



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Gallic acid is a well-known antioxidant ascribed to various beneficial health effects and is found in a variety of plants. In this work, firstly, gallic acid was extracted from *Ficus auriculata* leaves using ultrasound-assisted extraction, and the process parameters were optimized. Maximum extraction was obtained after 30 min at 50% sonication level, 1:10 g/mL solid to solvent ratio and pH 8 at 50 °C. 50% methanol resulted in highest extraction followed by alkaline water and 50% ethanol where gallic acid content in the extract was found to be 329.46 mg/L, 312.92 mg/L and 183.74 mg/L, respectively. Secondly, the gallic acid (antioxidant) rich leaf extract of *F. auriculata* was then incorporated into polyvinyl alcohol (PVA) and utilized as a coating to delay the ripening of green bananas. The weight loss was higher in the uncoated group than in any coated fruits. The reduction in titratable acidity and the increase in total soluble sugars was slower in all the coated samples, as compared to the uncoated ones. The fruits without any treatment attained complete maturity on the 9th day. The fruits coated with pure PVA as well as 10% extract incorporated PVA remained acceptable till day 15, while the ones with 1% and 5% of extract reached full ripeness on the 18th day. Thirdly, the extracted gallic acid was used as the active ingredient for the preparation of antioxidant formulations. The free-flowing formulations were formed into tablets using a hand-operated pellet maker. All the tablets had disintegration times below 15 min, which meet the standards of the Indian Pharmacopeia. The formulations were found to be stable at pH 2.5 and 8.5, signifying a good stability in the gastrointestinal tract. Finally, lignin was extracted from the waste leaves of *F. auriculata* obtained after separation of gallic acid and incorporated into PVA films. Lignin addition improved the UV-shielding, thermal, antioxidant and mechanical property of PVA films. The prepared films showed a much better performance than commercial packaging films in inhibiting mold growth during storage of preservative – free bread storage. The bread samples packed with commercial package showed signs of mold growth on the 3rd day while the growth was completely inhibited till 15th day for PVA film containing 1% lignin. The pure PVA film and the ones containing 3% and 5% of lignin inhibited growth till the 12th and 9th day, respectively. Findings from the current study shows that safe, cheap and eco – friendly biomaterials can inhibit the growth of spoilage microorganisms and thus potentially be used in food packaging.