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Research article

Konjac Biodegradable Film for Packing Thai Caramel

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Abstract: This study explores the development of natural, edible packaging materials derived from fresh konjac corms (*Amorphophallus muelleri* Blume.) for producing konjac powder and biodegradable films under controlled casting conditions. The films were formulated using a 1% konjac solution, with glycerol added at varying concentrations (0%, 0.1%, and 0.2% v/v). Among the tested formulations, the film without glycerol demonstrated the best performance. Physical characterization showed an average film weight of 0.4436 ± 0.0071 g (total solution weight: 40.0053 ± 0.0056 g), a thickness of 0.048 ± 0.002 mm, and a tensile strength of 2.497 ± 0.044 N/cm². Water solubility tests revealed that the glycerol-free film dissolved quickly, with an average water permeability time of 1.17 ± 0.03 minutes. When applied as a wrapping material for Thai caramel, the glycerol-free film maintained its structural integrity for over 30 days. It preserved the product's quality for up to three months without mold growth. These findings highlight the potential of konjac-based films as a sustainable, biodegradable alternative to conventional synthetic packaging, particularly for food products like Thai caramel.

Keywords: Thai caramel; Konjac; Biodegradable film; Food wrapping

1. Introduction

The excessive use of plastic packaging has become a significant concern for consumers and the environment. Plastic packaging may contain substances linked to cancer in the lungs, liver, lymph nodes, and skin. Furthermore, the persistent increase in plastic use poses challenges for waste management due to its prolonged decomposition time [1]. To address these issues, natural and biodegradable materials have garnered increasing attention as alternatives to plastic. Konjac, an agricultural cash crop widely cultivated in Thailand, offers promising potential in this context. This biennial plant thrives nationwide and is often found along forest edges or cultivated areas. Renowned for its culinary and medicinal uses, konjac has been a staple in Japanese and Chinese diets for centuries as a healthful food. In Thailand, it is traditionally consumed in rural areas, where it has been used to prepare various dishes and desserts. It is sold in local markets across provinces like Prachin Buri, Phitsanulok, Nan, and Chiang Mai. Every part of the plant—including its tuber, stem, stalk, and young flowers—is utilized in traditional cooking, with the tuber requiring processing to remove potential irritants through methods such as boiling, grilling, or steaming. These components are commonly included in sour soup or red curry, while the flowers are often eaten with chili.[2].

Konjac contains glucomannan, a natural, high-molecular-weight fiber composed of glucose and mannose in a 2:3 ratio. Extracted from the tuber through a process that removes toxins, glucomannan forms a viscous solution when dissolved in water. Upon drying, this solution transforms into a sticky, rigid film, as shown in Figure 1. Edible films made from konjac glucomannan can extend food shelf life by preventing gas and moisture penetration. These films represent a safer, more degradable alternative to plastic films. Numerous studies have explored konjac-based films' properties and applications. For instance, Piyanus Noiduang et al. [3] investigated starch film production using Chinese water chestnut, revealing that film properties such as thickness, elongation, and water vapor permeability varied with starch and glycerol concentrations. Similarly, konjac films demonstrate remarkable stability in various conditions, including exposure to heat, cold, acidity, and alkalinity. The films are soft, durable, and can be produced in transparent, semi-transparent, and opaque forms. Studies also highlight how blending konjac glucomannan with gelatin and starch can enhance the film's mechanical properties, flexibility, and potential applications in food packaging, including wrapping fruits [4-8].

Additionally, konjac powder exhibits a gel-forming property when mixed with water. This gel promotes satiety, reduces food intake, and absorbs excess fats, cholesterol, and sugars, facilitating their removal. Research by Lamul Wiset et al. [9] further emphasizes the influence of drying temperature and glycerol concentration on konjac film properties, demonstrating improvements in tensile strength, elongation, and water vapor permeability with the addition of glycerol. Such advancements position konjac-based films as a sustainable and functional alternative to conventional plastic packaging. In addition to their environmental benefits, konjac-based films offer significant health advantages, primarily due to their glucomannan content. This natural dietary fiber promotes satiety, aids in reducing cholesterol and sugar absorption, and supports digestive health by enhancing waste elimination. These properties have been associated with preventing colon cancer and managing conditions such as obesity and diabetes [10]. Building on these benefits, the present study seeks to develop edible konjac powder films tailored for wrapping Thai caramel. This innovation addresses environmental waste concerns and adds value to Thailand's abundant konjac resources, showcasing the potential for creating sustainable, functional, and biodegradable packaging solutions.

