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Research Article

Moth Bean, Gelatin, and *Murraya Koenigii* Leaves Extract-Based Film and Coating: Effect of Coating on Shelf and Quality of *Solanum Melongena*

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Moth bean starch (MS), gelatin (GA), and *Murraya koenigii* leaves extract (ME) are blended at different compositions to prepare film and coating according to casting and dipping approaches. Different MS, GA, and ME compositions were used to synthesize films and coating. The film compositions (MS : GA: ME: 60 : 20 : 20 and MS : GA: ME:20 : 60 : 20) were represented in terms of F3 and F4, respectively. The results showed that F3 exhibited better physicochemical properties than other films. In addition, SEM images showed that all components of the films were uniformly mixed and formed smooth surface morphology without cracks and bubbles. FTIR results indicate that ME in the films induces interactions between the film components, causing an improvement in compactness. Moreover, an optimized film-forming solution was tested as a coating. Parameters such as skin tightness, weight loss, pH, titratable acidity, and sensory analysis were considered to check the quality of coated *Solanum melongena* during storage. The results show that the formulation effectively maintains the quality parameters during storage. Furthermore, it also notices that coating extends the shelf life of *Solanum melongena* by one week.

1. Introduction

India's global fruits and vegetable cultivation stands second in the world next to China. However, a considerable amount of fruits and vegetables (around 30–40%) degrades before their use due to improper postharvest management practices. Among these vegetables, *Solanum melongena* is a versatile climacteric fruit widely cultivated across India in different seasons and known to have antioxidant properties, nutrients, and minerals [1]. It is highly perishable and has a shorter shelf life of around 2-3 days. Many pre-, post-treatments, and processes are utilized to extend the shelf life of fruits and vegetables to avoid postharvest losses. Nowadays, researchers are unearthing possible eco-friendly and cheap postharvest technologies that are sustainable and eco-friendly. In this context, packaging and coating materials play an essential role in the food supply chain industries. The coating is a thin layer that applies to fruits' outer surface to enhance the barrier properties against aroma, moisture, and gas exchange [2]. For example, a wax coating done on apples creates an off-flavor. Therefore, researchers are exploring the possibility of developing coating and films derived from

natural polysaccharides [3]. Several works have verified that fruits and vegetables' shelf life can be extended by applying edible coatings formulated from natural polysaccharides, including starch, cellulose, chitosan, protein, and gums [4]. Currently, the requirement of starch globally exceeds its production due to its versatile applications in different types of industries. Therefore, there is a need in the future to find sustainable and underutilized sources of starch, especially for developing countries. Starch from unexplored white can be used for the preparation of films and coating. The excellent gel-forming ability of moth bean starch makes it suitable for the development of coating and other food packaging films. Since starch shows inferior moisture barrier and mechanical properties, so starch in combination with gelatin is applied for the development of film and coating to improve the physicochemical properties. For the development of coating, thin, and flexible films for food packaging, few research works conducted on moth starch were found compared to other films. However, moth bean starch and gelatin do not have inherent antimicrobial and antioxidant properties that limit their application as an active and intelligent packaging film and coating in the food industry. Hence, we attempt to incorporate *Murraya koenigii* extracts into starch and gelatin-based active films and packaging. *Murraya koenigii* is associated with the Rutaceae family found in tropical to subtropical regions in India and Asia. For the development of active film and coating, a few works such as gelatin/chitosan with *Eugenia uniflora L* extract [5], and vinyl alcohol/corn starch with pineapple peel extract [6], are available for the development of films. In our previous work, we have shown that plant extract with starch can extend the shelf life of cucumber [7]. Nevertheless, the MS, GA, and ME-based film and coating have not been developed yet by any researcher. Therefore, this work was investigated to know the impact of GA and ME on the physicochemical properties of films. Subsequently, the effect of an optimized film formulation as a coating on the shelf life and quality of *Solanum melongena* along with storage was investigated. Moreover, this coating may be a viable alternative to conventional wax coating upon proper technological interventions and scale-up.

2. Materials and Methods

Calcium chloride (≥98), gelatin (≥98), and sorbitol (≥98) were procured from Loba. Chem. (Mumbai, India). Moth bean seeds and fresh *Murraya koenigii* leaves were obtained from the local market.

2.1. Preparation of Starch Solution. The MS (3 gm) and sorbitol (25% w/w dried starch) were added to 100 mL distilled water, and then the mixture was heated at 90 ± 1°C for 20 min. Next, the homogenization and degassing of the starch solution were done using a high-speed homogenizer and vacuum oven.

