Development and Evaluation of Herbal Bio-coating from *Aloe vera,* Tulsi (*Ocimum sanctum*) and Lemongrass (*Cymbopogon citratus*) for Postharvest Preservation of Fruits

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The continuous growth of the global population has increased the demand for nutritionally rich fruits and vegetables, by considering quality and safety. Fresh fruits are highly perishable commodity, the development of natural and sustainable techniques to retain quality attributes and extend shelf life is vital important. The study was conducted to develop and evaluate herbal bio-coatings of *Aloe vera* gel, Tulsi extract, and lemongrass essential oil for postharvest preservation of climacteric fruits. The herbal materials were prepared individually and formulated with food-grade glycerol, lecithin, and xanthan gum to obtain a stable and uniform bio-coating solution. Three coating formulations (A, B, and C) with varying concentrations were developed and evaluated. Among them, formula B exhibited superior postharvest preservation and quality retention. Therefore, it was selected for further analysis. Mango, banana, and avocado fruits of uniform maturity and defect-free were coated using the dipping method and stored under ambient conditions. Postharvest quality parameters including physical and physicochemical weight loss, firmness, colour, pH, TSS (ºBrix), titratable acidity, water activity, moisture content, visual appearance, and microbial spoilage were evaluated at 3-day intervals over a 15-day storage period. The results exhibited that the herbal bio-coating significantly improved postharvest quality compared to uncoated control fruits. Coated fruits exhibited reduced weight loss and better firmness retention throughout the storage period. Ripening-related changes in pH and TSS were delayed. Improved moisture retention, enhanced surface appearance, and reduced shriveling were observed in all coated fruits. In addition, microbial spoilage was noticeably lower in coated samples, particularly during extended storage. Overall, the herbal bio-coating effectively enhanced postharvest quality and extended the shelf life of fruits, and highlighting its potential in fruit preservation.

Keywords: *Aloe vera*, Herbal bio-coating, Lemongrass, Storage, Tulsi