Tomato Edible Packaging

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***Abstract*-Edible packaging made from tomato-based material is an innovative and sustainable approach to packaging materials like plastic. inventing an edible packaging by using tomato based material contain sustainable sourcing, biodegradability, edible and safe, versatile, pasta, noodles or condiment sachets and even as a coating for various food products to extend their shelf life, customizable properties, flavor and aroma enhancement, reducing food waste, innovations in blending, environmental benefits ,consumer appeal .overall tomato based edible packaging represents a promising step toward a more sustainable and eco-friendly approach to packaging ,addressing both environmental concerns and consumers preference for sustainable choices. Plastic packaging poses environmental issues due to its non-biodegradable nature, contributing to pollution and harming ecosystems. Finding sustainable alternatives and promoting recycling can help address this problem.**

Keywords:
Edible packaging, tomato puree, glycerol, gelatin, food grade components, edible film.

I. INTRODUCTION

Imagine walking into a grocery store where everything is wrapped in edible skins, with no other packaging. You would be able to eat your ice cream or protein bar right off the shelf, its package or wrapper included! Think biodegradable skins and shells like those of fruits (tomato, coconuts, bananas, apples, etc.). Would you be afraid of germs? Would it make you nervous to eat the package, as well as the food product within, wondering what this "Tomato edible" package is comprised of? While edible packaging innovations are on the rise, countless uncertainties prevent consumers from being willing to give these new products a try.

Yet edible packaging may provide more sustainable products and a way to help the environment and limit landfill waste from packaging. Advances in food packaging technology could make food storage and preparation simpler, meanwhile curbing food and packaging waste, and reducing the leaching of chemicals from packaging into food. It doesn't make sense that a food item consumed within minutes or seconds leaves behind a piece of packaging that lasts for years in Earth's landfills.

While edible packaging may seem like a novel idea, it isn't. In nature and the world around us, all sorts of produce come in their own protective skin. Potato skins are a delicacy, and lemon peels are both a water-repelling protective layer for the fruit and an aromatic and flavorful addition to baked goods and savory dishes. Other manmade foods also utilize the concept of an edible wrapper – sausages, mochi (Japanese ice cream in a soft, glutinous rice th shell), and caramel candies filled with a soft center, among others. Up until the 20 century, most wrappers and films for packaging food items were biologically derived and many were edible. For example, yuba (soymilk skin) has been traditionally used in Asian countries since the 15 century. It wasn't until the 20 century, when petroleum-derived chemicals replaced biologically derived resources, that we switched over to other packaging materials, such as plastic. The push to go back to bio-based packaging materials will utilize sources that are annually renewable. Edible packaging, films, and coatings can be made from carbohydrates, fats, or proteins, depending on their uses. There are five categories of edible food packaging innovation: food wrapped in food, food paired with an edible/biodegradable container, a cup or container to be eaten with its beverage, packaging that disappears, and edible packaging served at quick-service restaurants.

II. FOOD WRAPPED IN FOOD

Stony field Farm, Inc. was one of the first companies to sell a product with edible packaging in stores. In 2014, they launched a frozen yogurt novelty item called Wiki Pearls™. These small, single-serve spheres contain a Stonyfield frozen yogurt center encased with an edible gel skin. The skin was developed by Harvard scientist David Edwards at "Le Laboratories", a lab in Paris, and Edwards founded his company, Wiki Foods, in 2012 to commercialize the edible packaging innovation. The collaboration between Stonyfield and Wiki Foods was the first to bring this novelty to market. Edwards describes his inspiration for the gel skin (called Wiki Cells) as coming from nature itself. Made of algae and calcium, Wiki Pearls are like a grape – wrapped in their own protective skin and can be handled without melting and washed like a piece of fruit. They are like human skin, reproducing the natural barrier that keeps everything inside the body. These edible food wrappers have no flavor, eliminate the need for plastic spoons or wrappers, and can be rinsed and eaten whole or, when peeled off and thrown away, will quickly break down. The flavor of the skins can be modified to complement what's

contained inside; for instance, the frozen yogurt pearls come in sweet flavors like banana-chocolate and strawberry-chocolate. Stonyfield currently sells their frozen yogurt pearls in select Whole Foods either in pre-packed bags made from wood fiber (shown above), or over the counter at Wiki bars (in Boston and Paris) where customers place the pearls in their own bags, egg cartons, or packaging. Stonyfield's eventual goal of eliminating packaging for premade foods is still far-off. Their vision of one day having these individually packaged items sold in bulk bins, like granola or fruit, with consumers shopping with their own Tupperware or reusable bags is a utopian approach that retailers and shoppers aren't ready for yet. So, the question lies with food scientists, food companies, and retailers – how do we make products with edible packaging more feasible to sell.

