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**Contribution of chemical and physical treatments in the fungal inactivation**

Mouna Saoudi<sup>1\*</sup>, Imane Habila<sup>2</sup>, Housseem Eddine Bousba<sup>3</sup>

<sup>1</sup> Laboratory of molecular and cellular biology, Faculty of Nature and Life Sciences, University Frères Mentouri, Constantine – Algeria

<sup>2</sup> Research Unit of Environmental and Molecular Structure Chemistry (URCHEMS), Faculty of Exact Sciences, University of Frères Mentouri Constantine 1, Algeria

<sup>3</sup> Laboratory of Microsystems and Instrumentation (LMI), Electronic Department, Faculty of Technology, University of Frères Mentouri Constantine 1, Algeria

\*[mounasaoudi@outlook.fr](mailto:mounasaoudi@outlook.fr)

**Abstract**

Research about decontamination and disinfection processes keep offering novel and various techniques in both chemical and physical fields. Chemical based processes can include the use of antibiotics or other chemical compounds that are known for their antifungal potential, whereas physical techniques are based on the employment of different agents such as UV-light, ultrasound or plasma discharges. Fungi present a major microbial threat for vegetal species especially wheat, for this purpose, this work presents a contribution for the aim to use a chemical treatment from one hand and a physical one from the other hand on different microbial strains *viz. Fusarium culmorum, Fusarium pseudograminearum* and *Alternaria graminiicola*, in order to come up with an effective solution to protect these vegetal species. The chemical method relies on the employment of the in-vitro antimicrobial activities of a new complex of zinc (II) with sulfamethoxazole ligand using well-diffusion method upon several fungal species; a detailed description of the chemical compound is presented in previous work. Results of this experiment are compared to the standard antibiotic (*Cotrimoxale*) that is used as positive control. The physical treatment is based on the use of atmospheric pressure plasma jets (APPJs) that are known to have an anti-microbial potential. A plasma setup has been adapted for liquids treatment where the APPJ can generate relatively high concentrations of Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS). Those chemical species generated with the intermediate of plasma in water are the main responsible factors of its anti-microbial activity that is investigated on the same fungal species. The results illustrate that the chemical method has been proven to be highly effective against *F. pseudograminearum* and moderate effect against *A. graminiicola*. In contrast, the physical treatment leads to total inhibition of the microbial strains in the average of 5 minutes of treatment when the plasma is ignited using Ar + N<sub>2</sub>O as working gas.

**Keywords:** Antifungal potential, Antibiotic, Sulfamethoxazole-Zn, Plasma, Reactive nitrogen and oxygen species.