2.2. Preparation of Gelatin Solution. The GA (8% w/v) and sorbitol (25% w/w) were mixed in 100 mL distilled water and heated at 60 ± 1°C for 15 min, and the resulting mixture was used as a gelatin solution.

2.3. Development of an Active Film and Coating. Two films were prepared from MS and GA solutions each, which were noted as F1 (MS : GA: 100 : 0) and F2 (MS : GA: 0 : 100) and these films may be assumed as control samples. Two films were prepared which were noted as F3 (MS : GA: ME: 60 : 20 : 20), and F4 (MS : CGA : ME: 20 : 60 : 20), respectively. All solutions were mixed at 50 ± 1°C for 20 min. Finally, 15 mL solution was carefully decanted over the plastic Petri dish and kept in an oven at room temperature for 24 h. Dried films were carefully removed and stored in an airtight bag for further investigation.

2.4. Film Thickness (TH). A digital micrometer (Mitutoyo, Japan) having a precision of ± 0.001 mm was utilized for the measurement of TH at eight different positions on the films.

2.5. Moisture Content (MC). The MC of the samples was calculated by a gravimetric approach using the following equation:

$$\mathrm{MC}(\%) = \frac{W_1 - W_2}{W_1} * 100, \tag{1}$$

where W_1 and W_2 are the initial and dried weights of the film sample, respectively.

2.6. Opacity (OP). The OP of the films was calculated using a standardized Hunter Lab colorimeter (Color Flex EZ, Hunter Lab, USA). For calibration, white and black plates were used. OP was determined using the following equation:

$$\mathrm{OP}(\%) = \frac{L_{\mathrm{Black}}}{L_{\mathrm{White}}} * 100, \tag{2}$$

where L_{Black} and L_{White} are the lightness with black and white plates, respectively.

2.7. Water Vapor Permeability (WVP). A well-established cup technique (ASTM E96-80) was applied to determine the WVP. In brief, the mouth of customized cups filled with dried $CaCl_2$ was enclosed with film samples and fixed using vacuum grease. Cups were then transferred to a desiccator filled with distilled water. Finally, a sealed desiccator was shifted into an incubator and kept at 25 ± 1°C. The weight of cups was cautiously recorded with time, and the WVP was estimated by applying the following equation:

$$\mathrm{WVP} = \frac{(\Delta m/\Delta T) * t}{a\Delta P}, \tag{3}$$

where $\Delta m/\Delta T, t, a\&\Delta P$ are the variation In weight of cups with time, film thickness, area, and pressure difference, respectively, Swelling Index (SI).

Dried samples mentioned in MC analysis with initial weights (w_a) were transferred to 15 mL of distilled water for 2 min. All wet samples were cautiously removed and

then weighed (w_b) again. Equation (4) was used to measure SI%.

$$\mathrm{SI}(\%) = \frac{w_b - w_a}{w_a} * 100, \quad (4)$$

where w_a and w_b are the weights of dried and swollen samples, respectively.

2.8. Solubility (WS). Dried samples described in SI and MC with initial weight (W_1) were dipped into 15 mL distilled water and kept at 25 ± 1°C for 24 h. The resulting swelled samples were carefully removed from the water and placed in a hot air oven at 105 ± 1 °C. After 24 h, weights (W_2) of the dried undissolved samples were measured. The WS was determined using the following equation:

$$\mathrm{WS}(\%) = \frac{W_1 - W_2}{W_1} * 100, \quad (5)$$

where W_1 *and* W_2 are the initial and final weight of samples, respectively.

2.9. Mechanical Property. The film strength (TS, MPa) and elasticity (*E*%) were computed using a texture analyzer (Stable Micro Systems Ltd, UK) with a 50 N load cell. The crosshead speed was fixed at 1 mm/s. TS (MPa) and *E* (%) were calculated using the following equations:

$$\mathrm{TS}(\mathrm{MPa}) = \frac{F}{A}, \quad (6)$$

$$E(\%) = \frac{l_2 - l_1}{l_1} * 100. \quad (7)$$

2.10. FTIR Analysis. Fourier transform infrared spectra (FTIR) of the films were measured to know interactions among the film's components induced with the addition of ME using a Shimadzu-8400, Japan. Spectrum was taken in the range of 500 cm^{-1} and 4000 cm^{-1} wave numbers with resolution at 4 cm^{-1}.

