

DIGITAL FOODTECH INITIATIVE AND BEYOND: Innovation for Sustainable Future Foods

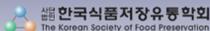


AUGUST 28-30, 2024
BEXCO, Busan, Korea



2024 45th KoSFoP International Symposium & Annual Meeting

Organizer



Co-organizer



Sponsor



SUSTAINABLE
U.S. SOY.

세계인의 영양을
책임지는 미국산 콩



지속가능한 경작을 통해
다음 세대에도 물려주어야 합니다.

SOY

ASA

UNITED
ESTRAN
FARMERS

USSEC



대한민국 치즈산업의 중심 (재)임실치즈앤식품연구소가 만들어 가겠습니다.

임실치즈의 대부(代父) 지정환(벨기에명:디디에 세스테벤스) 신부님이 임실 성당의 주임신부로 오셔서 가난한 농촌을 살리 고자 1967년 유산양 2마리로 시작한 치즈 제조의 역사가 대한민국 치즈 산업의 초석이 되었듯이, (재)임실치즈앤식품연구소는 대한민국 치즈산업의 중심이 되도록 꽃을 피워 나가겠습니다.

(재)임실치즈앤식품연구소는 임실군의 핵심사업인 임실치즈의 명품화·글로벌 경쟁력 강화를 위해 관련 산업을 육성·발전시켜 나가는 데 역점을 두고 유관기관과의 협력체계를 구축하여 새로운 치즈개발과 사업화에 최선을 다하고자 합니다.

또한 관내 유가공 낙농가 및 유업체의 든든한 '베이스캠프'의 역할을 충실하고, 동시에 새로운 발효 유산균주의 기능성 구명연구와 이공기술개발로 임실치즈의 차별화를 통한 명품화를 추진해 나가겠습니다. 전문화된 연구역량을 통해 작지만 강한 연구소로서의 위상제고와 경쟁력 강화에 최선을 다하겠습니다.

앞으로도 (재)임실치즈앤식품연구소가 더욱 발전할 수 있도록 아낌없는 성원과 격려를 보내주시기 바랍니다.

연구소 연혁

- 2022년 : 임실치즈 역사문화관 개관 및 운영
- 2020년 : 2020 대한민국 베스트 신상품 향긋한 독활차 대상 수상
- 2019년 : 중소벤처기업부 산학연협력기술개발사업 공동개발기관 지정
- 2018년 : 유제품가공사 민간자격증 시행기관 지정
- 2016년 : (재)임실치즈과학연구소→(재)임실치즈앤식품연구소로 명칭 변경
- 2014년 : 산업통상자원부 장관상 수상
- 2011년 : 연구소 개소



연구수행 내용



지역특산자원 활용 소재개발 연구 활발

중소벤처기업부 지원으로 지역특산자원 독활 및 식물성 유산균 발효소재를 활용한 피부건강 개선 기능성 소재개발 연구 지속 추진

연구수행 내용



기능성 프로바이오틱스 균주개발 지속

중소벤처기업부 및 산림청 지원으로 전동발효식품에서 분리한 식물성 유산균주의 장관면역증진효과 확인을 통한 고령케어 맞춤형 유산균 개발연구 지속 추진



자연을 담은 기업
(주)한울

“Nature is present for you”

계절이 주는 선물, 바르고 건강한 간식

자연에서 오는 원재료 그대로를 사용하면서
맛을 포기하지 않았습니다.



제주대학교 지역혁신클러스터육성 사업단이 산학협력 현장착근형 인재양성을 책임지겠습니다.

계약Lab 운영 지원사업

사업개요

제주지역혁신클러스터 내 바이오산업 및 전후방산업 특화산업 관련 기업과 대학이 공동으로 기업의 수요 발굴 후 문제해결형 산학협력 공동프로젝트 수행을 통한 맞춤형 인력양성 및 취업 연계지원

사업규모

참여기관(팀) 별 최대 3천만원 이내

산학협력 프로젝트Lab 운영 지원사업

사업개요

대학-사업체 협력 운영체제 구축을 통한 현장중심 교육과정 개설 및 전문기술 인력양성 지도교수 및 기업 전문가의 연구 지도하에 과제참여 학생들의 기술개발 과정 참여기회 부여 클러스터 내 유망기업의 수요중심의 산학협력을 통하여 애로기술 해결 및 신기술 개발 지원

사업규모

참여기관(팀) 별 최대 1천만원 이내

유망기업 혁신인재 재직자교육 프로그램

사업개요

클러스터 내 네트워크 활용 성장육성형 중심의 맞춤형 바이오산업 기술역량 강화를 통한 기술혁신형 강소기업 육성 기반 마련

강좌수

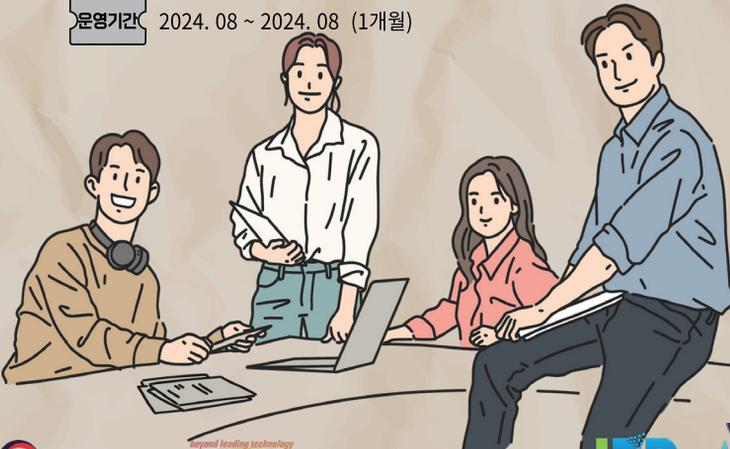
1개 프로그램, 10개 강좌 내외

운영기간

2024. 08 ~ 2024. 08 (1개월)



scan me





ZELKOVA

발효를 전공한 1급 주조사가 만드는 자연담은 와인

젤코바와이너리는

2022, 2023 아시아와인트로피 금상,

2019, 2024 대한민국 주류대상 대상,

2024 한국와인대상 골드상을 수상하며 전문가와 소비자들에게
맛과 품질을 인정받고 있는 와인브랜드입니다.

강창석 대표는 농화학과 식품공학(박사과정 수료)을 전공하고

다년간 주류메이커에서 근무하다 은퇴하고

대학과 기술센터 등에서 와인강의를 하다 귀농하여

소몰리에 아내 최영희와 함께 와이너리를 운영하고 있습니다.

젤코바와이너리는 오크통에서 숙성하고 자가분석으로

철저한 품질관리를 통해

고품질의 와인을 만들어 제공합니다.



주소 : 경북 상주시 남상주로 1108-3

Email : zelvowine@naver.com

연락처 : 010-4507-7232

010-2720-7232

NAVER

젤코바와인

검색



010-4507-7232

010-2720-7232

자연 친화원료로 건강지향 소재를 추구하는 기업

(주)에스앤디는 국내외 다양한 인증을 받아
안전하게 섭취할 수 있는 식품을 생산하고 있습니다.
최고의 연구개발능력으로 신뢰받는 기업이 되겠습니다.

S&D CO., LTD

일반기능식품

- 치즈혼합분말
- 가당난황분말
- 쌀가공분말
- 요구르트파우더
- 유아분말
- 카라멜분말
- 청양고추시즈닝분말
- 야채엑기스분말
- 마추출분말
- 토코페롤혼합제제
- 타트체리농축분말

건강기능식품

- 미강주정추출물
- 감태추출물
- 회화나무열매추출물
- 흰목이버섯효소분해추출물
- 가시오가치속지황복합추출물
- 새싹보리추출물
- 해국추출물

기능성식품

- MPG-6
- 새싹보리추출분말
- 구기자엑기스
- 자감초추출물
- 울금추출물
- 백편두추출물
- 약썩추출분말
- 명일엽추출물
- 루버스씨드추출물
- 여성초추출분말
- 라임과피추출물



충북 청주시 흥덕구 오송읍 오송생명4로 163
Tel. 043-710-8000 Fax. 043-710-8099



INNOBIZ
기술혁신형중소기업

XEVO™ | MRT

Meet Our Metabolomics Masterpiece

Delivering unrivaled
performance at **SPEED**



Waters™

Waters와 Xevo는 Waters Corporation의 상표입니다.
기타 모든 상표는 해당 소유권자의 자산입니다.

©2024 Waters Corporation. Printed in Korea.

(유) 워터스코리아

경기도 광명시 신기로 20 유플래닛타워 22층, 14345
전화: 02, 6300, 9200
팩스: 02, 6300, 9204
홈페이지: www.waters.com/kr

Microplate Reader



Epoch

모노크로메이터 방식 흡광 리더
(200-900nm)



Epoch2

온도 조절/shaking 기능 지원
모노크로메이터 방식 흡광 리더



Synergy HTX

흡광, 형광, 발광 검출 모드를
갖춘 경제적인 멀티모드 리더

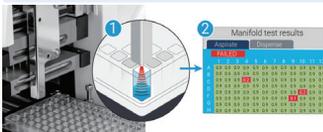
Microplate Washer



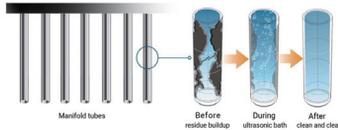
405 TS Washer

- Manifold 변경 없이 96-, 384-well microplates 세척
- Ultrasonic Advantage: 자동으로 Maintenance & Cleaning 실행
- Verify Technology: 초음파 프로브를 사용하여 Manifold의 흡입 또는 분주 막힘을 자동 감지
- Dual-Action Manifold: 각진 형태의 분주 팁, 분주 및 흡입 속도 정밀 조정으로 세포 단층 보호
- Application: ELISA, Magnetic & polystyrene based assays, cell-based assays etc.

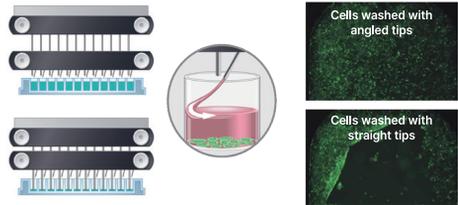
Verify Technology



Ultrasonic Advantage



Dual-Action Manifold



25% 특별 할인!!

Ch 카톡에서 (주)엘씨케이테크놀로지스 채널 추가하세요 +

한국식품저장유통학회 초록 본 분만 Microplate Reader & Washer 할인!!



사탕수수에겐 참 미안한 이야기

사탕수수야, 건강한 땅에서 햇빛 먹고 바람 마시며 자란
 네가 내 원료라는 걸 모르시는 분들이 아직 많은 것 같아.
 내 감칠맛은 너를 꼬박 마흔 시간 동안 발효해서
 얻은 맛이라는 것도 말이지. 그래, 생각이라는 걸 쉽게
 바꿀 순 없겠지. 하지만 난 믿어. 맛을 위해, 건강을 위해
 진심을 다하다 보면 오해는 조금씩 풀릴 거라고.
 더 많은 식탁에서 실력 발휘할 수 있는 날이 곧 올 거야.

사탕수수를 발효하여 만든 발효미원



Contents

▶ KoSFoP Board	12
▶ Organizing Committee	13
▶ Welcome Message	14
▶ Venue Information	16
▶ Schedule	17
▶ Plenary Lecture	19
▶ Academic Award Lecture	20
▶ Symposium Session	22
▶ International Session	42
▶ Young Scientist Presentation	45
▶ Graduate Student Presentation	46
▶ Capstone Design Competition	52
▶ Special Lecture	56
▶ Poster Session	209
▶ Exhibition	265
▶ Author Index	283

KoSFoP Board

President

- **Jong-Kuk Kim** (Kyungpook National University)

Next President

- **Seong-Gook Kang** (Mokpo National University)

Vice Presidents

- **Kwang-Sup Youn** (Daegu Catholic University)
- **Jun-Hyun Oh** (Sangmyung University)
- **Won-Young Lee** (Kyungpook National University)
- **Seung-Ho So** (Korea Ginseng Corp.)
- **Kee-Jai Park** (Korea Food Research Institute)
- **Sang-Bae Han** (Korea Agency of HACCP Accreditation and Services)
- **Yong-Sup Choi** (Korea Institute of Fusion Energy)

Auditor

- **Kwon-Il Seo** (Dong-A University)
- **Kwon-Tack Hwang** (Nambu University)



Organizing Committee

Position	Name	Affiliation
Secretary General	Mi-Kyung Park	Kyungpook National University
Secretary of General Affairs	Jung-Beom Kim	Sunchon National University
	Young-Min Kim	Chonnam National University
Treasurer	Jin-Young Lee	Sangmyung University
	Joon-Goo Lee	Seoul National University of Science and Technology
Secretary of Academic Programs Affairs	Jeong-Yong Cho	Chonnam National University
	Chang-Ki Huh	Sunchon National University
	Mi-Jeong Kim	Changwon National University
Secretary of Foreign Affairs	Deokyeong Choe	Kyungpook National University
	Jeong-Seok Cho	Korea Food Research Institute
	Ji Youn Hong	Korea University
	Bokyung Son	Dong-A University
Secretary of Public Relations	Kyoung Sun Seo	Jangheung Research Institute for Mushroom Industry
	Ho Hyun Chun	World Institute of Kimchi
	Jin-Kyu Rhee	Ewha Womans University
	Young-Jung Wee	Yeungnam University
Secretary of Information	Jaewoo Bai	Seoul Women's University
	Bon-Jae Gu	Kongju National University
	Duyun Jeong	Kyungpook National University
	Sang-Soon Kim	Dankook University
Managing Editors	Joong-Ho Kwon	Kyungpook National University
	Dong Uk Ahn	Iowa State University
	Jeung-Hee Lee	Daegu University
	Soo-Rin Kim	Kyungpook National University
	Me-Hea Park	Rural Development Administration
	Hyun-Jin Kim	Gyeongsang National University
	Deokyeong Choe	Kyungpook National University
	Xi Huang	Huazhong Agricultural University
	Joon-Young Jun	Korea Food Research Institute
	Eun Joo Lee	University of Wisconsin, Stout
	Syng-Ook Lee	Keimyung University
	Abeer E. Aziza	Mansoura University
	Kyung Young Yoon	Yeungnam University
	Hye-Lim Jang	Dong-eui University
	Choon Young Kim	Yeungnam University
	Sun-Il Choi	Kangwon National University
Chang-Gu Hyun	Jeju National University	
Ji-Young Choi	World Institute of Kimchi	

Welcome Message

Dear Members of The Korean Society of Food Preservation,

The Korean Society of Food Preservation (KSFP), founded on September 26, 1992, has experienced remarkable growth over the past three decades. With a current membership exceeding 2,000 individuals, the society has emerged as a prominent force in the domestic food sector, catalyzing advancements in food storage, processing, distribution-related technologies, and industry development.

We are pleased to announce that our society will host the 2024 International Academic Conference and Regular Academic Conference from August 28th (Wednesday) to 30th (Friday) at BEXCO in Busan, under the theme "Digital Food Tech Initiative and Beyond: Innovation for Sustainable Future Foods". The regular academic conference, our flagship event, will feature distinguished scholars from both domestic and international fields related to food storage, processing, and distribution. They will deliver their latest research findings and engage in active discussions. Esteemed research institutions, industries, and universities from both domestic and international arenas will participate, providing a platform to showcase valuable research outcomes achieved thus far.

Our plenary session titled "AI, Sensors, and Robotics for Food and Agricultural Products Processing" will be held by professor Baohua Zhang from Nanjing Agricultural University. There will be approximately 30 academic lecture sessions and over 300 poster presentations hosted by leading research institutions, industries, and universities in food-related fields. Engage in various enriching programs, including graduate student presentation competitions and educational training on metagenomics analysis techniques, as well as Chat GPT utilization. Take advantage of the special sessions on how



to start a business, young scientists' presentations, and the capstone design competition. We kindly ask for your participation and take advantage of this opportunity to be at the forefront of food and agricultural science innovation.

We express our gratitude to the organizing committee and staffs, for their efforts in preparing and organizing this conference successfully. We also extend our deepest gratitude to the researchers who will present outstanding research findings, the session chairs, the sponsoring organizations, as well as representatives from food-related research institutions and industries, for their unwavering commitment and valuable contributions.

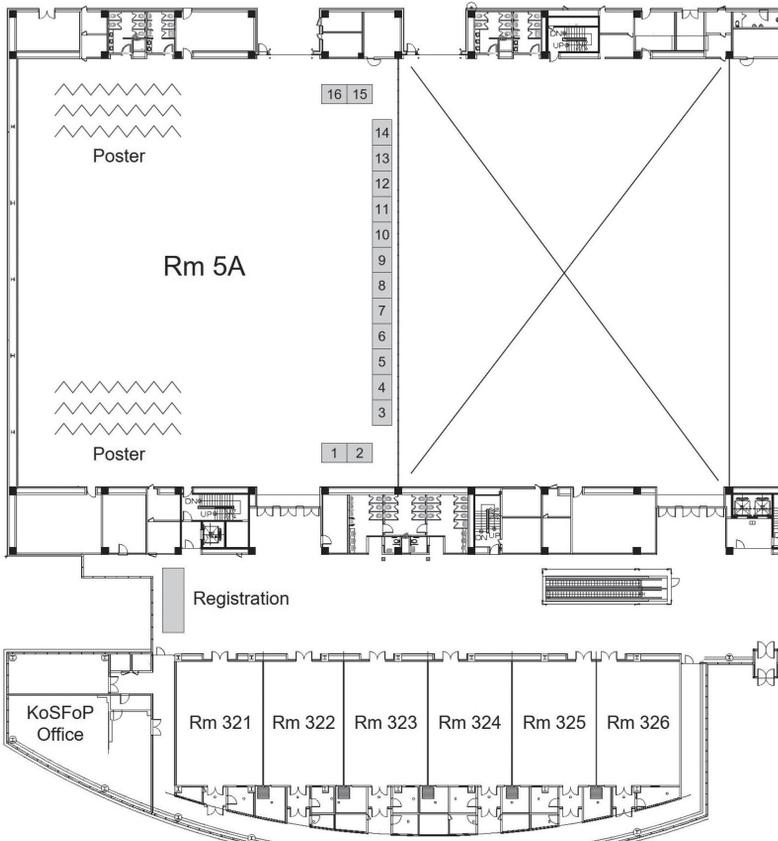
We wish all members of our society good health, happiness, and prosperity in both their personal and professional endeavors.

