
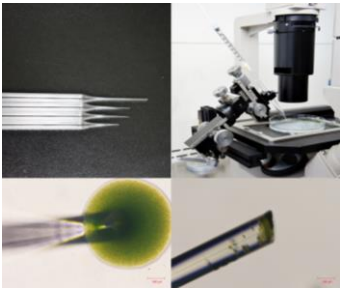

Institute of Environmental Sciences

3rd Annual Graduate Symposium

Monday, June 5th 2017


ABSTRACT BOOK

Organisation Committee

Prof. Dr. Işıl Balcıoğlu
Assoc. Prof. Dr. Başak Güven
Asst. Prof. Dr. Berat Z. Haznedaroğlu

Merve Tunalı
Ayşe Hazal Pekcan
Fahri Koray Sakarya
Başak Savun
Çağrı Akyol
Defne Şahin
Deniz Marangoz
Dışeps Apiş
Ece Özön
Elif Irmak Erdem
Elifcan Çalışkan
Gülşah Günel
Mehmet Meriç Tunalı
Nazmiye Cemre Birben
Zeynep Akdoğan

Annual Graduate Symposium
Monday, June 5th 2017

PROGRAM

09.00 - 09.15 Registration - Coffee Service

09.15 - 09.30 Welcome Speech by Prof. Dr. Orhan Yenigün, Director of the Institute of Environmental Sciences

9.30 - 10.15 Keynote Talk by Dr. Katalin Zaim - "Education, Lifestyle and/or Experience: Which One Matters the Most for Career Choices?"

10.15 - 10.30 Coffee Break

10.30 - 11.45 Oral Session I - Moderator: B. Aylin Alagöz

Natalia Ciobanu - Building Resilience to Climate Change Impacts in The Ichel Watershed in Moldova: A System Dynamics Approach

Dışeps Apiş - Environmental Sustainability Assessment for Ceramic and Polymer Products with LCA Methodology Application

Ayşen Eren - From Riverscape to Energyscape: Constructing the Space of Hydroelectricity Production in the İkizdere River Valley, Turkey

11.45 - 13.00 Lunch Break

13.00 - 13.50 Oral Session II - Moderator: Deniz Marangoz

Başak Helvacı - Environmental Education and Teachers' Tendencies to Implement Environmental Education Objectives in Their Lesson Plans

Melike Müezzinoğlu - Education and Capacitation Building Resilience in Ecosystems: How Does Permaculture Farming Bring the Biodiversity into the Hands of New Generations? Teaching Local Communities Supported Agriculture

13.50 - 14.00 Coffee Break

14.00 - 14.45 Keynote Talk by Dr. Ömer Madra - "Kâinatın en büyük intihar eylemcisi..."

14.45 - 16.00 Coffee Break - Poster Evaluations

16.00 - 16.30 Award Ceremony

Poster Presentations

ID 07 Kübra Karaman- An Intron-based Nuclear Genetic Analysis of the Long-Fingered Bat, *Myotis capaccinii* around the Mediterranean Basin

ID 08 İlkay Civelek - Genetic Diversity and Phylogenetic Analysis of Gray Wolves and Red Foxes from Different Geographical Sites in Turkey

ID 09 Dilek Atik - Novel Direct Liquid-Liquid Lipid Extraction Method for Biodiesel Production from Sewage and Petrochemical Industry Sludges

ID 10 Ece Özön - Effects of Microwave, MW/H_2O_2 and Heat/H_2O_2 Pre-treatments on the Biochemical Methane Production Potential of the Wastewater Sludges

ID 11 Serap Karaca - Fate of Veterinary Antimicrobials During Composting of Animal Waste

ID 12 Bilgesu Tutal - Microbial Community Dynamics in Anaerobic Digesters Fed with Cow Manure and Barley under Different Operational Conditionals

ID 13 Gökçin Gül - The Role of Biotransformation on Biocide Resistance in a Co-Culture of *Pseudomonas sp*. BIOMIG1 and *E. coli*

ID 14 Elif Irmak Erdem - Comparison of Bacterial Community Profiles during Composting of Yard and Kitchen Wastes

