Formulation of American Oyster Mushroom (*Pleurotus ostreatus*) Infused Candy

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Abstract

The American Oyster mushroom (Pleurotus ostreatus) infused candy was developed as a novel confectionery product with enhanced nutritional value. The candy formulation was optimized by different sugar levels and drying times to improve the taste and texture. Four candy samples were prepared from blanched (at 100℃ for 5 minutes) oyster mushrooms with different sugar levels (40%, 50%, 60%, and 70%) to identify the optimum sugar level based on sensory attributes. The best sample was then used to assess in a hot air oven at 60 °C suitable drying time (7,8,9, and 10 hrs.). The physicochemical properties and shelf life of candies with different sugar levels were analyzed. Sensory evaluation was performed by 30 untrained panelists using a seven-point hedonic scale to select the most preferred candy. The sensory data were analyzed using the Friedman test, and other data were analyzed using one-way ANOVA. Mushroom candy produced with a 60 % sugar level and 10 hrs drying time was most preferred by the panelists. The moisture content of treatments varies between (1.91±0.21 - 9.77±1.00), ash (1.47±0.12 -1.80±1.00), pH (3.3±0.05-3.9±0.05), acidity level (0.15±1.00-0.30±1.00), and total soluble solids (52.33±1.00 - 71.33±1.00). Hardness value of the candy decreased with increasing level of sugar while chewiness and cohesiveness were increased. The most preferred mushroom candy showed 4.70% protein content, 0.5% fat content, 4.25% fiber content, and 86.45% carbohydrates. This study revealed that the optimum sugar level and drying time for American oyster mushroom candy were 60 % and 10 hrs with enhanced taste and texture. The mushroom-infused candy is a potential functional alternative to traditional sweets.

Keywords**: **Candy, drying time, Pleurotus ostreatus, sugar level

I. INTRODUCTION

Many species of mushrooms are grown and eaten all over the world, and they have long been valued for their nutritional and therapeutic properties. The American oyster mushroom (*Pleurotus ostreatus*) is notable among them for its abundant nutritional profile and useful bioactive substances. The B-complex, vitamin D, dietary fiber, high-quality proteins, and vital minerals - potassium, calcium, and phosphorus are abundant in *Pleurotus ostreatus* (Adebayo and Oloke, 2021). *Pleurotus ostreatus* also contains health-promoting bioactives, such as ergothioneine, polysaccharides, and antioxidants, which have been linked to immunomodulatory, anti-inflammatory, and cholesterol-lowering effects (Riaz and Ahmed, 2022). Because of these qualities, *Pleurotus ostreatus* is a functional ingredient in making healthy foods that help improve overall health and well-being.

The integration of these functional ingredients into common foods has been the focus of recent food science advancements in response to growing consumer awareness of diet-related health concerns. Although mushrooms have been used in many different food applications, including baked goods, soups, and snacks, their use in confections has not received much attention (Dhanapal, Dhanaraj, and Rajoo, 2023).

Candy is a confection that is typically made up of sugar, syrups, and flavorings. It is commonly consumed by all ages. Candy is high in sugar content and lacks nutritional value, which can result in health problems like obesity, diabetes, and dental issues, even though it has a long shelf life and a pleasing taste. Additionally, the majority of traditional candies lack functional ingredients, which reduces the potential health benefits. Confectionery products are increasingly being reformulated to incorporate ingredients that improve their nutritional value and functionality as consumers grow more health-conscious and look for natural and wholesome substitutes for traditional snacks (Chakraborty and Sikdar, 2008).

An innovative way to address these problems is to incorporate *Pleurotus ostreatus* into candy formulations. Even though other plant-based ingredients have been used to make healthier sweets, using *Pleurotus ostreatus* in candy is still mostly unexplored. Adding this mushroom to candy can enhance its nutritional value by adding proteins, fiber, and antioxidants. It can also add special bioactive qualities that may help with gut health, immune system function, and metabolic control (Moon, Bro, and Lo, YM., 2022). Consumer acceptance remains a critical factor in the successful introduction of such innovative food products. The short shelf life of mushrooms and their limited incorporation into convenient food formats further highlight the need to explore their potential in confectionery. The purpose of this study was to formulation of mushroom-infused candy recipe, figuring out the ideal sugar content and drying duration, examining its physicochemical characteristics, evaluating its sensory qualities, and assessing its shelf life are the main goals.

II. MATERIALS AND METHODOLOGY

A. Study Location

The study was conducted at the Food Science Laboratory of the Department of Biosystems Technology, Faculty of Technology, South Eastern University of Sri Lanka.