Sincerely,
Jong-Kuk Kim, President, KoSFoP

Venue Information

Exhibition Center 2

3F



Schedule

Digital Food Tech Initiative and Beyond: Innovation for Sustainable Future Foods

August 28~30, 2024 / BEXCO, Busan

Place Time	Room 321	Room 322	Room 323	Room 324	Room 325	Room 326	Room 5A
▶ August 28 (WED)							
12:30-17:00	Registration (Lobby, 3F)						
13:30-15:30	YSL	WS1	WS2	SPOC1	SPOC2	Poster & Exhibition	
	Young Scientist Presentation	Techniques of Metabolomic Analysis in Agricultural Products and Foods	Techniques of Metagenomic Analysis in Foods	Oral Competition (Ph. D1)	Oral Competition (MS1)		
15:30-15:40	Break						
15:40-17:40	CDC	WS3	SL1	SPOC1	SPOC2	Poster & Exhibition	
	Capstone Design Competition	ChatGPT	Special Lecture for Start a Business	Oral Competition (Ph. D2)	Oral Competition (MS2)		
17:40-18:30	Board Member Meeting						
▶ August 29 (THU)							
08:30-16:00	Registration (Lobby, 3F)						
09:30-10:20	[PL] Dr. Baohua Zhang (Room 5A)						
10:20-10:30	Break						
10:30-12:10	Session 1	Session 2	Session 3	Session 4	Session 5	IS1	Poster & Exhibition
	Digital Transformation of K-Dried Laver's Industries to Lead the Global Market	Innovation for Technology of Kimchi Preservation	A Study on Food Tech to Advance the Technology of Food Safety Management	Food Safety Production Technology through Artificial Intelligence and Smart Manufacturing Innovation	3rd Senior Medical Healthcare Common Symposium	Sustainable Food System I - Agricultural Products and Packaging	
12:10-13:00	Lunch						
13:00-14:10	Opening Ceremony / Award Ceremony [AAL] Dr. Deog-Hwan Oh (Room 5A)						
14:10-14:30	General Assembly Meeting (Room 5A)						
14:30-14:40	Break						

Place Time	Room 321	Room 322	Room 323	Room 324	Room 325	Room 326	Room 5A
► August 29 (THU)							
14:40-16:20	Session 6	Session 7	Session 8	Session 9	Session 10	IS2	Poster & Exhibition
	Innovative Eco-friendly and Cutting-edge Food Packaging Technologies for Sustainable Future	Quality Control Technology to Build a Reliable Food Distribution Chain	Development and Future Direction of Functional Medifood for Animals Using <i>Rhus verniciflua</i>	Innovation of Korea Testing Management System: Global Harmonization and Digital Transformation	Cultured Meat: Technology, Trends, and Challenges	Food Upcycling: Global Market, Trends, and Challenges	
16:20-16:30	Break						
16:30-18:10	Session 11	Session 12	Session 13	Session 14	Session 15	Session 16	Poster & Exhibition
	The Importance of Food Safety in the Food Industry Efforts and Challenges to Ensure Food Safety	Plasma Storage Technology to Improve the Freshness of Crops after Harvest	Efficient Used-by-date Management Measures to Improve the Safety of Distributed Foods	Microbiome and Effect of Korean Fermented Soybean Paste (Doenjang)	Status of Fermented Food Industry in the Southern Coastal Area and K-food Development Strategy	Recent Advances and Future Prospects in Fermented Foods	
► August 30 (THU)							
08:30-11:00	Registration (Lobby, 3F)						
09:30-11:10	SL2	Session 17	Session 18	Session 19	Session 20	IS3	Poster & Exhibition
	Career Pathways for Students	New Paradigm of Sarcopenia Research: Agricultural Products and Functional Substances	Development and Distribution Technology for High-quality Processed Persimmon Products – Program to Improve Domestic and Overseas Export Competitiveness	Expanding for Foodtech Using Food Nutrient Database	Research of Functional Diversity from Wild Plants and Fermented Microorganisms in Korean Islands	Sustainable Food System II – Sea Products and Processing	
11:10-12:00	Closing Remarks / Competition and Poster Award Ceremony (Room 5A)						

YSL Young scientist lecture; **WS** Workshop; **SL** Special lecture;

SPOC Student presentation oral competition; **CDC** Capstone design competition; **PL** Plenary lecture;

AAL Academic award lecture; **IS** International symposium session

Plenary Lecture

AI, sensors and robotics for food and agricultural products processing

Baohua Zhang

College of Artificial Intelligence,
Nanjing Agricultural University, China

The integration of Artificial Intelligence (AI), sensors, and robotics in the processing of food and agricultural products is revolutionizing the industry by enhancing efficiency, precision, and sustainability. AI technologies, including machine learning and computer vision, enable advanced data analysis and decision-making processes, optimizing every stage from harvesting to packaging. These systems improve quality control by detecting defects, optimizing sorting and grading, and ensuring consistency. Additionally, AI-driven predictive maintenance and supply chain optimization reduce downtime and enhance efficiency. The application of sensors in food and agricultural products processing represents a significant advancement in enhancing efficiency, quality, and safety throughout the supply chain. Modern sensors, including optical, chemical, biological, and physical types, are employed to monitor a wide range of parameters such as temperature, humidity, pH, chemical composition, and microbial contamination. These sensors facilitate real-time data collection, enabling precise control and optimization of processing conditions, which leads to improved product quality and reduced waste. Robotics, equipped with sophisticated AI and sensor systems, automate repetitive and labor-intensive tasks such as sorting, grading, and packaging, significantly increasing throughput and reducing human error. The integration of robotics in processing plants also supports predictive maintenance by monitoring machinery health and predicting potential failures, thereby reducing downtime and extending equipment lifespan. Furthermore, robotics contributes to sustainability by optimizing resource usage and energy efficiency. This synergy between AI, sensors, and robotics not only improves productivity and product quality but also promotes resource conservation and cost reduction. As these technologies continue to advance, their application in food and agricultural products processing promises to address critical challenges such as labor shortages, food safety, and sustainability, paving the way for a more resilient and efficient agricultural sector.

Academic Award Lecture

A disease-control weapon: microorganisms in foods

Deog-Hwan Oh

Department of Food Science and Biotechnology,
Kangwon National University

As the global food industry faces increasing challenges related to safety, sustainability, and health, the role of microorganisms in food preservation has come under intense scrutiny. This presentation, titled "A Disease-Control Weapon: Microorganisms in Foods," delves into the cutting-edge research that harnesses the dual nature of microorganisms balancing their potential dangers with their remarkable benefits. This duality presents both a challenge and an opportunity: while harmful bacteria can cause significant food safety concerns, beneficial microorganisms offer transformative potential in enhancing both food quality and human health. *The presentation is structured in two key parts, each addressing a critical aspect of microbial interaction with food*

The first part focuses on the threats posed by foodborne pathogens, which remain a leading cause of illness and economic loss in the global food industry. This section highlights the development of advanced microbial safety technologies aimed at the rapid detection and control of these pathogens. Utilizing multiplex PCR detection, biosensors, and predictive microbiology models, our research offers a comprehensive approach to identifying and mitigating the risks posed by pathogens such as *Escherichia*, *Listeria*, and *Salmonella species*. These technologies represent a significant advancement in food safety, enabling quicker and more accurate identification of contaminants, thereby preventing outbreaks and ensuring the safety of food products before they reach consumers. The integration of microbial risk assessment tools further strengthens this approach by allowing for the prediction and management of potential hazards, offering a proactive solution to food safety challenges.

The second part of the presentation shifts from the threats to the opportunities presented by beneficial microorganisms. Here, the focus is on the development of functional food materials through fermentation processes. Fermentation not only preserves food but also enhances its nutritional value and safety. Our research particularly emphasizes the production of postbiotics from fermented brown rice.



Postbiotics, which are non-living bacterial products or metabolic byproducts, have shown significant potential in promoting health, particularly through the modulation of the gut-brain axis. This novel research explores how fermented foods can influence mental health by impacting gut microbiota, suggesting that dietary interventions could complement or even replace traditional pharmaceutical approaches in managing conditions like stress and anxiety.

This research on postbiotics represents a new frontier in food science, where food is not merely a source of nutrients but a means of delivering health benefits. By leveraging the natural processes of fermentation, we are able to create foods that not only taste better and last longer but also contribute to the well-being of consumers. The potential of these foods to influence mental health through the gut-brain axis is particularly exciting, as it opens up new possibilities for non-pharmaceutical interventions in mental health care.

The presentation concludes by synthesizing these two aspects such as safety and functionality into a cohesive strategy for the future of food preservation. It emphasizes the critical role of beneficial microorganisms in creating a food system that is both safer and healthier. By integrating advanced microbial safety technologies with the development of microbiome based functional foods, we propose a new paradigm in food preservation. This approach not only addresses the immediate challenges of food safety but also aligns with broader goals of sustainability and public health. Ultimately, this research underscores the importance of a holistic approach to food preservation as one that recognizes the potential of microorganisms to both harm and heal. By strategically harnessing the power of beneficial microbes, we can create a safer, healthier, and more sustainable food future.

Symposium Session

S1

August 29 (THU) | 10:30-12:10 | Room 321

Digital Transformation of K-Dried Laver's Industries to Lead the Global Market

Organized by Marine Food Division, KoSFoP

Chair _ Sung-Hwan Eom (Dong-Eui University)

S1-1

10:30-10:55

K-GIM export competitiveness in the global market

Sang Geon Lee

Korea Maritime Institute

S1-2

10:55-11:20

**Development Korea standard through evaluating quality
of dried laver and future plan**

Hee Youn Lee

Korea Food Research Institute

S1-3

11:20-11:45

**Implications for developing a quality grading system for dried
seaweed using artificial intelligence technology**

Byeong-Chul Kang

D,iF Inc.

S1-4

11:45-12:10

**Transition of production paradigm through the Introduction of
a land-based *Pyropia* aquaculture system**

Eun-Jeong Park

Pukyong National University



S2

August 29(THU) | 10:30-12:10 | Room 322

Innovation for Technology of Kimchi Preservation

Organized by Kimchi Division, KoSFoP

Chair _ Mi-Ai Lee (World Institute of Kimchi)

10:30-11:05

S2-1

Dynamic controlled atmosphere storage system for long-term storage of kimchi cabbage

Chunwan Park

National Institute of Agricultural Sciences

11:05-11:40

S2-2

Changes in characteristics of commercial kimchi and kimchi consumption in the global

Jin Ju Lee

Pulmuone Co., Ltd.

11:40-12:10

S2-3

Innovative food technology for long-term market distribution of kimchi

Sung Hee Park

World Institute of Kimchi

Symposium Session

S3

August 29(THU) | 10:30-12:10 | Room 323

A Study on Food Tech to Advance the Technology of Food Safety Management

Sponsored by Korea Agency of HACCP Accreditation and Services

Chair _ Jinhwan Hong (Korea Agency of HACCP Accreditation and Services)

10:30-10:55

S3-1

Irradiation treatment on packaged and processed meat products for sterilization

Jae-Kyung Kim

Korea Atomic Energy Research Institute

10:55-11:20

S3-2

Effective food sterilization technology using electromagnetic energy

Daeung Yu

Changwon National University

11:20-11:45

S3-3

Mechanistic insight into roles of bacterial structures and enzymes to ensure the food safety by electro-technologies

Jin Hong Mok

Pukyong National University

11:45-12:10

S3-4

Food material safety management strategies and GLC certification

Young-Jun Kim

Seoul National University



S4

August 29(THU) | 10:30-12:10 | Room 324

Food Safety Production Technology through Artificial Intelligence and Smart Manufacturing Innovation

Sponsored by Korea Food Research Institute

Chair _ Jeong Ho Lim (Korea Food Research Institute)

10:30-10:50

S4-1

Grade determination of red ginseng based on shortwave-infrared hyperspectral Imaging

Gyuseok Lee

Korea Food Research Institute

10:50-11:10

S4-2

The current status of automation technology in kimchi seasoning filling processes

Young-Bae Chung

World Institute of Kimchi

11:10-11:30

S4-3

Method to standardize data in food manufacturing

Jaehyeon Lee

Korea Electronics Technology Institute

11:30-11:50

S4-4

AI based pork deboning robot automation system

Ki Yang Park

Doolim-Yaskawa Co., Ltd.

11:50-12:10

S4-5

A machine vision-based automation process for duck slaughtering and transforming recovering blood into food

Sang Kuy Han

Korea Institute of Industrial Technology



Symposium Session

S5

August 29(THU) | 10:30-12:10 | Room 325

3rd Senior Medical Healthcare Common Symposium

*Sponsored by the LINC 3.0 Business Groups of Gwangju,
Chosun, and Dongshin Universities*

Chair _ Seok-Jun Kim (Chosun University)

10:30-10:50

S5-1

Control and manufactrue process advancement of senior-friendly drug quality

Jaejin Kim

Mokpo Marine Food-Industry Research Center

10:50-11:10

S5-2

Observational study on a Korean medicine meridian-based electrical stimulation device for improving sleep disorders in the elderly

Seojae Jeon

Korea Institute of Integrated Medical Research

11:10-11:30

S5-3

Exploration of various bioactive compounds from *Pinus densiflora*

Woong Kim

Chosun University

11:30-11:50

S5-4

Effect of bioactive elements on guided bone regeneration via combination with fibrous polymeric materials

Tae-Sik Jang

Pusan National University

11:50-12:10

S5-5

Study on skin, body care and head spas in senior medical cared

Hwa-Jung Choi

Youngsan University

S6

August 29(THU) | 14:40-16:20 | Room 321

Innovative Eco-friendly and Cutting-edge Food Packaging Technologies for Sustainable Future

Organized by Food Packaging Division, KoSFoP

Chair _ Youngjin Cho (Korea Food Research Institute)

14:40-15:15

S6-1

Element technologies for sustainable high functional paper packaging materials

So Hyeon Cho
EverChemTech Corp.

15:15-15:50

S6-2

Development of biodegradable film via food- and bio-waste upcycling

Young Hoon Jung
Kyungpook National University

15:50-16:20

S6-3

Development of real-time food prediction model and monitoring system based on data

Ji-Young Kim
Korea Food Research Institute



Symposium Session

S7

August 29(THU) | 14:40-16:20 | Room 322

Quality Control Technology to Build a Reliable Food Distribution Chain

Organized by Food Storage Division, KoSFoP

Chair _ Jeong Hee Choi (Korea Food Research Institute)

14:40-15:15

S7-1

Innovative microbial treatment to enhance the quality and shelf life of ribbonfish (*Trichiurus lepturus*) using lactic acid bacteria

Seul-Ki Park

Korea Food Research Institute

15:15-15:50

S7-2

Hyperspectral imaging technology for quality monitoring of kimchi manufacturing process

Ji-Young Choi

World Institute of Kimchi

15:50-16:20

S7-3

Quality control of agricultural products using hyperspectral imaging

Jong-Jin Park

Korea Food Research Institute



S8

August 29(THU) | 14:40-16:20 | Room 323

Development and Future Direction of Functional Medifood for Animals using *Rhus verniciflua*

Sponsored by Imsil Cheese and Food Research Institute

Chair _ Young Youn (Imsil Cheese and Food Research Institute)

14:40-15:15

S8-1

Development direction of medifood for animals

Hyang-Im Baek
Woosuk University

15:15-15:50

S8-2

Development of functional materials using *Rhus verniciflua*

Gun Hee Jung
Imsil Cheese and Food Research Institute

15:50-16:20

S8-3

Evaluation of efficacy and safety of animal health foods against obesity in obese dogs

Geum-Hwa Lee
Jeonbuk National University Hospital



Symposium Session

S9

August 29(THU) | 14:40-16:20 | Room 324

Innovation of Korea Testing Management System: Global Harmonization and Digital Transformation

Sponsored by Laboratory Audit and Policy Division, Ministry of Food and Drug Safety

Chair _ Gyu Ho Choi (Ministry of Food and Drug Safety)

14:40-15:15

S9-1

Innovation of Korea testing management system : global harmonization and digital transformation

Kyoung Min Lee

Ministry of Food and Drug Safety

15:15-15:50

S9-2

Current management status of global countries for ensuring the reliability of food testing laboratories

Seung Yong Cho

National Food Safety Information Service

15:50-16:20

S9-3

Improvement strategies for MFDS LIMS

Sang-Hun Lee

Ministry of Food and Drug Safety



S10

August 29(THU) | 14:40-16:20 | Room 325

Cultured Meat: Technology, Trends, and Challenges

Sponsored by Department of FoodTech, Chonnam National University

Chair _ Soo-Jung Kim (Chonnam National University)

S10-1

14:40-15:15

Regulatory trends in novel food ingredients

Jun Hyun Sung

Ministry of Food and Drug Safety

S10-2

15:15-15:50

**Current status of academic research and development
of cultured meat**

Jiyoun Han

Hyupsung University

S10-3

15:50-16:20

**Global trends in key technologies and product developments
in cell-cultured foods**

Minchul Kang

Pulmuone Co., Ltd.



Symposium Session

S11

August 29(THU) | 16:30-18:10 | Room 321

The Importance of Food Safety in the Food Industry Efforts and Challenges to Ensure Food Safety

Organized by Food Safety Division, KoSFoP

Chair _ Myung Sub Chung (Food Safety Policy Institute)

Chair _ Sang-Do Ha (Chung-Ang University)

S11-1

16:30-16:45

Food safety management and application cases using smart HACCP

Yoon-Jeong Choi

Sempio Foods Company

S11-2

16:45-17:00

Introduction to Daesang Co., Ltd.'s food safety management system

Yu-Jin Kim

Daesang Corp.

S11-3

17:00-17:15

Why are Codex's standards and specifications important in the food industry?

Moo-Hyeog Im

Daegu University

S11-4

17:25-17:40

ESG activities for small and medium-sized food company

Min Gyoo Kim

Mutual Cooperation Foundation for Food Safety

S11-5

17:40-17:55

Occurrence and management of food foreign matters in Korea

Won-Bo Shim

Gyeongsang National University

S11-6

17:55-18:10

A possibility that 2-chloroethanol may be unintentionally detected in processed foods without using ethylene oxide

Hee-Seok Lee

Chung-Ang University



S12

August 29(THU) | 16:30-18:10 | Room 322

Plasma Storage Technology to Improve the Freshness of Crops after Harvest

Sponsored by Korea Institute of Fusion Energy

Chair _ Hyeongwon Jeon (Korea Institute of Fusion Energy)

16:30-17:05

S12-1

Assessment of disinfection efficacy with changes in C and T

Seungmin Ryu

Chungnam National University

17:05-17:40

S12-2

Research on composite sensor device for storage of various agricultural products

Hi-Deok Lee

Chungnam National University

17:40-18:10

S12-3

Utilizing surface dielectric barrier discharge as a nitric oxide source regulating fruit ripening

Sanghoo Park

KAIST



Symposium Session

S13

August 29(THU) | 16:30-18:10 | Room 323

Efficient Used-by-Date Management Measures to Improve the Safety of Distributed Foods

Sponsored by Expiration Date Research Center, Korea Advanced Food Research Institute

Chair _ Jong-Seok Park (Ministry of Food and Drug Safety)

16:30-17:05

S13-1

Principles for improving quality and safety indicators for efficient use-by-date setting experiments

Sang-Do Ha

Chung-Ang University

17:05-17:40

S13-2

Study of used by date reference value setting-alcoholic beverages

Jae-Wook Shin

Korea Advanced Food Research Institute

17:40-18:10

S13-3

Management of use by date for private brand products

Hyoung-Sik Park

BGF Retail Co., Ltd.



S14

August 29(THU) | 16:30-18:10 | Room 324

Microbiome and Effect of Korean Fermented Soybean Paste (Doenjang)

Sponsored by Microbial Institute for Fermentation Industry
Chair _ Ki Man Kim (Gwangju University)

S14-1

16:30-17:05

Traditionally-made doenjang enriched with *Bacillus subtilis* mitigates estrogen-deficient symptoms through gut-organ axis modulation

Sunmin Park
Hoseo University

S14-2

17:05-17:40

The effects of doenjang on health benefits and identification of the Korean Jang paradox

Youn-Soo Cha
Jeonbuk National University

S14-3

17:40-18:10

Effects of traditional Korean soybean paste on hypercholesterolemia patients: reducing arteriosclerosis index and improving intestinal health

Su-Jin Jung
Jeonbuk National University Hospital



Symposium Session

S15

August 29(THU) | 16:30-18:10 | Room 325

Status of Fermented Food Industry in the Southern Coastal Area and K-Food Development Strategy

Sponsored by Fermented Food Industry Support Center

Chair _ Jung Beom Kim (Suncheon National University)

S15-1

16:30-17:05

Industrial application of fermented tea, kombucha

Hee Jeong Chae
Hoseo University

S15-2

17:05-17:40

Microbiome research in traditional fermented foods

Sangdon Ryu
Honam National Institute of Biological Resources

S15-3

17:40-18:10

Introduction to the fermented food industry support center and the kombucha developed by the foundation

Byung-Kuk Choi
Fermented Food Industry Support Center



S16

August 29(THU) | 16:30-18:10 | Room 326

Recent Advances and Future Prospects in Fermented Foods

Sponsored by National Institute of Agricultural Sciences

Chair _ Jin Song (National Institute of Agricultural Sciences)

16:30-17:05

S16-1

Non-conventional yeasts: the next-generation starters for fermented foods

Sung Ho Lee

SPC Research Institute of Food and Biotechnology

17:05-17:40

S16-2

AI-based approaches for quality control of kimchi and other traditional fermented foods

Ji Yoon Chang

Gyeongsang National University

17:40-18:10

S16-3

Precision fermentation to enhance flavor of fermented foods

Chan-Woo Kim

National Institute of Agricultural Sciences



Symposium Session

S17

August 30(FRI) | 09:30-11:10 | Room 322

New Paradigm of Sarcopenia Research: Agricultural Products and Functional Substances

Sponsored by Research Institute of Human Ecology, Yeungnam University

Chair _ Choon Young Kim (Yeungnam University)

09:30-10:05

S17-1

The effect of agricultural product and probiotics on muscle health for well-aging

Sanghyun Lim

Cell Biotech R&D Center

10:05-10:40

S17-2

Strategies to discover functional materials for muscle aging

Jiyun Ahn

Korea Food Research Institute

10:40-11:10

S17-3

Muscle health benefits of Gardenia fruit extract

Chang Hwa Jung

Korea Food Research Institute



S18

August 29(THU) | 16:30-18:10 | Room 326

Development and Distribution Technology for High-quality Processed Persimmon Products - Program to Improve Domestic and Overseas Export Competitiveness

Sponsored by Gyeongbuk Persimmon Export Agricultural Technology Support Group
Chair _ Young-Jung Wee (Yeungnam University)

S18-1

09:30-10:05

Standardization of the manufacturing process for farm-style persimmon vinegar using persimmons

Hey Kyung Moon

Kyungpook National University Instrumental Analysis Center

S18-2

10:05-10:40

Improvement plan of export agricultural packaging boxes

Soo-Il Kim

Kim's Packaging Research Institute

S18-3

10:40-11:10

AI trends and characteristics in the commerce market-focusing on AI platforms used in online marketing

Ka Kyung Mun

Yeonwoo Co., Ltd.