ID 15 İlknur Temizel - Effect of Nano ZnO on Biogas Generation from Sanitary Landfills

ID 16 Koray Sakarya - Biotransformation of Benzalkonium Chlorides by Immobilized Cells of *Pseudomonas sp.* BIOMIG1

ID 17 Gülsüme Külçe - Social Aspects of Green Buildings: A Case Study on Building-Occupant Interaction

ID 18 Merve Tunalı - Investigation of Metal Content of Electronic Waste by Comparing Three Different Digestion Method

ID 19 Mehmet Meriç Tunalı - The Generation of Glomalin-related Soil Protein (GRSP) and Its Contribution to Copper Sequestration in Contaminated Soils

ID 20 Mahir Bozan - Pretreatment of Cow Manure and Barley with Extracellular Enzymes Secreted by Aerobic Fungi Trametes Trogii for Enhanced Biogas Production

ID 21 Çağlar Akay - Biotransformation of Acetaminophen by Soil Microbial Community

ID 22 Adnan Mirhanoğlu - Sustainable Management of Groundwater Commons: A System Dynamics Approach

ORAL PRESENTATIONS

Session I: 10.30 - 11.45
Moderator:

ID 01 Building Resilience to Climate Change Impacts in the Ikel Watershed in Moldova: a System Dynamics Approach

Presenter: Natalia Ciobanu

Having adopted the paradigm of long-term sustainable development, countries and communities are now facing the challenge of pursuing this goal in the face of climate change risks, the most important of which have to do with securing sufficient and high quality water resources, agricultural production, public health and overall social welfare, while at the same time preserving ecosystems, biodiversity and subsequent ecosystem services. Multidisciplinary nature of climate change and incoherent interventions based on sectorial approaches, make the drafting and implementation of climate change adaptation strategies and action plans at sectorial level difficult and very costly. Researchers suggest that risks posed by climate change need to be addressed at watershed scale. Resilience assessment practitioners have so far only made use of causal loop diagrams and descriptive approaches for policy recommendations on how to make socio-ecological systems more resilient. Current challenge in the field of social-ecological systems research is to proceed from causal maps to computer simulation models comprehensible by the decision makers. In this research the aim is to develop a simulation model based on system dynamics methodology and Group Model Building (GMB) involving stakeholders in the watershed. The aim of the research is to help the assessment of a watershed's resilience to climate change risks and to assist the policy development for building resilience. The research, which is being conducted in Ikel watershed in the Republic of Moldova, also intends to contribute to the existing modeling work in resilience assessment and socio-ecological systems framework, and to explore synergies between these and system dynamics modeling.

ID 02 Environmental Sustainability Assessment for Ceramic and Polymer Products with LCA Methodology Application

Presenter: Dışeps Apiş

The products produced by shaping and firing inorganic and nonmetallic materials with different methods are called as ceramic. As drying and firing processes require high temperatures, varying from 700 to 2000 °C based on raw material and product type, and take long time, ceramic sector is classified under energy-intense sector. Because of high energy consumption, ceramic production causes severe environmental impacts. In addition to its energy consumption, ceramic production consumes natural resources and materials, generates emissions and wastes through its life cycle from raw material extraction to processing, transportation and disposal stages. In order to reduce the environmental impacts of ceramic production and economic burden caused by high energy consumption, polymer that will provide the same service can be the substitute. Within this respect, environmental sustainability assessment will be carried out for ceramic and polymer products. For this purpose LCA methodology developed by UNEP Life Cycle Initiative and SETAC will be used as decision making tool. The results will definitely indicate the environmental burdens generated from different life cycle stages of the selected ceramic and polymer products. Based on the results the improvement opportunities will be identified and recommended.