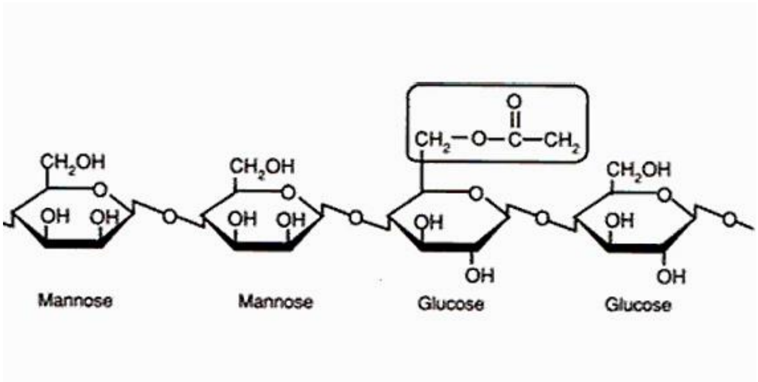


Figure 1. The structure of glucomannan. [10].

Source: http://www.foodnetworksolution.com//

Objective

1. Study methods and suitable conditions for extracting edible konjac powder from fresh konjac tube
2. Investigate the formation of wrapping Thai caramel film from edible konjac powder.
3. To evaluate the impact of edible packaging using films made from konjac powder

2. Materials and Methods

Sample Konjac powder is used in film form. It is a konjac powder extracted from the edible gazelle konjac variety (such as *A. muelleri* Blume found in Mae Wang District, Chiang Mai Province. **Instrument** 1) Analytical balance, AG 245, METTLER TOLEDO, Switzerland. 2) Hot air oven, DLE 500, MERMERT, Germany.

3) High-speed centrifuge, UNIVERSAL 32, Heffich, Germany. 4) Hotplate, stirrer, 1203, JENWAY, the U.S.A. 5) Rotary stirrer (Multifunction Stirrer), Eurostar, IKA, U.S.A. 6) Simple mechanical Tensile Testing Apparatus. 7) Micrometer, Mitutoyo, 103-129 Range 0-25 mm/ 0.001 mm, Japan. 8) Fruit Blender, Y46, Moulinex, France. 9) Simple distillation apparatus. **Chemicals** 1) Sodium Metabisulfite; $Na_2S_2O_5$, Food grade, %Assay = 98.0, MW 190.10, Thailand. 2) Ethyl alcohol; CH_3CH_2OH, Food grade, % Assay = 95.0, Density 0.789 g/mL, MW 46.07, Thailand. 3) Glycerol; $C_3H_5(OH)_3$, Food grade, % Assay = 99.5, Density 1.2570 g/mL, MW 92.09, Thailand. **The experimental method** involves **the extraction of konjac powder**. 1) Rinse the konjac tube with clean water, peel it, and cut it into thin slices. Weigh about 500 grams, add 200 milligrams per liter of sodium metabisulfite ($Na_2S_2O_5$) to about 750 milliliters of 60% ethanol, then mix with a blender until wholly filtered through a thin white cloth. (Wash 3 times with water) and dried at 65°C for 12 hours. 2) Take the konjac powder obtained in step 1, wash it with sodium metabisulfite ($Na_2S_2O_5$) 200 mg/L in 1500 ml 95% ethanol, and then centrifuge carefully. It was filtered through a thin white cloth (washed with water 3 times) and dried at 65 °C for 12 hours. 3) Sieve through a 60-mesh sieve in different sizes. The chemical composition of the extracted konjac powder was analyzed to determine its primary constituents. The analysis included moisture, ash, crude protein, fat, fiber, and carbohydrate content. The procedures were conducted using standard methods to ensure accuracy and reproducibility. **Film formation** 1) Weigh the powder into 10.00 g of konjac and add 1000 ml of water. Then, take the konjac solution to re-separate the sediment by centrifugation at 5000 rpm for 10 minutes. The solution is divided into two parts: the supernatant and the sediment. 3) Remove the clear part and mix with a magnetic stirrer at 1400 rpm for 3 hours. 4) Pour the solution to a known exact weight, about 90 mL, onto a ceramic plate and then dry in a hot air oven at 60 °C for 24 hours. Allow to cool in a desiccator containing silica gel after the specified time. Repeat steps 1) to 4) adding in step 3) 0.1% and 0.2% (v/v) glycerin solutions in 1.00- and 2.00-ml volumes, respectively, and check all film properties such as film appearance, color (by the Lab color system, which also known as the CIELAB system, is widely used in scientific research to measure and describe color), water permeability, etc. **Thai caramel wrapping test** 1) Take a suitable film from the test to wrap the Thai caramel. 2) Observe after 1, 3, 7, 9, 15, 20, 25, 30, and 90 days of packing Thai caramel with and without desiccant and record the results.