Symposium Session

S19

August 30(FRI) | 09:30-11:10 | Room 324

Expanding for Foodtech using Food Nutrient Database

*Sponsored by Dietary and Nutrition Safety Policy Division,
Ministry of Food and Drug Safety*

Chair _ Heejung Park (Sangmyung University)

S19-1

09:30-10:05

**Standardization and integration of food nutrient database
in Korea**

Young-In Lim

Ministry of Food and Drug Safety

S19-2

10:05-10:40

**Predicting food nutrients for personalized nutrition based
a machine learning**

Jiyoun Hong

Korea University

S19-3

10:40-11:10

**AI based eating habits analysis and management solution
using food nutrition database**

Hyunsuk Lee

Doinglab Inc.



S20

August 30(FRI) | 09:30-11:10 | Room 325

Research of Functional Diversity from Wild Plants and Fermented Microorganisms in Korean Islands

Sponsored by Honam National Institute of Biological Resources

Chair_ Kyung-Min Choi (Honam National Institute of Biological Resources)

S20-1

09:30-10:05

Generation of a comprehensive dataset from extracts of indigenous plants in Korean islands

Won Woo Lee

Honam National Institute of Biological Resources

S20-2

10:05-10:40

Protective effects of the postbiotic *Lactobacillus plantarum* MD35 on bone loss in an ovariectomized mice model

Jae-Il Park

Korea Basic Science Institute

S20-3

10:40-11:10

Polystyrene microplastics biodegradation by gut bacterial *Enterobacter hormaechei* from mealworms under anaerobic conditions: anaerobic oxidation and depolymerization

Younghoon Kim

Seoul National University



International Session

IS1

August 29(THU) | 10:30-12:10 | Room 326

Sustainable Food System I - Agricultural Products and Packaging

*Sponsored by Institute of Agricultural Science and Technology,
Food and Bio-industry Research Institute,
and Institute of Fermentation Biotechnology at Kyungpook National University*

Chair _ Mi Jeong Kim (Changwon National University)

10:30-10:55

IS1-1

Poultry production: animal welfare and environmental sustainability

Sungeun Cho
Auburn University, USA

10:55-11:20

IS1-2

Revisiting the chemical diversity of organic crops

Joonhyuk Suh
University of Georgia, USA

11:20-11:45

IS1-3

Advancing sustainable smart packaging solutions for food applications

Abdus Sobhan
Alcorn State University, USA

11:45-12:10

IS1-4

Shelf-life evaluation on pineapple-egg yolk pastry by pulsed light treatment combined with nitrogen-modified atmosphere packaging

Yu-Wei Chang
National Taiwan Ocean University, Taiwan



IS2

August 29(THU) | 14:40-16:20 | Room 326

Food Upcycling: Global Market, Trends, and Challenges

Sponsored by the LINC 3.0 Business Group of Chonnam National University

Chair _ Alexander Myoung Min (REharvest Co., Ltd.)

14:40-15:15

IS2-1

Food upcycling overview in Korea and trend

Alexander Myoung Min

REharvest Co., Ltd.

15:15-15:50

IS2-2

Food upcycling application and related market challenges

Dong-Jin Moon

The Bread Blue Corp.

15:50-16:20

IS2-3

**Cross economy: new economic model for sustainability
in the AI age**

Nam-Joon Cho

Nanyang Technological University, Singapore

International Session

IS3

August 30(FRI) | 09:30-11:10 | Room 326

Sustainable Food System II - Sea Products and Processing

Sponsored by Institute of Agro-Bio Convergence, Jeonju University

Chair _ Jun-Hyun Oh (Sangmyung University)

09:30-09:55

IS3-1

Formulating antimicrobial agent using weak acid and beyond

Tin-Chen Hsu

National Taiwan University, Taiwan

09:55-10:20

IS3-2

Maximization of spent-hen utilization: an innovative chicken-surimi products

Yi-Chen Chen

National Taiwan University, Taiwan

10:20-10:45

IS3-3

Revolutionizing emergency and disaster response in the Philippines: process standardization of innovative seafood-based products

Encarnacion Emilia S. Yap

University of the Philippines Visayas, Philippines

10:45-11:10

IS3-4

Utilization of Philippine marine fish species as sources of high value protein products

Lhumen A. Tejano

University of the Philippines Visayas, Philippines



Young Scientist Presentation

YSL

August 28(WED) | 13:30-15:30 | Room 321

YSL-1

13:30-14:00

Co-occurrence networks of school lunch menus using big data and text mining

Jimi Kim

Changwon National University

YSL-2

14:00-14:30

Early diagnosis system using nanotechnology

Youngsang You

Dankook University

YSL-3

14:30-15:00

The applicability of natural extracts and essential oil nano-emulsion to improve the microbiological safety and storability of fresh produce

Ji-Hoon Kang

Hankyong National University

YSL-4

15:00-15:30

Recent technology for retarding starch retrogradation

Seon-Min Oh

Korea Food Research Institute

Graduate Student Presentation

SPOC1

August 28 (WED) | 13:30–15:30/15:40–17:40 | Room 325

Oral Competition (Ph. D)

SPOC1-1

Dietary supplementation of cedryl acetate ameliorates adiposity and improves glucose homeostasis in high-fat diet-fed mice

Jingya Guo

China Agricultural University, China

SPOC1-2

Upcycling technology for the valorization of kimchi cabbage by-products derived from the kimchi industry

Suk-Min Yun

World Institute of Kimchi

SPOC1-3

Preparation of a novel gas scavenger based on sodium carbonate hydrogel for enhanced removal of headspace carbon dioxide in packaging

Jae Young Kim

Yonsei University

SPOC1-4

A novel *Salmonella*-specific phage, vB_SalM_SE, and its application in contaminated milk for dairy products

Jaemin Choe

Kyungpook National University

SPOC1-5

Changes of mycosporine-like amino acids in laver by roasting and preventative effect of shinorine on macular degeneration

Si-Hun Song

Chonnam National University

SPOC1-6

Reduction of caffeine kombucha production and fermentation characteristics using *Komagataeibacter saccharivorans* KS1

Da Eun Jang

Chonnam National University

SPOC1-7

Effect of ice pack placement and capacity on quality indicators of minced meat in transport-simulated condition

Jeong Heon Kim

Korea Food Research Institute

SPOC1-8

Significant impact of photopollution on skin carcinogenesis and amelioration by oleanolic acid

Min Jeong Kim

Kyungpook National University

SPOC1-9

Characteristics of edible films made from fish skin collagen hydrolysates blended with green tangerine peel extract

Sunita Gaikwad

Changwon National University

Graduate Student Presentation

SPOC2

August 28(WED) | 13:30-15:30/15:40-17:40 | Room 326

Oral Competition (MS)

SPOC2-1

Effects of different storage temperatures and harvest maturity on pineapple quality

Geng-Han Li

National Taiwan Ocean University, Taiwan

SPOC2-2

Comparative physicochemical characteristics of lactic acid bacteria fermented extracts of *Cordyceps militaris* using brown rice and seven edible insects mixed medium

Won Hee Lee

Sunchon National University

SPOC2-3

Production and characterization of rebaudioside D-like compound using glucosyltransferases as a potential sweetener

Hye-Jin Kim

Chonnam National University

SPOC2-4

Optimizing lyophilized bacteriophage powder: viability, stability, and characterization for food application

Putri Christy Artawinata

Kyungpook National University

SPOC2-5

In vitro evaluation on physiological activity of gut bacteria by kimchi

Yerim Choi

Dong-A University

SPOC2-6

Impact of drying and subsequent storage on red pepper metabolites based on ^1H NMR

Dong-Hyeok Shin
Chung-Ang University

SPOC2-7

Physicochemical characteristics and biological activities of Alaska pollock skin collagen hydrolysate extracted using kombucha and microbe

Hui Jeong Lee
Changwon National University

SPOC2-8

Modification of characteristics for plant-based meat analogs through high hydrostatic processing

Jeongmin Kim
Kongju National University

SPOC2-9

Exploration and standardization of functional compounds from milk thistle cultivated in Korea

Seung-Uk Yu
Kyungpook National University

SPOC2-10

Identification of marker compounds of lignans in *Schisandra chinensis* seeds and optimization of analytical methods

Seong Do Lee
Kyungpook National University

SPOC2-11

Exploring functional ingredients from the seeds of red pepper (*Capsicum annuum* L.)

Hannah Chi
Kyungpook National University

SPOC2-12

Evaluating the efficacy of fermented green tea in reducing inflammation and alleviating arthritis symptoms

Dong-Gyu Kim
Kangwon National University

SPOC2-13

Antioxidant quality characteristics according to ultrasonic extraction time of various varieties of persimmon leaves

Minh Huy Tieu
Kyungpook National University

SPOC2-14

Preserving areca nuts color: a combination of high-pressure processing and edible coating

Tesalonika Sevi
National Taiwan Ocean University, Taiwan

SPOC2-15

Changes in quality characteristics during storage of Korean soy sauce added with onion juice according to heat sterilization conditions

Eun Hye Kim
Sunchon National University

SPOC2-16

Phage vB_LmS_LM3 for controlling *Listeria monocytogenes* in dairy products: characterization, genomic analysis, and application in heat-treated milk

Jeongeun Park
Kyungpook National University

SPOC2-17

Application of deep learning for predictive modeling of foodborne pathogens in growth media and food samples

Hwa-Young Lee
Dankook University

SPOC2-18

Proposal of processing and washing strategies to enhance microbial safety and quality maintenance of fresh produce

Minyeong Jung
Seoul Women's University



SPOC2-19

Identification of quercetin and luteolin derivatives as osteoclast differentiation inhibitors from safflower leaves

Seon-Jin Lee

Chonnam National University

SPOC2-20

Optimization of micro-encapsulated probiotics for *in vitro* digestion stability and evaluation of efficacy in atopic dermatitis

Se Won Park

Changwon National University

SPOC2-21

Method validation and quantification of phospholipids in K-agricultural foods

Ho-Chang Kim

Daegu university

SPOC2-22

Isolation and bioactivity evaluation of phytochemical compounds from *salvia hispanica* L. (Chia seed) seed oil residue

Hwanyun Lee

Kyungpook National University

SPOC2-23

Inhibitory effects of Chinese bushclover on adipogenesis of 3T3-L1 preadipocytes

Yeju Jeong

Yeungnam University

SPOC2-24

Microbial communities altered by *Metschnikowia pulcherrima* improve makgeolli quality

Di Wang

Kyungpook National University

SPOC2-25

Antioxidant quality and characteristics of differently processed bee pollen

Johnson Olowoniya

Kyungpook National University



Capstone Design Competition

CDC

August 28 (WED) | 15:40-17:40 | Room 321

CDC-1

Upcycling of persimmon waste: a low-calorie sugar substitute for cookies and characterization of quality and sensory properties

Min Ji Choi

Changwon National University

CDC-2

LC-MS-based metabolite analysis of laver hot water extract according to boiling time and quality characteristics of laver puree

Ji-Woo Hong

Chonnam National University

CDC-3

일반 하우스 재배와 스마트팜 재배 딸기(설향)의 수확시기별 이화학적 조성 및 항산화 활성 비교

김성균

순천대학교

CDC-4

Lipid profile of duck meat by parts and cooking

Myeong-Ju Kim

Daegu University

CDC-5

Evaluation of microbial contamination in portable tumbler

Gippeum Kim

Suncheon National University

CDC-6

블랙베리옥수수 속대 첨가 막걸리 제조 및 그 품질특성

이영서

전남대학교

CDC-7

해조류 청각을 활용한 제빵 특성 연구

고흔주
국립목포대학교

CDC-8

건강지향 어묵스낵 제조를 위한 진공어묵유탕기술의 온도 및 시간 최적화

최윤서
경상국립대학교

CDC-9

술지게미로 제조한 맥주의 품질 특성

진주영
국립목포대학교

CDC-10

키토올리고당을 첨가해 보존성을 향상시킨 K 제육볶음 소시지의 개발

문채현
국립목포대학교

CDC-11

인공지능을 활용한 식품 건조 공정 최적화를 위한 예측 모델 구현

이병욱
건국대학교

CDC-12

Manufacturing process of anti-stress functional kombucha and kombucha jelly using L-theanine

Ji-Won Kim
Chonnam National University

CDC-13

해조류를 활용한 쌀베이글 제조에 관한 연구

김서인
동아대학교

CDC-14

아마란스를 이용한 기능성 비건 아이스크림 제작

최가원
동아대학교

CDC-15

생기총총 “초석잠 곤약젤리”의 제조

박가연
동아대학교

CDC-16

푸룬과 우유를 이용한 건강한 양갱 개발

홍한비
동아대학교

CDC-17

All-in-one container for milk and cereal

Hojin Jung
Kongju National University

CDC-18

소형화 스낵 개발을 통한 지속 가능한 제품 전략 연구

정윤성
동아대학교

CDC-19

Production of slow-digestible isomaltooligosaccharides and novel steviol glycosides using transglucosidase from *Thermoanaerobacter thermocopriae*

Jong-Hyeok Kim
Chonnam National University

CDC-20

두부크림과 글루텐프리 페스츄리를 이용한 건강한 디저트 개발

정혜지
동아대학교



CDC-21

배추 무름병 제어를 위한 박테리오파지 기반 친환경 생물학적 제어제의 개발

노수민
경북대학교

CDC-22

천연 항균 소재를 첨가한 저염등치미의 저장성 연장

오승연
국립목포대학교

CDC-23

식품 보존성 향상을 위한 청도반시 추출물 기반의 식품포장용 친환경 항균
젤라틴 필름 제작

김형준
경북대학교

CDC-24

Antidiabetic efficacy evaluation and material research of fermented
sorghum using lactic acid bacteria strains

Dong Ho Kim
Kangwon National University



Special Lecture

SL 1

August 28(WED) | 15:40-17:40 | Room 324

Special Lecture for Start a Business

Sponsored by the LINC 3.0 Business Group of Kyungpook National University

SL1-1 15:40-16:40 프레쉬벨

SL1-2 16:40-17:40 미스터아빠

SL 2

August 30(FRI) | 09:30-11:10 | Room 321

Career Pathways for Students

Sponsored by the LINC 3.0 Business Group of Kyungpook National University

SL2-1 09:30-09:55 한국인삼공사

SL2-2 09:55-10:20 쉐바이오텍

SL2-3 10:20-10:45 (주)대평

SL2-4 10:45-11:10 WEMEET

Symposium Session

S1-1

K-GIM export competitiveness in the global market

Sanggeon Lee

Korea Maritime Institute

The consumption of GIM is spreading from Asian markets such as Korea, China, and Japan to the global market, leading to increased GIM trade activities. In fact, GIM exports to the global market have shown a strong annual growth rate of 7.1%, increasing from \$820 million in 2019 to \$1.08 billion in 2023. During the same period, the number of countries importing seaweed increased from 131 to 147. As the popularity of GIM grows in the global market, competition among countries like Korea, China, and Japan in GIM exports is intensifying. Although South Korea currently holds over 70% of the global GIM export market, its market share is decreasing as GIM industries in China, Thailand, and other countries grow. To enhance South Korea's competitiveness in the global GIM market, it is necessary to analyze the competitiveness of the seaweed industry in South Korea and develop GIM industry nurturing strategies based on this analysis

Development Korea standard through evaluating quality of dried laver and future plan

Heeyoung Lee

*Food Standard Research Center,
Korea Food Research Institute*

Laver is a traditional Korean food ingredient and one of the most widely consumed seaweeds both domestically and internationally. The quality of Korean laver significantly impacts the country's export competitiveness. The Korean Industrial Standards (KS) specify standards for dried laver. This study aims to review the current KS through quality monitoring of dried laver and suggest future directions for improvement. Firstly, we investigate the production and distribution status of dried laver domestically to evaluate the appropriateness of the quality standards. Through quality monitoring of domestically distributed laver, we identify areas within the current standards that require revision. Additionally, we gather industry feedback on the terms of definitions, classification, and other aspects used in standard through Focus Group Interviews (FGI), and actively incorporate these insights into the standards for dried laver. The results of this study will not only contribute to the revision of KS for dried laver but also enhance the sustainability of the laver industry.



Implications for developing a quality grading system for dried seaweed using artificial intelligence technology

Byeong-Chgul Kang

D,iF, Inc.

In the food industry, accurate quality grading is essential for determining market value and ensuring consumer satisfaction. While current grading systems for dried seaweed often rely on subjective evaluations, this presentation explores how artificial intelligence (AI) and machine vision (MV) technologies can address these limitations. Although there is no direct research on dried seaweed quality grading, we draw insights from successful applications of AI and MV in other food sectors, such as beef tenderloin quality assessment. This presentation will highlight key technical challenges and gaps in the existing grading framework for dried seaweed and discuss how these technologies can overcome these issues. By adapting these approaches, we aim to offer practical recommendations for improving the quality grading system for dried seaweed.



Transition of production paradigm through the introduction of a land-based *Pyropia* aquaculture system

Eun-Jeong Park

Department of Marine Biology,
Pukyong National University

Pyropia is the most economical seaweed species as it showed as 63% of the production in value. Particularly, the rapid growth in exports of Korean *Pyropia* products, driven by global popularity (from \$110 million in 2010 to \$770 million in 2023), has elevated its status as a global food item. However, recent changes in aquaculture environments have led to insufficient production and quality degradation of raw *Pyropia*, causing instability in supply and demand. Recently, land-based aquaculture systems have been gaining attention as a solution to address these issues. To develop a land-based *Pyropia* aquaculture system, research on the following three elements is necessary. First, the year-round mass supply of high-quality *Pyropia* seeds must be ensured. However, current seed production methods are heavily influenced by seasonal factors, making them unsuitable for land-based aquaculture systems. Therefore, it is essential to establish a year-round mass production and supply system for high-yield, high-quality and disease-free clonal seeds using tissue culture technology and other methods. Second, it is necessary to develop commercial-scale bioreactors or land-based tanks for *Pyropia* aquaculture and investigate optimal cultivation conditions suitable for *Pyropia* growth to secure stable production technology. Additionally, developing an automated control device for the cultivation environment will enhance the efficiency of the land-based aquaculture production system. Third, quality management technology for *Pyropia* produced in land-based aquaculture systems must be developed. This involves evaluating the physicochemical properties and processing suitability of land-based *Pyropia*, developing prototypes, and improving quality. The establishment of these core technologies will not only enable the realization of land-based *Pyropia* aquaculture but also have the potential to expand the supply base for high-value phyco-colloid industry materials, leading to a paradigm shift in seaweed production.

Dynamic controlled atmosphere storage system for long-term storage of kimchi cabbage

Chunwan Park

*Division of Postharvest Engineering,
National Institute of Agricultural Sciences*

Nowadays, food storage technology is advancing beyond simple storage to provide fresh agricultural products demanded by consumers. In particular, Controlled Atmosphere (CA) storage, which precisely controls temperature, humidity, and oxygen and carbon dioxide concentrations, is being used as a long-term storage technology. Recently, Dynamic Controlled Atmosphere (DCA) technology was introduced to predict the physiological characteristics of stored agricultural products and control the gas environment using respiration quotient (RQ), ethanol (ET), and chlorophyll fluorescence (CF).

Long-term storage technology is used not only to maintain freshness but also to control the supply and demand of agricultural products. It is expected that the effect of applying RQ-DCA will be significant for kimchi cabbage, which has large price fluctuations throughout the year. Using the RQ-DCA system developed by the Rural Development Administration, kimchi cabbage harvested in winter (winter cabbage) was stored for 5 months and kimchi cabbage harvested in spring (spring cabbage) was stored for 3 months. Additionally, to confirm the possibility of long-term storage of winter cabbage, the quality was checked for 8 months after 5 months of storage.

As a result, when winter cabbage was stored for 5 months, the weight loss rate was maintained at about 6.9%, the seed loss rate was maintained at about 12.9%, and the SSC and pH were maintained. The water content and hardness of the outermost leaves tended to decrease. When stored for 8 months, the quality deteriorated rapidly with a weight loss rate of 19% and a seed loss rate of 44%. Spring cabbage showed a tendency to decrease in SSC, pH, and moisture content of the outermost leaves, while hardness was maintained. Due to xylem rot, the loss rate was high at 68% at 3 months, but compared to general low-temperature storage, the occurrence of xylem rot was delayed by 1 month.

Although CA storage was confirmed to be effective in maintaining freshness by suppressing respiration, it could not prevent physiological disorders such as xylem rot caused by the rainy season during the harvest. Therefore, for stable field distribution of long-term storage technology, it is necessary to develop a quality prediction method that can predict physiological disorders in advance through cultivation environment history and minimize distribution losses.

Changes in characteristics of commercial kimchi and kimchi consumption in the global

Jin Ju Lee

Pulmuone Co., Ltd.