ID 03 From Riverscape to Energyscape: Constructing the Space of Hydroelectricity Production in the İkizdere River Valley, Turkey

Presenter: Ayşen Eren

This study examines the processes, relations, and practices by which all the involved parties construct, sustain and contest the space of hydroelectricity development along the İkizdere River, Turkey. Beginning with the first hydroelectricity plant built in 1950s, the İkizdere Hydroelectricity Plant (İkizdere HES), the study traces historical hydroelectricity development and then focuses on the sustainable development of hydroelectricity program launched in 2003. The study explores how the program came about on the national scale and materialized on the local scale with the emergence of five private hydroelectricity plants. It also seeks to explain how the emerging hydroelectricity plants have contributed to the deterioration of the once-positive local perception toward hydroelectricity production. Moreover, this study focuses on the water-electricity nexus in order to better understand the hydroelectricity development and to demonstrate the real scale of its environmental and social consequences in the valley. The study follows an interdisciplinary methodology, integrating multi-sited fieldwork with a mixed-method design. It uses a post-structuralist approach in examining the policies, regulations, and practices surrounding hydroelectricity, and employs Lefebvre's the theory of space together with the concepts of relations of production and infrastructure in analyzing the processes and relations.

Session II: 13.00 - 13.50
Moderator:

ID 04 Environmental Education and Teachers' Tendencies to Implement Environmental Education Objectives in Their Lesson Plans

Presenter: Başak Helvacı

In science and mathematics education curricula, one of the main goals is to raise responsible citizens, who participate in activities to make the world a better place or to act in behalf of social, economic and environmental justice. In this study, tendencies of elementary school mathematics and science teachers for implementing environmental education objectives in their lesson plans analyzed. The teachers were volunteered to participate in Integrated Teaching Project (ITP) directed by Assoc. Prof. Dr. M. Sencer Çorlu. In this project, teachers attended four face-to-face workshops which involved making flasks out of recycled materials, problem solving in urban transformation projects, building solar cars, and creating smart buildings by programming printed circuit boards. After the workshops, teachers developed their own lesson plans and applied in their classrooms. Teachers' lesson plans were evaluated with lesson plan evaluation rubric and their attitudes towards environmental education were inferred from their reflections. It is concluded as a result of the study that, although there are differences between categories of individuals, there is not a significant effort to implement environmental education among teachers.

ID 05 Education and Capacitation Building Resilience in Ecosystems: How Does Permaculture Farming Bring the Biodiversity into the Hands of New Generations? Teaching Local Communities Supported Agriculture

Presenter: Melike Müezzinoğlu

History of learning since the industrial revolution is to longer stand on its grounds when facing an era of mass extinction. With ever increasing environmental and intertwined social problems, and fewer students choosing to study science at higher levels of education and as a career, in-class and laboratory based schooling will not suffice the unpredected proceedings of the future. Though efforts to reform the curriculum exist, we believe that the place where the natural sciences teaching and learning takes place needs to move out-of-boundaries, out-of-school. Observation of the actual world through fieldtrips; interaction in organic farms and experience of the presented world through botanic gardens; herbariums and natural science museums will nurture brains as well as souls. Opportunity to use all the senses, living biodiversity through emotions and experimenting creatively through practice will enhance ability to design solutions to respond to changes. Interacting with other beings (i.e. peers, animals and plants) will create a mutual language and will remind us of our minute place in the history of evolution. Collaboration with academia through academic programs; implementation of cultural centers, ecologically conscious exhibition and art events will have further impact in outreaching to new audiences in societies. Our view is that organic botanic garden/farms are increasingly valuable hubs in bringing together the opportunities and knowledge to educate scholars as well as societies to form the thinkers, creators and doers to realize our responsibility as humans. Through their evolution, this inclusion towards resilience will prove mutually beneficial to botanic gardens.

POSTER PRESENTATIONS

ID 07 An Intron-based Nuclear Genetic Analysis of the Long-Fingered Bat, *Myotis capaccinii* around the Mediterranean Basin

Presenter: Kübra Karaman

Myotis capaccinii, long-fingered bat, has a wide distribution in the western Palearctic, covering the Mediterranean basin and spreads into North Africa, and reaching Anatolia and Iran to the east. It is considered to be polytypic with a taxonomic break in the former Yugoslavia. A recent mitochondrial DNA analysis with samples from the Mediterranean coasts of Europe, North Africa, Anatolia and Iran showed the presence of two genetic breaks; a deeper one in southeastern Europe, and a more recent one around the Alps, potentially corresponding to species and subspecies level differentiation, respectively. In this study, using a nuclear intron marker, we aimed to see whether these mitochondrial DNA breaks were reflected in the nuclear DNA as well. The results indicated no parallel differentiation in nuclear DNA, suggesting conspecificity of all three mitochondrial groups. However, the lack of differentiation could be due to the lack of resolution of the intron marker, and more detailed analyses with higher resolution markers such as ddRAD-seq are necessary for firmer conclusions.