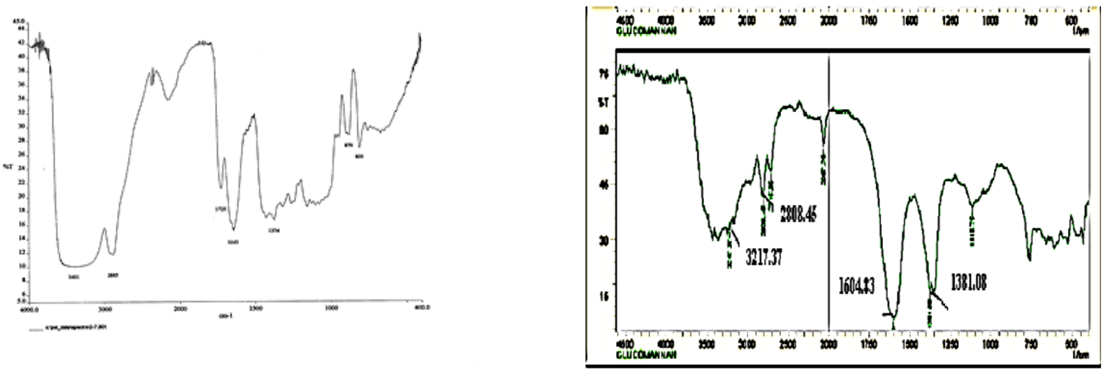
3. Results and Discussions

According to the research, it was found that the konjac variety (*A. muelleri* Blume.) from Mae Wang, Chiang Mai, was peeled, cut into small pieces, mixed well with a mixer, and then extracted with an ethanol solution. It was then dried at 65 ° C. After the dried konjac powder was obtained, it was sieved through a 60-mesh sieve. Resulting in smaller particle sizes of less than 150 micrometres; as shown in Figure 2, the yield percentage was 34.92 (0.16). The extraction and drying methods used can influence the particle size of konjac powder. The average percentage composition of konjac powder extracted with 95% ethanol, calculated on a dry weight basis, is presented in Table 1. When observing the film-forming process, the color of the konjac powder was white and yellow. After investigating the functional groups from Konjac films with the FTIR technique, the sample Konjac powder and standard glucomannan powder are compared, as shown in Figures 3A and 3B, respectively. From 3B, the wavenumber range of glucomannan is observed between 4000 and 400 cm^{-1}. The mannose in glucomannan absorbs at 807 and 892 cm^{-1}, stretching methyl groups at 2898 and 2925 cm^{-1}, and a carbonyl group absorption at 1727 cm^{-1}. From Figure 3A, the wavenumber range of glucomannan also spans from 4000 to 400 cm^{-1}. Mannose in glucomannan absorbs at 809 and 879 cm^{-1}, stretching methyl groups at 2885 and 2925 cm^{-1}, and the carbonyl group absorption at 1725 cm^{-1} [11]. In conclusion, the extracted konjac powder contains glucomannan as a significant component. Konjac glucomannan, the primary component of konjac powder, has a high molecular weight, typically ranging from 200,000 to 2,000,000 Daltons. The exact molecular weight can vary depending on the source and processing methods. High molecular weight contributes to its viscosity and film-forming capabilities. [15].

