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EFFECT OF PINEAPPLE PEEL OIL INCORPORATED CORN STARCH BASED EDIBLE COATING ON THE QULITY OF FRESH CUT FRUITS AND VEGETABLES

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Abstract: This study explores the effect of physiochemical properties of pineapple peel oil (PPO) incorporated corn starch based edible coating and the effect of this oil incorporated starch based edible coating on the shelf life of fresh cut fruits and vegetables. Corn starch based edible coating was prepared using corn starch, distilled water and glycerol. The pineapple peel oil was incorporated at a rate of 1%, 2% and 3%. The physiochemical properties of edible coating such as the Total Soluble Solids (TSS), ph., titratable acidity and ascorbic acid content were analyzed.Weight loss and sensory analysis were used as parameters for testing the shelf life of coated fruitand vegetable in 0, 3 and 7 days. The study concluded that 3% Pineapple peel oil incorporated Corn starch based edible coating were provided an extended shelf life when compared to 2% PPO + Corn starch, 1% PPO+ Corn starch and uncoated sample. The uncoated sample showed a rapid deterioration with an estimated shelf-life period of 2 days at room temperature, based on the fast weight loss, color changes, accelerated softening and ripening, browning, and high incidence of decay. On the contrary, those treated with edible coating significantly delayed the above parameters related to postharvest quality losses, and storability could be extended up to 7 days at room temperature. Interestingly, the sensory analyses revealed beneficial effects in terms of delaying browning and dehydration and maintenance of the visual aspect of the sample without any detrimental effect on taste, aroma, or flavors.

I.INTRODUCTION

Fruits and vegetables play an important role in human diet, providing essential minerals, antioxidants and phytochemicals. They are used as functional foods since ancient times. However, they are also the product with relatively short shelf life. They are prone to physical, chemical and microbiological damages, thus leading to important economic losses. In order to minimize the losses, various artificial measures were undertaken. These can extent the shelf life of product but at the same time can cause serious health and environmental hazards, associated with chemical residues or the proliferation of resistant pathogenic strains. The growing restriction on the utilization of agrochemicals by many countries and the increasing consumer demand for high quality, minimally processed fresh food products have sharpened the search fornew preservation methods and technologies.

The use of edible coating has emerged as an effective and environmentally friendly alternative for extending the shelf life of many perishable foods, thus protecting the food against physical and biochemical changes. Pineapple peel waste are important issue of waste management. It contains a considerable content of antioxidant property, sugar, phenolic compounds, high fiber and protein, Pineapple peel waste also provides high potential bromelain enzyme as functional materials (V. Saraswaty et al., 2016). The oil extracted from pineapple peel contain antioxidant, anti-browning properties. The coating will not only act as preservative agent but also add value to the fruit and vegetable by their functional properties.

II.MATERIALS

The materials required for performing this work are corn starch, food grade glycerol, pineapplepeel essential oil, banana, brinjal and distilled water. Corn starch, food grade glycerol and pineapple peel essential oil were purchased from the local market. Distilled water was obtainedfrom water still distillation unit single stage (horizontal type).

III.METHODOLOGY

Preparation of corn starch based edible film

Coating formula were 15 g corn starch, 150 ml of distilled water, the starch was melted using a continuous heated stirrer at 75 ◦C until the solution gelatinized to allow leaching. A total of 2.5 mL of glycerol was used as plasticizer and then

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mixed and heated at 60 ◦C for 30 min. After theheating process was completed, the mixture was cooled down to 30 ◦C and 2 ml glycerol. 1%, 2% and 3% (v/v) Pineapple peel essential oil were mixed after the last heating of the solution.

Sample preparation for shelf-life evaluation test:

To evaluate the shelf-life changes after coating fruits and vegetables (banana, potato and brinjal)of uniform size with no physical damage was selected. The samples were then treated with 1%, 2%, 3% pineapple peel oil incorporated starch coating solution in different containers and 3 sample from each fruit and vegetable were untreated for comparing their characteristics with the coated samples. After that fruit and vegetables were kept in room temperature for 20 minutes forsurface drying and coating formation and stored in tray by wrapping with newspaper. They werekept to continuous observation for almost one week storage period at room temperature.

Physicochemical evaluation of prepared samples

Determination of pH:

The pH of the samples was estimated by the method of AOAC depicted by Horwitz by using a pH meter at room temperature (28±2˚C). The decision of the pH was made by setting up a bufferat pH 7.0 and the temperature was set to 28°C.

Determination of total soluble solid (TSS):

TSS of sample juice was determined by the method of AOAC suggested by Horwitz using ahand refractometer and the data were recorded as degree Brix.

Determination of percentage of total acidity:

Titrable acidity was determined by the suggested method of Athmaselvi, Sumitha. Whole samples were thoroughly homogenized. Filtered 10 mL juice was taken in a beaker and 25 mL ofdistilled water was added. After that it was titrated with 0.1M NaOH, using 2 drops of phenolphthalein as an indicator.

The weight of citric acid= 0.1 $M\ NaOH\ X\ Vol.\ of\ NaOH\ (in\ liter)\ X$ 192.43∗ 3

% Of total acidity = $wt.\ of\ acid\ wt.\ of\ sample$ X 100

Determination of ascorbic acid:

Ascorbic acid was determined by the method of iodine titration. Iodine solution is prepared by dissolving 5g of potassium iodide and 0.268g of potassium iodate in 200ml of distilled water. Add 30ml of 3M sulfuric acid. Pour this solution into 500ml graduated cylinder and dilute it to a final volume of 500ml with distilled water and transfer the solution to a 600ml beaker. Sample solution is prepared by diluting 25ml of sample solution with 100ml distilled water. Add 25ml ofdiluted solution and 10 drops of 1% starch solution to 125ml Erlenmeyer flask and titrate until the endpoint which is indicated by orange colour.

