCR în timp real multiplex cu amestecuri primer specific de grup. Separarea electroforetica a produselor PCR va duce la coduri de bare microbiene din sol. Datele acumulate chimice, fizice şi microbiologice vor fi folosite pentru a crea matrici (hărți de sol). În plus, bioindicatori activității microbiane vor fi identificatori de monitorizare a calității solului, la nivel transfrontalier.

Impactul proiectului

Impactul proiectului pe termen mediu va fi materializat prin: a) dezvoltarea unei metodologii pentru evaluarea calității solurilor prinrtr-o abordare complexă chimică, fizică şi microbiologică, b) validarea noii metodologii, c)realizarea de hărți ale solurilor bazată pe însuşirile chimice, fizice şi microbiologice, d) soluții pentru factorii de decizie în vederea reducerii impactului negativ al activităților umane, e) asistență pentru elaborarea de tehnologii cu impact scăzut, noi practici pentru agricultori, şi f) materiale de instruire pentru învățământul superior. Impactul proiectului pe termen lung se referă la implicarea altor regiuni la cooperarea în proiecte de tipul R + D, aprofundarea cooperării internaționale cu partenerii de proiect având în R + D sinergia şi valorificarea planificată a rezultatelor proiectului începând cu dezvoltarea de produse microbiene specifice bazate pe hărți ale solurilor.

SOIL*MAP*

Talajok minősítésére alkalmas, komplex kémiai – fizikai – mikrobiológiai eljárás kifejlesztése és értékelése

Projektpartnerek: Szegedi Tudományegyetem, Természettudományi és Informatikai Kar, Mikrobiológiai Tanszék, Szeged, Magyarország
Bánáti Agrártudományi és Állatorvosi Egyetem, Temesvár, Románia
Gabonakutató Nonprofit Kft., Szeged, Magyarország
Pedológiai és Agrokémiai Tudományok Hivatala, Temesvár, Románia

Társult partnerek: Csongrád Megyei Agrárkamara, Szeged, Magyarország
Temes Megyei Mezőgazdasági Igazgatóság, Temesvár, Románia

A projekt futamideje: 2011. 01. 01. – 2012. 05. 31.

Háttér

A mezőgazdasági talajok térben és időben változó, természetes, élő egységek. A talajvédelem nemzetközi ügy. A Magyarország és Románia közti határmenti régió talajai döntő szerepet játszanak a régió mezőgazdaságának fenntarthatóságában. Ezért nagy szükség van a mezőgazdasági talajokra (mint legnagyobb szervesanyagraktárakra) a klímában és termőterülethasználatban bekövetkező változások, a talajeróziót fokozó technológiák, a szervesanyagszint csökkenése, a szennyezések, a sófelhalmozódás, a tömörülés és a talajbiodiverzitás csökkenése miatt nehezedő, növekvő környezeti nyomás kezelésére. A felsorolt tényezők károsítják a talaj mikrobiális életminőségét, ami általános probléma a határmenti régió talajainak esetében. Ezen a területen a) a határmenti régióban talajanalízisre irányuló K+F együttműködésekből, b) a talaj mikrobiológiai sajátságairól, bio-geo-kémiai folyamatairól és ezek összefüggéseiről rendelkezésre álló tudásból, c) a határmenti régió talajminőségének monitorozására alkalmas bioindikátorokból és d) a talaj széntartalmával és annak változásaival kapcsolatos adatokból egyaránt hiány mutatkozik. A talaj szervesanyag-tartalma döntő szerepet játszik a talaj szénciklusában. A talajegészséget az élő makro- és mikroszervezetek egyensúlya határozza meg. Ezek mennyiségi és minőségi elemzése szükséges a fenntartható mezőgazdasági gyakorlat alkalmazásához, a sikeres védekezéshez és a talajra gyakorolt nemkívánatos hatások enyhítéséhez. A sófelhalmozódás a határmenti régió speciális problémája, melyre különös figyelmet kell fordítani. A projekt célkitűzései és tervezett tevékenységei a célcsoportok igényeinek és prolémáinak előzetes felmérése alapján kerültek kidolgozásra.

