EFFECT OF LIGHT SPECTRUM AND PACKAGING MATERIAL ON CURCUMIN DEGRADATION UPON STORAGE

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Curcumin, the major bioactive compound in turmeric (*Curcuma longa*), is highly sensitive to light exposure, which can reduce its stability during storage. This study evaluated the effect of different light spectrum and packaging materials on curcumin degradation. Curcumin was isolated from turmeric powder using solvent extraction and purification methods and characterized using Fourier Transform Infrared (FTIR) and UV–Visible spectroscopic analysis. The isolated curcumin samples were exposed for 3 hours to ultraviolet (UV) light, visible light and direct sunlight under three packaging conditions: aluminum foil, low-density polyethylene (LDPE) and direct exposure without packaging. A non-exposed control sample was maintained under dark conditions without light exposure for comparison. Following exposure, samples were analyzed using UV–Visible spectrophotometry at 421 nm and absorbance changes were used to assess degradation based on the Beer–Lambert Law. Three replicates were prepared for each treatment and statistical analysis was carried out using one-way Analysis of Variance (ANOVA) followed by Tukey's post-hoc test at a 95% confidence level. Significant differences among treatments were observed ($p < 0.05$), confirming that both light spectra and packaging materials influenced curcumin stability. Direct sunlight exposure without packaging showed the highest degradation with lowest absorbance values, while aluminum foil packaging demonstrated the highest protective effect by maintaining absorbance values closest to the control sample. LDPE provided moderate protection against degradation. Tukey's post-hoc analysis confirmed a progressive increase in curcumin degradation under the following light–packaging combinations: Control ≈ Visible–Al > UV–Al ≈ Sunlight–Al > Visible–LDPE > Visible–direct ≈ UV–LDPE > Sunlight–LDPE > UV–direct > Sunlight–direct. So, the study demonstrated that appropriate packaging and reduced light exposure are essential for preserving curcumin stability during storage.

Keywords: Beer–Lambert law, FTIR, photodegradation, storage stability, turmeric, UV–Visible spectrophotometry