2.11. SEM Analysis. Possible variations in the surface morphology of the MS/GA-based films with ME were analyzed using SEM (SU1510, Hitachi, Japan) at different magnifications.

2.12. Shelf Life and Quality Analysis. Solanum melongena of uniform shape, color, and size were selected for the experimental work. First, all samples were washed thoroughly with distilled water and dried. After that, samples were soaked in the coating solution for 2–5 min and then carefully removed from the solution. Finally, the resulting coated samples were transferred to an incubator and maintained at 25 ± 1°C during the observation period.

2.13. Skin Lightness. Change in *Solanum melongena* skin lightness throughout the storage period was reported in terms of lightness (L^*) using a standardized Hunter Lab colorimeter (Color Flex EZ, Hunter Lab, USA). The calibration of the colorimeter was done using black and white cups.

2.14. Weight Loss. Weight loss in *Solanum melongena* was recorded using a scientific weighting machine (Denver Instrument APX-60; *d* ¼ 0.1 mg). Equation (8) was used to calculate the weight Loss of *Solanum melongena*.

$$\mathrm{Weight\ Loss}(\%) = \frac{m_f - m_i}{m_i} * 100, \quad (8)$$

where m_i and m_f are the initial and final weights of *Solanum melongena*, respectively.

2.15. Total Soluble Solids. A hand-held refractometer was used to measure the total soluble solids counts of coated and uncoated *Solanum melongena* during storage time using the AOAC method (932.14).

2.16. pH and Titratable Acidity. The pH of *Solanum melongena* pulp extract was measured by a digital pH meter (Model: EUTECH Instruments, Singapore). Titratable acidity was estimated according to the reported approach [8].

2.17. Sensory Analysis. The sensory technique is essential to study customer behavior and the market acceptability of fruits and vegetables. In this approach, trained volunteers were selected to monitor coated and uncoated *Solanum melongena* quality and freshness after 2, 4, and 7 days of storage. All coated and uncoated *Solanum melongena* were marked separately and presented randomly. Parameters such as surface appearance and brightness were selected to study the quality and freshness of *Solanum melongena* using a hedonic scale 1 = poor, inedible; 3 = fair, the limit of usability; 5 = good, the limit of marketability; 7 = very good; 9 = excellent.

2.18. Statistics. The results of films and coatings were analyzed according to the analysis of variance (ANOVA) using Origin 8 software. The difference at $P < 0.05$ was considered significant.

3. Results and Discussion

3.1. Film Thickness. Film thickness is an essential parameter of food packaging materials, which directly influences important physicochemical properties such as water vapor barrier and mechanical properties. TH values of all films are shown in Table 1, which vary between 0.03 mm and 0.14 mm. Film thickness is a function of drying and synthesis approaches, film-forming solution, and concentration and molecular interactions [9]. According to Kumar et al. 2021, interactions and structure formed during drying impact TH of the films.

Table 1: Film thickness, moisture content, and opacity of the film.

Films	Compositions MS : GA : ME	Thickness (mm)	Moisture content (%)	Opacity (%)
F1	100 : 0 : 0	0.03 ± 0.04	12.92 ± 0.17	26.33 ± 0.16
F2	0 : 100 : 0	0.14 ± 0.02	15.34 ± 0.34	24.75 ± 0.11
F3	60 : 20 : 20	0.05 ± 0.01	13.05 ± 0.46	28.61 ± 0.22
F4	20 : 60 : 20	0.09 ± 0.02	16.54 ± 0.18	26.09 ± 0.24

3.2. Moisture Content. The MC of all prepared films varied in the range of 12.92% to 16.54% and MC values of all films are shown in Table 1. From the results, it was found that the addition of GA and ME guided to remarkably ($P \leq 0.05$) diminish the MC of the films. Adilah et al. noticed that the MC of GA-polyethylene films increased when fruit peel extract was added [10]. Reduction in the MC might be related to the induced molecular interactions among the various components of the films, resulting in the development of a compact network of the film [11].

3.3. Opacity. The OP plays a crucial role in retarding the light transmission properties through the packaging films. The impact of ME on the OP of the films is shown in Table 1. When varied contents of ME were incorporated, the OP of the active films was increased. A noticeable increase ($P < 0.05$) in the OP of the active film was observed. Similarly, Hazirah et al. observed that as xanthan gum was added into the films made with gelatin, carboxymethyl cellulose (CMC), and the opacity of the films improved [12]. Enhancement in the OP of active films with ME might be related to the light scattering effect [13].