Figure 2. Extracted konjac powder

Table 1. The average percentage composition of konjac powder

Sample	Moisture	Percentage (Dry Weight)				
		Fat	Protein	Fiber	Ash	Carbohydrate
konjac powder extracted with 95% ethanol	9.14	0.06	3.11	0.79	1.00	95.04



(A) (B)

Figure 3. (A) Extracted Konjac powder IR spectrum (B) Standard Glucomannan IR spectrum [11].

After the konjac powder was dissolved in water, 0.1 and 0.2% v/v of different glycerol concentrations were added, and no glycerol was added. The powder was then dried at 60 ° C for 24 hours. Film properties are shown in Table 2. The research findings were that the appearance of the films and the weight of the films were similar (the weights are approximately 1.0090 ± 0.0035 g.), the average thickness is approximately 0.050 ± 0.002 mm., and the flexibility of the films depended on the amount of glycerol. High glycerol makes it very flexible. Since glycerol is a plasticizer for polymers, it intercalates between polymer chains and forms hydrogen bonds. This causes a partial loss of symmetry in the glucomannan structure. Films with varying glycerol concentrations were prepared and cut into dimensions of 1 centimeter in width and 3 centimeters in length. Each film was tested for tensile strength using a sandbag tearing method, where the amount of sand required to tear the film was weighed and recorded. The experiment was repeated three times for accuracy. The results indicated that the film without glycerol addition exhibited the lowest tensile strength, while the film with a glycerol concentration of 0.2% (v/v) demonstrated the highest tensile strength [12]. To evaluate water solubility, glycerol films with dimensions of 2 cm × 2 cm were immersed in water under varying conditions. The changes in the film's structure were monitored at 1-minute intervals for 4 minutes. All films demonstrated solubility in water under the tested conditions. However, glycerol films dissolved more slowly, with the dissolution time increasing proportionally to the glycerol concentration. The color of konjac-based films mixed with glycerol is influenced by Glycerol concentration (affecting transparency and brightness). Konjac powder purity (affecting the base color of the film), Processing conditions (e.g., drying temperature, film thickness). Expected Lab Ranges for Konjac Films: L* (Lightness): Konjac films mixed with glycerol are typically translucent to semi-transparent with L* values in the range of 75–90. A higher glycerol concentration increases transparency, leading to higher L* values (closer to white). a* (Red-Green Axis): Konjac films are generally neutral to slightly yellowish, with a* values ranging from -1.0 to +1.5, indicating minimal redness or greenness. b* (Yellow-Blue Axis): Films tend to have a slight yellow tint due to the natural color of konjac powder and the addition of glycerol. The b* value typically ranges from +5.0 to +15.0. The water permeability study of cutting a membrane of each glycerol concentration differs. The size is 5 cm. width and 5 cm. long and then extended over the mouth of the beaker. Then, 10 drops of distilled water were added to the film. Record the time when the first drop of water penetrates the membrane. Three replicates were made according to Table 3.

Table 2. Film appearances with different concentrations of glycerol

Glycerol Concentration	Film Appearances
No glycerol added	
0.1 % v/v	
0.2 % v/v	

Table 3. The table shows the time that the water had penetrated.

Glycerol Concentration	Water penetration time (min)
No glycerol added	1.17 ± 0.06
0.1 % v/v	10.22 ± 0.81
0.2 % v/v	15.00 ± 0.33

Table 3 shows the test results. A glycerol concentration of 0.2% (v/v) was found to have the highest water penetration resistance. The choice of packaging characteristics is to take film of different concentrations and cut it to 9 cm. Width and 9 cm. long, then wrapped in Thai caramel. Physical results were recorded according to Table 4. The film without adding glycerol was found to be the most similar to the plastic film (normally, PP was used). So, could you take it to the next test? A study on film was conducted by selecting finished films from a designated environment and using them to package triangular pyramid-shaped candies. Afterwards, the Thai caramel wrapped in konjac film is placed in 2 bags: bag 1 contains a desiccant bag, and bag 2 does not contain a moisture-absorbing bag (desiccant bag). After that, the change characteristics were observed on days 1, 3, 7, 9, 15, 20, 25, 30 and 90 as shown in Tables 5 and 6.