III. TOMATO EDIBLE PACKAGING

Tomato edible packaging is a sustainable innovation where thin films made from tomato extracts are used to wrap food items. These biodegradable films help reduce plastic waste and offer an eco-friendly alternative. The packaging is not only edible but also adds a hint of tomato flavor to the food, enhancing the overall experience.3 Tomato edible packaging is not only environmentally friendly but also addresses the global issue of plastic pollution. These films are typically transparent, flexible, and can be used for various food items. The concept aligns with the growing demand for sustainable practices in packaging, contributing to a greener and healthier planet. Additionally, the use of tomato extracts adds a unique touch, creating an innovative and flavorful packaging solution. Tomato edible packaging goes beyond just being eco-friendly; it offers extended freshness to the packaged food due to the natural antimicrobial properties of tomatoes. The bioactive compounds in tomatoes also contribute to the film's antioxidant qualities. This edible packaging concept encourages a circular economy by utilizing waste from tomato processing, reducing the overall environmental impact

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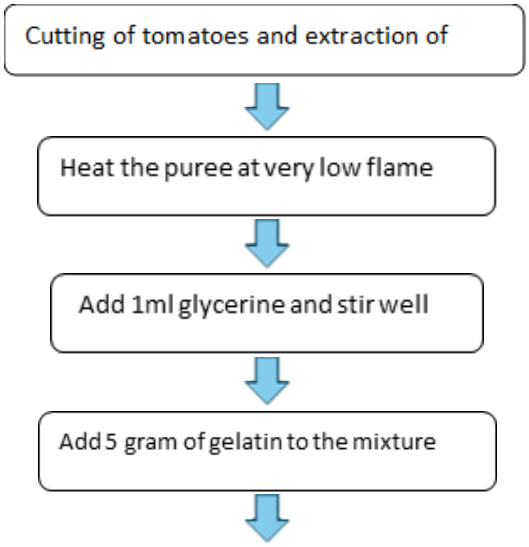
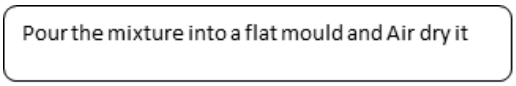
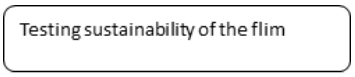
IV. Problem Identification

- Usage of plastic packaging can lead to environmental issues due to its non-biodegradable nature.
- It is contributing to pollution and harming ecosystems.
- 8 million tons of plastic are dumped in the ocean every year.
- The reliance on fossil fuels for plastic production further affects climate change.

V. METHODOLOGY







VI. LITERATURE REVIEW

Roxana Gheorghita1, SoniaAmariei2, LilianaNorocel1and Gheorghe gutt2 entitled as "New edible packaging material with function in shelf-life extension: Application for the Meat and cheese industries" said that Researchers are studying the shelf-life extension of packaging material by testing the edible material; General appearance, thickness, color, Roughness. Edible film and coatings are the biggest concern to the food industry today. Nowadays, there are consumers trends to use ready to eat foods, including prepacked and precooked products that come in different presentations.

From this literature, we have selected the packaging material by testing the edible

Film to extend the shelf life

Sweetie R. Kanatt1, Tanvi jethwa2, Kirti Swant1 and Spychala entitled as "Gelatin Films Incorporated with Tomato Pulp: A Potential Primary Food Packaging Film "said that the bioactive properties of cooked and uncooked pulp of solanum Lycopersicon (Tomato) were studied. Tomatoes constitute the major dietary source of lycopene which is a carotenoid associated with several health benefits. Composite food packaging films were prepared by blending Polyvinyl Alcohol (PVA) and Gelatin and functional properties of film were improved by addition of these pulp

From this literature, we are decided to take uncooked pulp of tomato and addition of Gelatin to make edible film

JustynaKadzinska1, MonikaJanowicz1, StanistawKalisz2, Joanna Bry 3, AndzejLenar1 entitled as "An overview of fruit and vegetable edible packaging materials "said that They have provide information about various edible fruit and vegetable material including purees, residues, extracts and juices to improve the Quality and improving the efficiency of synthetic packaging. Some of the fruits and vegetables as a compound of edible packaging material such as Apple, Banana, Pomegranate, grapes, carrot, cabbage, Pumpkin, Tomato.

From this literature, we are decided to take tomato puree for manufacturing the Edible packaging

Anna Kocina, Katarzyna Kozlowicz, Katarzyna Banasiewicz, Mariola Stania entitled as "Polysaccharides as edible Films and coatings: Characteristics and influence on fruits and vegetables quality" Said that Scientists have investigated various polymers of biological origin to obtain a continuous structure of membranes or coatings. Polysaccharide hydrocolloids are the most common group of biopolymers used in the production of edible films and coatings. They can be obtained from sources such as plants, crustaceans and microorganisms. Cellulose derivatives, starches, alginates, pectin's, chitosan's, pullulan and carrageenan's are the most popular polysaccharides used in the production of edible films and coatings. However, these materials are hydrophilic in nature. Therefore, different types of oils and fats are incorporated into the hydrocolloid matrix to enhance their water vapor barrier properties. The most popular are waxes, triglycerides, acetylated monoglycerides, free fatty acids and Vegetable oils.