B. Collection of Materials

American Oyster Mushroom was collected from a farm in Batticaloa. Sugar, citric acid, and vanilla essence were collected in the local market.

C. Preparation of mushroom candy

Fresh mushrooms were manually cleaned and cut into small pieces. Then pieces were blanched at 100°C for 5 minutes in 1% Sodium Metabisulfite solution. After draining for half an hour (adapted from Bora and Kawatra, 2014), they were treated with sugar.

The blanched mushrooms were subjected to four different sugar levels: 40%, 50%, 60%, and 70% (w/w, sugar to mushroom ratio). For each treatment, a measured quantity of sugar was applied at a ratio relative to 200 g of blanched mushrooms. The total amount of sugar for each concentration was divided into three equal portions.

On Day 1, one-third of the sugar was mixed with the blanched mushrooms and left to stand for 24 hours at ambient temperature. On 2nd day, the second portion of sugar was added to the same mixture and again left overnight. On Day 3, the mushrooms were separated from the resulting syrup. 0.5 g of citric acid and the final portion of sugar were added to the syrup, which was then brought to a boil. The mushrooms were reintroduced into the boiling syrup and cooked for 5 minutes.

After boiling, the mixture was allowed to cool. The mushrooms were removed, drained for approximately 30 minutes, and sorted manually to remove any damaged or non-uniform pieces. The drained mushroom pieces were then dried in a hot air oven at 60 °C for approximately 10 hours until a crispy texture was achieved (adapted from Bora and Kawatra, 2014). Once dried, the candies were packed in food-grade polypropylene bags and stored in a cool, dry place for further analysis.

D. Sensory evaluation

Sensory evaluation was conducted to identify the optimum sugar level and drying time. Initially, four candy samples were prepared with varying sugar level (40%, 50%, 60%, and 70%) and the optimum sugar level was identified based on panelists' preferences. The treatment T3 was then used to assess suitable drying time, as shown in Table 02 based on panelists' preferences. The sensory evaluation was performed with 30 untrained panelists (10 males and 20 females), aged between 23 and 26 years, using a 7-point hedonic scale ranging from 1 ("dislike very much") to 7 ("like very much").

E. Analysis of Physiochemical parameters

1) Determination of Moisture Content

Moisture content was measured following AOAC 925.10 (2016). Five (5) g of mushroom candy was weighed into a pre-dried and pre-weighed petri dish using an electronic scale. Then candy samples were kept in the oven (Memmert GmbH+Co.KG manufacturer, Memmert brand, 30 – 1060 model) at 105°C for 5 hours, cooled in a desiccator. The loss in weight after drying represented the moisture content.

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$$Moisture\ content\ (\%) = \frac{W2 - W3}{W2 - W1} * 100\%$$

W1 = Weight of empty dish
W2 =Initial weight of dish and sample
W3 =Final weight of dish and dried sample

2) Determination of Ash Content

Ash content was measured following AOAC 942.05 (2016). A muffle Furner (MF 1400 – 30 Model) was used to measure the ash content after measuring the moisture content of the candy sample. The weight of the empty crucible was taken. Five (5) g of sample was taken to the pre-weighted crucible. The weight of the crucible with the sample was taken. It was placed in the muffle Furner at 550ºC for 5 hours. Then the weight of the ash was taken.

$$Ash\ content\ (\%) = \frac{W3 - W1}{W2 - W1} * 100\%$$

W1 =Weight of empty crucible
W2 =Weight of crucible and sample
W3 =Weight of crucible and ash after incineration

3) Determination of pH

The pH was measured using a calibrated digital pH meter (HI98190 model) based on Khan and Ullah, (2018). Five (5) g sample was dissolved in 50ml of distilled water, mixed thoroughly using a magnetic stirrer for about 2-3 minutes to achieve homogeneity, and the stabilized pH reading was recorded.

4) Determination of Acidity

Acidity content was measured following AOAC 942.15 (2016). Five (5) g sample was crushed into a fine powder and dissolved in 50 mL of distilled water. The solution was stirred for 30 minutes and filtered. Filtered samples were titrated with 0.1 M NaOH using phenolphthalein as an indicator until a pale pink endpoint.

$$Acidity\ (\%) = \frac{V * N * 0.064}{W} * 100\%$$

V – Volume of NaOH
N – Molarity of NaOH
0.064 – Equivalent factor for citric acid
W – Weight of the sample.

5) Determination of Color

Color analysis was conducted using the CIELAB system (L*, a*, b* value). The sample was analyzed into the colorimeter, and values were recorded using the calibrated colorimeter app.

