Herb bioprocessing emerges as a spotlight topic at World FoodTech 2026: Bridging traditional wisdom with synthetic biology

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From June 9 to 12, 2026, the World FoodTech ConfEx (WFT26) convened under the theme "World FoodTech Emergence Platform" at KINTEX Hall in Goyang, South Korea. Co-organized by the World FoodTech Council, the Korea Chamber of Commerce and Industry, and Seoul National University, and co-located with the Seoul Food 2026 exhibition, the event serves as an integrated "Conference + Expo" platform for global food technology innovation (Figure 1A). The conference hosted more than 100 sessions (roughly 20 global-leader-led and 80 domestic-led sessions), gathering over 500 experts from academia, industry, and government as speakers and panelists. Aligned with its Prizes-Exhibition-Conference tripartite framework, WFT26 placed strong emphasis on identifying and showcasing innovative food-technology solutions (Figure 1).

Several conference sessions and exhibition displays at WFT26 highlighted herbal bioprocessing, an interdisciplinary field that merges food biotechnology, synthetic biology, and traditional herbal knowledge (Figure 1B).[1] Representative technological frameworks presented across the event integrate sustainable herbal cultivation, probiotic-driven fermentation, enzymatic biotransformation, and microbial synthesis of bioactive phytochemicals to advance the modernization of medicinal-edible plant resources. Certain herb technologies were widely discussed among participating researchers and industry delegates. First, enzyme-catalyzed biotransformation leverages glycoside hydrolases such as β-glucosidase to convert poorly bioavailable glycosides into corresponding aglycone derivatives with enhanced absorbability. Second, probiotic fermentation exploits microbial resources isolated from traditional fermented ecosystems to process medicinal-edible herbs, which can elevate bioactive compound yields, improve sensory profiles, and mitigate undesirable components.[2,3] Third, synthetic-biology-based microbial cell factories adopt metabolically engineered yeast strains and other microorganisms to produce rare herbal bioactive molecules from renewable carbon feedstocks, shortening production timelines for target phytochemicals.[4,5] Collectively, these technical routes open application prospects for functional foods, pharmaceutical intermediates, and other health-related products.

Cross-border panel exchanges at the conference further addressed key topics including herbal biotransformation mechanisms, functional food product development, and barriers restricting academia-industry translation (Figure 1B). Panel participants shared frontier research findings on microbial-driven structural remodeling of herbal bioactive molecules, while highlighting practical bottlenecks spanning strain stability, process scale-up, cross-regional regulatory divergence, standardized evaluation systems, and high-cost downstream processing that hinder lab-scale herbal bioprocessing technologies from moving toward commercial manufacture. The WFT26 provided a platform integrating thematic panel discussions, on-site technology showcases and herbal product sessions to demonstrate how herb bioprocessing, as a convergence of traditional herbal wisdom and modern biotechnology, can drive the sustainable modernization of medicinal-edible plant