ID 08 Genetic Diversity and Phylogenetic Analysis of Gray Wolves and Red Foxes from Different Geographical Sites in Turkey

Presenter: İlkay Civelek

The gray wolf (*Canis lupus lupus*) and the red fox (*Vulpes vulpes*), are extremely mobile carnivores, which have spread globally to find new habitats and mates. These carnivores are the most significant predators of the Carnivores of the Canidae family, living in the Northern Hemisphere. Turkey is a country with wide ecological and geographical continuity in the middle Asia and the Middle East, at the intersection of three global biodiversity hotspots, and hence. The conservation of gray wolf and red fox populations in Turkey is very important. In this study, we used faecal samples from two sites (Sarıkamış, Kars and Yenice, Karabük) in the winters of 2013 and 2014. We assessed the genetic relationships of these two representative gray wolf and red fox populations (49 sequences of gray wolves and five sequences of red foxes) from Turkey, with comparisons to their conspecific populations throughout the world, based on a partial 228 bp fragment of mitochondrial d-loop using sequences. The genetic information on wolves and foxes will also help outline evolutionary strategies for conservation.

ID 09 Novel Direct Liquid-Liquid Lipid Extraction Method for Biodiesel Production from Sewage and Petrochemical Industry Sludges

Presenter: Dilek Atik

Biodiesel production from agricultural products, such as vegetable oils, is currently limited due to high raw material costs and lack of agricultural lands. Sewage sludge having high lipid content is gaining traction as a lipid feedstock for biodiesel production. Petrochemical industry wastewater treatment plant sludge, including sludges from oil separators, primary clarifier, and the waste activated sludge from secondary clarifier, contains a high concentration of petroleum hydrocarbons, phospholipids, free fatty acids, neutral lipids and can also be used as a feedstock for biodiesel. Lipid extraction is the first step of biodiesel production from sludges. Standard reference drying lipid extraction method necessitates expensive sludge dewatering/drying steps, holding almost 50% of overall conventional biodiesel production cost, to remove high water content in sludge. The aim of this study was to explore lipid extraction from sewage and petrochemical industry sludges by using the novel direct liquid-liquid extraction method, which does not require expensive sludge dewatering/drying steps, and to compare it to standard reference drying method. The study also investigated the effect of acid pre-treatment on lipid yields of the sludge samples. The results of the study showed that, in both of the lipid extraction methods. Acid pre-treatment increased the lipid yields noticably. The highest lipid yield was obtained from pre-acidified petrochemical industry sludge by using liquid-liquid lipid extraction method. Compared to conventional reference drying method, direct liquid-liquid lipid extraction is found to be more efficient for petrochemical industry sludge samples. However, standard dry lipid extraction method was more effective for sewage sludge samples.

ID 10 Effects of Microwave, MW/H_2O_2 and Heat/H_2O_2 Pre-treatments on the Biochemical Methane Production Potential of the Wastewater Sludges