3.4. Water Vapor Permeability. The WVP is a fundamental parameter in packaging materials, which refers to the ability of materials to inhibit the migration of water vapor molecules from the surroundings to food materials. Moreover, it was also observed that MC in food items plays a crucial role in food spoilage. Therefore, the WVP of food packaging materials should be minimum. Table 2 presents the WVP values of all films. As shown in Table 2. An F3 film shows the lowest WVP value while an F2 film illustrates the highest WVP value. ME and GA in the film were significantly influenced ($P < 0.05$) WVP. Similarly, Kumar et al. noticed a similar downward trend in the WVP when pomegranate peel extract was mixed into the chitosan film [14]. A decrease in the WVP may be closely associated with twisted paths formed in the film matrix with ME and GA, leading to a reduction in the WVP [15].

3.5. Swelling Index. The variation in the SI of the films with the addition of various GA and ME contents and the SI values are shown in Table 2. As shown in Table 2, the SI of the F3 film was lower than that of the other films, which offers a higher hydration capacity, a critical characteristic of packaging films used in food industries. It was also found from the results that the SI of the films was enhanced notably ($P < 0.05$) with the incorporation of GA and ME. Similarly, Ramos et al. stated that glycerol in the films made with whey protein increased the hydration capacity of polysaccharides film [16]. Enhancement in the SI may be connected with disturbed interactions in the polymer matrix. Due to this fact, water molecules strongly interact with hydrophilic sites of the active film matrix [17].

3.6. Solubility. The WS is an essential parameter in the food packaging system that indicates film capacity to maintain food integrity in a humid environment. Higher or complete solubility of the food packaging materials supports the biodegradation mechanism. For storage and transportation purpose, WS should be as minimum as possible. Table 2 demonstrates the WS values of all films. As noticed, in compression with other films, the F3 film reported the lowest WS value. In addition, the GA and ME into the films showed a notable ($P < 0.05$) reduction in the WS. Similarly, Ribeiro Sanches et al. mentioned that with an increase in the content of red cabbage extract in the starch film, the WS of the starch film had a downward trend [18]. Reduction in the WS could be related to induced interactions among the control film matrix, limiting the mobility of polymer chains, thus diminishing the polymer matrix's hydrophilicity, leading to lower WS [19].

3.7. Mechanical Property. The mechanical property of food packaging materials plays an essential role in preserving the structural integrity of food during transportation and storage. The *E*% and TS change of the films with GA are shown in Table 3. The results showed that the TS of the films were reduced while the elasticity was enhanced when GA and ME were added. ME and GA incorporation in the films induced notable ($P \leq 0.05$) differences in TS and E% in F3 films than other films. Similarly, Nazmi and Sarbon showed that adding *Centella asiatica* (pegaga) extract in the active film made with GA and carboxymethyl cellulose improved the tensile strength [20]. ME and GA in the film formed a complex interaction among the polymer matrix, which diminishes the cohesion composite matrix and causes a decrease in the film's resistance [11].

3.8. FTIR Analysis. FTIR spectra (*s*) of the MS-based films and MS film with GA and ME are shown in Figures 1(a) and 1(b)). -OH, -CH, and NH stretching vibrations in the starch chains relate to peaks in the range of 3300–2800 cm^{-1} [21, 22]. Starch hydration, bending mode of CH_2 and-C-OH bending and stretching vibrations, amino and amide groups associate with peaks in the range of 1600–1200 cm^{-1} [23]. The peaks between 850 and 1200 cm^{-1} link with glucose pyranose and C-O vibrations stretching glucose units, coupling bonds (-C-O and C-C) stretching, respectively [23, 24]. The peaks noticed within a range of 850–1450 cm^{-1} represent C-OH stretching

Table 2: Water vapor permeability, swelling index, and solubility of the films.

Films	Compositions MS : GA:ME	Water vapor permeability (g/m·s·pa×10^{-10})	Swelling index (%)	Solubility (%)
F1	100 : 0 : 0	2.1 ± 0.03	44.92 ± 0.16	36.33 ± 0.17
F2	0 : 100 : 0	4.9 ± 0.02	60.34 ± 0.24	51.75 ± 0.16
F3	60 : 20 : 20	2.7 ± 0.04	39.05 ± 0.31	30.61 ± 0.18
F4	20 : 60 : 20	4.3 ± 0.03	41.54 ± 0.14	41.09 ± 0.21

Table 3: Mechanical property of film.