A projekt célkitűzései

- a K+F együttműködési aktivitás fejlesztése és a gazdasági kohézió erősítése a határmenti régióban
- a talaj mikrobiológiai sajátságairól, bio-geo-kémiai folyamatairól és azok összefüggéseiről rendelkezésre álló ismeretanyag bővítése
- a határmenti régió talajminőségének nyomonkövetésére alkalmas mikrobiális bioindikátorok azonosítása
- a talaj széntartalmával és annak változásaival kapcsolatos adatok gyűjtése

A projekt tevékenységei

A projektpartnerek kifejlesztenek egy talajvizsgálati tervet. A talajok a rendelkezésre álló nyomonkövethetőségi adatok alapján kerülnek kiválasztásra. A mintavételezés magyarországi és romániai búzaföldek intenzív, ill. organikus termesztésbe vont talajaiból történik. Kontrollként legelők és erdők talajaiból is történik mintavétel. A talaj szerves és szervetlen anyagainak mennyisége és minősége nagymértékben befolyásolják a stabilitást, a vízmegtartó és kationcserélő képességet, a talaj ökológiáját és biodiverzitását. Metodikák kerülnek kifejlesztésre a talaj mikrobiális diverzitásának a szerves szén-, egyéb makroelem- és szennyező nehézfémtartalom függvényében történő elemzésére. A talajminták fizikai-kémiai tulajdonságai (pH, textúra, tömörülés, sófelhalmozódás) valamint biokémiai és mikrobiális diverzitása egyaránt elemzésre kerül. Sor kerül a foszfatáz, β-glükozidáz, cellobiohidroláz, β-xilozidáz, tripszin- és kimotripszin-típusú proteáz, lipáz és kitináz enzimaktivitások vizsgálatára. A mikrobiális elemzés a talajbaktériumok *Pseudomonas*, *Bacillus, Actinomycetes, Azotobacter, Nitrosomonas, Nitrobacter* és *Paracoccus* nemzetségeinek, valamint a *Trichoderma, Aspergillus, Penicillium, Acremonium, Fusarium* és *Zygomycetes* taxonokba tartozó talajgombáknak a vizsgálatát célozza. A baktériumok és gombák diverzitása közvetlen összefüggésben van a talaj biodiverzitásának csökkenésével. Az általános mikrobiális diverzitás felmérse a riboszómális RNS intergénikus elválasztó régiójának polimeráz láncreakción (PCR) alapuló analízisével (RISA) történik, míg a funkcionális diverzitásvizsgálatok céljára csoportspecifikus indítószekvencia-keverékek alkalmazásán alapuló, multiplex, valós idejű PCR-technika kerül felhasználásra. A PCR-termékek elektroforetikus elválasztása talajmikrobiális vonalkódokat eredményez. A felhalmozott kémiai, fizikai és mikroiológiai adatokból mátrixok (talajtérképek) készülnek. Ezen túl a határmenti régió talajminőségének nyomonkövetésére alkalmas mikrobiális bioindikátorokat is azonosítunk.

A projekt várható hatása

A projekt középtávú hatása lesz a) egy komplex kémiai – fizikai – mikrobiológiai talajminősítési eljárás, b) az új metodika validálása, c) a felhalmozott kémiai – fizikai – mikrobiológiai adatokon alapuló talajtérképek, d) útmutatás a döntéshozók számára az emberi tevékenység negatív hatásainak csökkentésére, e) hozzájárulás a gazdálkodók részére készítendő, új, környezetbarát termesztéstechnológiákkal kapcsolatos útmutatások összeállításához, f) konzultációs szolgáltatások és a felsőoktatásban alkalmazott új képzési anyagok. A projekt hosszú távú hatásai más régiók bekapcsolódása, új K+F projektekben történő együttműködések, a K+F szinergiákkal rendelkező projektpartnerekkel történő nemzetközi együttműködések elmélyítése, valamint a projekt eredményeinek a talajtérképeken alapuló, talajspecifikus mikrobiális termékek fejlesztése útján megvalósítani tervezett gazdasági hasznosulása.

