Proceedings of the 8th World Congress on Civil, Structural, and Environmental Engineering (CSEE'23)
Lisbon, Portugal – March 29 – 31, 2023
Paper No. ICEPTP 200
DOI: 10.11159/iceptp23.200

The Toxic Effect of Drug Residues on the Germination of Cultivated Plants

Szilárd Székely[1], Eszter Rápó[1], Katalin Mihályfalvi[2], Szende Tonk[1,*]
[1] Environmental Science Department, Sapientia Hungarian University of Transylvania
400193 Cluj-Napoca, Calea Turzii no. 4, Cluj County, Romania
rapoeszter@gmail.com, *corresponding author: tonk.szende@sapientia.ro
[2] Liceul Teoretic Reformat
400084 Cluj-Napoca, Mihail Kogălniceanu no. 16, Cluj County, Romania
mihalyfalvi.katalin@gmail.com

Extended Abstract

Over the past decades, industrial development has led to the identification of several new chemicals in the aquatic environment, which are pollutants of growing concern for water management. These compounds are referred to as "emerging contaminants (ECs)", micropollutants (MPs) or trace organic compounds (TrOCs) [1]. In nature, these pollutants are synthetic or naturally occurring contaminants, most of which are of organic origin and typically occur in trace amounts. As emerging micropollutants, their detection in water is difficult and their long-term ecological and health effects are not yet known. In many cases, they have been shown to have known or suspected adverse effects on the aquatic environment or human health [2]. Organic micropollutants cannot be fully removed by conventional wastewater treatment processes and therefore accumulate through biomagnification and are spread through the food chain [3].

Because drugs are designed to perform different physiological and biochemical functions, they can penetrate biological barriers and persist stably in the human body. Antibiotics used in food (milk, meat, eggs, fruit, vegetables and fish) as growth promoters, therapeutic and preventive agents can pose ecological and health risks if released into the environment [4,5]. Globally, pharmaceuticals and their metabolites have been detected in wastewater, groundwater and even drinking water [6]. Contamination levels of antibiotics in wastewater can reach 10-100 mg/L, but the majority of reports have shown levels in the ng-µg/L range, and water in this form cannot be used in agriculture [7].

The main objective of this study is to investigate the toxic effects of pharmaceuticals (tetracycline and ampicillin) on germination through standard tests such as germination, growth, morphological/anatomical changes of the germ. White mustard (*Sinapis alba*) and lettuce (*Lactuca sativa*) were used as model plants.

Our experiment was performed on seeds (25 seeds) placed on filter paper in sterilized Petri-dishes. Samples were germinated for 72 hours in the dark at T= 20±2 ºC on solutions of different initial concentrations of analytical grade and commercially used ampicillin and tetracycline (5-5 mL, 0-10 g/L). Our tests were carried out in 6 replicates. Seedling growth inhibition (SGI), relative germination, relative root growth and germination index were calculated. The morphology was studied and compared by microscopy.

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