Films	Compositions MS : GA:ME	Tensile strength (MPa)	Elongation (%)
F1	100 : 0:0	9.37 ± 0.03	6.92 ± 0.17
F2	0 : 100 : 0	16.37 ± 0.02	11.34 ± 0.34
F3	60 : 20 : 20	14.59 ± 0.03	8.01.05 ± 0.46
F4	20 : 60 : 20	17.31 ± 0.02	9.91 ± 0.18

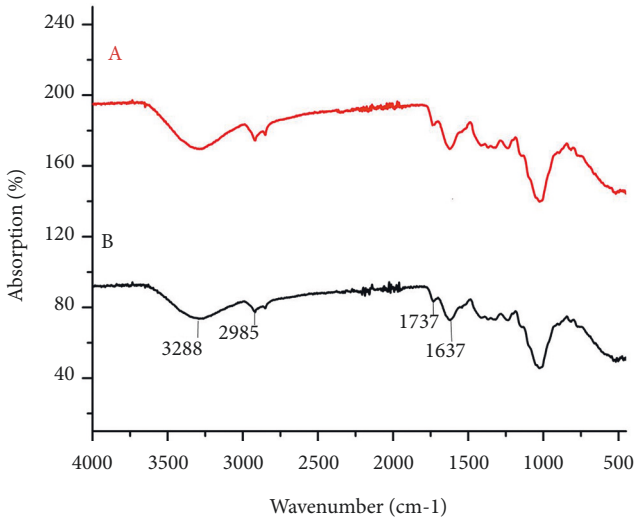

Figure 1: FTIR spectra showing (a) MS films and (b) MS films with ME and GA.

vibration and O-H bond vibration [25, 26]. As ME and GA were incorporated, the positions of peaks slightly altered and shifted to lower wave numbers, possibly due to some interaction among active film components (MS, GA, and ME) [27]. In addition, the peaks between 3600 cm^{-1} and 3000 cm^{-1} became a little broader Similar changes in the FTIR spectra were observed in the sword starch films with goji berries extract [28]. Furthermore, Carolina Medina-Jaramillo et al. also showed similar changes in FTIR spectra of cassava starch film as basil and green tea extract were added [29].

3.9. SEM Analysis. SEM images of the film surface are shown in Figure 2(a)–2(d), which provide a clear understanding of the distribution of constituents of the films. Figures 2(a)–2(d) show that the MS and GA were entirely mixed and formed a smooth surface without cracks and bubbles [30]. Thus, it seems that MS and GA have good compatibility. Kahvand and Fasihi reported similar SEM results for the composite film made with polyvinyl alcohol and corn starch [31]. The surface of the MS films slightly changed from smooth to rough as ME was added. The roughness of the MS with ME might be connected to those insoluble low molecular weight components of ME, which are not thoroughly mixed with MS matrix, and leach out from MS matrix to the surface [32].

3.10. Skin Lightness. Consumer acceptability and market value of fruits depend on various parameters such as texture, appearance, freshness, color, and skin lightness. Among them, skin lightness plays a crucial role in evaluating the quality of fruits with storage time. The lightness values of uncoated and coated *Solanum melongena* during the consideration period are given in Figure 3(a). Active coatings improved *Solanum melongena'* skin lightness than uncoated counterparts. The *Solanum melongena* surfaces seem more bright and fresh because of enhanced incident light reflection brought by the coatings. The results exhibited that the coating application on the *Solanum melongena* effectively retarded skin lightness. However, coated *Solanum melongena* skin lightness differed noticeable ($P \leq 0.05$) during the consideration period than the uncoated *solanum melongena* Similarly, Singh et al. reported that the coating made with carnauba wax helped to retain the skin lightness of *solanum melongena* during storage [33]. Change in skin lightness was affixed with the moisture barrier capacity of coating, which changed the migration rate of gases and moisture in the coated *solanum melongena* and provided an excellent environmental condition around the *solanum melongena* [34].

3.11. Weight Loss. Weight loss is one of the influential parameters that change food materials' quality and shelf life during storage. Weight loss causes wrinkles on the skin of *Solanum melongena* that adversely affects the acceptability of the customer. The coating acts as a moisture barrier around the fruit, thereby diminishing the moisture loss from the *Solanum melongena* and thus improving the shelf life. The change in weight loss of all uncoated and coated *Solanum melongena* with storage time is shown in Figure 3(b). The results showed that the weight loss of uncoated and coated *Solanum melongena* was increased as a function of storage time. However, a notable ($P \leq 0.05$) difference was observed in the coated and uncoated *Solanum melongena* weight loss. Nawab et al. observed that the rate of weight loss in mango starch-coated tomatoes was lower than uncoated tomatoes with the storage time [35]. The improved moisture retention in the coated *Solanum melongena* could be related to moisture barrier resistance offered by the coating, which altered the moisture permeability rate through the coated *Solanum melongena* [36].

