Effect of Gamma Irradiation on Physicochemical and Microbiological Properties of Ceylon Black Pepper *(Piper nigrum L.)*

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Ceylon black pepper (*Piper nigrum* L.), commonly known as the "King of Spices", has dominated the international spice market due to its high piperine content, strong aroma, and rich flavor. Ceylon black pepper is highly susceptible to contamination with different types of microorganisms. This study focused on evaluating the effects of different doses of gamma irradiation on physicochemical and microbial properties of Ceylon black pepper. Samples were collected from a particular exporter in the western province, Sri Lanka. The collected samples were irradiated at five different doses (0, 5, 10, 20, and 30 kGy) by using an industrial Co-60 gamma irradiator. Treated samples were analyzed for water activity (Water activity meter -Novasina LabMATER), moisture content (Moisture analyzer -MRS 120-3), antioxidant activity (DPPH assay method), total polyphenol content (Folin ciocalteu reagent method), flavonoid content (Colorimetric method) and volatile content (GC-MS). Total plate count and yeast and mold counts of these samples were enumerated. This experiment was repeated thrice. Irradiation dose did not affect significantly ($p<0.05$) on the tested physicochemical properties of Ceylon black pepper. All tested irradiation doses were capable of reducing total plate count and yeast and mold count significantly ($p<0.00$) as compared to the control. Therefore, it can be concluded that irradiation with 5 kGy dose will ensure the microbial quality of Ceylon black pepper while preserving its original physicochemical properties.

Keywords: Ceylon black pepper, Gamma irradiation, Dose, Microbial safety