ABSTRACTS OF THE PROJECT TRAINING COURSE PRESENTATIONS

LIST OF THE PROJECT TRAINING COURSE PRESENTATIONS

TC-1: Attila Oberschall: DUO-FLOW SYSTEM: A VERSATILE APPROACH FOR PURIFICATION AND ANALYSIS I

TC-2: Béla Ózsvári: PHASE HOLOGRAPHIC IMAGING

TC-3: Attila Oberschall: DUO-FLOW SYSTEM: A VERSATILE APPROACH FOR PURIFICATION AND ANALYSIS I

TC-4: Márton Vass: MICROPLATE READER BASED FLUORESCENCE APPLICATIONS IN MICROBIOLOGY

TC-5: László Galgóczy: APPLICATION OF PULSED-FIELD ELECTROPHORESIS IN MICROBIOLOGY

TC-6: Attila Stamm: IMAGE ANALYSIS APPROACHES FOR INVESTIGATION OF MICROBIOLOGICAL SAMPLES

TC-1, TC-3

DUO-FLOW SYSTEM: A VERSATILE APPROACH FOR PURIFICATION AND ANALYSIS I-II

Attila Oberschall

BioRad Ltd., Budapest, Hungary

Understanding the developmental processes and physiology of different organisms can be based on the complex analysis of protein expressions, protein modifications and functions.

In addition, the mapping of protein-protein interactions, studies of isoforms, structures and complexes are also the essential parts of these protein function targeted approaches.

The purification of individual proteins or protein complexes are the fundamental steps of these studies.

The Bio-Rad BioLogic DuoFlow chromatography system is specifically designed for the high resolution purification of proteins, peptides, and other biomolecules where recovery of biological activity is of primary concern.

The major goals of this presentation are:

- to give a brief introduction to the most commonly used chromatography techniques,
- to give detailed overview of the Bio-Rad chromatography systems,
- to understand the theoretical background of chromatography based protein purification protocols,
- to overview the connections of the chromatography system components.
- Finally, description of the main features of the control software will introduce the task being aimed to solve during the practical part of the presentation.

TC-2

PHASE HOLOGRAPHIC IMAGING

Béla Ózsvári

Avidin Ltd., Szeged, Hungary

Cell cultures are one of the most fundamental tools in biological science to study various mechanisms. Cells are transparent. Cells have to be stained. All handling of cells effect the parameter you want to study.

Bleaching and phototoxicity:

- GFP (green fluorecent protein) - Last years Nobel-prize winner
- Bleaching occures dependent on light intensity and exposure time
- Excitation of fluorecent markers create amongst free radicals which causes phototoxcicity and eventually cell death

Digital holography: Exposure, Reconstruction (focus plane), 3D hologram

Analysing cells: We perform multiple (non-invasive) time point measurements (cell counting, proliferation, viability, confluence, cell area, cell volume, density, morphology, migration, and more…

What's unique?

- The worlds first totally noninvasive live cell imaging microscope/analyzer for life science research.
- The HoloMonitor™ helps the scientists to both increase the scientific quality and quantity and ease the every day handling of cells in a modern laboratory
- No staining necessary. No toxic agents or damaging light
- Perform directly in the cells growth environment
- Powerful analysis software
- 3D-options and perfect autofocus time-lapse

Applications:

- Long term studies (siRNA studies, dose-response, gene transfections, toxicology)
- Cell culture status (non-destructive measurements of various parameters, viability)
- Visualisation (imaging, time-lapse)

Not only can we measure cell numbers and proliferation, we also get morphological parameters, which cannot be analysed in traditional assays. Furthermore, and very importantly, as the analysis is non-destructive, it is done on the same culture. Cultures are unaffected by our analysis so afterwards you can use them for any other eperiments.

TC-4

MICROPLATE READER BASED FLUORESCENCE APPLICATIONS IN MICROBIOLOGY

Márton Vass

Auroscience Ltd., Budapest, Hungary

Short introduction of microplate reader technologies with the world brand BMG Labtech and their application:

1. The miniaturisation of cuvettes measuring with spectrophotometers
2. The Monochromators vs. Filters
3. Halogen lamp and the Xenon
4. Top and bottom reading
5. The setup of BMG readers
6. Application center of BMG Labtech
7. Classification of the assays
8. Fluorescence assays/application
9. Absorbance assays/application