Presenter: Ece Özön

Anaerobic digestion (AD) has been used to stabilize wastewater sludges while producing energy in the form of biogas. Efficiency of digestion and methane production can be enhanced by pretreating the sludge prior to AD. This study investigates the effects of microwave (MW), combined microwave-hydrogen peroxide (MW/H_2O_2) and heat-hydrogen peroxide (heat/H_2O_2) pre-treatments on the biochemical methane production potential of wastewater sludges. The microwave pre-treatment was applied to sludge samples by irradiating them at 160 °C for 15 minutes in a MW oven. The combined MW and H_2O_2 pre-treatment was applied to sludge samples by mixing them with 1 g H_2O_2/g TS and then microwaving them. In the combined heat and H_2O_2 pre-treatment, 1 g H_2O_2/g TS was added to sludge samples at 75 °C for 90 minutes. The pretreated sludge samples and the inoculum were mixed in 120 mL reactors with an inoculum to substrate ratio (I:S) of 1:1 (w/w on VS basis). The reactors were sealed and flushed with nitrogen gas for 2 minutes to provide an anaerobic environment. The samples were anaerobically digested at 37 °C for 40 days. Total gas productions were measured daily and gas compositions were analyzed weekly during the digestion period of the batch reactors. Initial and final characteristics of the reactor contents were analyzed according to Standard Methods.

ID 11 Fate of Veterinary Antimicrobials During Composting of Animal Waste

Presenter: Serap Karaca

Recycling of nutrient rich organic solid fraction of dairy slurry is performed followed by composting process, which needs to be improved and fastened to handle huge amounts of solid waste generated from intensive animal farming. However, as well as chemical characteristics high moisture content of this waste can limit the efficiency of composting process. Enhancing the composting efficiency of the solid fraction of dairy slurry by blending it with broiler litter and layer manure to meet the necessary requirements for composting was the first aim of the study. It is well known that mismanagement of animal waste can cause a risk especially on natural resources because of not only excessive nutrients, and pathogens but also antimicrobials as emerging contaminants. Therefore, the second aim of this study was to determine the concentrations of antimicrobials and to investigate their degradation during the composting of manure mixtures. Although recent studies revealed the promising results for the degradation of antimicrobials in manure during conventional composting process in long treatment period, there is not any study for the fate of antimicrobials in rotary drum composter.

ID 12 Microbial Community Dynamics in Anaerobic Digesters Fed with Cow Manure and Barley under Different Operational Conditionals

Presenter: Bilgesu Tutal

Anaerobic digestion of lignocellulose-rich wastes is an effective method of both sustainable waste management and renewable energy generation. Biomass recovery in anaerobic digestion systems are closely related to operating parameters such as temperature, source of inocula etc. Furthermore, rumen fluid addition in anaerobic digestion systems is a common approach to enhance methane yield. In this study, effects of temperature (mesophilic vs. thermophilic), inoculum to substrate (I:S) ratios and different types of inocula on bacterial and methanogenic community profiles were investigated in anaerobic batch tests by Illumina Hiseq Platform. The highest specific methane yield (278 mL CH_4/g VS) was found in the digester containing anaerobic seed sludge and cow rumen fluid as a supportive inocula, which was operated with an I:S ratio of 1:2 at mesophilic temperature, followed by the thermophilic digester (259±12 CH_4/g VS) inoculated only with anaerobic seed sludge with the same I:S ratio. Firmicutes, Bacteroidetes and Proteobacteria were "major" bacterial phyla in all digesters. Although bacterial community profiles were quite similar in the digesters, methanogenic profiles varied significantly. Hydrogenotrophic methanogenesis was favoured in all digesters as the relative abundance of hydrogenotrophic methanogens was higher than that of acetotrophic methanogens. The most dominant methanogenic archaea was Methanobacterium sp. (Order: Methanobacteriales) in the digesters inoculated only with anaerobic seed sludge; whereas, Methanobrevibacter spp. (Order: Methanobacteriales) dominated the digesters contained the rumen fluid. Overall, the findings of this study can contribute to further bioaugmentation applications in anaerobic digesters treating lignocellulosic feedstocks.

ID 13 The Role of Biotransformation on Biocide Resistance in a Co-Culture of *Pseudomonas sp.* BIOMIG1 and *E. coli*

