

Effect of Aloe vera gel enriched with basil (*Ocimum bacilicum* L.) essential oil as a natural coating on maintaining postharvest quality of fruits and mushroom during storage

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論 文 名 : Effect of *Aloe vera* gel enriched with basil (*Ocimum basilicum* L.) essential oil as a natural coating on maintaining postharvest quality of fruits and mushroom during storage
(バジル精油添加アロエベラゲルコーティングによる農産物の品質保持効果)

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論 文 内 容 の 要 旨

The total cost of product due to injury and spoil at the time of marketing is higher than during the production phase. Thus, it is necessary to find a new strategy to delay senescence after harvesting, during storage and distribution of products to achieve reasonable shelf life. In recent years, consumers attention has increased to natural food with beneficial effect on health rather than foods combined with chemical additives. Natural edible coatings as a safe and eco-friendly preservative are now receiving significant attention to extend the shelf life and delay deteriorate of different kind of fruits and vegetables. *Aloe vera* gel is a typical example of postharvest edible coating with high maintenance of postharvest qualities applied on various types of fruits. *Aloe vera* gel as a natural edible coating has been recently developed in food productions and pharmaceutical industries due to antimicrobial activity, biochemical and biodegradability properties such as anticancer, antioxidant, anti-allergic, anti-inflammatory, immunomodulatory, hepatoprotective and antidiabetic. These properties of *Aloe vera* arise from rich content of polysaccharides combined with soluble sugars, proteins, vitamins, and minerals, albeit with relatively low lipid content (0.07% – 0.42%). However, lipid content plays a key role in hydrophobic barrier properties of the edible coating. It is reported that coatings contained both polysaccharide and lipid form more effective barrier to moisture loss and gas permeability compared to polysaccharide-based alone. Among possible sources, the essential oil of basil (*Ocimum basilicum* L.) plant with 0.64 g/100 g fatty acid could be a good selection which uses in food industry as antimicrobial and antioxidant additive agents in food products. Basil plant of Lamiaceae family can grow in various regions with different climates around the world and contain in protein, fatty acid, vitamins, and minerals. Thus, to maximize coating treatment efficiency, a combination of *Aloe vera* gel as polysaccharide and basil oil as lipid has been proposed.

In this research, the effect of *Aloe vera* gel alone and enriched with basil oil at 500 and 1000 $\mu\text{L L}^{-1}$ concentration as a new coating on three crops including peach as climacteric fruit, strawberries as non-climacteric fruit and button mushroom with spongy texture were investigated.

Applying *Aloe vera* gel mixed with basil oil at 1000 $\mu\text{L L}^{-1}$ concentration on peaches indicated the highest firmness, lowest weight loss and total soluble solid in compare other treatments.

Application of *Aloe vera* gel with 1000 $\mu\text{L L}^{-1}$ concentration of basil oil on strawberry at 4 °C storage, showed retarded the weight loss, softening, respiration rate and fungal mycelium growth on medium during cold storage and had beneficial effects on maintaining total acidity, flavor quality and color of the fruit. Finally, the sensory analysis confirmed that the visual acceptance of the coated fruit was more than the uncoated samples.

Aloe vera gel containing 1000 $\mu\text{L L}^{-1}$ concentration of basil oil reduced weight loss and respiration on strawberry at ambient temperature (20 °C) more than other treatments and prevented surface color change. This treatment showed beneficial inhibition on the *in vitro* and *in vivo* study of fungal infection at ambient temperature. Furthermore, sensory evaluation obtained the scores for coated sample strawberries higher than uncoated.

Aloe vera gel and basil oil at both concentrations on button mushroom in cold storage decelerated respiration rate and weight loss and preserved firmness by inhibition of relative electric leakage and malondialdehyde accumulation. Furthermore, browning index were delayed through inflation of phenolic contents, antioxidant and phenylalanine ammonia lyase activities and reduction of polyphenol oxidase activity. In addition, sensory evaluation presented the high score for mushrooms treated with *Aloe vera* gel plus basil oil at 1000 $\mu\text{L L}^{-1}$ concentration treatment.

The combination of *Aloe vera* gel and basil oil as an incorporation of polysaccharide and lipid leads to the formation of higher barrier efficacy and delayed senescence process of these different types of crops. Finally, it is recommended to use *Aloe vera* gel supplemented with basil oil especially at of 1000 $\mu\text{L L}^{-1}$ concentration as a potential candidate for senescence inhibition of stored peach, strawberry and mushroom.