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Silicon Nanoparticles and Irradiated Chitosan: Sustainable Elicitors for PS II Activity and Antioxidant Mediated Plant Immunity

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Abstract : Lemongrass (Cymbopogon flexuosus (Steud.) Wats) is an aromatic grass with great industrial potential. It is cultivated for its essential oil (EO), which has great economic value due to its numerous medicinal, cosmetic, and culinary applications. The present study had the goal to evaluate whether the combined application of silicon nanoparticles (SiNPs) 150 mg L^{-1} and irradiated chitosan (ICH) 120 mg L^{-1} can upgrade lemongrass crop and render enhanced growth and productivity. The analyses of growth and photosynthetic parameters, leaf-nitrogen, and reactive oxygen species metabolism, as well as the content of total essential oil, indicated that combined foliar sprays of SiNPs and ICH can significantly ($p \leq 0.05$) trigger a general activation of lemongrass metabolism. Overall, the data indicate that concomitant SiNPs and ICH application elicit lemongrass physiology and defence system, and opens new possibilities for their biotechnological application on other related plant species with agronomic potential.

Keywords : photosynthesis, Cymbopogon, antioxidant metabolism, essential oil, ROS, nanoparticles, polysaccharides
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