6) Determination of Total Soluble Solids (Brix value)

Total soluble solids content was measured following AOAC 932.14, (2019). One (1) g sample was crushed finely and dissolved in 10 ml of distilled water, filtered, and the Brix (%) was recorded using a refractometer (ERB-32 model) after calibration with distilled water.

7) Determination of Texture

Twenty (20) g of candy was weighed and molded into a cylindrical shape was equilibrated to room temperature. A compression test was performed using a Texture analyzer (Brookfield CT3 model) to record hardness, elasticity, cohesiveness, and chewiness (Bourne, 2002).

F. Proximate Analysis

The proximate analysis was done on the best sample with optimum sugar level (T3).

1) Determination of Protein Content

Protein content was measured following AOAC 981.10, (2016). One (1) g of candy sample was weighed and digested with 20 ml H_2SO_4 and catalyst at 360°C - 400 °C for 2 - 3 hours, distilled with 40 ml of 2N NaOH, and the liberated ammonium was trapped in 25 ml of 4 % boric acid solution. The distillate was titrated with 0.1 M hydrochloric acid in the presence of an indicator until the color changed from green to red.

$$Nitrogen\ percentage = \frac{0.014 \times V \times N}{W} * 100\%$$

$$Protein\ Percentage = Nitrogen\ \% \times F$$

where,

V =Required volume of HCL
W =Weight of sample
N =Molarity of HCL
F =Protein conversion factor

2) Determination of Crude Fiber Content

Crude fiber content was measured following AOAC 978.10 (2012). Crude fiber was determined by using acid and alkaline digestion. Two (2) g defatted sample was initially digested in 200 ml, 1.25% HCl for 30 minutes. Then, 200 ml, 1.25% NaOH for 30 minutes. After that, it was washed with distilled water, followed by ethanol, and filtered. The residue was placed in pre-weighted crucible. The residue in the crucible was placed in an oven and dried for 3 hours at 105°C. After that, the residue in the crucible was ignited in a muffle furnace at 550 °C for 3 hours. Then the weight of the crucible was recorded.

$$Crude\ fiber\ content\ (\%) = \frac{W1 - W2}{W3} * 100$$

W1=Weight of the crucible and residue after oven drying
W2= Weight of the crucible and ash after igniting
W3= Weight of sample

3) Determination of Fat Content

The fat content was determined according to the method in AOAC 920.39 (2016). Two (2) g sample was weighed into a thimble and covered with a cotton plug. Thimble was placed into a previously cleaned, dried fat extraction tube, and 50 ml of petroleum ether (boiling range 50 - 60 °C) was added to the pre-weighted round-bottom flask. The round-bottom flask was fixed to the soxtherm and extraction was carried out at 50 - 60°C for 4 - 6 hours. The round-bottom flask was removed and kept in a boiling water bath for 15 minutes, oven dried at 105 °C for 1 hour. The weight of the round-bottom flask was recorded.

$$Fat\ content\ (\%) = \frac{W3 - W2}{W1} * 100\%$$

W1=Weight of sample

W2= Weight of empty round-bottom flask

W3= Weight of round-bottom flask with fat after drying

4) Determination of Carbohydrate Content

The carbohydrate content of mushroom candy was determined using the difference. This method estimates carbohydrate by subtracting the sum of moisture, protein, fat and ash content from the total weight of the sample.

$$Carbohydrate\ content = 100 - (moisture + protein + fat + ash)$$

G. Shelf Life Evaluation

The shelf life of mushroom candy was tested by checking its moisture, pH, and texture once a week. The candy was stored in a dry and cool place during the analyzing process.

H. Statistical Analysis

Sensory evaluation data were statistically analyzed using the Friedman test. Other data were statistically analyzed using One-way analysis of variance (ANOVA) and the means were compared by Tukey's test at p = 0.05 using the SPSS statistical package (SPSS 25.0, IBM).

Table 01: Experimental design of Mushroom-infused candy

Treatments	**T1**	**T2**	**T3**	**T4**
Sugar	40%	50%	60%	70%

Table 02: Determination of optimum drying time for candy making using the treatment T3

Temperature	**60 °C**	**60 °C**	**60 °C**	**60 °C**
Drying time	7 hours	8 hours	9 hours	10 hours

III. RESULTS AND DISCUSSION

A. Sensory evaluation

1) Sensory evaluation for the determination of optimum sugar level in candy making

According to Figure 01, there was a significant difference ($p<0.05$) between T1, T2, T3, and T4 were observed in sensory score. The treatment T3 (60 % sugar level) had a high sensory score and the treatment T1 had a lower sensory score in all sensory attributes.