Presenter: Gökçin Gül

Antimicrobial resistance is the major health threat that human society is facing today. It is believed that the main cause of antimicrobial resistance development is exposure of microorganisms to biocides such as quaternary ammonium compounds (QACs) at low concentrations in the environment. QAC-induced resistance mechanisms also confer cross- and co-resistance to many antibiotics. One of the most commonly used form of QACs is benzalkonium chlorides (BACs) and they are used in disinfectants. Domestos is one of the widespread used commercial disinfectant for surface cleaning. The aim of this study is to clarify the influence of BAC degrading bacteria's presence on BAC susceptible bacteria in Domestos containing medium. In this research *E.coli*: BAC susceptible bacteria (BAC MIC: 16 mg/L) and *Pseudomonas sp.* BIOMIG1: BAC resistant and BAC degrading bacteria used in co-culture. According to our results *E.coli* can live up to 125 mg/L BAC concentration in the presence of *Pseudomonas sp.* BIOMIG1 while it can survive only 2 mg/L BAC concentration without *Pseudomonas sp.* BIOMIG1. These findings suggest that *Pseudomonas sp.* BIOMIG1 protects BACs susceptible *E.coli* from disinfectant.

ID 14 Comparison of Bacterial Community Profiles during Composting of Yard and Kitchen Wastes

Presenter: Elif Irmak Erdem

Composting is an environmental-friendly process relied on the biological decomposition of organic matter. This process enables to obtain a stabilized, humus-like end product that can be used as soil amendment. As microbial population profiles are highly depended on organic materials used in composting as well as physicochemical conditions, there is limited knowledge about microbial community structure at different stages of the process. In this particular study, bacterial community variations in tumbler composting systems fed with yard waste and kitchen waste were assessed. Two compartments were fed with yard waste (Y) and kitchen waste (K) separately and the last one contained binary combination of these wastes (YK) at a volumetric mixing ratio of 1:1. Moisture content was maintained at 55±5% with the aid of sawdust. The bacterial community compositions at the thermophilic stage of composting process in all systems were analyzed by Ion PGMTM protocol. The thermophilic stage ranged 58-70 ℃, where the composting system fed with yard waste reached the highest temperature. Firmicutes and Proteobacteria which have the members of humic acid-reducing bacteria were the most abundant phyla in which Bacillaceae (Y: 61%, K: 26%, YK: 8%) and Enterobacteriaceae (Y: 5%, K: 26%, YK: 7%) dominated all composting processes at family level, respectively. As the highest temperature was observed in the yard waste composting system, the abundance of Enterobacteriaceae which contains key pathogens was the lowest in the thermophilic phase.

ID 15 Effect of Nano ZnO on Biogas Generation from Sanitary Landfills

Presenter: İlknur Temizel

Nano-ZnO enters landfills mostly through disposal of cosmetics, UV protection and catalysts. In this study, the effect of ZnO on biogas generation from sanitary landfills was investigated. Two conventional and two bioreactors were operated using real MSW samples at mesophilic temperature (35 ºC). Results indicated that the waste stabilization was faster with leachate recirculation (bioreactors) both with and without the addition of nano-ZnO. Moreover, the presence of the nano-ZnO within the waste led to a decrease in biogas production of about 15% suggesting that the the nano-ZnO may have some inhibitory effects on biogas production.

ID 16 Biotransformation of Benzalkonium Chlorides by Immobilized Cells of *Pseudomonas sp.* BIOMIG1

Presenter: Koray Sakarya

Mass use of quaternary ammonium compounds (QACs) caused these chemicals to become an environmental concern. Little or no elimination of QACs in wastewater treatment plants necessitates a removal policy for these chemicals within treatment system before discharge. In this study, an advanced treatment system after biological treatment is proposed for efficient removal of benzalkonium chlorides (BACs) which are the most common type of QACs in consumer products. Cultures of *Pseudomonas sp*. BIOMIG1^{BDMA} which can convert BACs into N,N-Dimethylbenzylamine (BDMA) were immobilized into Ca-alginate beads. Beads were optimized with respect to $CaCl_2$ concentrations and diameter for the best BAC biotransformation efficiency at a cell density of 10^7 cells/mL. Most efficient beads were 3 mm beads produced by using 0.15 M $CaCl_2$. Number of cells in these beads was found to be $4.6\pm1.4x10^6$ per bead. BAC degradation kinetics were elucidated for the most common BACs found in the wastewater, C_{12}BDMA and C_{14}BDMA. The rate constant was estimated to be 0.46 µM-BACs/hr. Continuous flow packed bed reactors were prepared using alginate beads as packing material and going to be operated at 5.3, 2.7, and 1.3 hrs empty bed contact times corresponding to 1.3, 0.8, and 0.3 mean residence times to identify the optimum operating retention time for >90% BAC removal.