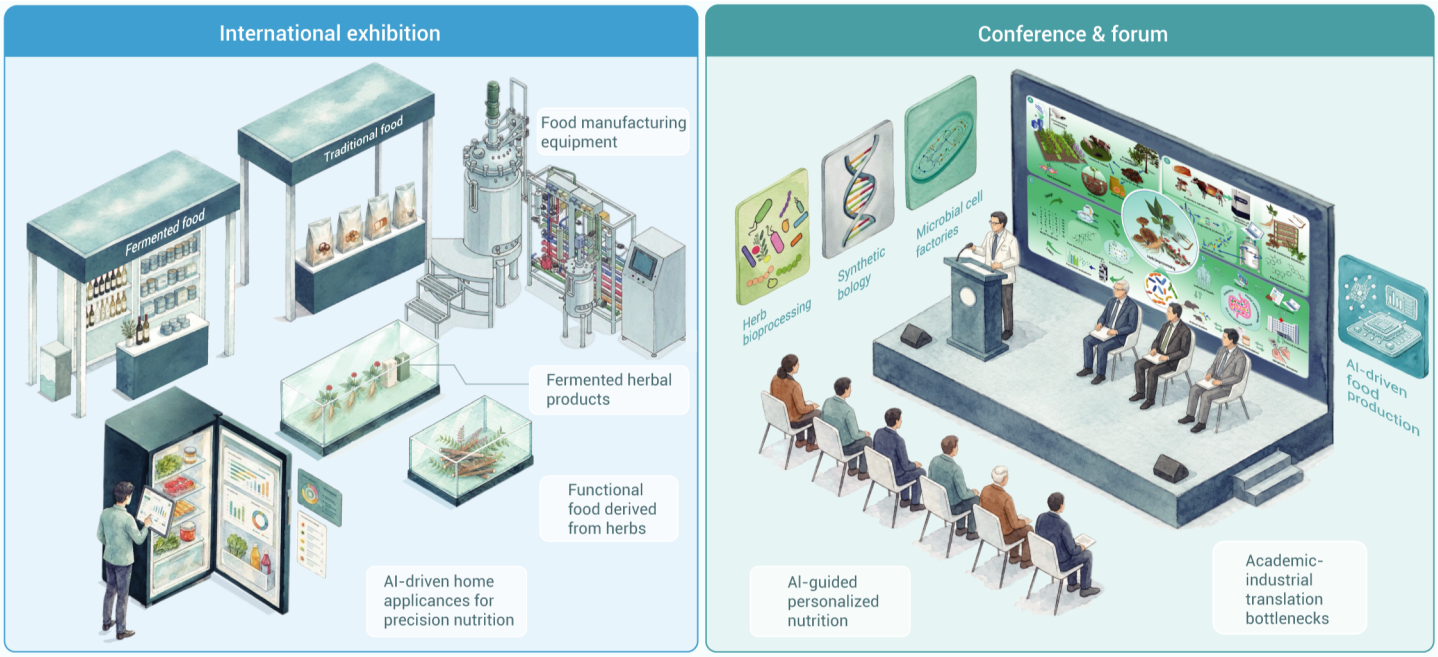

Figure 1. Highlights from the World FoodTech ConfEx 2026 (WFT26) (A) Overview of the WFT26 conference-expo event held in Goyang, Republic of Korea. (B) Key topics discussed in cross-border panel sessions and exhibition showcases at WFT26, including advances in herbal bioprocessing, broad applications of AI and other advanced technologies across food-technology value chains, academic-industrial translation barriers, and future directions for functional food innovation.

resources for global health benefits (Figure 1). Participants also exchanged insights on circular-economy-oriented valorization of herbal raw materials and by-products, exploring feasible pathways to translate botanical knowledge into market-ready, consumer-oriented functional ingredients and consumer goods for global markets.

Numerous reports and exhibitions at this conference involved the application of artificial intelligence (AI) in food development, production, and other food areas (Figure 1). In the future, AI is set to reshape the full-value chain of herb bioprocessing. In sustainable herb cultivation, AI-powered environmental monitoring systems combine real-time soil microbiome data, weather patterns, and plant growth indicators to optimize irrigation, nutrient delivery, and pest management. Such predictive farming strategies help boost the output of high-quality herbs while lowering land occupation and chemical-agent inputs. For probiotic strain screening, machine learning tools can rapidly screen genomic and functional datasets to identify candidate strains with desirable traits — such as high glycoside hydrolase activity or favorable gut-colonization potential — substantially shortening strain-screening cycles. In synthetic-biology workflows, AI-assisted design of microbial cell factories, combined with automated design-build-test-learn (DBTL) cycles enable prediction of optimal enzyme combinations and metabolic flux redistribution, accelerating prototyping of engineered microbial hosts for high-titer biosynthesis of rare herbal metabolites.

A forward-looking research direction highlighted at the conference lies in AI-guided personalized nutrition. By integrating existing medical knowledge, multi-omics data, and individual gut microbiome profile, AI frameworks can generate customized dietary guidance for bioprocessed herbal products, covering herbal categories, general dosage ranges, and suggested consumption patterns. For example, based on an individual's gut microbial composition, inflammatory biomarkers, and metabolic phenotypes, AI tools may propose general consumption schemes for fermented herbal preparations or microbially synthesized bioactive substances to support immune homeostasis or healthy aging, alongside recommended consumption windows to optimize bioavailability and gut-microbiota synergies. The technology may be integrated with refrigerators and other smart home devices (Figure 1). It should be emphasized that such personalized recommendations remain conceptual at current stage and require further clinical validation. With accumulating clinical and real-world evidences, AI-driven systems will keep optimizing decision outputs, propelling herb bioprocessing from generalized solutions toward data-supported personalized dietary interventions that reconcile traditional herbal experience with modern precision nutrition.

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AUTHOR CONTRIBUTIONS

Yongjun Wei wrote and revised the manuscript, and Mee-Hyun Lee revised the manuscript. All authors have read and agreed to the published version of the manuscript.

DECLARATION OF INTERESTS

The authors declare no competing interests.