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INOPTEP 2025
and
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PROCESSING AND ENERGY
IN AGRICULTURE
PTEP 2025
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INOPTEP 2025
i
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Editors / Urednici

Prof. Dr. Siniša Bikić
Doc. Dr. Aleksandra Đukić-Vuković

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Marko Nenadić dipl.ing, Uljarice Bačka doo Novi Sad, Srbija
Dr. Olivera Đuragić, Naučni institut za prehrambene tehnologije Novi Sad, Univerzitet u Novom Sadu, Srbija

INNOVATIVE THREE-DIMENSIONAL 3D-ESSERTS WITH DIETARY SUPPLEMENTS IN EDIBLE PACKAGING

Jasna HALAMBEK[1], Ivana KOLIĆ[1], Denis KOTARSKI[1], Predrag PUTNIK[2], Danijela BURSAĆ KOVAČEVIĆ[3], Sandra ZAVADLAV[1]

[1]Department of Food Technology, Karlovac University of Applied Sciences, Trg J. J. Strossmayera 9, 47000 Karlovac, Croatia

[2]Department of Food Technology, University North, Trg dr. Žarka Dolinara 1, 48000 Koprivnica, Croatia

[3]Faculty of Food Technology and Biotechnology, University of Zagreb, Pierottijeva 6, 10000 Zagreb, Croatia

Contact: sandra.zavadlav@vuka.hr

3D food printing is an emerging processing technology poised to have a significant impact on the entire food industry and consumer health. It enables transformation of high-quality food ingredients into special designed, highly customized 3D printed foods, such as "3D-esserts" with edible packaging. One notable application of this technology is the creation of fully edible packaging made from ingredients that are safe for human or pet consumption. Familiarizing consumers with these innovations and demonstrating their relevance to both the human and pet food industry is crucial. A key example of edible and printable material includes desserts with supplemental nutrients tailored to an individual's dietary needs.

Unlike conventional food, dietary supplements are intended to enhance nutrition by incorporating essential proteins, vitamins, minerals, bioactive compounds, live beneficial microbes, or other beneficial nutrients like methylsulfonylmethane. These advancements in 3D food printing are driving the rise of personalized nutrition. Moreover, 3D printing allows for the personalization of both food and packaging, adapting to individual preferences and dietary requirements. From a societal perspective, public opinion generally supports the development of new food technologies - especially 3D food printing – due to its innovative and visually appealing products. Edible films and coatings have gained significant attention in recent years due to their advantages over synthetic polymer films. Unlike traditional packaging materials, edible films can be consumed along with the packaged product. In addition to serving as effective vapor and gas barriers, they enhance food quality, extend shelf life, and reduce packaging waste. They can also serve as carriers of bioactive compounds, further enhancing the functional properties of food. The combination of "3D-esserts" and 3D-printed edible packaging represents a promising approach to environmental sustainability. By replacing plastic packaging with edible alternatives, 3D food printing can help reduce plastic waste and promote a circular economy.

As part of the HRID project, recipes compatible with 3D food printing technology will be developed and presented to meet specific nutritional and health requirements.

***Key words**: dietary supplements, edible packaging, 3D-esserts, 3D food, 3D printing*

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INOVATIVNI TRODIMENZIONALNI 3D-ESERTI S DODACIMA PREHRANI U JESTIVOM PAKIRANJU

Jasna HALAMBEK[1], Ivana KOLIĆ[1], Denis KOTARSKI[1], Predrag PUTNIK[2], Danijela BURSAĆ KOVAČEVIĆ[3], Sandra ZAVADLAV[1]*

[1]Department of Food Technology, Karlovac University of Applied Sciences, Trg J. J. Strossmayera 9, 47000 Karlovac, Croatia

[2]Department of Food Technology, University North, Trg dr. Žarka Dolinara 1, 48000 Koprivnica, Croatia

[3]Faculty of Food Technology and Biotechnology, University of Zagreb, Pierottijeva 6, 10000 Zagreb, Croatia

Contact: sandra.zavadlav@vuka.hr

3D ispis hrane nova je tehnologija obrade koja će imati značajan utjecaj na cjelokupnu prehrambenu industriju i zdravlje potrošača. Omogućuje transformaciju visokokvalitetnih sastojaka hrane u posebno dizajniranu, visoko prilagođenu 3D ispisanu hranu, kao što su „3D-eserti“s jestivim pakiranjem. Jedna značajna primjena ove tehnologije je stvaranje potpuno jestivih pakiranja napravljenih od sastojaka koji su sigurni za prehranu ljudi ili kućnih ljubimaca. Upoznavanje potrošača s ovim inovacijama i spominjanje njihove važnosti za prehrambenu industriju i industriju hrane za kućne ljubimce od ključne je važnosti. Ključni primjer jestivog materijala koji se može ispisati uključuje deserte s dodatnim hranjivim tvarima prilagođene prehrambenim potrebama pojedinca. Za razliku od konvencionalne hrane, dodaci prehrani namijenjeni su poboljšanju prehrane uključivanjem esencijalnih proteina, vitamina, minerala, bioaktivnih spojeva, korisnih živih mikroba ili drugih korisnih hranjivih tvari poput metilsulfonilmetana. Ovaj napredak u 3D ispisu hrane pokreće uspon personalizirane prehrane.

Štoviše, 3D ispis omogućuje personalizaciju hrane i pakiranja, prilagođavajući se individualnim preferencijama i prehrambenim zahtjevima. Iz društvene perspektive, javno mnijenje općenito podržava razvoj novih prehrambenih tehnologija - posebno 3D printanje hrane zbog svojih inovativnih i vizualno privlačnih proizvoda. Jestivi filmovi i premazi privukli su značajnu pozornost posljednjih godina zbog svojih prednosti u odnosu na filmove od sintetičkih polimera. Za razliku od tradicionalnih materijala za pakiranje, jestive folije mogu se konzumirati zajedno s pakiranim proizvodom. Osim što služe kao učinkovite parne i plinske barijere, poboljšavaju kvalitetu hrane, produljuju rok trajanja i smanjuju otpadnu ambalažu. Oni također mogu poslužiti kao nosioci bioaktivnih spojeva, dodatno poboljšavajući funkcionalna svojstva hrane. Kombinacija “3D-eserata” i 3D ispisane jestive ambalaže predstavlja obećavajući pristup održivosti okoliša. Zamjenom plastične ambalaže jestivim alternativama, 3D ispis hrane može pomoći u smanjenju plastičnog otpada i promovirati kružno gospodarstvo.

U sklopu projekta HRID razvit će se i prezentovati recepti kompatibilni s tehnologijom 3D printanja hrane kako bi se zadovoljili specifični prehrambeni i zdravstveni zahtjevi.

Ključne riječi: *dodaci prehrani, jestiva ambalaža, 3D hrana, 3D ispis, 3D-eserti*

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