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Non-thermal plasma: new technology for pathogen control and improvement on the quality of soybean seeds

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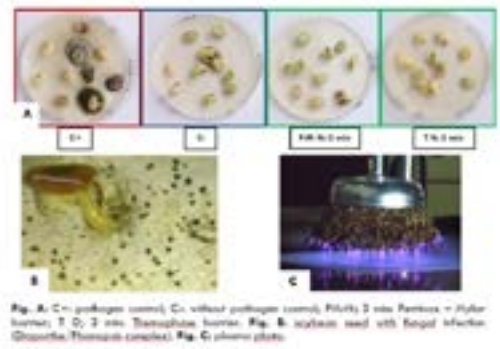
Statement of the Problem: Soybean (*Glycine max* L.) is one of the most important crops worldwide. *Diaporthe/Phomopsis* complex is one of the causal agents of soybean stem canker and pod and stem blight. It is well known that agrochemicals remain in the harvested products as in the fields and they disrupt the natural state of the microbiological flora leading to the formation of resistant strains. Considering the fact that storage provokes a deterioration of the biological quality of the seeds, the reduction of fungal contamination is of great interest.

Methodology & Theoretical Orientation: Non-thermal plasma is a fast, economic and pollution-free method. It is based on non-ionizing low-level radiation, which can activate the vitality of seeds but without causing gene mutations. Soybean seeds were exposed to a multi filamentous dielectric barrier (Pertinax – Mylar (P-M) and Thernophase (T)). Different gases (O_2 and N_2) were used to transport the active agents of the plasma. In this work, we focus on the ability of the plasma to control *Diaporthe/Phomopsis* in soybean seed.

Findings: The results showed a decreased in the presence of the pathogen and an increase of the germination percentage and vigour test on the seeds with plasma treatment (P-M: O_2 2 min and N_2 3 min and T: O_2 3min and N_2 3min) respect to the pathogen control. We evaluated different oxidative enzymes as well as lipid peroxidation in seeds. These results demonstrated an activation of the antioxidant defenses in soybean seeds reversing the oxidative damage caused by the fungi. Changes in the lipid composition of the seed membranes were evaluated.

Conclusion & Significance: Plasma treatments were efficient in controlling *Diaporthe/Phomopsis* infection in soybean seeds. Therefore, this innovative technology would allow a reduction of environmental contamination by agrochemicals in soil and water.



Biography

Karina Balestrasse has graduated in Biochemical at Buenos Aires University, Argentina. She finished her Doctoral thesis in Vegetal Biological Chemistry in 2003. She is a Professor of Buenos Aires University and Independent Investigator of The National Scientific and Technical Research Council (CONICET). She works in Agronomy Faculty of Buenos Aires University and Institute for Research in Agricultural and Environmental Biosciences (INBA) Argentina. Her expertise is oxidative stress and metabolism vegetal. Her current research program focuses on the use cold plasma to pathogen control in seed. She leads an interdisciplinary group of Engineers, Biotechnology Physicists and Biochemists. In the last year, she received two awards for her innovative work. She carries out research in collaboration with the CSIC of Granada through the program I-Links 2015. She has published more than 40 research papers in national & international journals. She currently directs Doctoral Thesis and grants.

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