TC-5

APPLICATION OF PULSED-FIELD ELECTROPHORESIS IN MICROBIOLOGY

László Galgóczy

Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary

The most commonly used technique for separation of DNA fragments is conventional gel electrophoresis. This method is appropriate for separation of DNA molecules up to 50 kilobase pairs. Above this size the fragments run as broad, unresoveld bands due to their anomalously high mobility and the lost of sieving action of gel. The solution of this problem is the pulsed-field gel electrophoresis (PFGE). During the PFGE the DNA is under pulsed, alternating, orthogonal electric field. In each reorientation of the electric field, relatively smaller sized DNA will begin moving in the new direction more quickly than the larger DNA, so the larger DNA lags behind, providing a separation from the smaller DNA. With this method, up to 6-10 megabasepair DNA fragments can be separated from each other. So many parameters influence the quality and resolution of the PFGE: the uniformity of the two electric fields, the duration of the electric pulses, the ratio of the pulse times for each of the alternating electric fields, the angles of the two electric fields to the gel, the ratio of the strengths of the two electric fields, the temperature during the running, quality and concentration of the agarose and the running buffer. In recent years, the use of pulsed-field gel electrophoresis (PFGE) in the molecular microbiology area has been subject to much research. It is used in analysis of bacterial genomes, fingerprinting and physical mapping of chromosomes, investigation of relationship between different strains of the same species, establishment of the electrophoretic karyotype of different strains, study of the genome organization, following of the mutation and cloning events, establishment of position of certain genes in chromosome, and creation of chromosome specific gene libraries.

TC-6

IMAGE ANALYSIS APPROACHES FOR INVESTIGATION OF MICROBIOLOGICAL SAMPLES

Attila Stamm

Auroscience Ltd., Budapest, Hungary

Image capturing and analysis:

- Digital camera
  - Sensor type: CMOS, CCD, EMCCD, sCMOS
  - Important parameters: resolution, pixel size, full well capacity, read noise, dark current, cooling, digital interface, frame rate
- Image capturing
- Software sollutions, software packages
  - Microscope company's software packages: Nikon: NIS-Elements (F, D, Br, Ar version)
  - Software packages from independent developers:
    - Media Cybernetics: Image-Pro Plus, Image-Pro Insight, AutoQuant
    - Molecular Devices: MetaMorph
- Image enhancements, multichannel images
  - Basic tools: contrast, brightness, gamma, background correction, filter tools (noise reduction, morphological filters)
  - Advanced tools: image operations, image alignments, EDF, deconvolution
- Measurements
  - Manual measurements: distance, length, angle, area
  - Segmentation based automatic measurements: counting, spatial sizes, area ratio, intensity measurements, particle size

ABSTRACTS OF THE PROJECT WORKSHOP PRESENTATIONS

LIST OF THE PROJECT WORKSHOP PRESENTATIONS

WS-1: **János Varga, Beáta Tóth: ROLE OF SOIL- AND AIRBORNE FUNGI IN MYCOTOXIN CONTAMINATION OF AGRICULTURAL PRODUCTS**

WS-2: **Enikő Sajben, László Manczinger, Csaba Vágvölgyi: RIBOSOMAL INTERGENIC SPACER ANALYSIS AFTER PRECULTURING (RISA-APC), A NEW METHOD FOR THE INVESTIGATION OF FUNCTIONAL BACTERIAL DIVERSITY IN SOIL**

WS-3: **Csaba Vágvölgyi: THE INTERACTIONS OF PESTICIDES WITH SOIL MICROORGANISMS**

WS-4: **Ferenc Somogyvári: MELTING-POINT ANALYSIS: A NEW APPROACH IN THE IDENTIFICATION OF SOIL-BORNE BACTERIAL SPECIES**

WS-5: **András Szekeres: MODERN METHODS FOR ANALYSIS OF PESTICIDE-RESIDUES IN AGRICULTURAL SAMPLES**

WS-1

ROLE OF SOIL- AND AIRBORNE FUNGI IN MYCOTOXIN CONTAMINATION OF AGRICULTURAL PRODUCTS

János Varga[1], Beáta Tóth[2]

[1]Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary
[2]Cereal Research Non-profit Ltd., Szeged, Hungary