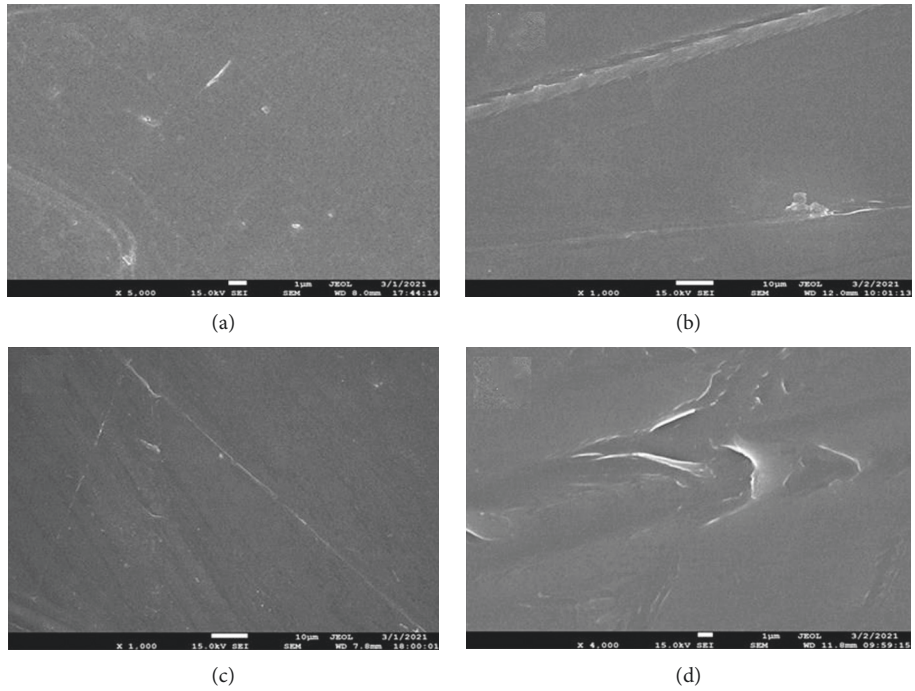

Figure 2: Surface morphology of the F3 (a and b) and F4 (c and d) films.

