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Plant Mucilage as a Sustainable Coating for Improving Fresh Produce Storage Stability

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Background: If applied as an edible coating, plant mucilage may provide high tensile strength and barrier properties against different gasses thereby reducing the rate of softening and weight loss of coated produce.

Objective: This study assessed characteristics of various Sri Lankan plant mucilage and the potential use of selected mucilage as an edible coating to assess the storage stability of fresh produce.

Methods: Mucilage was extracted from various local plants such as okra, kehipiththan, hibiscus, aloe vera, kumbuk, dawul kurundu, chia seed, and fenugreek. Physiological characteristics of the extracted mucilage were evaluated. Fresh produce (Mango, Banana, Capsicum, Tomato); selected based on the rate of post-harvest loss during their season, were dipped in coating solutions with selected plant mucilage, such as Aloe Vera (AV), Okra (O), Aloe Vera: Glycerine in 80:20 (AVG), and Okra: Glycerine in 80:20 (OG). All the treated samples were stored under ambient conditions (25°C, 58% RH) for seven days. Physico-chemical parameters were monitored during storage in comparison with an uncoated sample.

Results: Results revealed that all the extracted mucilage samples exhibited pH values ranging from 4.1–5.8 and were soluble in warm water while insoluble in organic solvents. AV and OF showed moisture contents of 90.03% and 87.23% respectively, with drying losses of 98.73% and 98.20%, and TSS levels of 1.13% and 1.63%. Electrical conductivity was 2.531 ms/cm for AV and 4.498 ms/cm for Okra, with viscosities of 59.18 Centipoise and 120 Centipoise indicating superior flow behavior. AV coating enhanced the shelf life of mangoes and tomatoes by significantly ($p < 0.05$) lowering total soluble solids and weight loss, treated tomatoes retained higher firmness, titratable acidity and lower a^* and b^* values representing lower ripening rate.

Conclusion: This study confirms that AV mucilage can be used as a natural, functional coating to reducing the rate of ripening of certain fresh produce such as tomato and mango.

Keywords: Aloe Vera; Fruits and vegetables; Okra; Post-harvest losses.