Table 4. Physical characteristics of the film for wrapping the Thai caramel.

Glycerol Concentration	Physical appearance	The appearance of the packaging
No glycerol added	The film is soft and smooth.	
0.1% v/v	The film is slightly flexible.	
0.2% v/v	The film is very flexible.	

Table 5. Table shows the changes in packaging and caramel without desiccant bags.

Packaging Observation Date Of Thai Caramel Wrapping	Physical Appearance	Picture Showing Physical Appearance
Day 1	The film was brown, and the Thai caramel was black and soft	

Table 5. Table shows the changes in packaging and caramel without desiccant bags. (Continued)

Packaging Observation Date Of Thai Caramel Wrapping	Physical Appearance	Picture Showing Physical Appearance
Day 1	The film was brown, and the Thai caramel was black and soft	
Day 3	The brown color of the film remained unchanged, and the Thai caramel did not change.	
Day 7	The brown color of the film remained unchanged, and the Thai caramel did not change.	
Day 9	The brown color of the film was unchanged, and the Thai caramel was black; its softness had not changed.	
Day 15	The brown color of the film was unchanged and the Thai caramel was black, less softness	
Day 20	The brown color of the film was unchanged and the Thai caramel was black and starting to harden a little.	

Table 5. Table shows the changes in packaging and caramel without desiccant bags. (Continued)

Packaging Observation Date Of Thai Caramel Wrapping	Physical Appearance	Picture Showing Physical Appearance
Day 25	The brown color of the film was unchanged and the Thai caramel was black and had to be hardened.	
Day 30	The brown color of the film was unchanged and the Thai caramel was black and rigid.	
Day 90	The film turned yellow from mold, and Thai caramel became black and hard caramel.	

Table 5 revealed that the film had no physical changes within 30 days, but the Thai caramel changed within 1 month because the shelf life of Thai caramel was about 30 days. The film was edited. The mold was about 90 days. Table 6 revealed that the physical properties of the film did not change for 90 days. That's why a film can take more than 90 days.

Table 6. Shows the changes in packaging and caramel with desiccant bags.

Packaging Observation Date Of Caramel Wrapping	Physical Appearance	Picture Showing Physical Appearance
Day 1	The brown color of the film was unchanged, and the Thai caramel had black and Softness	

Table 6. Shows the changes in packaging and caramel with desiccant bags.

Packaging Observation Date Of Caramel Wrapping	Physical Appearance	Picture Showing Physical Appearance
Day 1	The brown color of the film was unchanged, and the Thai caramel had black and softness	
Day 3	The brown color of the film was unchanged, and the Thai caramel had black and softness	
Day 7	The brown color of the film was unchanged, and the Thai caramel had black and softness	
Day 9	The brown color of the film was unchanged, and the Thai caramel had black and softness	
Day 15	The brown color of the film was unchanged, and the Thai caramel had black and Less softness	
Day 20	The brown color of the film was unchanged, and the Thai caramel had black and slightly hardened.	

Table 6. Shows the changes in packaging and caramel with desiccant bags.

Packaging Observation Date Of Caramel Wrapping	Physical Appearance	Picture Showing Physical Appearance
Day 20	The brown color of the film was unchanged, and the Thai caramel had black and slightly hardened.	
Day 25	The brown color of the film was unchanged, and the Thai caramel was black and becoming more rigid.	
Day 30	The brown color of the film was unchanged, and the Thai caramel had black and rigid	
Day 90	The brown color of the film was unchanged, and the Thai caramel had black and rigid	

