

## Surface Analysis of White Grapes treated using Argon Cold Atmospheric Pressure Plasma Jet

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Grapes, being a significant fruit crop owing to their high economic value, with a global production of approximately 79.2 million tonnes (FAO, 2018), are perishable and undergo changes in flavour, colour, nutrients, and texture during storage, which can impact consumer purchasing decisions [1]. Softening is the most common phenomenon in fruit texture changes, and it occurs during the ripening process and is often associated with a decrease in cell wall hardness, causing a reduction in cell wall adhesion, making it easier for microbial to invade the cell, resulting in rotting and spoilage [2]. Several technologies have been developed to improve the quality and shelf-life of perishable products that includes Modified Atmosphere Packaging (MAP), Cold-Chain Storage and Transportation, Ozone treatment and chemical preservatives, etc. [3]. Cold atmospheric plasma (CAP) is a novel quality preservation technology that has gained attention in the food industry recently due to its distinctive characteristics and versatile applications [4]. However, in-depth understanding is needed to understand the induced changes in quality attributes of the treated Grapes.

The present study focuses on the effect of Argon CAP jet on the surface properties of white grapes at different treatment intervals. The developed cross-field configured CAP jet is a double dielectric barrier discharge (DBD) system which generates plasma through a dielectric material tube having dielectric constant 3.7 in which a copper wire mounted by similar tube acts as the central power electrode and a thin copper material as the outer ring electrode. The central electrode is connected through a bipolar pulsed high-voltage power source, and the outer electrode is grounded. Argon is used as the working gas at atmospheric pressure. The plasma discharge is optimized at different combinations of input parameters like its applied voltage, frequency, average power consumption and gas flow rate. The CAP jet generated species are analysed using Optical Emission Spectroscopy (OES). Grapes are treated for different time intervals like 1 min, 2 min and 3 min at optimized parameters. The effect of CAP jet treatment on different physicochemical properties like change in surface microstructure, hydrophilicity, firmness, chemical structure assessment, change in colour, Total Soluble Solid (TSS) level, water activity, etc. are compared between untreated and treated grapes. CAP jet treatment is found to be effective only on the physical characteristics of the grapes surface and not altering any

chemical compositions. The detailed results obtained will be presented.

### References

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