This study explored the awareness and consumption patterns of kimchi among consumers in the United States, the United Kingdom, and Germany to identify strategies for expanding kimchi as a global food. Surveys were conducted with 600 participants each from LA and NY in the US, and 240 participants each from the UK and Germany. In the US, kimchi is seen as a spicy but delicious food made from fermented cabbage with high health benefit expectations. In the UK and Germany, it is perceived as a nutritious food with a unique taste and flavor, also with high health expectations. Information sources about kimchi varied: in the US, through Korean restaurants, SNS, and YouTube mukbang videos; in the UK and Germany, through Korean restaurants, word of mouth, in-store displays, SNS, and the internet. Consumption patterns also differed. In the US, napa cabbage kimchi is mainly consumed, about a quarter of a jar per serving. In the UK, small amounts of napa cabbage kimchi are eaten, while in Germany, various types are consumed similarly. The primary consumers are individuals, but reasons for consumption vary: rich taste in the US, health and diverse flavors in the UK, and accompaniment to Asian food in Germany. Non-consumption reasons were similar: unfamiliarity, strong spiciness, and lack of sales information, with the UK also noting a lack of pairing information. Future consumption is expected to increase in the US, remain stable or increase in the UK, and maintain in Germany due to awareness of alternative fermented vegetables. Taste preferences rank rich flavor, spiciness, and crunchiness in the US; spiciness, crunchiness, and rich flavor in the UK; and rich flavor, spiciness, and tanginess in Germany.

Complaints include sourness and difficulty buying branded kimchi in the US, lack of promotions and high prices in the UK, and high prices and quality changes over time in Germany. Americans buy kimchi from Asian markets monthly, Germans every 2–3 months offline, and the British at least once a month offline. Over 60% store kimchi in the refrigerator. This study identified the requirements for expanding the global kimchi market based on awareness and consumption patterns in each country. To boost kimchi consumption across the three countries, offering diverse recipes, enhancing market sales and storage quality, and improving packaging design are crucial. Highlighting kimchi's health benefits is essential given its primary role in promoting health.



Innovative food technology for long-term market distribution of kimchi

Sung Hee Park

World Institute of Kimchi

The kimchi market has grown at an exponential rate in recent years, due to its widespread use as a Korean cuisine staple. This progress is reflected in its growing popularity outside Korean borders, with global demand booming.

Unfortunately, kimchi doesn't have a long shelf life when compared to other preserved foods. The fermentation process continues after packaging, resulting in flavor and texture variations over time. This limits kimchi storage and distribution, particularly for long-distance transit and export markets, posing issues in maintaining freshness and product quality.

Kimchi is inevitably exposed to various temperature conditions from production to delivery. As a result, we can't guarantee the maturity and edibility of kimchi until we open the package.

To solve this problem, we would like to propose a new method for the long-term distribution of kimchi.



Irradiation treatment on packaged and processed meat products for sterilization

Jae-Kyung Kim

Korea Atomic Energy Research Institute

Recently, several enterohemorrhagic *E. coli* (EHEC) infection cases were outbreak in meat products such as ground meat or raw beef in Korea. Food irradiation treatment is one of the promising non-thermal technologies for sterilization and has been used safely worldwide for over 70 years including Korea. However, the irradiation treatment on packaged and processed meat products is not permitted in Korea yet, thus following studies were conducted to expand applicable food items through revision of the Korea Food Code. The sterilization effect of each different type of radiation sources (gamma ray, electron beam, and X-ray) on various packaged and processed meat products (tteokgalbi, pork cutlet, raw beef, etc.) was studied. 3 kGy was confirmed as the minimum necessary dose for sterilization, and 7 kGy was the maximum permissible absorption dose for intake. A survey was conducted on 70 meat manufacturers and 1,000 general consumers regarding the application of irradiation treatment for meat. About 80% manufacturers responded that the regulations need to be established, 70% manufacturers responded they would apply irradiated technology to their meat products. 93% consumers also responded that they were willing to purchase irradiated meat products after regulations were established. In July 2023, a request to revise on the food irradiation treatment regulations for meat products was submitted to the Ministry of Food and Drug Safety, which is expected to contribute to improving public health and minimizing trade friction by ensuring the safety of domestic meat products.



Effective food sterilization technology using electromagnetic energy

Daeung Yu

*Department of Food and Nutrition,
Changwon National University*

Electromagnetic sterilization uses energy to uniformly heat food, killing microorganisms efficiently. It preserves quality, is scalable, and versatile. Radio Frequency (RF) sterilization uses alternating electric fields to generate heat through molecular friction in food, typically at 27 MHz. This method penetrates deeper, providing uniform heating. Advantages include larger penetration depth, higher energy efficiency, uniform electric fields, and suitability for various food products, making it effective for industrial-scale food sterilization. Microwave sterilization uses 2.45 GHz energy to heat food by causing water molecules to oscillate, generating frictional heat. This raises the temperature to sterilize by denaturing microbial proteins and disrupting cell membranes. Advantages include uniform heating, faster processing, energy efficiency, quality preservation, scalability for industrial use, and versatility for various food types, making it more efficient than traditional methods. Cold plasma sterilization uses ionized gas at low temperatures to generate reactive species that disrupt microbial cells, effectively sterilizing without significant heat. Advantages include non-thermal processing, preserving food quality and nutrients, rapid treatment times, and the ability to sterilize temperature-sensitive and irregularly shaped foods. This method is effective against a wide range of microorganisms and can be applied to both solid and liquid foods. Electromagnetic sterilization is applicable to various foods, offering efficient and uniform heating. Its ability to preserve quality makes it promising for future food industry applications, enhancing safety and extending shelf life while maintaining nutritional and sensory properties.



Mechanistic insight into roles of bacterial structures and enzymes to ensure the food safety by electro-technologies

Jin Hong Mok

*Department of Food Science and Technology,
Pukyong National University*

Electro-technologies, such as ohmic heating (OH), pulsed electric field (PEF), and moderate electric field (MEF), more effectively kill microorganisms and inactivate the enzymes than traditional wet heating, yet its mechanism remains poorly understood. This study investigates the accelerated inactivation mechanism using genetically modified spores and quality-related enzymes. For spore inactivation study, we investigated the effects of OH and conventional heating (CH) on various genetically modified strains of *Bacillus subtilis*: isogenic PS533 (wild type_1), PS578 [lacking spores' α/β -type small acid-soluble proteins (SASP)], PS2318 (lacking *recA*, encoding a DNA repair protein), isogenic PS4461 (wild type_2), and PS4462 (having the 2Duf protein in spores, which increases spore wet heat resistance and decreases spore inner membrane fluidity). For enzyme inactivation, inactivation of polyphenol oxidase (PPO) and peroxidase (POD) enzymes in fresh fruit juice was studied by subjecting the OH and MEF treatments. The effects of field strength and frequency of electric field were discussed via molecular motion. Collectively, proteins in spores and enzyme in liquid foods under electric field are key factors in enhanced food quality and safety with electric field-heat combinations.



Food material safety management strategies and global logistics certification (GLC)

Young-Jun Kim

Seoul National University of Science and Technology

Recently, the safety of food materials has emerged as a critical issue directly impacting consumer health, drawing increasing attention. For the advancement of the foodservice industry, it is essential to develop and modernize the food material distribution industry, which plays a crucial role in supplying fresh and safe food materials. Therefore, it is imperative to consider food material safety management measures and the role of Global Logistics Certification (GLC).

Food material safety management encompasses a series of actions and policies aimed at minimizing risk factors related to food safety throughout the entire process of production, distribution, storage, and consumption. These management measures are closely associated with international standards such as GAP (Good Agricultural Practices), HACCP (Hazard Analysis Critical Control Points), GMP (Good Manufacturing Practices), ISO 22000, and GFSI (Global Food Safety Initiative). In particular, GLC certification is awarded to companies that implement these food material safety management measures, ensuring safety and efficiency in the logistics process. The standards and procedures for GLC certification include management responsibility and involvement, product and supplier management, food safety management system, product traceability, recall and crisis management, verification and improvement of certification standards, resource and environmental management, and additional criteria. Based on the evaluation results, certification is categorized into Level 1, Level 2, and Level 3.

Ultimately, GLC certification plays a significant role in enhancing food material safety. Companies that obtain this certification are likely to experience a significant reduction in the incidence of accidents during logistics processes and an increase in consumer trust. It is anticipated that the improvement of the food safety management system and the widespread adoption of GLC certification will contribute to the advancement of the food material distribution industry in the future.

Grade determination of red ginseng based on shortwave-Infrared hyperspectral imaging

Gyuseok Lee

*Smart Food Manufacturing Project Group,
Korea Food Research Institute*

Red ginseng is a food product processed by steaming and drying ginseng. It can be stored for a longer period compared to raw ginseng, and bioactive compounds such as Rh2, Rg3, Rh1, and Rh4 are produced, and have been consumed as a high-quality health food. The red ginseng typically obtain the form of a head, a body, and one or two primary legs. And the completed red ginseng is graded by professional inspectors as 1st grade (Cheon), 2nd grade (Ji), 3rd grade (Yang), and 4th grade (Out of grade) using the visual methods from the external and internal structures of red ginseng. However, this conventional grading method is time-consuming, labor-intensive, and costly. In particular, the grade of red ginseng has a significant impact on the price of red ginseng, meaning that it is largely dependent on the subjective evaluation of professional investigators. A reliable and objective grading technology is essential to overcome these challenges. Recently, hyperspectral imaging (HSI) technology has been extensively researched for quality assessment of foods. The HSI can individually measure the spectral data for each pixel in a picture of sample, allowing non-destructive analysis of the sample's unique spectral fingerprint. This technology can measure the physical and chemical properties of a sample through spectral data, which can be applied to chemometric techniques such as multivariate analysis, regression analysis, and sample classification depending on the purpose of analysis. In this study, we investigated a classification model for the red ginseng grading using HSI technology in the short-wave infrared (SWIR) region. We utilized data preprocessing and various classification algorithms on SWIR HSI data of red ginseng to suggest a new grade determination method of red ginseng.

The current status of automation technology in kimchi seasoning filling processes

Young-Bae Chung

*Practical Technology Research Group,
World Institute of Kimchi*

As of 2022, the domestic supply of commercial kimchi in South Korea was 442,000 tons, reflecting an increase in the commercialization rate. The market size, based on sales revenue, is approximately 1.5 trillion KRW. The international market is also continuously growing due to the spread of K-culture, with the number of export destinations diversifying from 61 countries in 2013 to 98 countries in 2023. However, the automation level of the seasoning preparation and filling processes, which still rely heavily on manual labor, is below 3 out of 5 points, indicating a need for increased mechanization and automation. The seasoning preparation process, with a production volume of 200 kg per batch, can be automated by classifying the ingredients into liquid, intermediate, and solid states for selection and input, allowing for the weighing and automation of raw materials. The filling process has been commercialized by automating the methods of seasoning supply and insertion, and using a rotary drum mixer, which has been shown to improve productivity by reducing the time and labor required. Recently, field-level improvement requirements have been identified, necessitating the development of advanced technology for the seasoning filling process.



Method to standardize data in food manufacturing

Jaehyeon Lee

*Autonomous Manufacturing Research Center,
Korea Electronics Technology Institute*

The food industry is accelerating its transition from human-centered manufacturing processes to automated processes utilizing equipment, robots, and more. As a result, connecting and utilizing the data generated is expected to be an important factor in the future of food manufacturing. However, there are various obstacles to connecting and utilizing data.

The Asset Administration Shell (AAS), which originated with Industrie 4.0, is a technology that organizes various manufacturing components into digital models and helps them communicate data effectively. With AAS-based data standardization, the meaning and attributes of data are defined according to a standard dictionary, and data can be linked between processes, equipment, and solutions through standard interfaces.

In this session, we will introduce how to standardize food manufacturing data through AAS, how to use it, and share the status of related research.



AI based pork deboning robot automation system

Ki Yang Park

Doolim–Yaskawa Co., Ltd.

In the domestic meat processing industry, the deboning process has been carried out manually in a dangerous working environment. Automation is strongly required to improve worker safety and productivity. The fusion of robot technology, artificial intelligence technology, auto robot path generation technology, AI based image processing technology, and high–precision applicator technology is necessary for the pork deboning process.

The pork deboning process is divided into a cutting process and a deboning process. The cutting process divides the two carcasses received from the slaughterhouse into three carcasses. The deboning process is divided into the shoulder, ham, and rib deboning process. The pork cutting process accurately separates the shoulder, rib, and ham with a circular saw using the image information from the 3D vision sensor integrated with the reinforcement learning information. In the deboning process, the optimal deboning trajectory is generated in real time based on the artificial intelligence learning result of the bone shape image input through the X–ray equipment, and then transferred to the robot to separate the bone with a knife. It is necessary to design a new deboning process integrated with robot path planning and deboning applicators to optimize the robot based deboning automation process.

It is possible to enable sustainable growth of the meat processing industry by automating the know–how of experts in the pork processing by combining robot and artificial intelligence technology.



A machine vision-based automation process for duck slaughtering and transforming recovering blood into food

Sang Kuy Han

Korea Institute of Industrial Technology

Duck slaughter process consists of a total of sixteen stages from arrival to shipping. Most of process has been automated. However, the bloodletting process among sixteen stages still requires repetitive and dangerous labors who are constantly exposed to physical and psychological hazards including blood and filth. In order to overcome this problem, artificial intelligence and robot technologies have taken attention. In this study, we propose a machine vision-based bleeding area recognition technology to automate the bleeding operation during duck slaughtering. A Mask R-CNN, the most general deep learning model for background segmentation, is utilized for object-background segmentation. Following the background segmentation, an integrated pipeline was implemented to find the bleeding area based on the estimated cervical vertebrae from the neck area. This automation process also includes classifying faint and non-faint ducks after passing a faint machine process. Non-faint ducks were defined as ducks with necks bent or vigorously moving. These non-faint ducks were classified by calculating the change rate of the boundary box of each duck. For evaluating the proposed method, a training dataset of 1,789 RGB images was collected from duck slaughtering process and the deep learning model for duck neck-background segmentation was trained. This machine vision algorithm developed for an automated duck slaughter process system was implemented in a high-speed Cartesian robot. In addition, it studied how to transform recovering blood into food which helps reduce the cost of cleaning waste blood. With preliminary result from this study, we anticipate the possibility of automation process for duck slaughtering and transformation of recovering blood into food.



Control and manufactrue process advancement of senior-friendly drug quality

Jaejin Kim

Mokpo Marine Food–industry Research Center

A quantitative model based on transmission Raman spectroscopy was developed to analyze the content of naproxen sodium, the active pharmaceutical ingredient (API) in a drug product. Compared to the conventional high–performance liquid chromatography (HPLC) method, Raman spectroscopy offers high test efficiency due to its shorter sample preparation and measurement times. Additionally, Raman spectroscopy is environmentally friendly, requiring only minimal reagents, and allows for rapid, nondestructive testing of samples. This method enables quick testing of numerous commercially produced tablets, thereby enhancing pharmaceutical quality control.

The new method was specifically applied to assess the naproxen sodium content in tablets produced during commercial–scale manufacturing, with a comparison to the reference HPLC method. To establish the quantitative model, 30 standard samples were prepared. Of these, 23 samples were used to develop the model, and seven were used for validation. The model utilized a multivariate regression method, specifically the partial least square (PLS) method, which yielded a standard error of cross–validation of 0.949% and a standard error of prediction of 0.724%, demonstrating high accuracy.

Comprehensive method validation was performed, including tests for specificity, linearity, accuracy, precision, and robustness, all of which met the required criteria. Ultimately, the transmission Raman spectroscopy method was successfully applied to analyze the API content in commercially produced drugs, offering a fast, accurate, and efficient approach for quality control testing.



Observational study on a Korean medicine meridian-based electrical stimulation device for improving sleep disorders in the elderly

Seojae Jeon

Korea Institute of Integrated Medical Research

Sleep disorders in the elderly have emerged as a significant health issue in modern society. As people age, the quality of their sleep deteriorates, resulting in symptoms such as insomnia, difficulty maintaining sleep, and early awakening. These sleep problems negatively impact the physical and mental health of the elderly, reducing their quality of life. Various medications and products have been developed to improve sleep disorders, but many of these come with side effects. For instance, long-term use of sleeping pills can lead to dependency, drowsiness, and memory impairment. Consequently, many elderly individuals are reluctant to take medications and seek alternative treatments that are safe and have fewer side effects.

In traditional Korean medicine, stimulating the acupuncture points known as Johae-hyeol and Sinmaek-hyeol has long been used to improve sleep disorders. These points are closely related to sleep, and research has shown that stimulating these points can enhance sleep quality.

However, to achieve sustained therapeutic effects, it is important to stimulate these points consistently, not only in medical institutions but also at home. Many elderly individuals find it difficult to frequently visit hospitals, highlighting the need for easy-to-use home treatment methods. Thus, the development of effective and convenient home therapy devices is essential.

This study aims to develop a home-use electrical stimulation device that stimulates Johae-hyeol and Sinmaek-hyeol and to evaluate its effectiveness in improving sleep disorders in the elderly. The home-use electrical stimulation device is easy to use and allows for continuous stimulation, making it effective for home use. Through this study, we aim to verify the efficacy of the electrical stimulation device and propose a new method to improve the sleep quality of the elderly.

In this study, a 65-year-old woman with moderate sleep problems, as assessed by the Pittsburgh Sleep Quality Index (PSQI), was analyzed using quantitative electroencephalography (qEEG). The results of the qEEG measurements during electrical stimulation showed an increase in theta waves. Additionally, the PSQI score decreased to 7 points. These findings suggest that continuous electrical stimulation may improve sleep quality.

Exploration of various bioactive compounds from *Pinus densiflora*

Woong Kim

*G-LAMP Business Group,
Chosun University*

Red Pine trees (*Pinus densiflora* Sieb. et Zucc.), belonging to the family Pinaceae, are widely distributed in East Asia, including Korea, Japan, and China. In Korea, various parts of pine trees (needles, cones, bark, etc.) have been widely used for food or folk medicine for disease prevention. However, scientific evidence for the health benefits of pine needles is still lacking. Therefore, we identified various bioactive compounds in pine needle extract and verified them in this study. First, we identified dehydroabietic acid (DAA) and 4-epi-trans-communic acid (4ETC) from pine needle methanol extract and confirmed their antihypertensive effect through in vitro and in vivo tests. Moreover, it was confirmed that DAA has an anticancer effect by inhibiting survivin expression in gastric cancer. Next, we identified malonic acid (MA) from pine needle methanol extract and confirmed its ability to inhibit UVB-induced oxidative stress and inflammation in HaCaT keratinocytes. In addition, various biological activities such as antioxidant, anti-obesity, and anti-amoebic effects were verified using pine needle extract. These results demonstrate that pine needles can be a source of effective compounds for a variety of diseases and may be useful in drug development.



Effect of bioactive elements on guided bone regeneration via combination with fibrous polymeric materials

Tae-Sik Jang

*School of Biomedical Convergence Engineering,
Pusan National University*

In today's aging society, the number of patients suffering from periodontal disease is increasing rapidly due to accidents and age-related conditions. Guided bone regeneration (GBR) is a common strategy to regenerate damaged periodontal tissue. However, conventional GBR Membranes have a disadvantage of low affinity for bone tissue, which does not promote the recruitment of osteoblasts to the bone defect site, resulting in a long bone regeneration time. Therefore, research is underway to increase the affinity and cell recruitment rate. Polycaprolactone (PCL), a commercialized polymer for osteoinductive regeneration, is a widely used material due to its biodegradability, biocompatibility, non-toxicity, and flexibility, but it has the disadvantages of poor mechanical properties and low affinity for cells. To address these drawbacks, we sought to develop an organic/inorganic composite material incorporating bioactive elements (Ca and Si). The resulting membrane consists of fibers with an average diameter of about 700 nm, and observation of the microstructure at high magnification confirmed the presence of bioactive elements in the fibers. Mechanical property tests showed that the elastic modulus and tensile strength of the bioactive elements-containing fibers increased compared to pure PCL, while the elongation decreased slightly. Contact angle measurements showed that the fibers were hydrophilic. Furthermore, in vitro studies showed that the attachment and proliferation of osteoblasts to fibers increased with bioactive elements. These findings suggest that the addition of bioactive elements to PCL fibers can further promote bone cell activity and has potential as a highly functional biomaterial.



Study on skin, body care and head spas in senior medical care

Hwa-Jung Choi

*Department of Beauty Art,
Yongsan University*

Senior medical care is a comprehensive service to improve the health and quality of life of the elderly, and provides a variety of services such as functional beauty programs such as skin, body care, and head spas, as well as medical care, health care, psychological counseling, and social activities.

The characteristics of senior medical care are that it provides customized services to the elderly, has a professional and diverse workforce, and operates systematic and creative programs.

The benefits of senior medical care include increasing their physical confidence and inner well-being, helping to prevent and cure disabilities and diseases, strengthening mental health and social connections, and providing opportunities for them to discover their hobbies and interests, and to experience new challenges and learning.

The purpose of this study is to point out the problem that the prevention and management of skin aging in the elderly is not considered in the current elderly welfare policies and services, and to prove the necessity and effectiveness of professional and systematic skincare programs to improve the skin health of the elderly.

Therefore, this study is to design a new comprehensive geriatric skin care service called senior medical skin & body care and head spa, and to specifically analyze how this service affects the physical, mental, and social health as well as the skin health of the elderly.



Element technologies for sustainable high functional paper packaging materials

So Hyeon Cho

EverChemTech, Research & Development Center

The demand for high barrier packaging materials that can control oxygen, moisture, and light is constantly increasing to ensure the freshness and long shelf life of food. Since these packaging materials use plastic-based multilayer films, environmental problems are also seriously emerging along with the growth of the packaging industry.