4. Discussions

Based on the experiment, konjac-type gazelle (*A. muelleri* Blume.) from Mae Wang District, Chiang Mai province, was extracted with ethanol and dried at 65 °C. After the dried konjac powder was obtained, it was sieved through a 60-mesh sieve. The experimental results showed that Konjac powder, which has a white-yellow appearance, was used in the study to investigate film formation with different glycerol concentrations. The study examined film formation without glycerol and with 0.1 and 0.2% glycerol (v/v) after film formation with different glycerol concentrations. It was observed that the appearance and weight of the film were similar. In the next step, which included testing the properties of the film from the thickness study, stress study, water solubility study, and film water permeability study, it was found that the glycerol-filled film has the most suitable properties to develop into an environmental usage. The package thickness was 0.048 ± 0.002 mm, the average tensile strength was 2.497 ± 0.044 N/cm², and the water solubility, all film-forming conditions can dissolve in water, with an average water permeability of 1.17 ± 0.03 minutes. Therefore, as the glycerol content increases, the result is an increase in tensile strength. This suggests that glycerol integrates into the polymer structure of glucomannan by forming bonds with the polymer chains, primarily through hydrogen bonding. These hydrogen bonds draw the molecules closer together, promoting crystallization and enhancing the material's overall strength. Consequently, as the glycerol content increases, the tensile strength of the polymer improves [13]. This is consistent with a study by Danijeal Z. Suput et al. [14], who found that adding glycerol to a konjac solution increased tensile strength. This may be due to the addition of molecular crystals. As a result, it has a higher tensile strength. Another factor influencing the lab values of konjac films with glycerol was that higher Glycerol concentrations increase transparency, leading to higher L* values (lighter appearance) while potentially reducing yellow tones (b* values). And the film thickness: Thicker films may appear less transparent, reducing L* values and increasing b* (yellowish tones). As the processing temperature increases, higher temperatures can cause slight browning or degradation of the film, increasing a* (redness) and b* (yellowness) [15-17] from trying to bring the best quality film instead of plastic to packaging Thai caramel that can be bought as a takeaway and researching the age of Thai caramel from konjac powder after film formation to packaging within 30 days. It has been observed that for 30 days, the Thai caramel appears increasingly stiff. However, the physical properties of the Konjac film did not change. It was concluded that edible konjac film was probably used as a substitute for plastic film to wrap Thai candies. This is consistent with Chupapan Rattananil's study[18] that using konjac film in the packaging of Nam Dok Mai mango varieties can increase the shelf life of mangoes. In addition, Hansa Jakraphan et al. [19] conducted a comprehensive study to develop and enhance the functional properties of carrot-based edible films. The experiment was divided into two main objectives: improving the tensile strength of the films and optimizing their elongation properties. To achieve these goals, pectin and alginate were tested for their ability to enhance film strength, while xylitol was added as a plasticizer to improve elongation. The results indicated that the optimal film properties were obtained by incorporating 3% alginate and 3.75% xylitol, calculated based on the weight of carrot flesh. Alginate significantly increased the film's tensile strength, providing greater rigidity and resistance to tearing, while xylitol, as a sugar substitute, enhanced film elasticity. The carrot-based films demonstrated excellent oxygen transfer resistance, making them suitable for use in packaging products such as candies and fruit preserves, where they effectively prevented quality degradation caused by oxidative reactions. Furthermore, these films contained up to 3465 micrograms of beta-carotene, contributing to their nutritional value. The films retained their functional integrity for up to two months, exhibiting similar mechanical properties to konjac glucomannan-based films. In addition, other biodegradable films, such as those made from chitin and chitosan (1.5%), have been explored for their improved water vapor permeability. Combined with gelatin (2%), these films successfully preserved moisture in Khao Nam Phueng pomelo fruits, extending their shelf life to over 21 days [20-22]. These findings highlight the potential of carrot-based films and other biodegradable materials for food preservation and sustainable packaging applications, aligning with the broader goals of reducing environmental impact. This study successfully developed biodegradable and edible films from konjac powder under controlled conditions. The key findings are: Glycerol acts as an effective plasticizer, enhancing tensile strength and water resistance in konjac films. Films without glycerol exhibited the lowest tensile strength but were most similar to conventional plastic films in appearance. Konjac-based films can effectively serve as sustainable packaging for Thai caramel, with desiccant bags further improving product shelf life. The developed Konjac film offers a promising biodegradable alternative to synthetic packaging, addressing environmental concerns and food preservation requirements.