ID 17 Social Aspects of Green Buildings: A Case Study on Building-Occupant Interaction

Presenter: Gülsüme Külçe

Environmental sustainability is highly dependent on human actions and behaviours since most of the environmental problems such as urban air pollution, deforestation, and loss of biodiversity are direct result of human behaviour. In recent years, there has been an increasing interest on the need to affect the impact of human activities on the environment positively. To achieve this, current analyses of the consumer behaviour are need to be known as a first step, together with the environmental awareness levels. In this study, environmental awareness and sustainable lifestyles of the university students in Bogazici University were assessed in water, waste and energy nexus. A questionnaire based survey; consisting of 3 main parts –awareness level, importance level, and behaviour analysis- was applied to undergraduate students from following faculties: Faculty of Arts and Sciences, Faculty of Economics and Administrative Sciences, Faculty of Education, Faculty of Engineering, School of Applied Disciplines, and School of Foreign Languages. The information from questionnaires was analyzed by using Microsoft Excel Programme and Statistical Package for the Social Sciences (SPSS, version 22.0) statistics program. The awareness level according to departments and sustainable behavior analysis of the students based on recycling, water efficiency, energy efficiency, waste minimization, meat consumption and the tendency to buy environmental friendly products are presented in the study.

ID 18 Investigation of Metal Content of Electronic Waste by Comparing Three Different Digestion Method

Presenter: Merve Tunalı

The rapid development of technology today leads to an increase in the use of electronic devices, especially over the past two decades. Humans are upgrading their mobile phones, computers, televisions, audio equipment and printers more frequently than ever before that results in generation of huge amount of electronic waste. These devices may include up to 60 different elements, containing rare earth elements, precious and hazardous elements. Revealing the content of electronic waste is crucial to determine the management options including recycling and recovery. For this purpose, 6 different type of electronic waste (consisting of mobile phones and computers) was digested by using three different digestion methods; including acid digestion and microwave assisted acid digestion. The samples were then analyzed by using Inductively Coupled Plasma Optical Emission Spectrometry. The metal content of each type of electronic waste was reported together with the most suitable investigation method.

ID 19 - The Generation of Glomalin-related Soil Protein (GRSP) and Its Contribution to Copper Sequestration in Contaminated Soils

Presenter: Mehmet Meriç Tunalı

In order to understand the role of two mycorrhizal species for enhancement of plant growth in sorghum (*Sorghum bicolor* L.) and sunflower (*Helianthus annuus* L.) rhizosphere, and their ability to integrate with mycorrhizal fungi in copper contaminated soils and Glomalin Related Soil Protein (GRSP) production under certain conditions in a greenhouse experiment, both sorghum and sunflower plants were inoculated with two AMF species, *Glomus mosseae* and *Glomus intraradices*, and grown in various copper (Cu^{+2}) concentrations. Generation of glomalin-related soil protein (GRSP) is the result of the interaction between AMF and host plants in Cu^{+2} contaminated soils. Cu^{+2} concentrations in this study were 100, 500 and 1000 ppm. Two commercial crops (sorghum and sunflowers) which are widely cultivated in majority of agricultural fields in Turkey were used as host plants. Results showed a strong variability in sunflower and sorghum plants colonized with both AMF species in terms of GRSP (0.6–11.2 mg/g and 0.2-10.75 mg/g, respectively). Up to 60% colonization was observed with *G. mosseae* species. Findings suggest highly efficient mechanism for AMF to mitigate stress leading to stabilization of polluted soils. Results also provide a new suggestion on the contribution of glomalin in copper sequestration in contaminated soils.