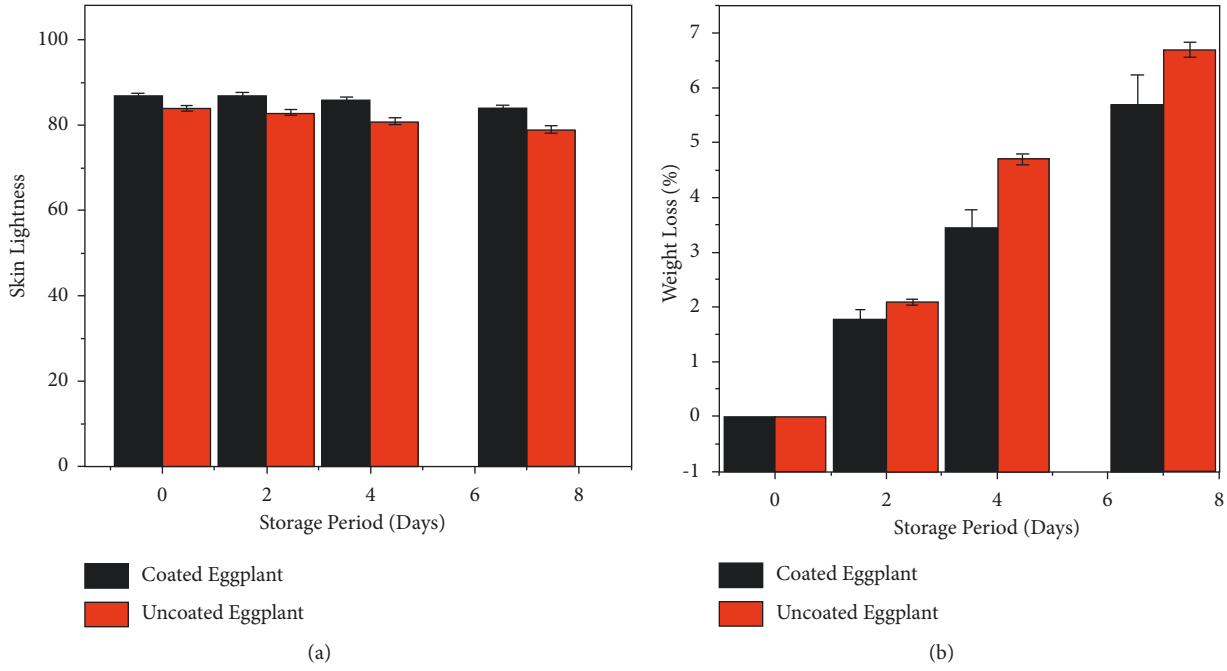

Figure 3: Effect of active coating on the skin lightness (a) and weight loss of (b) *solanum melongena* during storage time.

3.12. Total Soluble Solids. Total soluble solids of coated and uncoated *Solanum melongena* are shown in Figure 4. In general, the total soluble solids of fruits and vegetables continuously rise with storage time. But, coated *Solanum melongena* showed more stable total soluble solids content during the storage period. A significant ($P \leq 0.05$) difference was recorded in total soluble solids values of coated and uncoated *Solanum melongena* during storage time. Similarly, Moalemiyan and Ramaswamy noticed a rise in total soluble solids value with storage time [37]. Changes in total soluble solids may be related to the slower metabolism process due to the moisture barrier resistance of the coating [38].

3.13. pH and Titratable Acidity. The pH and titratable acidity represent the number of organic acids present in the vegetables. Figures 5(a) and 5(b) demonstrate that the pH of the

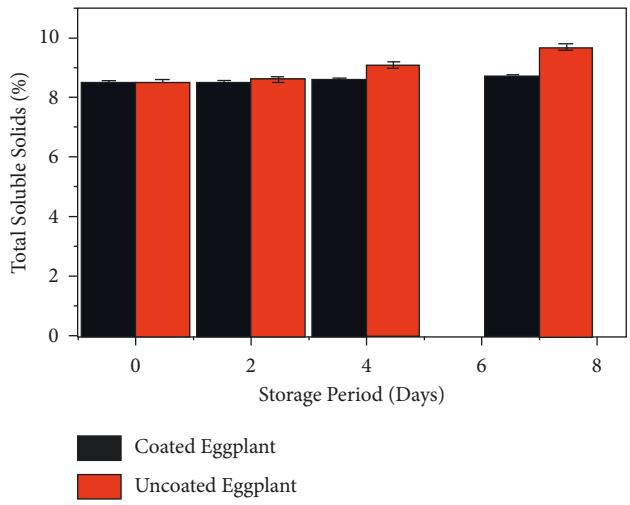

Figure 4: Effect of active coating on the total soluble solids of *solanum melongena* along with storage time.