Therefore, many studies are being conducted to solve environmental issues in the packaging industry. Development of single-material packaging materials that are easy to recycle, research on replacing plastic materials such as PE, PP, PET, PS, and Ny with plastic-free materials, and attempts to secure carbon neutrality of the material itself are continuing.

In this study, we intend to develop biodegradable plastic-free packaging materials using paper substrates. Paper is made of a porous material with a fine space between numerous fiber layers as the main material of cellulose, so it absorbs moisture according to the surrounding environment and has the disadvantage of low barrier of oxygen.

In this study, a coating material based on natural materials was applied to compensate for these weaknesses. Coating materials based on natural materials such as proteins and polysaccharides can be applied to paper packaging materials to block oxygen and have excellent grease barrier properties, so they can replace plastic packaging materials. In addition, based on natural materials, it is possible to secure not only the eco-friendliness of the material, but also the recyclability and biodegradability of the packaging material.



Development of biodegradable film via food-and bio-waste upcycling

Young Hoon Jung

*School of Food Science and Biotechnology,
Kyungpook National University*

The upcycling of food-derived waste biomass offers an innovative solution to mitigate environmental challenges while producing valuable resources. This presentation dealt with various pretreatment strategies aiming at augmenting the value of lignocellulosic waste biomass by selectively modifying its primary components. As an example, by manipulating the lignin content in lignocellulose, thereby producing nanocellulose or lignocellulose nanofibers (LCNFs) as well as by integrating those into backbone polymers like chitosan, alginate, etc. high-value products of which properties can be controllable were obtained. Also, as another example, the high selectivity and efficiency of deep eutetic solvent (DES) pretreatment allows producing levulinic acid, one of the key platform chemicals, from barley bagasse in the highest conversion ratio so far. This presentation underscores the significance of pretreatment strategies in the upcycling of food-derived waste biomass. These approaches offer pathways to maximize resource utilization and create valuable products, thereby contributing to the development of sustainable and circular economy practices.



Development of real-time food prediction model and monitoring system based on data

Ji-Young Kim

Korea Food Research Institute

This study describes the development of a method for predicting the freshness of food according to temperature to provide information on how the freshness of food changes during distribution. Various food quality factors were assessed according to temperature and time. The quality index was selected as a good freshness index, as it is dependent on temperature and correlates strongly with the sensory quality evaluation. Moreover, it is easy to measure and reproducible in the field. A predictive model was developed using the Arrhenius equation and Polynomial models to mathematically predict the food quality. This study provides important information about the development of models to predict changes in food quality index under fluctuating temperature environments. The predictions using the food temperature histories could help suppliers and consumers make a reasonable decision on the sales, storage, and consumption of foods. The developed model could be applied to other products for which the quality index at the stationary phase also changes with temperature histories



Innovative microbial treatment to enhance the quality and shelf life of ribbonfish (*Trichiurus lepturus*) using lactic acid bacteria

Seul-Ki Park

*Smart Food Manufacturing Project Group,
Korea Food Research Institute*

The fundamental priority in the fish industry is maintaining the hygiene and quality of seafood. Seafood can be contaminated by biological agents (bacteria, fungi, viruses, and parasites), chemicals (antibiotics, pesticides, and heavy metals), and physical contaminants (plastic, fishhooks, and metal). Detecting and preventing seafood contamination is an extremely important topic, but extending the shelf life and maintaining the quality of seafood are equally critical concerns. Various strategies and technologies, such as heat treatment, irradiation, high-pressure processing, and high-intensity pulsed electric fields, have been studied and reported. However, only a few studies have focused on microbial treatment. Microbes, in particular, are known to cause spoilage and off-odor in seafood, and microbial treatment has seldom been used to improve seafood quality. The current study sought to provide a novel method of preserving seafood quality through microbial treatment. Specifically, this research examined the use of lactic acid bacteria (LAB) cell culture to extend the shelf life of ribbonfish (*Trichiurus lepturus*). To investigate the effect of LAB cell-free culture treatment on the shelf life extension of ribbonfish, two LAB isolates, *Lactobacillus plantarum* SKD4 and *Pediococcus stilesii* SKD11, were chosen. As a result, treating the fish with the LAB cell-free culture medium was effective in lowering the pre-existing off-odor and had the same impact even in highly spoiled fish samples. Additionally, treating ribbonfish fillets with LAB cell-free culture improved food qualities related to physicochemical parameters, extended shelf life, and inhibited microbial growth.



Hyperspectral imaging technology for quality monitoring of kimchi manufacturing process

Ji-Young Choi

*Practical Technology Research Group,
World Institute of Kimchi*

Kimchi is a traditional Korean food produced by the fermentation of vegetables. Kimchi cabbage (RKC, *Brassica campestris* L. ssp. *Pekinensis*), the main ingredient of kimchi, is a psychrophilic vegetable, and more than 90% of the total production is used to process kimchi. In the kimchi manufacturing process, fresh cabbages are selected from those stored at low temperatures, then go through salting, dehydration, and seasoning. When chilling stress at improper storage temperatures below 0 °C is prolonged in RKC, these alterations lead to the development of physiological disorders including discoloration, membrane damage, loss of flavor, pathogen attack, and surface shriveling. During the salting process, because physicochemical quality characteristics such as the size, leaf thickness, spacing between leaves, and soluble solids of RKCs produced are different in each season, salting conditions must vary depending on the ambient temperature. Finally, Due to the need to control the fermentation process of kimchi to mature it into a delicious product, there is a demand for technology that can monitor the fermentation process of kimchi in real-time. Being able to predict the salinity and fermentation level of kimchi at the storage and distribution stages could provide valuable information for consumers. However, most kimchi manufacturers currently rely entirely on the experience of skilled workers to determine the quality of materials. Hyperspectral imaging (HSI) may be suitable for the online non-destructive assessment of global information related to vegetables because it provides both spatial and spectral information of samples by combining imaging and spectroscopic tools. HSI technologies have some advantages as they do not require sample preparation, chemical reagents, are labor intensive and are capable of real-time detection systems. HSI was attempted to monitor the overall kimchi production process, including monitoring of cold damage in RKCs, quality monitoring during the pickling process, and prediction

of kimchi quality properties. Prediction models were developed for the severity of chilling injury in RKC using short-wave infrared HSI combined with supervised classifications (artificial neural network, ANN) at early stages. ANN models using optimal wavelengths have potential and are simplified to predict chilling damage characteristics of RKC. The feasibility of using HSI to determine quality attributes including salinity and soluble solids in salted kimchi cabbages (SKC) and kimchi was assessed. Principal component analysis showed that the distribution according to the spectral characteristics of SKCs could be grouped. The accuracy and specificity of the optimal Partial least square discriminant analysis (PLSDA) model for salinity level in SKC have improved efficiency to over 0.93. In addition, the salinity, pH, titratable acidity, and lactic acid bacteria count of kimchi over varying storage periods were predicted with high accuracy using the PLS model. This indicates that the PLS model can accurately identify the critical factors in the distribution process of kimchi, a fermented food. Finally, visualization of the spectrum information in each pixel of the hyperspectral image using the model displayed the injured areas, salinity level and fermentation in KC. These results demonstrate the capability of HSI and the central role of chemometrics and neural networks in developing efficient models for the prediction of quality properties of RKC, SKC and kimchi, respectively.



Quality control of agricultural products using hyperspectral imaging

Jong-Jin Park

*Food Safety and Distribution Research Group,
Korea Food Research Institute*

In recent times, advancements in data processing technology have facilitated the digital transformation of the food industry. In this study, we utilized hyperspectral imaging data for quality control. Hyperspectral imaging, which combines machine vision and spectroscopy, allows for the simultaneous acquisition of spatial and spectral information from food. We collected hyperspectral imaging data in the short-wave infrared range. This data was preprocessed through spectrum preprocessing and feature selection, then applied to suitable prediction models. The prediction models based on hyperspectral imaging data accurately quantified moisture content in red ginseng and detected chilling damaged red pepper powder. These findings suggest that hyperspectral imaging is suitable for evaluating food quality and is a non-destructive technology applicable to the advancement and digitalization of food safety management.



Development direction of medifood for animals

Hyang-Im Baek

*Department of Food Science and Nutrition,
Woosuk University*

As the economic level improves, population and household structures change, and lifestyles and values change, the number of people raising companion animals is increasing worldwide, and the size of the global pet food market is growing rapidly. Spending and investment in companion animals is increasing due to the 'pet humanization' phenomenon, where companion animals are treated like humans. Recently, the demand for premium pet food, customized food for each age and species, and functional food according to health and nutritional status is increasing, and the medifood market for animals is expanding accordingly. However, the domestic medifood industry for animals is still in its early stages and requires development in various fields.

First, foundational laws and government policy support must be prepared to foster the medifood for animals industry. Currently, companion animal-related concepts, industry scope, and industry classification are incomplete, so it is necessary to establish a policy foundation to systematically foster related industries.

Second, R&D support and foundation building are needed so that medifood for animals using domestic food ingredients can be developed. Because foreign brands with long histories have a high market share, domestic companies are having difficulty securing competitiveness.

Therefore, domestic companies need support for exports by localizing materials through R&D support and improving competitiveness. Third, various pet tech products and services that combine various cutting-edge technologies such as the Internet of Things (IoT), artificial intelligence, and big data with medifood for animals must be developed. As the number of pet owners trying to improve the quality of life for their pets increases, the demand for pet tech and services for pets is expected to increase, so it is necessary to develop foods that incorporate food tech technology.



Fourth, we must integrate the latest technologies such as genetic analysis and microbiome research to provide more personalized health care solutions. Effective health management can be achieved by accurately identifying the characteristics and health status of your pet through genetic and intestinal microorganism analysis and supplying medifood tailored to the pet's needs.

In summary, medifood for animals will greatly contribute to improving the health and welfare of companion animals, and further growth is expected through various research and technological advancements in the future.



Development of functional materials using *Rhus verniciflua*

Gun Hee Jung

Imsil Cheese and Food Research Institute

Obesity is a significant global health issue that impacts quality of life. This study investigated the protective effects of *Rhus verniciflua* extract (IBF-R) against obesity in mice. IBF-R reduced body, liver, and adipose tissue weights without affecting food intake. It decreased lipogenesis and adipogenesis in the liver and epididymal white adipose tissue (eWAT). At the molecular level, IBF-R increased the AMPK-SIRT1 axis and decreased the mTOR-SREBP1-ER stress axis. In brown adipose tissue (BAT), IBF-R enhanced mitochondrial biogenesis and thermogenesis markers such as PGC1 α and UCP1 via AMPK-SIRT1 signaling. IBF-R also promoted PGC1 α deacetylation through SIRT1 activation. These results suggest that IBF-R protects against obesity by modulating liver steatosis, adipocyte metabolism, and BAT function through the AMPK-SIRT1 axis and ROS pathways



Evaluation of efficacy and safety of animal health foods against obesity in obese dogs

Geum-Hwa Lee

Biomedical Research Institute of Jeonbuk National University Hospital

Obesity in dogs is a growing concern, leading to severe health issues such as heart disease and diabetes. Overfeeding, inadequate exercise, and excessive consumption of high-calorie foods contribute to weight gain. Globally, between 50 to 60% of pet dogs considered companions are obese, and its prevalence is on the rise. Since the association between obesity and a range of health issues is significant, it is essential to develop interventions that could assist in reducing weight for pets. Hence, it is necessary to develop interventions that can be clinically managed through prescribed foods and medications by veterinarians.

This study aimed to assess the anti-obesity and anti-inflammatory properties of fisetin and fustin found in *Rhus verniciflua* Extract (RVE) against obesity in obese dogs. The dogs were fed with supplements (sausages) containing RVE once daily for dogs under 5 kg, twice daily for dogs between 5 and 10 kg, and three times daily for dogs over 10 kg for four weeks. No adverse reactions were recorded during 4 weeks of treatment, suggesting the safety of food supplements with RVE. The control group demonstrated no change in weight until the end of the second week, whereas the group supplied with the RVE had a gradual weight reduction. Further, until the end of the second week, there was no apparent difference in waist circumference between the control group and the group provided with the RVE. However, by the end of the experiment (after four weeks), the group that received RVE showed a significant decrease in chest circumference. Additionally, the Body Condition Score (BCS) indicated that dogs supplemented with lacquer tree extract gradually improved their physical condition. Specifically, BCS was reduced to 6.8 from 7.5, indicating the effect of RVE on weight and waist circumference. Together, study findings strongly suggest that dog food with RVE is safe and efficient in regulating obesity in dogs.

Innovation of Korea testing management system : global harmonization and digital transformation

Kyoungh Min Lee

*Laboratory Audit and Policy Division,
Ministry of Food and Drug Safety*

A testing and inspection management system was introduced by integrating the designation of testing and inspection laboratories and quality control standards that had been distributed and managed in seven area, including food and pharmaceuticals (Act on Testing and Inspection in the Food and Drug Industry, enacted on July 2013). As 10 years have passed since its introduction, the need to review the overall testing and inspection operation system is emerging. Meanwhile, in a situation where the international trade environment has recently strengthened such as nationalism and protectionism, and the global advancement of Korean food and drugs is increasing, changes in the testing and inspection management system are required to prevent trade disputes for export products and support domestic companies' overseas expansion. This study was conducted with the purpose of establishing a plan to improve the management system for testing and inspection agencies in order to enhance the reliability and efficiency of testing and inspection in the domestic food and drug Industry. To this end, problems such as the complexity of the testing and inspection evaluation system for the designated laboratories which the system is implemented by the Ministry of Food and Drug Safety in accordance with current Act on Testing and Inspection in the Food and Drug Industry, the redundancy with the ISO accreditation system, and the increased amount of evaluation due to the rise in the number of testing and inspection laboratories were diagnosed. Next, we investigated the cases of ISO/IEC 17025 application by the testing and inspection laboratories located in Korea and other countries. And then, we compared and analyzed the testing and inspection designation system of the Ministry of Food and Drug Safety and the ISO/IEC 17025 accreditation system which is established by the International Standard Organization as a general requirement for the capabilities of testing and calibration laboratories. It proposed an equivalence plan between testing and



inspection laboratories that build and operate their system with the ISO/IEC 17025 standards recognized by KOLAS(International Standard Organization Accreditation Body) and testing and inspection laboratories designated by the Ministry of Food and Drug Safety. Based on these results, we discussed the approval range and methods of the accredited ISO/IEC 17025 standards when evaluating testing and inspection laboratories designated by the Ministry of Food and Drug Safety, and the improvement measures for managing testing and inspection laboratories were also suggested.



Current management status of global countries for ensuring the reliability of food testing laboratories

Seung Yong Cho

National Food Safety Information Service

The trade volume of food products is increasing through the establishment of Mega FTAs between countries. Some countries, such as the United States, require that the national safety management system of the exporting country for specific products be at least equivalent to their own standards when importing food. Maintaining the reliability of a nation's food testing and inspection system is crucial for establishing an effective food safety management framework. Therefore, testing and inspection laboratories participating in official activities to ensure national food safety are required to meet the competency criteria set by international standards (ISO/IEC 17025). This requirement is also imposed on counterpart countries during trade.

In South Korea, the quality control standards for food testing laboratories were revised in 2022 to meet international standards, and laboratories are managed accordingly. However, because ISO/IEC 17025 is not mandated as a requirement for testing laboratories, there have been instances where laboratories faced disadvantages, such as undergoing rigorous laboratory evaluations during export country laboratory management assessments.

To achieve international harmonization of the internationally accredited inspection system, we investigated and reviewed the national testing and inspection laboratory management systems of countries such as the United States, the EU, Australia, Japan, and China. Additionally, we examined how these countries utilize and operate ISO/IEC 17025 accreditation.

In countries such as the United States, the EU, and Australia, laboratories responsible for official food safety activities must obtain ISO/IEC 17025 accreditation in advance. However, due to the unique nature of South Korea's system, where self-quality inspections are conducted under national supervision, it may be impractical to require all testing laboratories to obtain international accreditation. Therefore, an expanded accreditation system that considers small-scale self-quality inspection laboratories is necessary.



Improvement strategies for MFDS LIMS

Sang-Hun Lee

Ministry of Food and Drug Safety

This presentation addresses the direction for restructuring the Ministry of Food and Drug Safety(MFDS) 's integrated Laboratory Information Management System (LIMS). The MFDS LIMS is an information system designed to manage testing and inspection, laboratory equipment information for food, medical products, and more. As a core system for data-driven scientific safety management in various tasks such as authorization, permission and risk prevention, the MFDS generates approximately one million testing and inspection data entries annually through its 400 laboratories and 4,400 laboratory equipment. Testing and inspection agencies are mandated to use the MFDS LIMS and it is also used by a total of 937 institutions, including manufacturers and local governments.

This presentation introduces the current operational status of the MFDS LIMS and outlines the improvement directions and plans aimed at standardized end-to-end data management of the entire testing and inspection process, prevention of data tampering and stable operation.

We hope that this presentation will be the first step in establishing a better information system through the cooperation and participation of various stakeholders in academia and industry, thereby solidifying a globally trusted testing and inspection framework.



Regulatory trends in novel food ingredients

Jun Hyun Sung

Ministry of Food and Drug Safety

As global populations rise and environmental challenges intensify, the demand for innovative food sources, such as cell-based food ingredients, has escalated. This surge is driven by looming food shortages, evolving dietary preferences, and personal health beliefs. Consequently, there is a critical need for the proactive development of regulatory frameworks and safety management. In Korea, there are about 5,200 food ingredients officially approved for consumption. Ingredients not included on this list are prohibited for food use. Novel food ingredients lacking a domestic consumption history must undergo MFDS review process under the "Standards for Approval of Temporary Standards and Specifications for Foods, etc." To date, above 70 ingredients have been classified as novel and approved for use. Safety assessments for these ingredients include evaluations of their origin, development history, recognition and usage both domestically and internationally, characteristics, production processes, and results from toxicity and allergy testing.

The Ministry of Food and Drug Safety (MFDS) is currently noticed safety evaluation regulation for cell-based food ingredients. Moving forward, the MFDS is tried to ensuring the safety of innovative food, like cell-based food ingredients, and to advancing international safety framework through various global collaborations.



Current status of academic research and development of cultured meat

Jiyou Han

*Department of Biomedical and Chemical Sciences,
Hyupsung University*

The development of cultured meat technology began with a 1999 patent by Willem van Eelen and progressed to the point that Mark Post held the world's first cultured meat tasting in 2013. In late 2020, Josh Tetrick of Eat JUST received the world's first food license in Singapore for cultured chicken cell meat and began selling it to the public, albeit on a limited basis. This "cell-based agriculture (food)" incorporates new technology not yet 30 years after the first related technology patent. However, the development of serum-free culture media, mass production of cells, differentiation of stem cells into somatic cells, and tissue engineering technology for texture, surprisingly related and detailed core technologies, are revolutionizing the cell-based cultured meat industry. Such advanced cell-based food engineering technologies have given us the homework to rethink the safety of new food science and technology, change the existing meat and seafood consumers' perception structure, and examine the enlightenment measures and coexistence among the existing related industrial parties. In this study, we will introduce recent cultured meat-related source technologies and related food safety considerations and look at proposed alternatives.



Global trends in key technologies and product developments in cell-cultured foods

Minchul Kang

Pulmuone Co., Ltd.

In recent years, cell-cultured foods have made significant progress towards becoming commercially viable, thanks to advancements by pioneering companies like Good Meat, Upside Foods, Vow, and Eat Just. In 2023, Good Meat and Upside Foods received approval from the U.S. Department of Agriculture (USDA) to sell their cell-cultured chicken products, marking a historic milestone in the industry. Good Meat has combined plant proteins with cultivated chicken cells to enhance scalability and reduce production costs, while Upside Foods has focused on creating high-quality, 99% chicken cell-based products without plant-based fillers. Their products will be introduced in Michelin-starred restaurants. In Singapore, Vow and Eat Just are leading the way. Vow has developed cell-cultured food from Japanese quail cells, approved by the Singapore Food Agency (SFA), and sells it under the brand "Forged Parfait" in high-end restaurants. Eat Just, which first commercialized cultivated chicken in Singapore in 2020, continues to expand its production capabilities and has recently introduced a cost-effective hybrid meat product that combines plant proteins with cultivated chicken. Recently, Good Meat also launched "GOOD Meat 3," a hybrid product with 3% cultivated chicken, in Singapore's Huber's Butchery, making it available for home cooking. These success stories in the United States and Singapore highlight the importance of technological advancements, regulatory approvals, and market strategies in making cell-cultured foods a mainstream protein source. This presentation will explore the innovative approaches of these companies and their efforts to build a sustainable food system.



Food safety management and application cases using smart HACCP

Yoon-Jeong Choi

Sempio Foods Company

Smart HACCP is a management system that automates the monitoring of CCP and major processes using IoT, digitizes various documents, and real time monitoring each HACCP step. In accordance with the trend of digitalization in the manufacturing industry, it is essential to increase work efficiency through computerization and automation of food safety management needs to be strengthened. Above all, it is necessary to overcome the limitations of manual monitoring through real-time monitoring and respond to issues.