2) Sensory evaluation for the determination of the time duration for drying in candy making

According to the scores for sensory evaluation (Figure 02), there was a significant difference ($p<0.05$) in drying time was observed. The samples dried for 10 hours duration had the highest sensory score whereas the samples dried for 8 hours duration had the lowest sensory score in all sensory attributes tested for such as appearance, texture, flavor, color, taste, and overall acceptability.

B. Analysis of Physicochemical Parameters

Table 03 shows the physicochemical properties of different formulations of American oyster mushroom-infused candy. There was a significant difference among T1, T2, T3, and T4 in moisture content, ash, pH, acidity and TSS were observed.

Moisture content plays a critical role in defining the quality, texture, and shelf life of confectionery products, and a significant variation observed among treatments ($p < 0.05$) reflects the influence of both drying and formulation. T1 (9.77%) and T2 (6.68%) fall within the reported 5 - 15% range for mushroom-based confections (Sharma et al., 2021), while T3 (2.43%) and T4 (1.91%) showed much lower values, indicating more effective dehydration. Recent studies confirm that oyster mushrooms naturally contain 84 - 90% moisture, but proper drying can reduce this to 6 - 7% for stability (Nwaudah et al., 2025). Lower values, as in T3 and T4, may enhance storage stability but risk excessive hardness, highlighting the balance between water retention and texture.

Ash content is an important indicator of the total mineral composition in food products, reflecting their nutritional value and inorganic matter. In this study, a significant difference ($P<0.05$) was observed among treatments, with values ranging from 1.47% to 1.80%, suggesting that formulation and processing influenced mineral retention. These findings are consistent with previous reports on mushroom-based confections, where ash content ranged from 1.50% to 2.00% (Patel and Singh, 2020), indicating that mineral content can be maintained during candy processing. Lower ash in some treatments may result from leaching or interaction with sugar and other ingredients, whereas higher values reflect greater retention of essential minerals, contributing to the functional and nutritional quality of the finished product (Nwaudah et al., 2025).

A significant difference ($p < 0.05$) was observed in the pH of mushroom-infused candy samples, with T1 (3.89 ± 0.05) being the least acidic and T4 (3.32 ± 0.05) the most acidic. This variation reflects the influence of formulation, acidulate addition, and processing conditions on product acidity. Previous studies report mushroom-based confections typically have pH values between 3.0 and 4.5, while fruit-infused candies range from 3.0 to 4.0, highlighting the role of organic acids and sugar in flavor and stability (Sharma et al., 2021). Lower pH enhances microbial stability and shelf life, whereas higher pH contributes to milder taste. TSS analysis of mushroom-infused candy revealed significant differences ($p < 0.05$) among treatments, with T4 (71.33°Brix ± 1.00) and T3 (69.33°Brix ± 1.00) exhibiting higher values than T2 (59.00°Brix ± 1.00) and T1 (52.33°Brix ± 1.00). These differences reflect variations in sugar concentration, water content, and dehydration levels. Previous studies report TSS in mushroom-based confections ranging from 50 to 75°Brix and in fruit-based candies from 55 to 72°Brix, with higher sugar content and lower moisture increasing TSS (Sharma et al., 2021). The results suggest that sugar retention and moisture loss are key determinants of TSS, influencing texture and shelf stability.

Table 04 shows the color characteristics of mushroom-infused candy, and a significant difference among treatments ($p < 0.05$) was seen.

The L* value (lightness) ranged from T1 (28 ± 0.08) to T4 (45.33 ± 1.00), indicating darker and lighter appearances, respectively. There were no significant differences between T1, T2 and T3 in L* value was reported. The a* value (red - green) varied from 13.67 ± 0.16 to 17.33 ± 0.99 among the treatments reflecting differences in red pigmentation, while the b* value (yellow - blue) ranged from 22.33 ± 0.23 to 32.33 ± 1.00, showing

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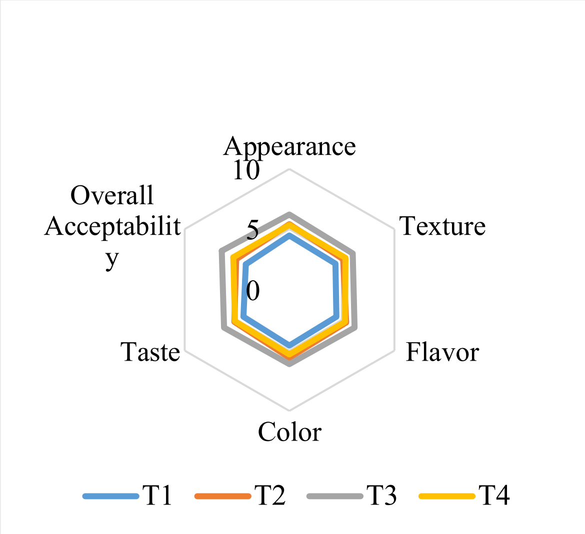

