

УДК 664.8/9

## **BIOFOAMS: ARE THEY REALLY THE PACKAGING REVOLUTION?**

**Kumar Pankaj** (ITMO University),  
**Scientific Advisor - Associate Professor, PhD Baranenko D.**  
(ITMO University)

«Роль биологически активных веществ природного происхождения в развитии и нутритивной профилактике неинфекционных заболеваний» 620145 НИР-ФУНД

### **Introduction**

Bio foams are biodegradable foams and are a type of food packaging composed of starch that is biodegradable and ecologically beneficial. Expanded polystyrene (EPS), a low-cost and commonly accessible polymer, is often used in foam packing. Unfortunately, EPS-based foams are harmful to the environment since they are non-biodegradable and rarely recycled. Phthalates in plastic, as endocrine disruptors and SVOCs, are harmful to human reproductive, neurological, and developmental systems through many exposure routes. Children are more exposed to phthalates and more sensitive to them. To address synthetic plastic pollution and health issues, it is critical to produce foams from renewable and non-toxic sources for use in biodegradable packaging for food and rapid food delivery. Researchers have explored and created starch-based biofoams for packaging, such as sweet potato starch (*Ipomea batatas*), Canna starch cassava starch, a blend of maize starch and potato starch, and sago starch. Because of the nature of its product, biofoam is likely to prosper. It is a tough, lightweight, and low-cost product. It leaves no dust trace, resists the impulse to move in transit, conforms to any shape in bulk, and protects in an outstanding manner. Its indestructibility may potentially provide an edge over its predicted opponents. On the other side, this product may fail owing to client preference shifts toward its replacements. It will take a long time to gain the market share that it predicts. Another factor is its cost, which is more than usual packaging materials.

### **Main Part**

- 1) Polystyrene is used to make Styrofoam, which is useful, affordable, leak-proof, and temperature resistant but has a significant detrimental influence on the environment (Rahmadhani et al., 2015).
- 2) Phthalates are a group of frequently used compounds in plastic that have been shown to alter hormones and be harmful to human health. The majority of goods that come into touch with plastics while being produced, packaged, or delivered contain phthalates. Even though phthalates have short half-lives in tissues, chronic exposure will negatively affect the endocrine system and the operation of many organs, which will have long-term effects on the success of pregnancy, child growth and development, and reproductive systems in both young children and adolescents. So its solution is need to be found (Wang *et al.*, 2021)
- 3) Biofoam, which employs starch as its major source ingredient, is one substitute for Styrofoam. High biodegradability, cheap cost, non-toxic, and heat resistance are all characteristics of starch.
- 4) A plasticizer can improve the quality of biodegradable foam. After the addition of plasticizers, the physical characteristics shifted to become softer, more water-resistant, and more elastic.

- 5) Cassava flour is a possible supply of starch, whereas corncob waste is the primary source of fiber. Maize has 90% cellulose. If cellulose is present in significant amounts, it will make strong fibers that are insoluble in water and organic solvents and will be white in color (Hauw et al.,2017).
- 6) An extruder is one way of generating biofoam, and it is used in the creation of biofoam. Thermoplastic extrusion is a high-volume industrial technique that involves melting raw plastic and forming it into a continuous shape. The molten plastic is then screwed into the mold to form a substance with a cross-section in the shape of the die. Another common process is thermo-pressing, which involves making biofoam with a tool that can hold and heat materials at the same time.
- 7) The cost of bioplastic is a crucial aspect to take into account, even if customers are becoming more interested in items with sustainable packaging and are constantly changing their attitudes regarding the word sustainability as a result of growing environmental concerns (Habermann, 2020). In this view, the price of starch-based foams, which is higher than the price of EPS foam, is a significant constraint for their industrial application. Hence, lowering the cost of producing biodegradable foams which may be accomplished by employing affordable raw materials and additives such agro-industrial leftovers, is one of the difficulties for the production of starch-based foam products.

## **Conclusion**

The packaging sector lacks sustainable, ecologically acceptable and non toxic options for food containers or other packaging, despite the fact that demand for such items has grown dramatically. As a result, creating foams that can effectively replace EPS is a global priority. Although starch has the potential to be used as a substitute for EPS in foam manufacturing, we believe that additional research is needed in this area to lower the cost of biofoams as well as to make them more stable.

## **References**

- 1) Plastics - The facts 2014/2015: An analysis of European plastics production, demand and waste data. Plastics Europe (2015), pp. 1-34, 10.1016/j.marpolbul.2013.01.015.
- 2) J. Habermann The consumer acceptance of primary packaging alternatives, Bachelor's thesis, University of Twente (2020).
- 3) A. R. Hauw, 2017, "Pengaruh Pretreatment Inokulum Em4, Suhu, Waktu Dan Tekanan Terhadap Fermentasi Kelobot Jagung (*Zea mays L.*)," Yogyakarta: Universitas Atma Jaya Yogyakarta.
- 4) S. P. Rahmadhani, 2015, "Gambaran Pengetahuan dan Sikap dengan Posisi Tawar Konsumententang Penggunaan Kemasan Styrofoam sebagai Wadah Makanan di Amaliun," Medan: Universitas Sumatera Utara.
- 5) Wang, Y., & Qian, H. (2021). Phthalates and Their Impacts on Human Health. In *Healthcare* (Vol. 9, Issue 5, p. 603). MDPI AG. <https://doi.org/10.3390/healthcare9050603>.