When comparing conventional polymer films for Thai Caramel packaging and the advantages of Konjac-based films. Currently, polypropylene (PP) films are widely used for packaging Thai caramel due to their low cost, mechanical strength, and moisture barrier properties, effectively preserving the product's quality and texture [23]. Polypropylene, being a synthetic polymer, is non-biodegradable and contributes significantly to environmental pollution through plastic waste accumulation [5]. In contrast, konjac-based films, derived from *A. muelleri* Blume, offer numerous advantages over conventional polypropylene films, such as biodegradability and environmental Impact: Konjac-based films are natural, biodegradable materials that decompose under environmental conditions, reducing plastic waste and promoting sustainability [14]. This makes Konjac films particularly relevant in addressing global plastic pollution and environmental degradation concerns. Regarding mechanical properties, these studies have shown that konjac-based films, when plasticized with glycerol, exhibit excellent tensile strength and flexibility [15]. These properties allow konjac films to function effectively as packaging materials for food products like Thai caramel, maintaining their structural integrity during handling and storage. Moreover, moisture and oxygen barrier: konjac-based films provide sufficient moisture and gas permeability resistance, extending the shelf life of food products by preventing oxidative deterioration [6]. This property is essential for products like Thai caramel, which are susceptible to changes in texture and quality due to moisture absorption. As a natural material for consumer safety, konjac films are free from harmful chemical additives, making them safer for consumers and reducing health risks associated with synthetic polymers [24]. Regarding cost comparison, while polypropylene films remain economically advantageous due to their low production cost and mature manufacturing technology, konjac-based films currently incur higher production costs. The cost is primarily attributed to the raw material extraction process and the need for specialized production methods [8]. However, with advancements in production efficiency and increasing consumer demand for eco-friendly products, the cost gap is expected to narrow, making Konjac films a viable alternative in the long term.

Konjac-based films provide a sustainable and functional alternative to synthetic polypropylene films for packaging Thai caramel. Their biodegradability, mechanical strength, and moisture barrier properties align with global efforts to reduce plastic waste and promote environmentally friendly solutions. Further research into cost-effective production methods will enhance their competitiveness and commercial viability in food packaging industries.

It is important to note that this study did not assess the potential for fungal growth on konjac-based films. These films are derived from organic materials and lack preservatives, so they may be prone to fungal contamination if stored unused for extended periods. This limitation was not addressed as the study primarily focused on evaluating the physical and functional properties of the films for packaging applications. Future research should explore strategies to enhance the antifungal properties of konjac-based films. For example, incorporating natural antifungal agents such as chitosan, a biopolymer with well-documented antimicrobial and antifungal properties, could significantly improve their resistance to fungal growth. Chitosan's ability to inhibit a wide range of fungi, including *Aspergillus niger* and *Penicillium* spp., makes it a promising additive for this purpose [25]. Furthermore, integrating plant-derived antimicrobial extracts, such as saffron petal or dragon fruit peel extracts, could complement the antifungal efficacy of the films while maintaining their biodegradability and food safety. [26-27]. By addressing this limitation, konjac-based films could offer enhanced functionality, making them more suitable as sustainable packaging materials for confectionery products like Thai caramel (kalamare), where the prevention of mold growth is crucial for preserving product quality and safety.

4. Conclusions

This study successfully developed edible, biodegradable films derived from Amorphophallus muelleri Blume corms through controlled extraction and film casting. The films, formulated with varying glycerol concentrations, demonstrated distinct physical properties. Glycerol acted as a plasticizer, enhancing tensile strength and water barrier capacity, while the glycerol-free film retained greater similarity to conventional plastic films in texture and transparency. Among the tested formulations, the glycerol-free film exhibited the most favorable characteristics for food wrapping: high water solubility, sufficient tensile strength, and structural integrity maintained for over 30 days. Furthermore, the inclusion of desiccant bags prolonged product shelf life up to 90 days without mold growth, supporting the film’s functional viability in food packaging applications. Konjac-based films offer significant advantages over petroleum-based polymers, notably biodegradability, consumer safety, and environmental friendliness. However, their susceptibility to microbial growth under storage remains a concern. Future research should explore strategies to enhance antifungal resistance by incorporating natural agents such as chitosan or plant-based extracts, thereby extending storage potential without compromising biodegradability. In conclusion, konjac-derived films represent a promising eco-friendly alternative for food packaging, particularly for confections like Thai caramel. With further development in formulation and production scalability, these materials have the potential to bridge sustainability and commercial application in the packaging industry.

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