Mycotoxins are secondary metabolites of (usually filamentous) fungi which are harmful to animals and/or humans. These compounds may contaminate foods and feeds and cause various disease symptoms. Soil- and airborne fungi are important mycotoxin producers, the economically most important ones belonging to the genera *Aspergillus, Penicillium, Fusarium, Claviceps* and *Alternaria*, although several other fungi are able to produce harmful mycotoxins. Among the most important mycotoxins produced, ochratoxins are produced by *Aspergillus* and *Penicillium* species. Ochratoxin contamination of grapes and grape-derived products is usually caused by black Aspergilli, especially by *A. carbonarius* and *A. niger*. Due to the climatic conditions of Hungary, these species have only relatively rarely been encountered in Hungarian vineyards. However, black Aspergilli are frequently isolated from imported dried vine fruits, and ochratoxin contamination of these samples has also been observed. Aflatoxins are mainly produced by members of *Aspergillus* section *Flavi*, and contaminate several agricultural products including maize in several parts of the world. However, aflatoxin-producing *Aspergillus* species have not been identified yet in maize in Hungary. Recent surveys clarified that aflatoxins occurred in concentrations exceeding the EU limit in several regions of Central Europe including Serbia, Slovenia, Croatia, Northern Italy and Romania. We examined the presence of potential aflatoxin-producing Aspergilli in maize samples collected around Szeged. According to their calmodulin genes sequences, all isolates were found to belong to the A*. flavus* species. Examination of aflatoxin producing abilities of the isolates is in progress.

Fumonisins are carcinogenic mycotoxins which were originally identified in *Fusarium verticillioides*. Fumonisins are produced mainly by *Fusarium* species, and by the recently identified producers *Aspergillus niger* and *A. awamori*. Data on the occurrence and the role of black Aspergilli in fumonisin contamination of agricultural products with high sugar content are needed to clarify the importance of *A. niger* in food safety. Data are also needed to clarify the clinical importance of fumonisin production of black Aspergilli. We examined fumonisin producing abilities of *A. niger/A. awamori* isolates collected from a variety of substrates including raisins, figs, dates, maize, pistachio and onions. Species assignment of the isolates was carried out by using sequence analysis of part of the calmodulin gene. Besides, strains collected from figs, dates and onions were also able to produce fumonisins, and preliminary data indicate that figs and onions are contaminated by lower but significant fumonisin levels than raisins. Interestingly, *A. awamori* was found to be responsible for both black mold rot and fumonisin contamination of onions in Hungary.

Potential fumonisin producing *A. awamori* isolates have also been identified on maize samples. Further studies are in progress to examine the occurrence of fumonisin isomers in other products including Hungarian wines and grape juices.

Fusaria are able to produce trichothecenes, sesquiterpene derivatives having mainly dermatotoxic properties, and zearalenone, an oestrogenic mycotoxin. These mycotoxins are frequently encountered in cereal products in Central Europe. Fumonisins produced by Fusaria mainly occur in corn-based products.

This study was partly supported by OTKA grant Nos. K 84077 and K 84122, and by the Bolyai Research Scholarship of the Hungarian Academy of Sciences for B. Tóth.

WS-2

RIBOSOMAL INTERGENIC SPACER ANALYSIS AFTER PRECULTURING (RISA-APC), A NEW METHOD FOR THE INVESTIGATION OF FUNCTIONAL BACTERIAL DIVERSITY IN SOIL

Enikő Sajben, László Manczinger, Csaba Vágvölgyi

Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Hungary

Soil is a very complex and dynamic biological system; microorganisms adapt to microhabitats and live there together in consortia. The extent of the diversity of microorganisms in soil seems to be critical to the maintenance of soil health and quality. The changes in the bacterial communities could be a good indicator for the soil quality and also indicates the influence of the different environmental factors. A possible solution for the investigation of functional structure of microbial communities in the soil is preculturing the microbes of the soil samples in distinct media and thereafter performing a molecular diversity analysis of the developed microbial communities. Our RISA-APC method (ribosomal RNA (rRNA) intergenic spacer analysis, after preculturing) is based on this principle.

The region of the rRNA gene cluster between the small (16S) and large (23S) subunits in bacteria is called the internal transcribed spacer region (ITS). The ITS length polymorphism could be visualized with gelelectophoresis, and the resulted mixture of fragments is characteristic, such as a barcode and indicates the composition of the investigated bacterial community.

The RISA analysis of DNA samples, extracted from mini-colonies appearing after preculturing of aliquots of the soil samples on solid media, solidified with agarose, supplemented with different carbon sources, could supply us information about the functional diversity of the bacterial communities.

In our presented investigations we analyzed three soil types deriving from wheat field, forest and sandy soils with RISA-APC. The carbon sources were: carboxy-methyl cellulose, xylane, chitin, starch, tributyrine, casein and protocatechuic acid. For the investigation of the heavy metal tolerant bacteria, we used YEG media supplemented with $CuSO_4$ or $CdCl_2$. Our RISA-APC method clearly correlated, as regards the complexity of RISA-fingerprints, with the expected basic taxonomical complexity of the soil types and with the carbon source used for preculturing. The most extensive functional diversity occurred in the forest soil sample and the less diverse was the sandy soil sample.