Sempio Foods Company was established in 1946, with its name standing as the oldest registered brand in Korea. Since the beginning, the company has been dedicating itself to manufacturing fermented food products – mainly soy based sauces – which are essential in the field of Korean cuisine. Remaining faithful to the philosophy of its founder, “I will never produce or sell products that my family would not eat,” Sempio Foods Company puts special emphasis on food safety and health. This led Sempio to a number of quality and food safety certification.

Sempio Foods Company is applying smart HACCP at its Icheon and Yeongdong factories. This includes all food types(soy sauce, sauce, seasoning, etc.) manufactured at Icheon plant, and beef jerky at the Yeongdong plant. The level of food safety management has been improved through real-time automated monitoring and recording of the CCP process, including the sterilization process and the filtration process. In this presentation, we would like to introduce smart HACCP application cases for food safety management of Sempio Foods Company. Through smart HACCP, employee’s quality and food safety awareness has improved and the reliability of monitoring results has increased. Above all, we are looking forward to predictive and preventive food safety management through monitoring data.



Introduction to Daesang Co., Ltd.'s food safety management system

Yu-Jin Kim

Daesang Corporation

Since its establishment in 1956, Daesang Co., Ltd. is a comprehensive food company that operates various brands such as Chungjungone, Jongga, and O'Food, with its main business being food and ingredients.

Since introducing consumer-centered management in 2010, Daesang has been spreading and realizing customer-first management throughout the company.

Daesang established the Food Safety Center in March 2002 to ensure continuous and systematic food safety management. The Food Safety Center obtained KOLAS accreditation in 2005, and is securing the reliability of analysis results through renewal of accreditation and maintenance of accreditation items until 2024.

We are carrying out activities to strengthen quality prevention and rapid response through a company-wide quality management system. The Food Safety Center evaluates the safety of food, global, and well-life products through new product safety gates, and conducts intensive preventive management through proactive policy monitoring and risk information response activities.



Why are Codex's standards and specifications important in the food industry?

Moo-Hyeog Im

*Department of Food Engineering,
Daegu University*

The mission of the Codex Alimentarius (Codex) is, first, to protect the health of consumers, ensure fair trade practices in food trade, and harmonize all food standardization work undertaken by international intergovernmental and non-governmental organizations. The reasons why we should participate in Codex are as follows. First, we must ensure that the law is consistently applied to domestically produced and imported foods. Second, regulations that could exclude domestic products from the market that do not meet international standards can be prevented from being included in international standards. Third, opinions can be proposed for the establishment of important standards that are related to the country. Fourth, we can learn about the international situation by exchanging information and opinions with various food safety and quality experts. Fifth, with the growth of the global food trade, consumers have the opportunity to easily access a variety of foods, resulting in potential opportunities for countries to expand their own productivity. Sixth, Codex member countries, which are the World Trade Organization (WTO) members, are obliged to comply with the Application of Sanitary and Phytosanitary Measures (SPS) and Technical Barriers to Trade (TBT) agreements, which are international obligations, and therefore, cannot restrict trade with trading partners.

Codex's general task subcommittees include general principles, food labeling, food import and export, veterinary drugs, food additives, pesticides, contaminants in food, food hygiene, methods of analysis and sampling, nutrition, and foods for special dietary uses. Subcommittees for each food include processed fruits and vegetables, fresh fruits and vegetables, oils and fats, spices and herbs, sugars, milk and dairy products, grains and beans.

Codex's points of contact are government agencies, and it must secure sufficient

support and resources to exchange information with all stakeholders and proceed with its work. This contact point establishes networking at the national level with government agencies, related organizations, academic experts, the private sector, and non-governmental organizations to carry out activities for the benefit of the nation. The standards set in Codex are accepted or referred to by most countries, including the United States, Europe, Japan, and Australia. Therefore, there is a need for Korea to set its own standards and harmonize them with international standards, and to set Korea's standards as Codex standards so that domestic food can be freely exported to foreign countries. In this sense, Codex is very important in the food industry.



S11-4

ESG activities for small and medium-sized food company

Min Gyoo Kim

Mutual Cooperation Foundation for Food Safety

Mutual Cooperation Foundation for Food Safety was established in 2014 with contributions from CJ CheilJedang. And we are carrying out six targeted projects to support the food safety activities of small and medium-sized food companies. We will continue to strive for the development of the Korean food industry and small and medium-sized food companies.



Occurrence and management of food foreign matters in Korea

Won-Bo Shim

Gyeongsang National University

Food foreign matter incidents have a significant impact on public interest and negative perceptions of companies and food, making the prevention and management of foreign matter contamination in food crucial for food hygiene and safety. In 2009, Korea revised the Food Sanitation Act to mandate the reporting of foreign matter in food through the "Regulations on the Scope and Investigation Procedures of Reportable Foreign Matter," which has been in effect since 2010. Since the implementation of this mandatory reporting system, the number of reports has shown a decreasing trend due to the continuous efforts of the government, investments in facilities by companies, advancements in technology, education, and consumer participation. However, since 2017, the number of reported cases has stagnated at an average of 4,300 cases/year. This phenomenon can be interpreted as reaching the limitations of foreign matter management, as foreign objects inevitably occur in the manufacturing and distribution processes of various foods despite the food industry's efforts. In this presentation, we will discuss the current status of food foreign matter occurrences in processed foods in South Korea and future management measures



A possibility that 2-chloroethanol may be unintentionally detected in processed foods without using ethylene oxide

Hee-Seok Lee

*Department of Food Safety and Regulatory Science,
Chung-Ang University*

Ethylene oxide (EO), which it can be converted to 2-chloroethanol (2-CE) in food materials, is no longer authorized for use as a pesticide in the various countries, and is classified as mutagenic, carcinogenic, and toxic for reproduction by the European Chemicals Agency. On the other hand, in many findings, it can be observed that only residues of 2-CE are found and that EO is absent. Based on this point, stakeholders have been suggesting that 2-CE could be present in food materials without using the EO as fumigant/disinfectant. Additionally, various scientists have been recommended that 2-CE residues should not be considered equivalent to EO because it would not be determined to be a genotoxic carcinogen by several previous studies. Therefore, the criteria for safety management of 2-CE in food materials are different by countries.

In terms of biosynthesis mechanism, 2-CE can be synthesized under appropriated condition through ethylene oxidation to oxygenates by electrocatalysis, directly or via EO. On the other hand, previous publication indicated that ethylene electrooxidation reaction is limited to alkaline and neutral electrolytes to produce acetaldehyde, ethylene glycol, and 2-CE. Interestingly, 2-CE is produced under acidic seawater containing chloride anions from ethylene, whereas ethylene glycol is produced under freshwater in previous publication. These data suggested adding the chloride anions under acidic condition is very important in biosynthesis of 2-CE from ethylene.

Here, I demonstrate unintentional detection of 2-CE in food matrix during processing to clarify that determining the 2-CE could not be related to the illegal use of EO as fumigant/disinfectant.



Assessment of disinfection efficacy with changes in C and T

Seungmin Ryu

Korea Institute of Fusion Energy

The importance of disinfection has been further emphasized during the coronavirus pandemic. In addition to chemical disinfection (chlorine dioxide, ozone, methyl bromide), and physical disinfection (UV, heat), plasma disinfection has also been proven to be effective. Disinfection is a crucial technology not only for safety but also for preventing spoilage of agricultural products.

Plasma technology used for air disinfection controls the production of reactive oxygen and nitrogen species (RONS) through plasma discharge. The important factor in disinfection is the CT value, which is the product of concentration and contact time. However, there has not yet been any study confirming the CT value for RONS generated by the plasma.

In this study, it will be verified whether the CT value is meaningful in air disinfection and the CT value for achieving 99% sterilization of *E. coli* by RONS will be determined respectively. These research findings can suggest an appropriate method of operating plasma to suppress spoilage bacteria when storing agricultural products.

This work was supported by R&D Program of “Plasma Advanced Technology for Agriculture and Food(Plasma Farming)” through the Korea Institute of Fusion Energy (KFE) funded by the Government funds, Republic of Korea.



Research on composite sensor device for storage of various agricultural products

Hi-Deok Lee^{1,2}

¹Korea Sensor Lab,

²Chungnam National University

Recently, unforeseen heavy rains and other extreme events has been occurring frequently around the world including Korea. Moreover, unexpected wars are occurring and there are regions where military tensions are escalating. Hence, we are living in an era of global climate crisis and regional disputes, which inevitably can lead to abrupt rise in the agricultural commodity price due to the unstable agricultural production and supply. Therefore, long-term storage of agricultural produces is crucial for maintaining stable agricultural supply and price stability. To achieve effective long-term storage, it is necessary to suppress the ripening of agricultural product and the generation of microorganisms which can spoil the agricultural product. The suppression of ripening can be obtained by maintaining constant temperature and humidity levels in the low temperature storage facilities and the ripening level can be monitored by measuring the concentration of gases such as ethylene (C_2H_4) and carbon dioxide (CO_2). One method to prevent the generation of microorganisms is the injection of ozone with specific concentrations into cold storage facilities. Therefore, accurate measurement of the concentrations of ethylene ozone, as well as temperature and humidity within storage facilities, is crucial for stable long-term storage of agricultural produces. This paper introduces a composite gas device capable of accurately measuring concentrations of various gases such as ozone, ethylene, carbon dioxide and NO (which can be generated when generating ozone) and temperature and humidity, and demonstrates its high accuracy through experimental validation. [This work was supported by the Technology development Program(S3302887) funded by the Ministry of SMEs and Startups(MSS, Korea) and in part by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2022S1A5C2A03093218).]



Utilizing surface dielectric barrier discharge as a nitric oxide source regulating fruit ripening

Sanghoo Park

KAIST

Nitric oxide (NO) is an invaluable multifunctional chemical in agri-food applications, for example, it plays a role in plant growth, development, and stress tolerance. One of the interesting implications of NO is the suppression of fruit ripening and the resultant shelf-life extension. Since it is known that a high concentration of NO is producible in atmospheric plasmas, increasing attempts at plasma agriculture have been made along with studying several types of plasma reactors operated in air. However, given that NO is rapidly oxidized by O₂ and/or ozone (O₃), the use of NO produced in atmospheric plasmas is naturally nontrivial, and the lifetime of NO is super-sensitive to reactor environments. In this study, we investigated the time development of O₃ and nitrogen oxides (NO_x) in a surface dielectric barrier discharge (sDBD) reactor, depending on the O₂ content of the controlled atmospheres (N₂+O₂). In situ optical absorption spectroscopy enabled us to observe the dynamics of O₃ and NO_x under gas-tight conditions. In such plasma reactors, NO becomes a dominant species after the chemical mode transition from O₃ to NO occurs. We found that the lower the O₂ ratio, the faster the appearance of NO in the plasma reactor. It is revealed that the NO lifetime is significantly increased as the O₂ content decreases from 20 to 5% in the plasma reactor, while the maximum concentration of NO decreases. Our findings indicate that appropriate control of O₂ content is essential in atmospheric plasma reactors, depending on O₃ and/or NO_x applications. Moreover, the present study suggests that nonthermal atmospheric plasmas can be also utilized as a promising source of NO for various fields of interest.



Principles for improving quality and safety indicators for efficient use-by-date setting experiments

Sang-Do Ha

Chung-Ang University

From January 1, 2023, the Ministry of Food and Drug Safety introduced the 'Use-by-date', which is the period during which products can be consumed, instead of the 'Shelf-life', which is the period during which sales can be made. In addition, the Ministry of Food and Drug Safety is carrying out a large-scale research project to set consumption dates for approximately 2,000 items of 200 food types in the Food Code from 2022 to 2025. According to this project's 'Report on Setting Consumption Dates by Food Type (December 1, 2022)', tofu's expiration date will increase from 17 days (expiration date) to 23 days (consumption date). Ham increased from 38 to 57 days, and fermented milk increased from 18 to 32 days. The existing Use-by-date is set by conducting an experiment according to the Use-by-date setting experiment guidelines, but the quality and safety indicators used here involve many unnecessary experiments and are missing essential experiment items. In addition, the Use-by-date is set uniformly for each type, but even for the same type, the Use-by-date varies greatly depending on the characteristics of each food (pH, Aw, packaging type, sterilization/sterilization, etc.), so realistic test items that take these indicators into account must be used. The principles of improving quality and safety indicators for Use-by-date setting experiments are largely based on convenience and precision. Convenience consists of 'simplification of experiment items' by deleting unnecessary experiment items and 'simplification of number of experiments' by distinguishing between stored experiments and initial single-shot experiments. For precision, essential storage test items that were not included in previous guidelines were added by analyzing overseas cases and literature, and internal factors [water activity (Aw), pH, sterilization/pasteurization, preservative content, thawing, etc.] and external factors were added. We plan to review quality and safety indicators by considering factors [manufacturing process, packaging materials and methods, storage and



distribution temperature, etc.]. Afterwards, we plan to select various and practical test items that take into account the characteristics of each product, even if they are of the same type. Afterwards, we plan to operate a 2-round Delphi expert advisory committee to verify and go through a process of collecting opinions from the industry to reasonably improve the quality and safety indicators for the Use-by-date setting experiment.



Study of used by date reference value setting-alcoholic beverages

Jae-Wook Shin

Korea Advanced Food Research Institute

This study investigates the quality changes of Makgeolli, a Korean traditional alcoholic beverage, during storage periods to set reference values for its expiration date. Makgeolli samples were collected and stored at 5°C, 10°C, and 15°C, with experiments conducted up to 200% of the current expiration date. Physicochemical indicators such as ethanol content, pH, and total acidity, along with microbial indicators including bacterial and yeast counts, were measured.

The results showed that ethanol content decreased from an initial 10.17 ± 0.12 v/v% to 9.70 ± 0.10 at 5°C, 9.67 ± 0.21 at 10°C, and 9.33 ± 0.1 at 15°C at the 200% mark. The pH levels slightly changed from an initial 3.72 ± 0.00 to 3.78 ± 0.06 at 5°C, 3.70 ± 0.01 at 10°C, and 3.70 ± 0.02 at 15°C. Total acidity increased slightly from an initial 1.03 ± 0.01 to 1.17 ± 0.01 at 5°C, 1.14 ± 0.01 at 10°C, and 1.15 ± 0.06 at 15°C.

Microbial indicators showed a general decrease in bacterial and yeast counts with higher temperatures, with yeast counts decreasing more rapidly.

This study provides critical baseline data for establishing expiration dates and quality management of Makgeolli by quantitatively analyzing quality changes according to storage temperature and duration.



Management of use by date for private brand products

Hyung-Sik Park

BGF Retail Co., Ltd.

The use-by-date is the period when you can eat it with confidence if you follow the storage method indicated on the food.

In order to set an appropriate expiration date for PB products, 13 different food types such as refrigeration and room temperature were tested, and the use-by-date was set by reflecting the safety factor of 0.7 during the quality limit period.

Then, after final consultation with the manufacturer concerned, the display was changed from the expiration date to the use-by-date, and the display was changed to the use-by-date according to the time when the wrapping paper was changed.

As a result, due to the change in the use-by-date, which was extended from 0% to 75% compared to the existing expiration date label, the safety verification of PB products and the effect of reducing food waste were obtained.

And then for continuous safety management of PB products, safety inspections are conducted through regular on-site hygiene inspections and product collection inspections.

In addition, PB partners are invited to provide quality hygiene education on foreign matter prevention management, food labeling, and changes to the Food Sanitation Act during the manufacturing process.



Traditionally-made doenjang enriched with *Bacillus subtilis* mitigates estrogen-deficient symptoms through gut-organ axis modulation

Sunmin Park

Department of Food and Nutrition,
Hoseo University

Traditional fermented soybeans, particularly doenjang, demonstrate promising outcomes in mitigating various menopausal symptoms, including hot flashes, autonomous nervous system dysfunction, energy, glucose, and lipid metabolism, memory dysfunction, bone mineral density loss. Although soybeans are known to act as phytoestrogen, the potentially superior effect of fermented soybean with *Bacillus subtilis* on alleviating these symptoms was expected. Traditionally made doenjang (TMD) intake, particularly types high in *Bacillus subtilis* (TMD-BS), significantly improved various parameters compared to control and cooked soybean groups in ovariectomized rats. TMD-BS intake reduced tail skin temperature (indicative of hot flashes) improving autonomous nervous system. It also decreased weight gain and visceral fat mass, increased lean body mass, improved glucose tolerance, lowered hepatic triglyceride content, and enhanced intestinal morphology. Moreover, TMD-BS intake decreased insulin resistance, preserved bone structure, and maintained memory function in OVX rats. The positive outcomes were associated with modulation of the gut microbiota, including increases in beneficial bacteria such as *Lactobacillus* and *Bacillus* and decreased *Clostridium*. Importantly, our findings revealed that TMD-BS intake modulated the gut microbiota, which was linked to improvements in energy metabolism, glucose homeostasis, bone health, and cognitive function through improving autonomous nervous system, especially vagus nerve system. TMD-BS with high biogenic amines did not show any adverse effects. This highlights the critical role of the gut-organ axis in mediating the benefits of TMD-BS on menopausal symptoms. The modulation of gut microbiota by TMD, especially those rich in *Bacillus subtilis*, appears to contribute to improvements in multiple organ systems in estrogen-deficient conditions. In conclusion, TMD-BS shows promise in alleviating various symptoms of estrogen deficiency through the gut-organ axis. This study offers valuable insights into novel therapeutic approaches targeting menopausal symptoms and related metabolic disturbances via gut microbiota modulation, ultimately paving the way for improved health outcomes in aging populations.

The effects of doenjang on health benefits and identification of the Korean Jang paradox

Youn-Soo Cha

*Department of Food Science and Human Nutrition,
Jeonbuk National University*

Doenjang, a traditional Korean condiment, is made from fermented soybeans and salt. It is a staple in Korean cuisine and is renowned for its rich umami flavor. The fermentation process used in making *Doenjang* involves beneficial microorganisms such as *Aspergillus* species and *Bacillus subtilis*, which break down components of soybeans, potentially enhancing the bioavailability of essential amino acids, minerals, and vitamins. This fermentation process may contribute to the observed health benefits of soy-based fermented foods, as fermented soybean products have demonstrated higher phenolic and protein contents along with greater antioxidant activity compared to their non-fermented counterparts. Previous studies have highlighted its health benefits, such as antioxidant, anti-obesity, antimutagenic, and anti-cancer activities.

However, concerns have arisen regarding the safety and health effects of *Doenjang* due to the production of harmful substances (such as biogenic amines) by harmful microorganisms during fermentation and the high salt content added during its preparation. Despite these concerns, various health benefits of *Doenjang*, including anti-obesity, anti-hypertensive, and anti-hyperlipidemic effects, have been confirmed. As a result of comparing the group that consumed the same amount of table salt as the salt content of *Doenjang* and the group that consumed *Doenjang*, in contrast to the salt intake group, all *Doenjang* groups showed modulation of blood pressure through the RAS system. In addition, *Doenjang* improved the lipid profile and showed anti-obesity and anti-hyperlipidemia effects.

These findings collectively suggest that the health-enhancing effects of *Doenjang* transcend mere microbial composition and salt content, implying intricate interactions with other constituents. Hence, a comprehensive understanding of the 'Korean Paradox' the hypothesis that the salt content of traditional fermented foods is not a direct cause of disease must be achieved through sustained research efforts. These efforts will promote an accurate perception of the safety and functionality of traditional fermented foods.



Effects of traditional Korean soybean paste on hypercholesterolemia patients: reducing arteriosclerosis index and improving intestinal health

Su-Jin Jung

Jeonbuk National University Hospital

The health safety of Korean traditional soybean pastes has been a subject of ongoing controversy due to their high levels of salt, histamine, and aflatoxin, a biogenic amine. Despite these concerns, the various microorganisms and metabolites present in traditional soybean pastes are known to enhance physiological activity and promote health. Salt, in particular, not only contributes to flavor but also plays a crucial role in fostering beneficial bacteria and suppressing harmful ones, making it an essential component in fermented foods. Previous studies have primarily focused on the anti-obesity effects of soybean paste in preclinical and clinical trials. However, there is a lack of research on the effectiveness and safety of traditional and commercial soybean paste supplementation in patients with hypercholesterolemia, particularly concerning changes in the intestinal microbiome and cardiovascular disease risk factors. In this study, patients with hypercholesterolemia consumed 6g (Deonjang pills) of three types of soybean paste powder (traditional soybean paste powder with high beneficial bacteria content, traditional soybean paste powder with low beneficial bacteria content, and commercial soybean paste powder) for four weeks. The results indicated changes in intestinal flora and cholesterol levels among the groups consuming different soybean paste powders, but no significant improvements in effectiveness were observed overall. However, the group consuming commercial Deonjang powder showed a significant decrease in arteriosclerosis indices, including the LDL-C/HDL-C and TC/HDL-C, compared to the group consuming traditional Deonjang powder with low beneficial bacteria content. The group consuming traditional Deonjang with high beneficial bacteria content demonstrated a significant reduction in Apo B, an arteriosclerosis index, compared to the low beneficial bacteria Deonjang group. Notably, the



consumption of traditional soybean paste powder with high beneficial bacteria content increased levels of propionic acid, a short-chain fatty acid associated with improved intestinal health, while the consumption of commercial Deonjang powder significantly decreased these levels. Throughout the clinical intervention period, all three types of soybean paste were deemed safe for consumption, with no significant differences in health cholesterol improvement benefits between the groups.

