10th Central European Symposium on Plasma Chemistry
21st International Conference on Plasma Physics and Applications

Bucharest, Romania, 1-5 September 2025

Book of Abstracts

Edited by: Daniela Dobrin, Monica Magureanu, Bogdana Mitu, Veronica Satulu

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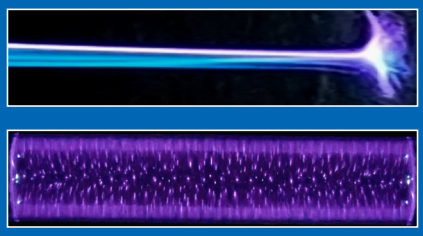

21st CONFERENCE
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Bucharest - Romania
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Effect of plasma-activated water on *Lactuca sativa* L. growth and development in hydroponic cultivation system

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The growing global population highlights the urgent need for sustainable food production. Modern agriculture heavily relies on commercial fertilizers, with nitrogen being a critical nutrient for plant growth [1]. Cold plasma generates reactive oxygen and nitrogen species (RONS), which dissolve in water, leading to the formation of plasma-activated water (PAW). PAW has demonstrated significant potential in agricultural applications, as the prolonged bioavailability of RONS may act as signaling molecules in plant metabolism or contribute to nutrient uptake [2]. Also, seed imbibition in PAW used as priming method resulted in a significant enhancement of the product yield in peas [3]. This study investigates the effects of PAW produced by transient spark (TS) discharge systems on the growth and physiological responses of hydroponically cultivated lettuce (*Lactuca sativa* L.). Four experimental treatments were implemented: (1) a control group cultivated in Hoagland's nutrient medium; (2) plants grown from seeds primed in PAW for 1.5 hours prior to cultivation in Hoagland's nutrient medium; (3) plants from PAW-primed seeds cultivated in PAW supplemented with Hoagland's nutrient solution; and (4) plants cultivated entirely in PAW with Hoagland's nutrient solution. Seedlings were initially pre-grown in stone wool baskets for four weeks before transplantation into a hydroponic system. Ther preliminary results after pre-growning indicates a positive effect of PAW priming on the seedling size and vitality but germination and early growth in PAW did not improve the seed growth parameters. At the end of the developmental stage, key physiological parameters—including chlorophyll concentration, phenolic content, and antioxidant enzyme activity—were analyzed to evaluate the impact of PAW on the plant growth and metabolism.

Keywords: dielectric barrier discharge, *Lactuca sativa*, physiological parameters, plasma-activated water, transient spark.
Acknowledgements: The research was supported by the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V03-00033 EnvAdwice and the Slovak Research and Development Agency APVV-22-0247.

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