

II. Natural Hazards and Climate Change Conference



Poster Session I

Agroclimatic Trends and Adaptation: Challenges and Future Perspectives in Hungary –
Erik Kovács, Balázs Zay, János Puskás

Biodiversity of cultivable bacteria in the rhizosphere of industrial crop plants in Hungary –
Orsolya Kedves, Tamás Zsolt Polyák, Katalin Perei, Csaba Vágvölgyi, László Kredics

Comparison of salt stress induced biochemical responses of *Lepidium sativum* (garden cress) and the salt tolerant *Lepidium crassifolium* –
Batnasan Ganbold, Adedokun Oluwatosin Peace, Rebeka Karginov, Ágnes Szepesi

Development of a healthy casing alternative from spent mushroom compost –
Henrietta Allaga, Dóra Horkics, Ádám Bordé, András Varga, Rita Büchner, Terézia Kovács, András Mész, Csaba Csutorás, Judit Bajzát, Nóra Bakos-Barczi, Csaba Vágvölgyi, László Kredics

Effect of plasma-activated water seed priming on the development of *Arabidopsis thaliana* seedlings in a drought stress model system –
Tamás Bodor, Gábor Fejes, Kinga Kutasi, Zsuzsanna Kolbert

Future crop yield trends across Europe from past observations and ISIMIP climate scenarios –
Tobias Conrad

Isolation, identification and characterisation of potential biocontrol agents of walnut pathogens in Turkey and Hungary –
Ahmet Akköprü, Younes Rezaee Danesh, Orsolya Kedves, Semra Demir, Emre Demirel Durak, Adnan Yaviç, Solmaz Najafi, Gokhan Boyno, Ceylan Pinar Uçar, Betül Yıldız Fırat, Árpád Brányi, Nóra Tünde Lange-Enyedi, Simang Champramary, Boris Indic, György Sipos, Csaba Vágvölgyi, László Kredics

Osmotic stress-induced anatomical changes in pea (*Pisum sativum* L.) leaves –
Réka Szöllősi, Gábor Fejes, Tamás Bodor, Zsuzsanna Kolbert

- Enhancing hydrocarbon biodegradation: Repeated application of extracellular organic matter from *Micrococcus luteus* in used lubricant oil-contaminated soils – *Klaudia Hoffmann, Enikő Mészáros, Gábor Feigl, Krisztián Laczi, Katalin Perei, Attila Bodor*
- A Research Station Plan for the Global Challenges of the 21st Century – *László Horváth, Zoltán Bozóki, Edit Mikó*
- Plasma activated water-based seed pre-treatment affects the development, in planta reactive oxygen- and nitrogen species and photosynthetic activity of osmotic-stressed pea plants – *Gábor Fejes, Tamás Bodor, Réka Szöllősi, Kinga Kutasi, Zsuzsanna Kolbert*
- Cellulose content in annual increments of Norway spruce (*Picea abies* (L.) Karst.) along an elevation gradient in the Rarău Mts (Romania) – *Daniela Maria Llanos-Campana, Zoltan Kern, Ionel Popa, Aurel Perşoiu*
- Frost rings in Swiss Stone Pine (*Pinus cembra*) from Rodna Mts. (Romania) - Anatomical evidence of late spring frost in the past centuries – *Eszter Mocsári, Balazs Nagy, Ionel Popa, Matyas Arvai, Zoltan Kern*
- The impact of polyethylene-based plastics and heavy metals on rapeseed root growth – *Kamilla Kovács, Enikő Mészáros, Dorottya Hicz, Gábor Feigl*
- The role of chitosan-encapsulated NO-donors in enhancing tomato resistance to fungal infections - *Dóra Kondak, Selahattin Kondak, Tamás Bodor, András Kukri, Réka Szöllősi, Zsuzsanna Kolbert*
- In silico assessment of the ecotoxicological characteristics of terbuthylazine as a pollutant in surface waters – *Tatjana Mitrović, Darija Obradović, Saša Lazović, Marija Perović*
- Zinc Oxide Nanoparticles: Dual Effects on Broccoli Growth Under Nutrient and Salinity Stress – *Adedokun Oluwatosin Peace, Batnasan Ganbold, Rebeka Karginov, Andrea Rónavári, Ágnes Szepesi, Zoltán Kónya*
- The role of climate microrefugia in shaping intraspecific trait variability in *Myrmica ruginodis* – *Bonita Ratkai, Kata Anna Bán, Kata Frei, Gergely Horváth, Gábor Li, Ádám Lőrincz, Gábor Lőrinczi, Fanni Pécsy, Zoltán Bátor, István Elek Maák*
- Temperature and geographical location induced fluctuations of population density of European ground squirrels in Hungary – *Csongor Gedeon, Olivér Váczi, Felix Knauer, Mátyás Árvai, Franz Suchentrunk*
- The accelerated spruce dieback in Central Europe is a warning sign of the climate change – *Zsuzsa Lisztes-Szabó, Mihály Braun, Albert Tóth, Elemér László, József Lennert, Anna F. Filep*
- Extreme Dry Events in Vojvodina: Observations and Climate Change Projections - *Atila Bezdán, Jovana Bezdán*
- Observed long-term trend in various extreme precipitation-related climate indices – *Csilla Simon, Mónika Lakatos, Olivér Szentes*
- Eutrophication in Freshwater Ecosystems: Impacts of Nutrients, Groundwater, and Climate Change – *Marija Perović, Vesna Obradović, Mitrinović David, Mitrović Tatjana*

In silico assessment of the ecotoxicological characteristics of terbuthylazine as a pollutant in surface waters

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Terbuthylazine (TBA), a triazine herbicide is commonly applied in agricultural activities to eliminate weed species and optimize crop yields. Following application, the accumulated TBA can persist in the environment and contaminate water sources via surface runoff and leaching. Consequently, human exposure to TBA through food chain may lead to a range of adverse health outcomes [1]. In our research, we applied various in silico methodologies to predict the biomimetic properties of TBA and evaluate its ecotoxicological impact on living organisms [2].

Preliminary studies (ADMETlab 3) indicate a significant toxicological profile such as cancerogenity and respiratore toxicity. Activity on liver enzymes (CYP2D6), passage through the blood-brain barrier and consequent neurotoxicity and endocrine toxicity can be expected as well (ProTox 3). The predicted bioconcentration factor (assesses the potential for secondary poisoning and the risk to human health via the food chain) is 0.946. The aquatic ecotoxicity is considered through values of LC50FM=5.30 (96-hour fathead minnow 50 % lethal concentration), and LC50DM=4.22 (48-hour daphnia magna 50 % lethal concentration). The predicted oral toxicity, LD50 for TBA is 750 mg/kg (Class 4). We assessed the impact on the human body of consuming one liter of water for measured 8.2 µg/l of TBA (OPERA). Predictions show that TBA will be mostly accumulated in the liver (7.8 µg/ml) and intestines (5.3 µg/ml) which can cause liver damage. Pharmacokinetic predictions indicate a high degree of human intestinal absorption (HIA=0.894), which further increases the toxic effect of its increased concentration in the intestines. In the case of a pregnant woman, it can be expected to cross the placenta and cause liver damage (36.38 µg/ml) and kidney damage (28.25 µg/ml). There is also accumulation in the thyroid gland (13.91 µg/ml) which may lead to delayed fetal development. The obtained data indicate an important ecotoxicological risk of TBA and the possibility of toxic effects including pregnant women.