In conclusion, traditional Deonjang with a high content of beneficial bacteria was found to be superior in preventing potential arteriosclerosis and enhancing intestinal health compared to its commercial and low beneficial bacteria counterparts



Industrial application of fermented tea, kombucha

Hee Jeong Chae

*Department of Food Science and Technology,
Hoseo University*

Kombucha is a tea-derived beverage produced by microbial fermentation by a symbiotic culture of bacteria and yeast (SCOBY). Attentive research has been conducted on the industrial applications of kombucha, in fashion, healthcare, and environmental industries, etc. Kombucha fermentation broth possesses various beneficial effects such as antimicrobial, antioxidant, immune-supporting, and probiotic functions, suggesting that kombucha could be used as a biologically active ingredient in the development of functional foods and cosmetic products. Several studies have demonstrated that kombucha shows significant antibacterial activity against several pathogenic microorganisms, so it can be used as an attractive natural source for preservatives and disinfectants. In addition, kombucha extract has been found to help stimulate skin regeneration and healing when used in cosmetic and m formulations. Kombucha-derived bacterial cellulose (KBC) has been tested for use as an alternative to fabrics and leather. KBC can be also a substitute for synthetic plastics in environmental, and packaging applications. KBC holds biocompatible and biodegradable characteristics, which are needed in drug delivery and packaging. The industrial application of kombucha extends well beyond the realm of a simple beverage, and it is a valuable resource for innovative and sustainable applications across many different sectors.



Title microbiome research in traditional fermented foods

Sangdon Ryu

Honam National Institute of Biological Resources

Recent advancements in molecular biology analysis techniques, particularly large-scale sequencing methods like Next Generation Sequencing (NGS), have significantly enhanced our ability to identify most microorganisms present in fermented foods. Traditional cultivation-based microbial analysis methods have only managed to identify about 1% of the total microorganisms. Even in the well-researched field of food microbiology, a considerable amount of microbial information remains unknown. Traditional fermented foods are naturally fermented by microorganisms from the environment, leading to inconsistent product characteristics. To address this, starter cultures are now being used in the production of some fermented foods. To effectively utilize these starter cultures and enhance nutritional or health-functional components, it is essential to determine the genetic characteristics of each microorganism and its ability to produce the desired bioactive components. This necessitates genome sequencing and gene identification through bioinformatics, made possible by NGS. Therefore, this article introduces various molecular biological methods used in analyzing microorganisms in fermented foods, emphasizing examples that utilize NGS techniques. Additionally, it aims to provide information on the industrial application of functional starter cultures with beneficial genes, obtained through genome sequencing of microbial resources from traditional fermented foods.



Introduction to the fermented food industry support center and the kombucha developed by the foundation

Byung-Kuk Choi

Fermented Food Industry Support Center

Fermented Food Industry Support Center is a significant institution supporting the fermented food industry in the southern coastal region of South Korea. The center aims to foster the development of the fermented food industry and stimulate regional economic growth through various programs and support initiatives.

- 1. Industry Support Programs:** The center runs educational programs for fermented food manufacturing and technology development, offering technical advisory and consulting services to companies.
- 2. Research and Development Support:** It facilitates research and development related to the fermented food industry by providing equipment, facilities, and long-term support for innovative technology development.
- 3. Marketing and Networking Support:** It assists in developing marketing strategies for fermented food products and expanding domestic and international markets, promoting networking within the industry.
- 4. Information Provision and Exchange Enhancement:** The center provides the latest trends and technological information in the fermented food industry, fostering knowledge exchange and collaboration opportunities between academia and industry.



Non-conventional yeasts: the next-generation starters for fermented foods

Sung Ho Lee

SPC Research Institute of Food and Biotechnology

"Non-conventional yeast" typically refers to yeast species except for *Saccharomyces cerevisiae*, which is widely used in baking or brewing industries.

Although a variety of non-conventional yeasts are involved in traditional fermented foods, there are very few examples of characterizing of their fermentation mechanism or industrial cases of fermented food production using non-conventional yeast starters.

In recent years, there have been cases in the U.S and some European countries where *Pichia kluyveri* has been used as a starter culture for the production of non-alcoholic beverages. However, there were no cases of non-conventional yeasts used in the baking industry.

Non-conventional yeast has the ability to produce a variety of aromatic compounds, in addition to the primary fermentation metabolites (alcohol, CO₂) of traditional baking yeast. It also possesses multi-functionality in nutritional and enzymatic aspects.

SPC group has been conducting related research on non-conventional yeasts, recognizing their high value as next-generation starters for fermented foods. In this report, we would like to introduce two research cases: 1) functional yeast *Kluyveromyces marxianus* NIYC1, 2) flavor yeast *P. kluyveri* NIYC3



AI-based approaches for quality control of kimchi and other traditional fermented foods

Ji Yoon Chang

*Division of Food Science and Technology,
Gyeongsang National University*

This study investigates the utilization of artificial intelligence (AI) in the quality control of kimchi and other traditional fermented foods. AI technologies have been increasingly adopted in the food industry for their ability to enhance production efficiency, ensure product consistency, and maintain high safety standards. By leveraging machine learning and computer vision, AI can analyze vast amounts of data in real-time, providing insights and predictive capabilities that surpass traditional methods. These advantages make AI particularly suitable for managing the complex biochemical processes involved in the fermentation of foods, which are influenced by various factors such as microbial activity, ingredient quality, and environmental conditions.

The research explores several AI models and their efficiency in predicting fermentation outcomes, detecting abnormalities, and maintaining consistent product quality. Key technologies include predictive algorithms for monitoring fermentation stages, image recognition for identifying defects or contamination, and the integration of sensor data for real-time tracking of environmental parameters.

Preliminary results indicate that AI-driven systems can greatly improve the accuracy and efficiency of quality control in the production of kimchi and other traditional fermented foods. These systems can automate the identification of potential issues and optimize fermentation conditions, leading to enhanced consistency and safety standards. The study concludes with recommendations for implementing AI-based quality control systems in industrial settings, discussing potential challenges and suggesting directions for future research.



Precision fermentation to enhance flavor of fermented foods

Chan-Woo Kim

National Institute of Agricultural Sciences

Precision fermentation is a promising biotechnology that uses microbial hosts as cell factories to produce value-added products. This approach has the potential to transform the food industry by providing an efficient method for improving quality of fermented foods. Here, we engineered a *Saccharomyces cerevisiae* N9 isolated from Korean Nuruk (fermentation starter) using CRISPR-Cas9 to increase flavor of Korean traditional rice wine. Firstly, the URE2 gene, which encodes a transcriptional regulator of nitrogen catabolite repression (NCR), was deleted to enhance amino acid accumulation. In addition, the ATF1 gene, which encodes alcohol acetyltransferase 1, was overexpressed to boost the production of ester-based flavor compounds. *S. cerevisiae* naturally produces alcohols and acetyl-CoA, which Atf1p can convert into ester compounds. Also, the IAH1 gene, encoding esterase, was deleted to increase ester accumulation. By regulating ATF1 expression levels and using mixed culture fermentation, ester-based compounds with varying intensities were produced. Finally, these engineered strains were used to produce Makgeolli, resulting in higher levels of amino acids and esters compared to the Makgeolli made with the parental strain. This study demonstrates that the genome-edited strains are not transgenic and can be widely applied to various fermented foods.



The effect of agricultural product and probiotics on muscle health for well-aging

Sanghyun Lim

Cell Biotech R&D Center

Muscle health is one of the important factors for well-aging. A variety of agricultural products and probiotics are known to be effective in muscle health. Nonetheless, the effect of the combination of those two materials on muscle health is not well known. Here, I would like to introduce patent analysis and the efficacy of plant-based and animal-based materials on muscle health. Ginseng and licorice were confirmed to be the most patented materials, and among seaweeds, *Ecklonia cava* was identified, and terpenoid and flavone-based compounds were also known. To verify efficacy of plant-based and animal-based materials on muscle health, C₂C₁₂ cell experiments were used to select materials, and animal models were treated with hindlimb and dexamethasone. Changes in genes related to muscle protein breakdown and synthesis showed significant differences, and exercise performance was confirmed to be improved significantly. In these experiments, it was confirmed that the effect increased when mixed with probiotics. Finally, human clinical trials will be performed for the confirmation.



Strategies to discover functional materials for muscle aging

Jiyun Ahn

Korea Food Research Institute

Sarcopenia is the loss of skeletal muscle mass, strength, and physical performance that occurs with aging and can lead to frailty. Sarcopenia is classified as an independent disease by the International Classification of Diseases (ICD-10-MC). However, there's currently no treatment for it. Therefore, the prevention of sarcopenia is the best option for now. For health functional foods, there are two health claims related to sarcopenia: 1) helping to maintain muscle health in the elderly, 2) helping to maintain muscle health in the elderly. We tried to search functional materials from natural resources and found Gromwell as one of the functional candidates for muscle health. The aim of this study was to investigate whether Gromwell root extract (GW) can prevent muscle wasting and to characterize the composition of GW to identify bioactive compounds. GW prevented dexamethasone (Dexa)-induced muscle atrophy. In Dexa-induced myotube atrophy, treatment with GW extract increased myotube diameter, reduced the expression of muscle atrophy markers, and enhanced the expression of myosin heavy chain (MHC) isoforms in C2C12 cells. Supplementation with the GW extract improved muscle function and performance in mice with Dexa-induced muscle atrophy, as evidenced by the grip strength and running tests. The GW group showed increased lean body mass, skeletal muscle mass, size, and myosin heavy chain isoform expression, along with reduced skeletal muscle atrophy markers in Dexa-injected mice. GW mitigated obesity-induced skeletal muscle atrophy. GW attenuated palmitic acid-induced myotube atrophy in differentiated C2C12 myotubes. Supplementation of obese mice with GW significantly increased skeletal muscle weight, lean body mass, muscle strength, and exercise performance. GW ameliorated sarcopenia. Supplementation with GW improved muscle function and physical performance in aged mice. The human study demonstrated GW improved muscle strength and muscle power in individuals of the experimental group without any signs of toxicity. Collectively, these findings support the protective effect of Gromwell against various muscle atrophy underscore the potential of the GW extract to prevent Dexa-induced skeletal muscle atrophy and highlight the contribution of LA to its effects.



Muscle health benefits of Gardenia fruit extract

Chang Hwa Jung

*Aging and Metabolism Research Group,
Korea Food Research Institute*

Since the early 20th century, human lifespan has markedly increased, yet this has not universally translated into healthier aging. The discrepancy between life expectancy and healthspan is a critical global issue, escalating healthcare costs and diminishing the quality of life for older adults. Dietary interventions are a promising strategy to enhance healthspan. This study investigates the potential of an ethanol extract of *Gardenia jasminoides* Ellis fruit (GFE) to extend lifespan and improve healthspan in *Caenorhabditis elegans*. Our results demonstrate that treatment with 10 mg/mL GFE extended the lifespan of *C. elegans* by 27.1% compared to controls. Moreover, GFE treatment improved multiple healthspan markers, including pharyngeal pumping, muscle quality, age pigment levels, and reactive oxygen species accumulation. GFE also conferred protection against amyloid β 1–42 toxicity, implicated in Alzheimer's disease (AD). These benefits are associated with the inhibition of insulin/IGF-1 signaling and activation of the SKN-1/Nrf pathway, promoting the expression of stress resistance genes. Geniposide (GP), the principal component of GFE, was also assessed for its effects on healthspan and lifespan. Treatment with GP increased lifespan by 18.55% and improved healthspan markers in *C. elegans*. To further explore GP's potential, its effects were tested on sarcopenia models in *C. elegans* and mice. In *C. elegans*, GP treatment significantly enhanced lifespan and motility. In mice, GP ameliorated physical function deterioration. In differentiated C2C12 cells, GP reduced dexamethasone-induced muscle atrophy by inhibiting FoxO1 activity and activating AKT signaling. Overall, our study highlights the potential of GFE and GP to extend lifespan and healthspan, primarily through mechanisms that enhance stress resistance and muscle integrity. These findings suggest promising avenues for dietary interventions aimed at promoting healthier aging.

Standardization of the manufacturing process for farm-style persimmon vinegar using persimmons

Hey Kyung Moon

Kyungpook National University Instrumental Analysis Center

As the monitoring results of the natural fermentation process of persimmon vinegar production in various farms in Sangju City: The raw materials used included soft, crushed, and overripe persimmons used in the production of dried persimmons. The persimmons were collected in rubber or plastic containers and left to ferment naturally. After about a year, the sludge and fermentation liquid were separated, and the fermentation liquid was used to produce persimmon vinegar. The persimmon vinegar, after removing the sludge, was transferred to different containers and aged for approximately three years before being sold as persimmon vinegar. However, since it was difficult for farmers to sell it individually, a persimmon vinegar collection company collected it, filtered it, commercialized it, and sold it as persimmon vinegar.

Here are the monitoring results from the actual production site of naturally fermented persimmon vinegar in various farms in Sangju City: For primary fermentation, most farms used black or red rubber barrels exposed to sunlight in outdoor settings. Some farms opted for PE material fermentation containers, which were purchased and utilized to a limited extent. For fermentation locations, almost all farms in Sangju City had their fermentation containers exposed to natural outdoor elements such as sunlight, rain, and wind. The surroundings were often overgrown with weeds and were not hygienic. However, some farms had designated spaces that, despite being outdoors, were maintained hygienically. They either organized clean areas for fermentation or created separate fermentation rooms to store the containers. For the maturation process, nearly all farms in Sangju City were maturing the fermented liquid and sludge separation from the primary fermentation in the same black or red rubber or plastic barrels, exposing them to unhygienic outdoor environments. Some farms were transferring the persimmon vinegar collected from primary fermentation into stainless steel storage tanks for maturation. However, these tanks were often placed in shaded areas behind buildings, still exposed to outdoor conditions and thus not entirely hygienic. One farm was observed to transfer the liquid from primary fermentation into interior maturation tanks within a building for secondary maturation before packaging and sale of the product. Based on the monitoring results mentioned above, it is urgent to standardize and improve the hygiene of the persimmon vinegar



production process in farms. This includes addressing hygiene conditions during fermentation and maturation stages, and ensuring the use of sanitary containers for producing persimmon vinegar. Here are the monitoring results regarding the quality characteristics of naturally fermented persimmon vinegar produced in various farms in Sangju City. The monitoring results of persimmon vinegar collected from farms in Sangju City are as follows: The pH of persimmon vinegar ranged from 3.44 to 3.82, with an average pH of 3.68. Total acidity ranged from 1.24% to 3.54%, with an average total acidity of 2.09%. According to food industry standards, persimmon vinegar should contain at least 2.6% total acidity (as acetic acid, w/v%). The °Brix (sugar content) of persimmon vinegar ranged from 6.50 to 11.03 °Brix, with an average of 8.60 °Brix. The reducing sugar content ranged from 22.21 to 134.94 mg/100g. Turbidity (cloudiness) of persimmon vinegar ranged from 11.68% to 82.00%T. Color analysis showed the following average values: Lightness (L) 24.72, redness (a) 0.08, yellowness (b) -0.03. Specific ranges were L 22.12 to 27.00, a -0.11 to 0.46, and b -0.99 to 1.33. Organic acid analysis revealed that acetic acid content in persimmon vinegar ranged from 197.89 to 781.90 mg/100g, with an average of 398.42 mg/100g. Mineral analysis indicated that potassium (K) content was notably high in persimmon vinegar, suggesting a relatively high mineral content overall.

Based on the monitoring results of persimmon vinegar quality characteristics from various farms in Sangju city, it was confirmed that the quality of products produced by each farm was inconsistent. This inconsistency stems from the lack of standardization in the manufacturing process, where each farm lacks systematic management of processes such as raw materials, alcohol fermentation, acetic acid fermentation, maturation, and fermentation vessels. As a result, the product quality varies significantly among farms.

We propose standardizing the hygienic production process of persimmon vinegar in farms as follows: Remove foreign matter and wash the unripe persimmon raw materials. Crush or wet grind and juice the raw materials. Transfer the crushed persimmon pulp or juice to fermentation tanks. Add 0.5–3% of dry yeast based on the capacity of the fermentation tank for alcohol fermentation. Measure Separate alcohol liquid from the sludge. Produce alcohol content (alcohol content 6–7%). Inoculate acetic acid fermentation tank (add approximately 10% based on the volume of well-fermented persimmon vinegar). Acetic acid fermentation, Filtration, Maturation, Persimmon vinegar product, the alcohol content during fermentation. When manufacturing persimmon vinegar on farms, if pottery or glass containers are burdensome due to their size or cost, stainless steel tanks of appropriate capacity are recommended as an alternative. Additionally, the use of PE (Polyethylene) or PP (Polypropylene) materials with valid test certificates is also permissible.



Improvement plan of export agricultural packaging boxes

Soo-Il Kim

Kim's Packaging Research Institute

As exports of fresh agricultural products increase, claims related to export packaging are increasing. We would like to present packaging technology to improve problems occurring at export sites. There are many problems with packaging boxes for agricultural exports, but I would like to present problems and improvement measures in terms of package design, prevention of crushing of packaging boxes, and reduction of logistics costs.

1. Package Design Improvement Plan

Use export-only packaging boxes and attach stickers with "Product of Korea" printed on the domestic packaging box if it is unavoidable, but print the font size of "Product of Korea" as large as possible to emphasize that it is made in Korea.

2. Prevention of Crushing in Packaging Boxes

A. Measures to Improve the Material of Boxes

Flexo printing box should use 100% pulp raw material KLB as a surface and back liner. For the color printing box, SC manila 220g/m² cardboard should be used rather than SC manila 240g/m² and coating the printing surface to prevent strength degradation due to moisture absorption. Raw paper with higher compressive strength than weight should be used, and corrugated cardboard with low weight high compressive strength (CK 180g/m²) should be used.

B. Measures to improve the support structure

The quality inspection for defective adhesion of the joints of the automatic box type should be strengthened, and a low-weight, high-pressure axis strength corrugated cardboard should be used. When packaging more than 10 kg, a corner structure for strengthening compressive strength should be used at the corners of the automatic box type box. In addition, a thorough quality inspection is required for defective adhesion of the joints.

3. How to reduce logistics costs

Standardization of T-11 and T-12 pallet standards and standardization for maximizing container loading efficiency for export are needed. This achievement (academic presentation) was made with the support of the Rural Development Administration's research project (task number: RS-2023-00231209)



AI trends and characteristics in the commerce market - focusing on AI platforms used in online marketing

Ka Kyung Mun

Yeonwoo Co., Ltd.

As exports of fresh agricultural products increase, claims related to export pain in recent years, artificial intelligence (AI) technology has been rapidly adopted in the distribution market and is driving innovative changes in various fields. In this paper, we analyze the current status and characteristics of AI applications in the distribution market.

First, major areas where AI technology is applied in the distribution industry include product recommendation and search, order and delivery management, inventory management, and customer management. In these areas, AI technology contributes to improving efficiency and accuracy by data analysis, prediction model construction, and automation system implementation.

Additionally, key features of AI technology in the distribution market include large-scale data collection and processing capabilities, advancement of deep learning algorithms, and provision of personalized services. This enables solving previously difficult problems and providing more differentiated services. However, there are several factors that must be considered when introducing AI technology such as security issues, privacy concerns, and ethical considerations. Therefore, it is necessary for distribution companies to carefully consider and address these issues.

In conclusion, AI technology is already being used in many areas of the distribution market and is expected to even play a larger role with further development. At the same time, careful consideration and response to security issues, privacy concerns, and ethical issues are required. As such, we need to forecast the future of the distribution market along with the development of AI technology and seek active countermeasures.



Standardization and integration of food nutrient database in Korea

Young-In Lim

Ministry of Food and Drug Safety

Recently, life expectancy has been increasing, and also the number of people trying to manage their health based on food nutrients is increasing. In Korea, three types of food nutrient databases (FNDB) have been produced and managed independently by different ministries for over a decade. Thus, it caused confusion and inconvenience for those trying to use the FNDB, so the government has launched a collaborative challenging project to unify FNDB by integration and standardization.

Therefore, all necessary information, including metadata for each FNDB, was collected and reviewed to determine what was needed for standardization and sustainable maintenance. First, we carried out standardization work on food coding, terminology, definitions, compilation methods, and nutrient content units. In order to integrate agricultural products, meat, seafood, processed food (PF), and foods at prepared dish under one coding system, an 8-level, 17-digit food code, each representing unique classification characteristics, was assigned instead of the 11 or 12 digits of the existing FNDB. The number of nutrients included will be expanded later, but we initially designed 24 nutrients to be listed at first. Then, standard operating procedures (SOP) were prepared for collection, compilation, data verification and a sustainable maintenance & update of FNDB at the government level accordingly.