Figure 01: Radar diagram for American oyster mushroom-infused candy in different sugar formulations

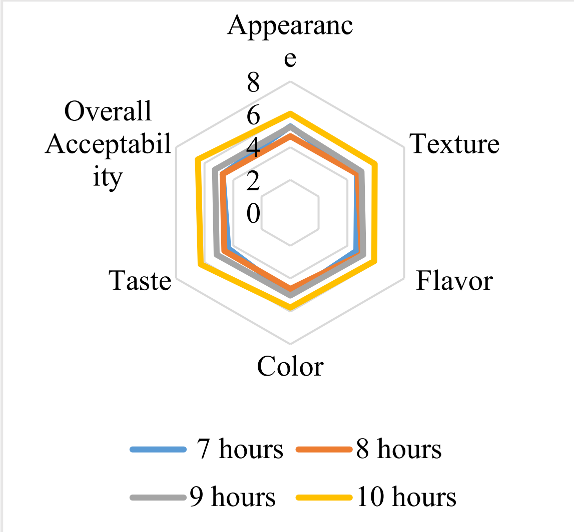

Figure 02: Radar diagram to identify the time duration for drying in candy making

increased yellowness and there was no significant difference reported between T1, T2 and T3, T4 in b* value. These values are consistent with reported ranges for mushroom confections (L*: 30 - 50; a*: 12 - 18; b*: 20 - 35) (Priyadarsini and Mishra, 2020)

The chewiness of candy increased with increasing level of sugar. The T1 had the lowest (21.87±1.00 mJ) whereas the T4 had the highest (38.43±1.00 mJ) value for chewiness due to moisture content and sugar levels, as an increase in sugar level combined with a reduction in moisture resulted in increased chewiness. Similarly, Sharma et al., (2021) reported that mushroom and fruit-based candies had chewiness, ranging from 20 to 40 mJ.

The candy in this present study showed similar trends for elasticity and cohesiveness. The elasticity and cohesiveness of candy in this study increased with increasing level of sugar. Mushroom-based candies typically exhibit elasticity between 2.5 and 4.0 mm and cohesiveness between 0.5 - 0.9 (Sharma et al., 2021).

C. *Proximate Analysis*

The proximate composition consisted of protein 4.70%±0.51, fat 0.5%±0.10 and fiber 4.25%±0.22. The inclusion of mushrooms enhanced protein and fiber content is the specialty in the candy developed compared to conventional candies (Dhanapal, Dhanaraj, and Rajoo, 2023). Similarly, the mushroom-based and plant-based confections had high protein content (5.20%) and low fat content (0.5%).

Table 03: Physicochemical properties

Treatment	**Moisture(%)**	**Ash(%)**	**pH**	**Acidity(%)**	**TSS(%)**
T1	9.77±1.00^{a}	1.47±0.12^{c}	3.9±0.05^{a}	0.15±1.00^{d}	52.33±1.00^{d}
T2	6.68±1.00^{b}	1.57±0.12^{bc}	3.7±0.05^{b}	0.20±1.00^{c}	59.00±1.00^{c}
T3	2.34±0.21^{c}	1.63±0.28^{b}	3.5±0.05^{c}	0.25±1.00^{b}	69.33±1.00^{b}
T4	1.91±0.21^{c}	1.80±1.00^{a}	3.3±0.05^{d}	0.30±1.00^{a}	71.33±1.00^{a}

The values shown mean value ± SD (n=3). Values followed by the same letters in the same column are not significantly different ($p \leq 0.05$).

Table 04: Color analysis

Treatment	Color		
	L*	a*	b*
T1	28.00± 0.08^{b}	15.33± 0.16^{ab}	22.33± 0.23^{b}
T2	33.33± 0.08^{b}	17.33± 0.99^{a}	24.00± 0.23^{b}
T3	34.33± 0.08^{b}	15.33± 0.16^{ab}	29.33± 1.00^{a}
T4	45.33± 1.00^{a}	13.67± 0.16^{b}	32.33± 1.00^{a}

The values shown mean value ± SD (n=3). Values followed by the same letters in the same column are not significantly different ($p \leq 0.05$).

