

UNIVERSIDADE FEDERAL DE VIÇOSA
CENTRO DE CIÊNCIAS EXATAS E TECNOLÓGICAS
DEPARTAMENTO DE TECNOLOGIA DE ALIMENTOS
Secretaria da Pós-Graduação em Ciência e Tecnologia de Alimentos

Campus Universitário – Viçosa, MG – 36570-900 – Telefone (31)3612-6705/6760 – E-mail: tca@ufv.br

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APPLICATIONS OF 3D PRINTING IN PLANT-BASED FOOD PRODUCTION

Pós-graduando: Gabriela Aparecida Nalon

Orientador: Bruno Ricardo de Castro Leite Júnior (Departamento de Tecnologia de Alimentos)

Nível: (X) MS () DS

Several technologies are being explored in the development of plant-based products, among which 3D printing stands out. Also known as additive manufacturing, this technique consists of the controlled deposition of layers of material from a digital model, allowing the creation of foods with complex geometries. Although it initially emerged in areas such as engineering and medicine, 3D printing has been adapted for the food industry, expanding its innovative potential. In the food sector, this technology enables nutritional and structural customization, allowing adjustments to calories, nutrients, shape, texture, and flavor according to individual needs. In addition, it has applicability in specific diets, such as in the case of patients with dysphagia, through the production of foods with appropriate textures and shapes. The performance of the process is directly related to the rheological behavior of the matrices used, since their flow properties determine the extrudability, structural stability, and final quality of the product. For the formulation of so-called "edible inks," products and by-products from the food industry can be used as sources of starch and proteins. Often abundant and low-cost, these materials form gels suitable for the manufacture of meat and dairy analogues. However, their rheological functionality depends on characteristics such as solubility, viscosity, and the ability to form stable three-dimensional networks. Currently, research seeks to optimize the technical and functional quality of plant proteins to improve the performance of these inks. Thus, 3D printing is establishing itself as a promising tool to drive innovation in plant-based products, combining technological advances with the nutritional and functional demands of society.

References:

ARSHAD, R. et al. Recent advances in 3D food printing: Therapeutic implications, opportunities, potential applications, and challenges in the food industry. *Food Research International*, v. 203, p. 115791–115791, 20 jan. 2025. DOI: <https://doi.org/10.1016/j.foodres.2025.115791>

BHAT, Z. F. et al. 3D printing: Development of animal products and special foods. *Trends in Food Science & Technology*, v. 118, p. 87–105, dez. 2021. DOI: <https://doi.org/10.1016/j.tifs.2021.09.020>

LIU, W. et al. Fabrication and characterization of edible inks for 3D printing of dysphagia foods based on corn starch stabilized by calcium ions and hydrocolloids. *Food Hydrocolloids*, v. 166, p. 111278–111278, 26 fev. 2025. DOI: <https://doi.org/10.1016/j.foodhyd.2025.111278>

CEN, S.; MENG, Z. Advances of plant-based fat analogs in 3D printing: Manufacturing strategies, printabilities, and food applications. *Food Research International*, v. 197, p. 115178–115178, 5 out. 2024. DOI: <https://doi.org/10.1016/j.foodres.2024.115178>

Orientador (a)

Orientado(a)