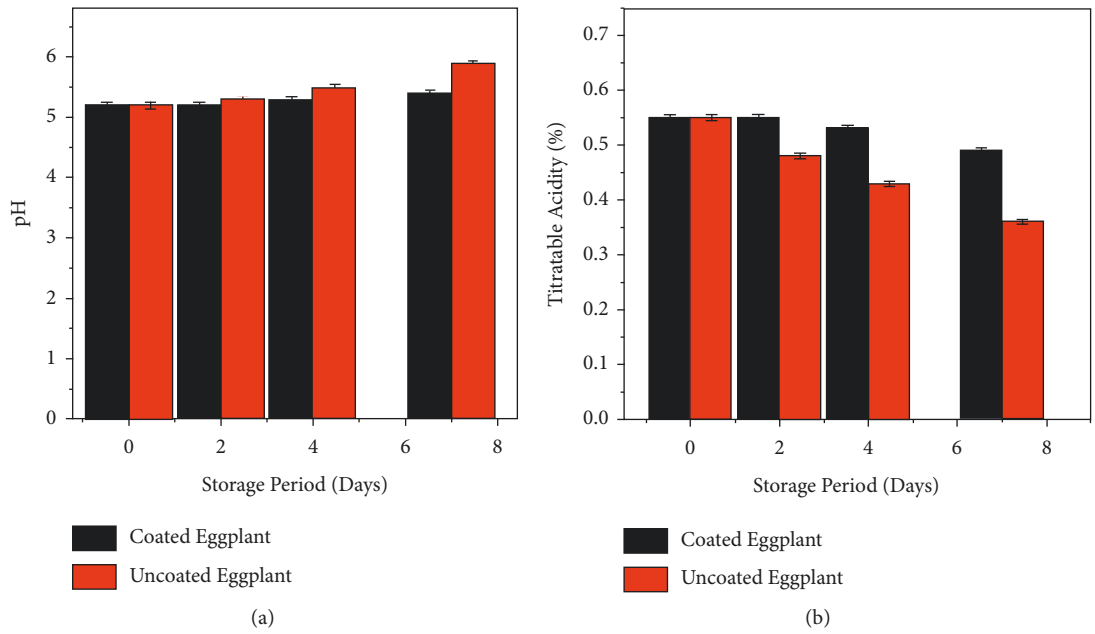

Figure 5: Effect of active coating on the pH (a) and titratable acidity (b) of *solanum melongena* along with storage time.

coated and uncoated *Solanum melongena* increased continuously along with storage time while titratable acidity decreased. Amanullah et al. stated that *Solanum melongena* pH and titratable acidity coated with aloe vera significantly delayed the pH and titratable acidity [39]. Moreover, significant variation in the pH and titratable acidity among the coated and uncoated *Solanum melongena* ($P \leq 0.05$) was obtained during the storage period. This enhancement in pH and titratable acidity was higher in uncoated *Solanum melongena* than coated *Solanum melongena* along with storage time. Likewise, in our previous study, active coating greatly improved the shelf life of *Solanum melongena* and cucumber during storage time [7, 40]. Improvements in the pH and titratable might be related to low metabolic and respiration rates due to coating [41].

3.14. Sensory Analysis. Sensory parameters including brightness, color, and appearance after zero, 2, and 6 days are present in Table 4. The results indicated that the coated *Solanum melongena* received better sensory parameter scores with storage time than that of uncoated *Solanum melongena* and, therefore, the coated *Solanum melongena* was classified as acceptable. Similarly, Theóphilo Galvão et al. reported that the customer acceptability of coated *Solanum melongena* was significantly better than uncoated *Solanum melongena* at the end of storage time [42]. A notable ($P \leq 0.05$) difference was witnessed in the sensory parameter's score of both coated and control *Solanum melongena*. A better sensory parameter score of coated *Solanum melongena* might be related to better functional properties of the coating [43].

Table 4: Sensory parameters values of coated and uncoated *Solanum melongena* during the storage period.

Storage period	Appearance (Coated)	Appearance (Uncoated)	Flavor (Coated)	Flavor (Uncoated)	Texture (coated)	Texture (uncoated)
0	8.5 ± 0.51	7.5 ± 0.22	8.0 ± 0.91	8.2 ± 0.72	8.4 ± 0.74	7.9 ± 0.55
2	8.2 ± 0.62	6.9 ± 0.29	7.8 ± 0.31	7.6 ± 0.74	8.2 ± 0.88	7.1 ± 0.67
4	8.0 ± 0.15	5.4 ± 0.52	7.5 ± 0.27	7.0 ± 0.51	8.1 ± 0.92	6.3 ± 0.43
7	7.8 ± 0.26	4.1 ± 0.32	7.2 ± 0.39	6.1 ± 0.13	7.8 ± 0.86	5.1 ± 0.97

Sensory parameters scale corresponds to 9 = excellent and 1 = extremely poor.

4. Conclusion

Efforts were made to develop the active film and coating from underutilized MS, GA, and ME. Results revealed that the ME significantly altered the functional properties of MS film. SEM images showed a smoother surface with no cracks and bubbles upon ME addition. Moreover, the active films were robust, stiffer, and more opaque than the control films. Finally, an optimized film-forming solution was tried as a coating formulation and examined the efficacy during the consideration period. The experimental observations revealed that the edible coating successfully delayed the deterioration of *Solanum melongena* thereby enhancing the shelf life of *Solanum melongena*. After one week of storage, coated *Solanum melongena* also showed better consumer acceptability than uncoated *Solanum melongena* in terms of sensory attributes.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare no conflicts of interest.

Authors' Contributions

Raj Kumar conceptualized the study, developed the methodology, and wrote the original draft. Venketesh T. developed the methodology, wrote the original draft, and investigated the study. Nasir Awol conceptualized the study, developed the methodology, and investigated the study. Anil Yadav conceptualized the study, developed the methodology, and investigated the study. Naina Gautam carried out experiments, wrote the original draft, and critically reviewed the manuscript. All Authors have read the manuscript and agreed to publish the manuscript version.

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