D. Shelf-life Analysis

The observed decrease in moisture content over seven weeks across all treatments aligns with established findings in confectionery science. Moisture loss is a critical factor influencing the texture and shelf life of sugar-based confections. As moisture content decreases, candies transition from a soft and chewy texture to a harder and more brittle consistency. This phenomenon is particularly evident in treatments T3 and T4, which exhibited the lowest moisture content by the seventh week. The higher moisture content in T1 and T2 may be attributed to differences in formulation or storage conditions, as moisture migration is influenced by factors such as water activity and packaging integrity (Ergun, Lietha, and Hartel, 2010).

The concurrent decrease in pH observed in all treatments over the storage period is consistent with findings in similar studies. For instance, research on jelly candies has reported a decrease in pH values during storage, which can be attributed to the hydrolysis of acidic components or the fermentation of sugars. Such pH reductions can impact the flavor profile and microbial stability of the confection (Abu-Shama, Aly, and Badr, 2022)

Texture profile analysis revealed significant changes in hardness, chewiness, elasticity, and cohesiveness over the seven-week period. An increase in hardness was observed across all treatments, indicating a transition towards a firmer texture. This is consistent with the findings of Figiel and Czopek (2006), who reported that a decrease in moisture content leads to an increase in hardness in sugar-based confections. The decrease in chewiness and cohesiveness can be attributed to moisture loss and structural changes within the candy matrix. Interestingly, while elasticity decreased in T1, T2, and T3, it increase in T4. This anomaly may be due to differences in formulation or the presence of specific ingredients that influence the elasticity of the candy (Nguyen et al., 2025).

In comparison to previous studies, our findings confirm the general understanding that moisture content, pH, and texture are interrelated factors that determine the quality and shelf life of confections. For example, research on hard candy

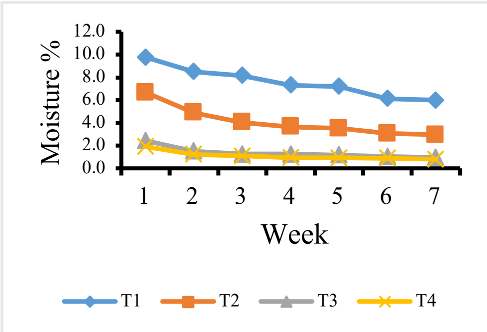

Figure 03: Moisture Content

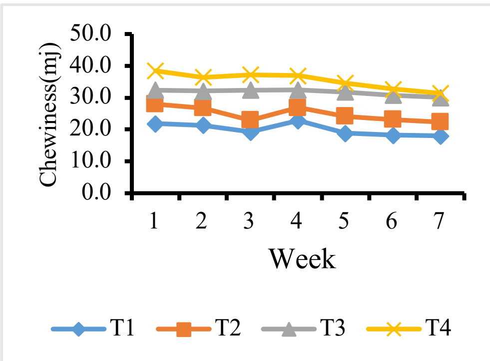

Figure 04: Chewiness

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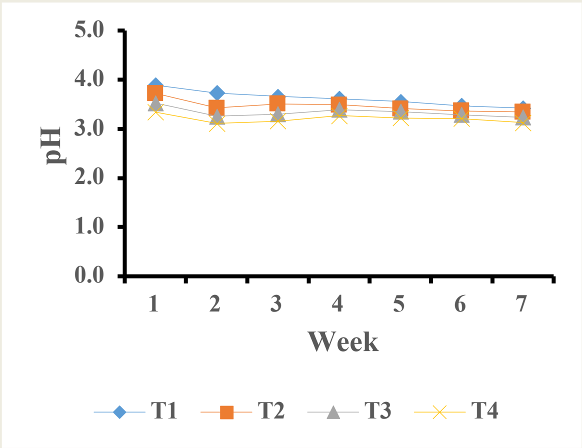