From this literature, we decided to take polysaccharides of starch to improve the quality. To alleviate the wastage of tomatoes and extend their shelf life, it is necessary to explore new methods of preservation.

VII. CONCLUTION

The development of edible packaging made of tomato puree represents a promising and sustainable solution in the name of eco-friendly packaging alternatives. This innovative approach not only addresses environmental concerns but also taps into the abundance of tomatoes, turning them into a functional and biodegradable packaging material

REFERENCES

[1] M. Nicola, C.-I. Nicola and M. DuTA, "Adaptive Sensorless control of PMSM using Back-EMF Sliding Mode Observer and Fuzzy Logic,"2019 Electric Vehicles International Conference (EV), Bucharest, Romania, 2019, pp. 1-6, doi: 10.1109/ EV.2019.8893070.

[2] D. Pawar and V. B hole, "Fuzzy Logic-Based Controller of PMSM Motor for EV Application," 20223 3rd Asian Conference on Innovation in Technology (ASIANCON), Ravet IN, India.

[3] M.G R, B, Y V and C.V, "Current Doubler Rectifier Analysis and Implementation for DC EV charger Application," 2023 IEEE International Conference on Power Electronics, Smart Grid, and Renewable Energy(PESGRE), Trivandrum, India.

[4] M. Divandari, B. Rezaie and B. Askari-Ziarati, "Torque estimation of sensorless SRM drive using adaptive-fuzzy logic control,"2016 IEEE NW Russia Young Researchers in Electrical and Electronic Engineering Conference.

[5] H. E. Mimouni, A. Guettaf and A. Arif, "Sensor-less DTC Control of SRM for EV Using Artifical Intelligence," 2023 7th International Symposium on Innovative Approaches in Smart Technologies (ISAS), Istanbul, Turkiye, 2023, pp. 1-7, doi: 10.1109/ISAS60782.2023.10391407.

[6] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - Journal of ELECTRICAL ENGINEERING, Vol.63 (6), pp.365-372, Dec.2012.

[7] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- Springer, Electrical Engineering, Vol.93 (3), pp.167-178, September 2011.
[8] C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, Electric Power Components and Systems, Vol.39 (8), pp.780-793, May 2011.
[9] C.Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.
[10] Nagarajan C., Neelakrishnan G., Akila P., Fathima U., Sneha S. "Performance Analysis and Implementation of 89C51 Controller Based Solar Tracking System with Boost Converter" Journal of VLSI Design Tools & Technology. 2022; 12(2): 34–41p.
[11] C. Nagarajan, G.Neelakrishnan, R. Janani, S.Maithili, G. Ramya "Investigation on Fault Analysis for Power Transformers Using Adaptive Differential Relay" Asian Journal of Electrical Science, Vol.11 No.1, pp: 1-8, 2022.
[12] G.Neelakrishnan, K.Anandhakumar, A.Prathap, S.Prakash "Performance Estimation of cascaded h-bridge MLI for HEV using SVPWM" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:750-756
[13] G.Neelakrishnan, S.N.Pruthika, P.T.Shalini, S.Soniya, "Perfromance Investigation of T-Source Inverter fed with Solar Cell" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:744-749
[14] C.Nagarajan and M.Madheswaran, "Analysis and Simulation of LCL Series Resonant Full Bridge Converter Using PWM Technique with Load Independent Operation" has been presented in ICTES'08, a IEEE / IET International Conference organized by M.G.R.University, Chennai.Vol.no.1, pp.190-195, Dec.2007
[15] M Suganthi, N Ramesh, "Treatment of water using natural zeolite as membrane filter", Journal of Environmental Protection and Ecology, Volume 23, Issue 2, pp: 520-530,2022
[16] M Suganthi, N Ramesh, CT Sivakumar, K Vidhya, "Physiochemical Analysis of Ground Water used for Domestic needs in the Area of Perundurai in Erode District", International Research Journal of Multidisciplinary Technovation, pp: 630-635, 2019
[17] S. Yang, S. Li, T. Wang, F. Liang and X. Su, "A Sensorless control strategy of a Single-stage fast EV battery charger based on the Voltage-type PWM Converter,"2020 4th.
[18] N. Bhardwaj, M. Singh, M. A. Hasan and A. Chawal, "Achieving Cost Benefit Using Fuzzy Logic Based Charging Schemes for Electric Vehicles," 2022 2nd International Conference on Emerging Frontiers in Electrical and Electronic Technologies (ICEFEET).
[19] Q. Wang, S. Wang and C. Chen, "A Novel Full-Speed Sensorless Control Strategy Based on Electric Vehicle PMSM,"2018 21st International Conference on Electrical Machines and Systems (ICEMS), Jeju, Korea (South), 2018.