



“Gheorghe Asachi” Technical University of Iasi, Romania



GREEN NITRATE AND HYDROGEN PEROXIDE SYNTHESIS BY NON-THERMAL PLASMA REACTORS FOR AGRICULTURAL APPLICATIONS

**Bogdan-Andrei Pingescu*, Daniel Asmarandei, Dragos Astanei,
Oana Cristina Beniuga, Constantin-Razvan Beniuga, Radu Burlica**

Gheorghe Asachi Technical University of Iasi, Faculty of Electrical Engineering, Bd. D. Mangeron 21-23, 700050 Iasi, Romania

Abstract

This work presents a preliminary study of a mini-glidarc non-thermal plasma (NTP) reactor designed in special configuration. Multiple tests were carried out on the glidarc reactor to determine the performance terms of generating reactive oxygen and nitrogen species (RONS) relative to electrical power consumption. The reactor was powered by a pulsed-high voltage power supply (P-HVPS) at 100, 200, and 300Hz to assess how the discharge frequency influences reactive-species generation. The influence of the treated water flow rate in the NTP reactor on the production of active oxidative species was also studied. The study focused on emphasizing the properties of the activated water for use as a supplementary nitrogen supply to plants but also as a disinfectant with an environmentally friendly pesticide effect. After plasma treatment, stable RONS concentrations found in the bulk phase (hydrogen peroxide – H₂O₂ and nitrates - NO₃⁻) were measured. A study was conducted to evaluate the physiological effects of PAW on plant growth. Three groups of ten pots of *Lactuca sativa* (cv. S. Anna) were cultivated outdoors for 28 days. The control group received only distilled water, while the other two groups were supplied with plasma-activated water. In all cases, water was administered through both foliar application and root irrigation. Plants treated with plasma-activated water developed longer, healthier leaves, whereas the control plants displayed clear signs of leaf disease.

Key words: glidarc reactor, green fertilizer, non-thermal plasma, plasma activated water

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* Author to whom all correspondence should be addressed: E-mail: bogdan-andrei.pingescu@academic.tuiasi.ro; Phone: +40 751375707