Figure 05: pH value

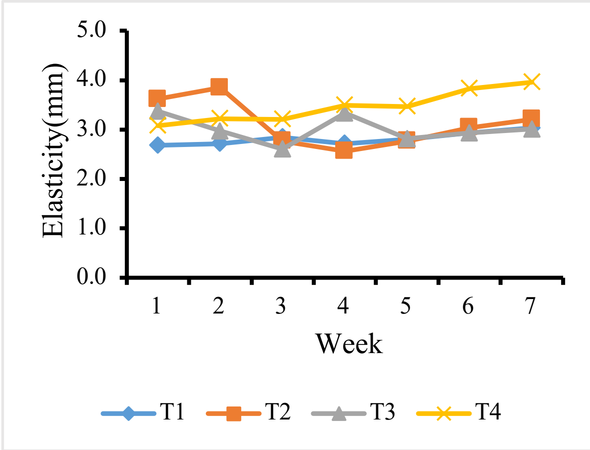

Figure 07: Elasticity

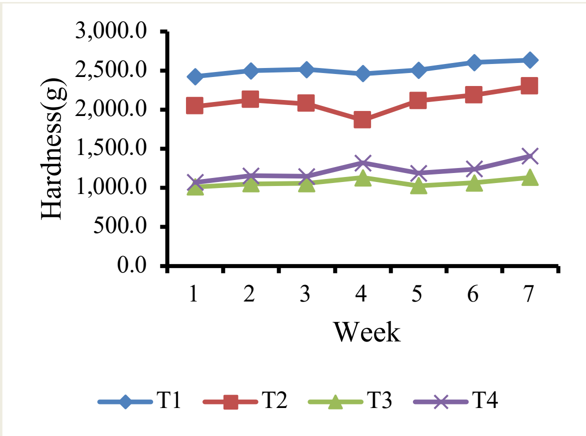

Figure 06: Hardness

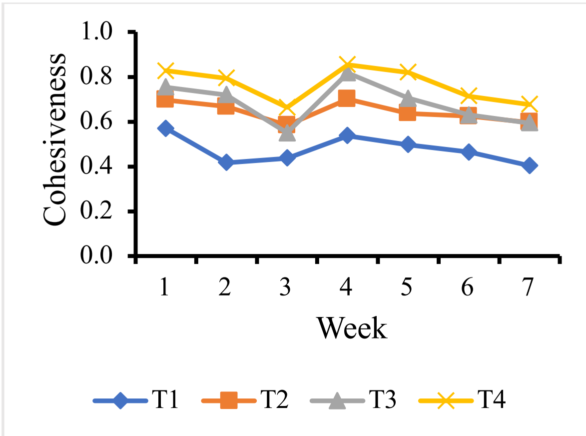

Figure 08: Cohesiveness

Table 05: Texture analysis

Treatment	**Texture**			
	Hardness(g)	**Chewiness(mJ)**	**Cohesiveness**	**Elasticity(mm)**
T1	2425.00±1.00[a]	21.87±1.00[d]	0.57±1.00[d]	2.68±1.00[d]
T2	2045.00±1.00[b]	27.97±1.00[c]	0.70±1.00[c]	3.61±1.00[a]
T3	1011.67±0.39[c]	32.41±1.00[b]	0.75±1.00[b]	3.37±1.00[b]
T4	1070.00±0.39[c]	38.43±1.00[a]	0.83±1.00[a]	3.08±1.00[c]

The values shown mean value ± SD (n=3). Values followed by the same letters in the same column are not significantly different ($p \leq 0.05$).

Table 06: Proximate composition of candy (T3)

Parameters	Value
Moisture	2.43±0.45
Ash	1.63±0.05
Protein	4.7±0.51
Fiber	4.25±0.22
Fat	0.5±0.10
Carbohydrate	86.45±0.63

The values shown mean value ± SD (n=3)

production has highlighted the importance of controlling moisture content and pH to maintain product quality (Ergun, Lietha, and Hartel, 2010). Additionally, studies on gummy candies have demonstrated that changes in texture parameters such as hardness and chewiness are indicative of product aging (Nguyen et al., 2025).

IV. CONCLUSION

The present study successfully developed a novel candy formulation infused with American oyster mushroom (*Pleurotus ostreatus*), demonstrating its potential as a functional confectionery product from edible fungi in sweet products. The 60% sugar level with 10 hrs. drying time was the most preferred by panelists indicating good consumer acceptability in terms of taste, texture, color, flavor and appearance. The lightness (L*) value and yellowness (b*) value increased with higher sugar levels, while the redness (a*) value decreased. Hardness value of the candy decreased with increasing level of sugar while chewiness and cohesiveness was increased. The mushroom-infused candy showed improved nutritional value, with higher protein and fiber and lower fat content compared to conventional candies. Over seven weeks, the shelf-life analysis showed significant changes in the physicochemical and textural characteristics of the mushroom-infused candy formulations (T3 and T4).

REFERENCES

Abu-Shama, H., Aly, F., & Badr, H. (2022). Assessment of jelly candy manufactured from prickly pear fruits (Opuntia spp.). World Journal of Advanced Research and Reviews, 16(1), 767–783. https://doi.org/10.30574/wjarr.2022.16.1.1100

Adebayo, E. A., & Oloke, J. K. (2021). Nutritional and medicinal value of *Pleurotus ostreatus*: A review. *Journal of Food Science and Nutrition*, 10(4), 287–305.