On the basis of these experiments we think that this method would be applicable for soil quality investigations.

The project is co-financed by the European Union through the Hungary-Romania Cross-Border Co-operation Programme 2007-2013 (SOILMAP, HURO/0901/058/2.2.2).

WS-3

THE INTERACTIONS OF PESTICIDES WITH SOIL MICROORGANISMS

Csaba Vágvölgyi

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Preserving the quality of agricultural soils is essential for sustainable agricultural practices. However, as a result of agricultural and industrial activities, substantial amount of various hazardous compounds (xenobiotics) are spread in the environment. Among them, many pesticides or their degradation products have carcinogenic, mutagenic, teratogenic, immuno-modulating and/or endocrine-disrupting properties. These harmful compounds also reduce the biodiversity in the soil and result in lower soil quality, a reduced level of nitrogen fixation and the mineralization of organic materials. Pesticide residues are taken up by plants and pass into vegetable-consuming persons directly or through the food web, so that the rapid elimination of pesticide residues from soil would be important.

Spreading and persistence of a pesticide in the environment depends on interactive physical, chemical and biological processes. In this system, soil microorganisms are the key players. The presentation reviews the main microbial processes which contribute to the transformation of pesticides in the soil and the most important factors affecting the degradation. Special attention will be paid to environmental factors modulating these microbial activities as well as biochemical and genetic background of the biodegradation. Some examples of pesticide degradation carried out by bacteria and fungi will be discussed in detail.

The project is co-financed by the European Union through the Hungary-Romania Cross-Border Co-operation Programme 2007-2013 (SOILMAP, HURO/0901/058/2.2.2).

WS-4

MELTING-POINT ANALYSIS: A NEW APPROACH IN THE IDENTIFICATION OF SOIL-BORNE BACTERIAL SPECIES

Ferenc Somogyvári

Department of Medical Microbiology and Immunobiology, Faculty of Medicine, University of Szeged, Hungary

Molecular-based methods provide valuable information about the microbial community as opposed to only culture-based techniques. In this lecture we will review the current and emerging molecular approaches for characterizing microbial community composition and structure.

Currently, a major focus is on describing biodiversity in microbial communities. The estimation of microbial diversity is a sensitive approach to detect modifications due to soil management. Knowledge of microbial diversity and function in soils is limited because of the taxonomic and methodological limitations associated with studying these organisms. The traditional culturing techniques from environmental samples are restricted by the ability to culture such organisms from complex environmental samples. Advances in molecular biology led to the development of culture-independent approaches for describing bacterial communities. Mostly one target gene is amplified by PCR, and the amplified fragments are subsequently differentiated by their size or sequence variability. Ribosomal RNA genes are evolutionarily conserved and therefore can be used to describe phylogenetic relationships between organisms. Several different methods based on the amplification and comparisons of the rRNA sequences have been applied to various environmental samples. These methods are ARDRA (16S-RFLP), RISA, t-RFLP, DGGE and ribosome gene cloning. Recent studies show that advances in micro fluidics and optoelectronics are increasing our capability of detecting several DNA sequences simultaneously and rapidly. Real-time PCR is a method used to detect PCR amplicons during the early exponential phase of the amplification reaction allowing the detection and quantification of the PCR products. Using real-time PCR, near quantification we have new possibilities to differentiate the bacteria with the help of the melting-point analysis.

WS-5

MODERN METHODS FOR ANALYSIS OF PESTICIDE-RESIDUES IN AGRICULTURAL SAMPLES

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Pesticides are substances or mixtures of substances intended for preventing, destroying, repelling or mitigating any pest of the cultured plants. Although there are benefits from the use of pesticides, some also have drawbacks, such as potential toxicity to humans and other animals, which is the main reason of their analytical investigations. The measurements of pesticides from agricultural samples mean considerable challenges for the laboratories, because of their trace amount and huge numbers as well as their chemical variegation. Moreover, the testing laboratories are able to measure very low LOQ and LOD values according to the today's MRLs and need to have a rapid sample clean up technique to test large numbers of agricultural samples. There are lots of usable methods for the pesticide analysis, which can be classified into different groups according to the type of sample preparation and the applied analytical instruments. In this presentation, the widely applied techniques are introduced and summarized.

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