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Exploring the impact of cold plasma treatment on seed germination and phytochemical content in Ocimum basilicum.

This study investigates the effect of electrical discharge plasma on the germination rate and phytochemical content in the seeds of *Ocimum basilicum*. Basil is known for its aromatic leaves along with its medicinal properties. The key focus of this study is to evaluate the significant changes occurring in the carbohydrate metabolism in basil after plasma treatment at varying incubation periods. The seeds were initially exposed to volume discharge and surface discharge plasma for varying time durations (30 seconds to 12 minutes). The plasma duration at which highest germination rate has occurred was selected as the optimal time and bulk quantity of seeds were exposed for this duration. The phytochemical changes were studied at the seed level as a function of incubation period starting from 7th, 14th and 21st days post-plasma treatment. The germination rates were observed to be highest when the seeds were exposed to surface discharge plasma for 30 seconds. The secondary metabolites like polyphenols, flavonoids, tannins, alkaloids and antioxidants showed an increase in their contents in response to the external stress by plasma. The proteins showed an increase by 471.42% compared to the control seeds. Meanwhile the concentrations of total carbohydrates and total dietary fibers decreased significantly by 22.22 % and 35.67% respectively on the 7th day of incubation indicating the enhanced enzymatic breakdown for energy during germination, which was accelerated by plasma treatment. These findings demonstrate that cold plasma treatment can modulate germination and phytochemical profiles in basil seeds, offering potential applications in agriculture and nutraceutical enhancement.

Author: SURESH, Dilbhi

Co-authors: Dr Y P, Naveen (Assistant professor, ASNS, Mandya); Dr BS, Rajanikanth (Professor, IISc, Bangalore)

Presenter: SURESH, Dilbhi

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