AOAC. (2016). Official Methods of Analysis of AOAC International (20th ed.). Association of Official Analytical Chemists.

Bora, Parul and Kawatra, Asha (2014). Study on development of value added products from oyster mushroom (Pleurotus florida). Food Sci. Res. J., 5(2): 165-167.

Bourne, M. C. (2002). Food texture and viscosity : concept and measurement. 2nd ed. San Diego: Academic Press.

Chakraborty, U., & Sikdar, S. R. (2008). Production and characterization of somatic hybrids raised through protoplast fusion between edible mushroom strains Volvariella volvacea and Pleurotus florida. World Journal of Microbiology and Biotechnology, 24(8), 1481–1492. https://doi.org/10.1007/s11274-007-9630-1

Dhanapal, D., Dhanaraja, R., & Rajoo, B. (2023). Value addition of mushrooms by incorporation in the food products: An overview. International Journal of Food Engineering, 19(12), 573–591. https://doi.org/10.1515/ijfe-2023-0073

Ergun, R., Lietha, R., & Hartel, R. W. (2010). Moisture and shelf life in sugar confections. Critical Reviews in Food Science and Nutrition, 50(2), 162–192. https://doi.org/10.1080/10408390802248833

Figiel, A., & Czopek, A. T. (2006). The effect of candy moisture content on texture. Journal of Food Service, 17, 189–195. https://doi.org/10.1111/j.1745-4506.2006.00037.x

Giridharaprasad, S., Sudhakar, V., & Shewale, S. R. (2024). Polysaccharides. In Structured Foods (Vol. 226). Elsevier.

Gupta, A. K., Jha, A. K., Naik, B., Kumar, V., Rustagi, S., & Tavassoli, M. (2025). Exploration of techno-functional properties and metabolomic profile of Scleroderma texense (Phutuki Mushroom): A comparative study with Agaricus bisporus (white button mushroom). Discover Food, 5, Article 21. https://doi.org/10.1007/s44187-025-00291-z

Moon, Bo & Lo, Y.M.. (2013). Conventional and Novel Applications of Edible Mushrooms in Today's Food Industry. *Journal of Food Processing and Preservation*. 38. 10.1111/jfpp.12185.

Nguyen, T. B. K., Cao, H. K. N., Nguyen, T. D. L. H., Doan, T. P. D., Phan, T. D., Le, M. T., & Dong, T. A. D. (2025). Improvement of gummy candy structure by gelling ingredients and cooling temperature. Vietnam Journal of Chemistry, 63(1), 126–137. https://doi.org/10.1002/vjch.202400211

Nwaudah, E. I., Mbaeyi-Nwaoha, I. E., Ofoegbu, D. C., & Onyeaka, H. (2025). Oyster mushroom (Pleurotus ostreatus) and okara flour as nutritional enhancers in wheat biscuits: A study on storage stability. Foods, 14(3), 539. https://doi.org/10.3390/foods14030539

Patel, R., & Singh, S. (2020). Development and evaluation of mushroom-based confectionery products. Journal of Food Science and Technology, 57(9), 3141–3148.

Priyadarsini, P., & Mishra, A. (2020). A storage study of value added oyster mushroom products. International Journal of Chemical Studies, 8(4), 266–270. https://doi.org/10.22271/chemi.2020.v8.i4d.9703.

Rachappa, P., Sudharma, D. C., Chauhan, O. P., Patki, P. E., Nagaraj, R., & Naik, S. N. R. (2020). Development and evaluation of white button mushroom based snacks. Journal of Food Processing & Technology, 11(3), Article 824. https://doi.org/10.35248/2157-7110.2020.11.824

Riaz, S., Ahmad, A., Farooq, R., Ahmed, M., Shaheryar, M., & Hussain, M. (2022). Edible Mushrooms, a Sustainable Source of Nutrition, Biochemically Active Compounds and Its Effect on Human Health. IntechOpen. doi: 10.5772/intechopen.102694

Sharma, P., Sudharma, D. C., & Shewale, S. R. (2021). Development and quality evaluation of mushroom-based confections. Journal of Food Science, 86(2), 456–465. https://doi.org/10.1111/1750-3841.15532.

Sharma, R., Yadav, S., & Gupta, V. (2022). Development of functional confectionery products: Trends and challenges. Trends in Food Science & Technology, 119, 35–45. https://doi.org/10.1016/j.tifs.2022.02.005

Ullah N, Ullah S, Khan A, Ullah I, Badshah S (2018) Praparation and Evaluation of Corrot and Apple Blended Jam. J Food Process Technol 9: 725. Doi: 10.4172/2157-7110.1000725