Determination of weight loss:

The physiological loss of mass was calculated according to the procedure described by Valverde,Valero. Weight loss was determined considering the fresh weight at harvest using a balance with an accuracy of 0.0001 g. Weight loss was then determined from the weight of each sample measured before storages and after 0, 5, 7 days.

% Weight loss = $Initial\ weight{-}Final\ weight/\ Initial\ weight$ × 100%

Sensory Analyses

Sensory analyses such as the taste, texture, colour, appearance and flavor test were carried out in0, 3 and 7 days after application of coatings.

IV.RESULT

Characterization of PPO incorporated corn starch edible coating

The pH., titratable acidity, total soluble solids and ascorbic acid content of the 1%PPO+ corn starch, 2% PPO+ Corn starch and 3%PPO+ Corn starch was indicated in the table 1. The low ph.of the edible coating solution could act as an effective preservative agent against the entry of microorganism.

Table 1

Formulation	Ph.	Titratable acidity(mg/gFW)	TSS %	Ascorbic acid(mg/100ml)
1%PPO+ cornstarch	5.02	0.6	1.5	20.6
2% PPO+ Cornstarch	5.46	0.7	1.7	21.5
3%PPO+ Cornstarch	6.03	0.9	1.9	23.2

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Characteristics of fruit and vegetable obtained from the application of PPO incorporated cornstarch edible coating solution

Weight-loss analysis

The initial weight of the fresh cut fruits and vegetables taken for analysis was 5g. The weight ofthe sample, measured on 0, 3 and 7 days was given in the table 2. The result obtained from the table indicated that

Table 2:

Percentage weight loss of 1% PPO incorporated corn starch edible coating in day 1, day 3 andday 7

Sample	Day 1	Day 3	Day 7
Potato	2.86	16.72	35.6
Brinjal	1.36	12.92	29.4
Banana	1.08	17.96	33.72

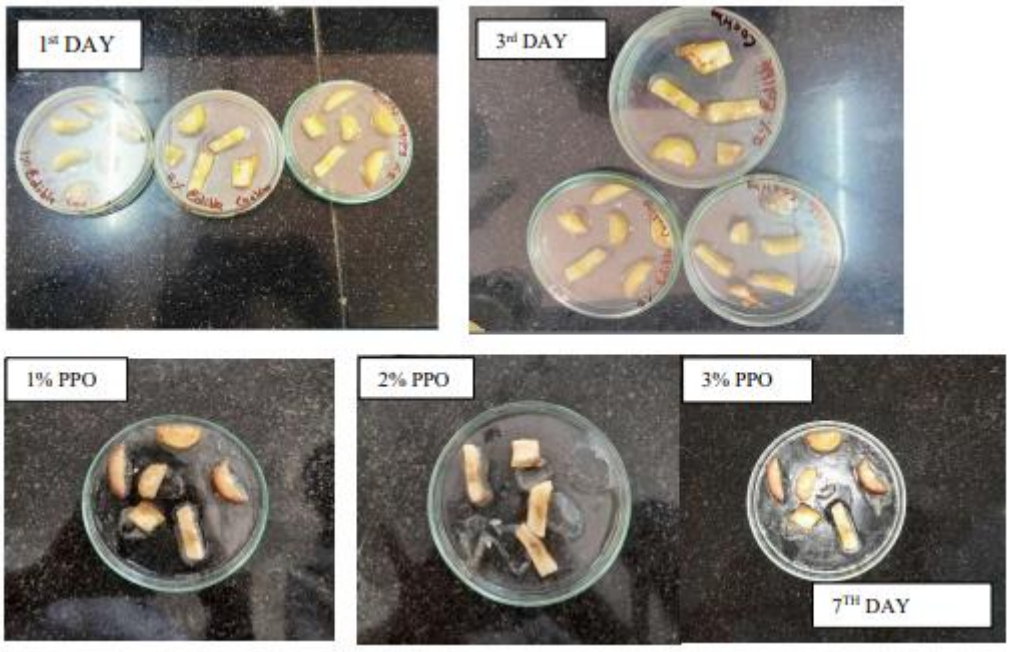
Percentage weight loss of 2% PPO incorporated corn starch edible coating in day 1, day 3 andday 7

Sample	Day 1	Day 3	Day 7
Potato	0.28	14.38	24.56
Brinjal	5.74	9.8	27.86
Banana	1.78	15.02	22.2

Percentage weight loss of 3% PPO incorporated corn starch edible coating in day 1, day 3 andday 7

Sample	Day 1	Day 3	Day 7
Potato	0.08	0.73	17.32
Brinjal	0.22	0.25	10.71
Banana	0.8	0.15	11.55

Sensory analysis



The sensory analysis concluded that the sample coated with 3% PPO incorporated corn starch based edible coating extended the shelf of fruits and vegetables (potato, brinjal and banana) for aperiod of 7 days without deteriorating the taste, texture, flavor and colour. The uncoated sample showed a rapid deterioration with an estimated shelf-life period of 2 days at room temperature, based on the fast weight loss, color changes, accelerated softening and ripening,

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browning, and high incidence of decay. On the contrary, those treated with edible coating significantly delayed the above parameters related to postharvest quality losses, and storability could be extended up to 7 days at room temperature. 3% PPO incorporated Corn starch edible coating can be used as an effective coating formulation which could extent the shelf life of fresh cut fruits and vegetables up to 7 days.

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