ID 20 Pretreatment of Cow Manure and Barley with Extracellular Enzymes Secreted by Aerobic Fungi Trametes Trogii for Enhanced Biogas Production

Presenter: Mahir Bozan

Lignocellulosic wastes have a potential to supply bioenergy by the anaerobic digestion systems to resolve world's energy requirement and novel environmental issues. However, the hardness of lignocellulosic biomass degradation creates a barrier to enhance biogas production. Furthermore, barley and cow manure can be lignocellulosic substrates for anaerobic digesters and applying different pretreatment systems in order to decrease complexity of lignocellulosic biomass can increase efficiency of those digesters. In this study, laccase enzyme secreted by the aerobic fungi *Trametes trogii* was used to degrade lignocellulosic biomass as biological pretreatment. Growth of *T.trogii* was maintained by using laccase inducer media containing soluble starch in order to maximize laccase activity in a short period. After 6 days of incubation, enzyme activity reached up to 278.47 U/L. Mycelium was extracted from the incubated culture by paper filtration to get extracellular enzyme laccase existing in the media. Enzyme was inoculated into Erlenmeyer flasks containing different amounts of barley and manure mixture. After inoculation, enzyme activity for each mixture was measured. Mixtures were left to incubation for 24 h and then samples were taken to analyze the chemical and biological contents. It is expected to be observed degradation of some parts of lignocellulosic substrates in a very short period of time and therefore to increase biogas production and furthermore decrease the cost of biological pretreatment of lignocellulosic biomass.

ID 21 Biotransformation of Acetaminophen by Soil Microbial Community

Presenter: Çağlar Akay

Acetaminophen, better known as paracetamol, is an active ingredient of widely used antipyretic and analgesic drugs worldwide. It has been frequently detected in domestic and industrial wastewater, surface water and soil. Since the conventional wastewater treatment systems are not adequate for the elimination of acetaminophen, a better understanding on the biotransformation of this compound is crucial to upgrade treatment systems or design advanced treatment technologies to control the release of acetaminophen into the environment and eliminate its potential hazardous impacts. In this study, four bacterial species capable of acetaminophen biotransformation were isolated from soil microbial community and identified as *Pseudomonas nitroreducens* BIOMIG-P2, *Rhodococcus erythropolis* BIOMIG-P19, *Flavobacterium sp.* BIOMIG-P32, and *Sphingobium sp.* BIOMIG-P36 via phylogenetic analysis based on 16S rDNA sequences. Among them only *Pseudomonas nitroreducens* BIOMIG-P2 is closely related to the bacteria previously isolated as acetaminophen degrader. BIOMIG-19 is a gram positive and belongs to Actinobacteria. BIOMIG-P32 which belongs to Bacteroidetes and BIOMIG-P36 which belong to Proteobacteria family of Bacteria are novel isolates that can degrade acetaminophen. Kinetics of biotransformation of acetaminophen by four isolates were determined in a batch experiment in order to acquire knowledge about the biotransformation mechanism of acetaminophen for further application systems.

ID 22 Sustainable Management of Groundwater Commons: A System Dynamics Approach

Presenter: Adnan Mirhanoğlu

Groundwater fed irrigation may have irreversible effects on local aquifers in arid and semi-arid places. The hydrology of groundwater resources and the impact of human activities on groundwater exploitation are complex and this complexity causes strategic management problems. System dynamics provides us tools to explore the relationship among nature and human in a holistic way. In this research, a dynamic simulation model is being developed to seek solutions for management of groundwater commons in Kızıltepe Plain, in south-east Turkey. The dynamic model consists of five sectors representing groundwater resources, water extraction, land use change, crop choice and pump investments. It is argued that although overexploitation of groundwater beyond its replenishment rates may be profitable for the farmers in the short term, it may cause irreversible economic and ecological damage in long term. The simulation model is expected to help us find effective strategies to achieve long term sustainability in Kızıltepe Plain.

Jury Members

Prof. Dr. Ferhan Çeçen	**Ayşe Defne Şahin**
Prof. Dr. Nadim Copty	**Elifcan Çalışkan**
Prof. Dr. Andrzej Furman	**Emine Ertekin**
Assoc. Prof. Dr. Nilgün Cılız	**Mahir Yazaar**
Asst. Prof. Dr. Berat Z. Haznedaroğlu	**Zeynep Akdoğan**

Special Thanks to:

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