By removing and organizing the same and similar data from the three FNDBs, the integrated FNDB containing about 66,000 food nutritional information was established in 2022(As of 2024, approximately 92,000). This complete FNDB will be provided to the public as an open API through the 'Public Data Portal' (<https://www.data.go.kr/index.do>).

To ensure continuous maintenance and quality control of FNDB, a development council composed of experts and relevant public officials is also organized and operated. With a recent amendment on the relevant regulation, reporting nutrition information of PF is required for the food manufacturing report since July 2023, thus, this will expedite the PF FNDB expansion more efficiently.

Predicting food nutrients for personalized nutrition based a machine learning

Jiyoun Hong

*Department Food and Biotechnology,
Department Food Regulatory Science, Korea University*

As exports of fresh agricultural products increase, claims related to export
paTo obtain personalized and precision nutrition information, it is essential to
know the exact intake of nutrients, especially minerals and vitamins. The food
nutrient database provides valuable information to consumers, but information
on numerous minerals and vitamins is often missing in processed foods or when
dining out. Directly analyzing all foods is realistically challenging, so methods
to supplement missing data are necessary. This study aims to demonstrate the
potential application of machine learning algorithms in predicting the amounts and
ranges of vitamins and minerals based on the food label information of processed
foods or the existing food nutrient database. Specifically, this study suggests using
the database of dining-out foods to verify the correlation between macronutrients
and micronutrients, and through this, to propose a machine learning method
for predicting the micronutrients of processed foods. These results can provide
evidence for utilizing personalized nutrition services by predicting the unreported
nutrient components in processed foods.



AI based eating habits analysis and management solution using food nutrition database

Hyunsuk Lee

Doinglab Inc.

The importance of eating habits is the same as now and then. However, as the industry develops, diseases such as diabetes and obesity are increasing due to eating habits. In order to manage this, it is most important to properly track what foods people are eating. However, there are still not many ways to properly collect data. Many hospitals are using the 24-hour recall method, and mobile services provide a meal recording function through text search. However, this method has the problems like data variation from person to person and it takes a lot of time to input whole foods. To solve this problem, we developed Foodlens technology based on AI image recognition technology and nutritional database. Our technology can recognize more than 10,000 foods and over 60 organizations are using. Also, we are analyzing 10 million food images per month. We will find out how we are using technology to solve the problem of collecting eating habits.



Predicting food nutrients for personalized nutrition based generation of a comprehensive dataset from extracts of indigenous plants in Korean islands

Won Woo Lee

*Practical Research Division,
Honam National Institute of Biological Resources*

The advent of life-threatening adversities, including incurable diseases and infectious pathogens, has led to the discovery and development of new types of treatment. Extensive investigations on continental territories have left few unexplored extremes on Earth, such as volcanoes and the polar regions, in the search for unknown materials. Islands are a promising habitat for rare species due to the geographic isolation and unique ecosystems, and these characteristics can lead to the discovery of undocumented bioactive chemicals. Through the exploration of several islands, we collected hundreds of Korean indigenous plants and produced plant extracts by using 30% ethanol or 50% alcohol for functional analyses. We measured the antibacterial activity of plant extracts. And anti-inflammatory activity was measured through in vitro assay. In addition, our collaborative institutions have been investigating the improvement of immune response, Blood neutral fat measurement, muscle strength improvement, joint health, cognitive function improvement, whitening, improvement of wrinkles in the skin. Overall, plant extracts are of valuable resources as natural anti-microbial agents and functional biomaterials. The comprehensive dataset information can play pivotal roles, not only in expanding our knowledge but also in the development of health products.



Protective effects of the postbiotic *Lactobacillus plantarum* MD35 on bone loss in an ovariectomized mice model

Jae-II Park

Korea Basic Science Institute

Postmenopausal osteoporosis is caused by estrogen deficiency, which impairs bone homeostasis, resulting in increased osteoclastic resorption without a corresponding increase in osteoblastic activity. Postbiotics have several therapeutic properties, including anti-obesity, anti-diabetic, anti-inflammatory, and anti-osteoporotic effects. However, the beneficial effects of the postbiotic MD35 of *Lactobacillus plantarum* on bone have not been studied. In this study, we demonstrated that the postbiotic *L. plantarum* MD35, isolated from young radish water kimchi, influences osteoclast differentiation in mouse bone marrow-derived macrophage (BMM) culture. In addition, it was effective protecting against estrogen deficiency-induced bone loss in ovariectomized (OVX) mice, an animal model of postmenopausal osteoporosis. In BMM cells, postbiotic MD35 inhibited the receptor activator of nuclear factor- κ B of NF- κ B ligand (RANKL)-induced osteoclast differentiation by attenuating the phosphorylation of extracellular signal-related kinase, significantly suppressing the resorption activity and down-regulating the expression of RANKL-mediated osteoclast-related genes. In the animal model, the oral administration of postbiotic MD35 remarkably improved OVX-induced trabecular bone loss and alleviated the destruction of femoral plate growth. Therefore, postbiotic MD35 could be a potential therapeutic candidate for postmenopausal osteoporosis by suppressing osteoclastogenesis through the regulation of osteoclast-related molecular mechanisms.



Polystyrene microplastics biodegradation by gut bacterial *Enterobacter hormaechei* from mealworms under anaerobic conditions: anaerobic oxidation and depolymerization

Younghoon Kim

Department of Agricultural Biotechnology and
Research Institute of Agriculture and Life Science,
Seoul National University

Synthetic plastic is used throughout daily life and industry, threatening organisms with microplastic pollution. Polystyrene is a major plastic polymer and also widely found sources of plastic wastes and microplastics. Here, we report that *Enterobacter hormaechei* LG3 (CP118279,1), a facultative anaerobic bacterial strain isolated from the gut of *Tenebrio molitor* larvae (mealworms) can oxidize and depolymerize polystyrene under anaerobic conditions. LG3 performed biodegradation while forming a biofilm on the plastic surface. PS biodegradation was characterized by analyses of surface oxidation, change in morphology and molecular weights, and production of biodegraded derivative. The biodegradation performance by LG3 was compared with PS biodegradation by *Bacillus amyloliquefaciens* SCGB1 under both anaerobic and aerobic conditions. In addition, through nanopore sequencing technology, we identified degradative enzymes, including thiol peroxidase (tpx), alkyl hydroperoxide reductase C (ahpC) and bacterioferritin comigratory protein (bcp). Along with the upregulation of degradative enzymes for biodegradation, changes in lipid A and biofilm-associated proteins were also observed after the cells were incubated with polystyrene microplastics. Our results provide evidence for anaerobic biodegradation by polystyrene-degrading bacteria and show alterations in gene expression patterns after polystyrene microplastics treatment in the *Enterobacter hormaechei*.



International Session

IS1-1

Poultry production: animal welfare and environmental sustainability

Sungeun Cho

*Department of Poultry Science,
Auburn University, USA*

Electrical water bath stunning is the preferred method of stunning in the American poultry industry due to its affordability and effectiveness; however, gas-stunning (i.e., controlled atmosphere stunning) is deemed an effective alternative that has a higher regard for animal welfare due to no live-shackling prior to the stun. Furthermore, gas-stunning may improve environmental sustainability. This study was to compare the effects of electrical and gas-stunning on the sensory characteristics and consumer acceptance of chicken breast meat as well as the impact of packaging type during chilled storage (15 days at 4°C). The samples were electric-stunned non-vacuum-packaged chicken (EN), electric-stunned vacuum-packaged chicken (EV), gas-stunned non-vacuum-packaged chicken (GN), and gas-stunned vacuum packaged chicken (GV). A consumer panel (n=90) found there were no significant differences in any of the ratings between different stunned chicken breast samples of day 0. On day 3 consumer panel (n=93) did not show any significant differences in the ratings, except juiciness. The significant differences in juiciness were between EV and EN ($P=0.002$, $EV=6.70 \pm 3.89$, $EN=8.48 \pm 3.93$) and GV and GN ($P=0.036$, $GV=7.81 \pm 3.56$, $GN=9.13 \pm 3.69$). Vacuum-packaged products had, on average, a lower juiciness level than the non-vacuum-packaged products. Although the consumer panels did not find a significant difference in aroma-liking between treatments, the electronic nose (e-nose, Heracles Neo, Alpha MOS, Toulouse, France) showed different volatile profiles between the cooked electric- and gas-stunned treatments. GN produced less off-odor volatiles through day 15 than EN. This was indicated by EN producing hydroperoxides (e.g., p-menthadienhydroperoxide), suggesting lipid oxidation initiated, and the ketone butane-2,3-dione, indicating an off-odor.

Meanwhile, GN did not produce these volatiles. A similar occurrence was found in EV and GV samples through day 15. GV produced volatiles such as nonan-2-one (hot-milk and musty), creating an off-aroma, while EV did not. This indicates EV produced less off-odor volatiles. It can be suggested that in terms of consumer perception neither stunning method creates a higher quality product based on sensory characteristics. However, vacuum-packaged products electric-stunned chicken maintained fewer off-odors, but in non-vacuum-packaged products gas-stunned chicken maintained less off-odors. In conclusion, gas stunned chicken meat showed no differences in meat quality and consumer likings compared to electrical stunned meat.



Revisiting the chemical diversity of organic crops

Joonhyuk Suh

*Department of Food Science and Technology,
University of Georgia, USA*

Organic food crops have become popular, with increasing attention to healthier and safer foods. Yet, the bulk of our knowledge on chemical diversity (discriminant compounds) of organic crops is limited to less than a hundred compounds within specific chemical classes, such as phenolics. The majority of organic crop studies have focused on the discovery of biomarkers that can distinguish organic crops from the conventional counterparts for crop authentication, control, and management purposes. However, individual markers, e.g., single or a few metabolites, obtained from each study do not represent the true quality of organic crops, because altered metabolism in organic crops involves a multitude of different types and levels of chemical compounds with varying nutritional values and health effects. Screening a whole set of compounds in a subject is ideal, but it's a challenge to current analytical techniques and instruments. In this work, we compiled articles published in the past ten years on the chemical profiling of organic crops, and made a list of potential biomarkers that had been selected as discriminant metabolites between organic and conventional crops at least in two articles. Using the marker list, functional enrichment analysis was executed to uncover a key metabolic network (bundle of metabolic pathways) rewiring in organic crops. The achieved network and related metabolite information allowed to narrow down the number of target metabolites in organic crop research. Finally, as a case study, metabolomic profiles of organic and conventional tomato fruits were investigated, and the chemical diversity of organic tomatoes was identified with their biological meanings. This presentation will cover the workflow of revisiting chemical diversity in organic crops, brief results of the case study, and future perspectives in the area.



Advancing sustainable smart packaging solutions for food applications

Abdus Sobhan

*College of Agriculture and Applied Science,
Alcorn State University, USA*

The concept of sustainable smart packaging solutions based on biosensors and indicators has been attracting more and more interest to the industrial community because of the concerns of food quality and safety. Food packaging equipped with biosensors and indicators has a scope to enable real-time monitoring of microbial breakdown products of packaged foods. Despite significant progress made in different studies regarding the uses of biosensors and indicators in smart packaging, the potential challenges and opportunities in developing smart food packaging with sustainability have not been properly addressed. Therefore, it is important to know more about biosensors and indicators for developing sustainable and affordable smart packaging materials. The focus of this research is to outline existing research and developments (R&D) on biosensors and indicators and provide some perspectives of their potential challenges and opportunities in future smart food packaging solutions, more sustainable future for smart food packaging industries.



Shelf-life evaluation on pineapple-egg yolk pastry by pulsed light treatment combined with nitrogen-modified atmosphere packaging

Yu-Wei Chang

*Department of Food Science,
National Taiwan Ocean University, Taiwan*

The use of preservatives might extend the shelf-life of pastry products, however natural products without preservatives have been grown recently. Hence, this study investigated the effects of combining the pulse light (PL) technology with different materials of modified atmosphere packaging (MAP) on the physicochemical quality of pineapple-egg yolk pastry and evaluated its shelf-life. The results revealed that the sample packed with nylon/LLDPH and nitrogen atmosphere with PL treatment (NYP group) at 7.9 J/cm² stored at 25°C has no significant changes in moisture content (11.89%), water activity (0.54), and hardness (18.07 N) compared to the initial values at the end of storage. Furthermore, the acid value of the NYP group was 2.17 ± 0.05 mg/g which is below the regulatory standard (≤ 5 mg/g) and significantly lower than that of the control group (14.57 ± 0.22 mg/g) after 10 weeks of storage. The microbial activity of the NYP group includes total plate count, *Escherichia coli*, coliform group, total mold, and yeast was not present. The sensory evaluation scores of the NYP group for appearance, aroma, texture, flavor, and overall acceptability were all above 3 at the end of the storage. This study suggested that PL application combined with MAP could significantly extend pineapple-egg yolk pastry shelf-life by at least 10 weeks with acceptable sensory attributes.

Food upcycling overview in Korea and trend

Alexander Myoung Min

REharvest Co., Ltd.

Food upcycling is a very new industry in Korea, representing a significant shift in how food by-products are managed and utilized. Despite the country's limited land space and the slow growth of its agricultural industry, most food by-products are currently being discarded rather than repurposed. This presents a substantial challenge, as the disposal of food waste contributes to environmental degradation and economic inefficiency. It is, therefore, essential for Korea to embrace food upcycling practices, not only to mitigate the impact of food waste but also to develop sustainable food sources that can support the nation's long-term food security.

By upcycling food by-products, the food and beverage industry in Korea has the potential to transform into a model of circular economy. This process involves repurposing waste materials into valuable products, thereby reducing the environmental footprint and fostering innovation in food production and consumption.

While food upcycling is a well-established practice in the Western Hemisphere, it remains a relatively new concept in the Korean market. Despite its novelty, food upcycling has gained significant recognition and has been selected as one of the top ten technologies in the Food Tech sector. This recognition underscores the potential impact of food upcycling on the food industry and its alignment with global sustainability trends.

In Korea, there are several notable companies pioneering meaningful food upcycling business models. These companies span both the startup ecosystem and large conglomerates, each contributing to the growing landscape of sustainable practices in the country. The innovative approaches adopted by these companies demonstrate the feasibility and benefits of integrating food upcycling into mainstream production and consumption processes.

Moreover, there is a growing demand from the government for sustainable food



management solutions. In response to this need, plans have been set in motion to establish the world's very first dedicated food upcycling R&D center. This center, slated to open by the end of 2026, will be located in Naju city. It will serve as a hub for research, development, and the promotion of food upcycling technologies and practices. The establishment of this R&D center represents a significant investment in the future of sustainable food systems and highlights Korea's commitment to leading the way in food innovation on a global scale.

By embracing food upcycling, Korea can significantly reduce food waste, promote environmental sustainability, and create new economic opportunities within the food and beverage industry. The concerted efforts of the private sector, supported by government initiatives, are poised to make Korea a leader in the global movement towards sustainable food production and consumption.



Food upcycling application and related market challenges

Dong-Jin Moon

The Bread Blue Corp.

The "Innovation for Sustainable Future Foods" initiative delves into the transformative potential of FoodTech in developing vegan foods and utilizing upcycled ingredients to create sustainable and nutritious food applications. This presentation outlines the methodologies and benefits of repurposing by-products such as rice bran, spent grain, and fruit pomace. By transforming these materials into high-quality food products, we support a circular economy, significantly reduce food waste, and lessen environmental impact.

Central to this initiative is the integration of personalized nutrition and medical food applications. Personalized nutrition leverages advanced analytics to tailor dietary plans to individual health needs and preferences, promoting healthier lifestyles. Medical food applications are developed to address specific health conditions, offering targeted nutritional support that enhances overall well-being. These innovative approaches not only cater to the growing demand for health-conscious food options but also contribute to improved public health outcomes.

Through comprehensive market analysis and case studies, this presentation demonstrates the practical applications and real-world impact of these technologies. By showcasing successful implementations, we highlight how these innovations can drive food sustainability and public health improvements. The initiative aims to bridge the gap between technology and food science, paving the way for a sustainable future in the global food industry.



Cross economy: new economic model for sustainability in the AI age

Nam-Joon Cho

*School of Materials Science and Engineering,
Nanyang Technological University, Singapore*

In the advent of AI and the convergence of emerging technologies, the concept of the environment has been broadened from the *physical* world to the ‘phygital’ world. This term refers to the integrated realm of physical and digital worlds in which we live today, driven by the convergence of technologies such as AI, the Metaverse, and more. This evolution creates the necessity to redefine ‘sustainability’ and expand the scope of corporate ESG responsibilities into new dimensions, called Digital–ESG. Moreover, the very concepts of dimensions and spaces can be redefined by leveraging the transformative power of technology, introducing the concept of ‘*dimensionless space–ability*’.

When considering an economic model for sustainability in the phygital world, it’s clear that the traditional circular economy falls short. It focuses solely on physical sustainability, which is insufficient to address the complexities of digital–related issues. To bridge this gap, the ‘cross economy’ model was introduced as an evolved version of the circular economy. This integrative system combines the strengths of both the physical and digital realms, aiming to enhance both environmental sustainability and digital well–being through the purposeful and ethical use of technology. This approach emphasizes the technological transformation of materials and resources, thereby increasing their economic value and leading to scalable profitability and impact. It addresses not only environmental challenges, such as climate change, biodiversity loss, waste, and pollution but also digital challenges, including AI governance/ethics, cybersecurity/safety, and more, that pose threats to human well–being, national security, and global stability.

The cross–economy model has been flexibly and practically used to better explain corporate innovation in balancing the needs for reducing industrial waste and carbon emissions while maximizing energy security. For instance, Saudi Aramco utilized this model as the “cross carbon economy” to enhance their circular carbon economy efforts and promote related technologies. In this presentation, Professor Nam–Joon Cho will further discuss the Cross Hydrogen Economy for the Hyundai Group.



Formulating antimicrobial agent using weak acid and beyond.

Tin-Chen Hsu

*Institute of Food Science & Technology,
National Taiwan University, Taiwan*

Applying Weak acid theory in design of antimicrobial agent has been a popular issue to replacing Preservatives in food application. Selection of weak acid needs to consider its dissociation constant, buffering capacity, hydrophobicity and acid-flavor Impact. Other than using weak acids in pH control, there are many factors influencing the integrity of the microorganism cell membrane that will enhance the antimicrobial activity of the weak acid. In combination of the weak acid and cell membrane “disruptor”, the common weak acid becomes a good alternative in food preservation.



Maximization of spent-hen utilization: an innovative chicken-surimi products

Yi-Chen Chen

*Department of Animal Science and Technology,
National Taiwan University, Taiwan*

The utilization of spent hen meat poses challenges due to its limited quantity and poor quality. Based on an Agrocycle view, its usability could be increased through a washing process to remove sarcoplasmic proteins and impurities, enhancing the shelf life and textural properties of resulting products, akin to surimi. Given a rising demand for foods fortified with omega-3 polyunsaturated fatty acids (ω -3 PUFAs), incorporating these nutrients is becoming more common. To increase protein recovery rates and ecofriendly (myofibrillar-protein loss), a 0.1% (w/v) NaCl solution is recommended for the third washing step of spent-hen breast protein recoveries. Flaxseed oil is suggested as an optimal source of ω -3 PUFAs for formulating surimi-like products, as it offers a nutritional value. However, α -tocopherol has shown limited effectiveness in retarding lipid oxidation in ω -3 FA-fortified chicken surimi. It was observed that the ethanolic extract of rosemary (RE) exhibits strong antioxidative properties in flaxseed oil, likely due to its antioxidant polyphenol profile. Additionally, combining treatment with both RE and dry ice (DI) to possibly exclude oxygen under atmospheric pressure during food manufacturing, has shown promise in reducing lipid oxidation of ω -3 FA-fortified chicken surimi during storage. Furthermore, incorporating 5% wheat fiber in the formulation not only improves physicochemical properties but also enhances the content of flaxseed oil. This innovative surimi-like product, enriched with dietary fiber and ω -3 FA, is positioned to meet the current market demand for high nutritional value and improved processing characteristics.



Revolutionizing emergency and disaster response in the Philippines: process standardization of innovative seafood-based products

Encarnacion Emilia S. Yap

*Institute of Fish Processing Technology,
University of the Philippines Visayas Miagao, Philippines*

In times of emergencies and disasters, coastal communities and other affected areas in the Philippines are usually provided with emergency food packs typically containing a variety of food items that may be lacking in nutritional value and may contain potentially harmful additives or preservatives. In our Seafood PRIME (Product Research, Innovation, Marketing, and Entrepreneurship) Laboratories, we highlight the development of innovative and consumer-oriented seafood-based products, that not only addresses the nutritional needs of disaster victims but also promotes sustainable practices and food safety, and reduces plastic waste. One of our research activities focuses on process development using an underutilized fish species (*Selaroides leptolepis* or *yellowstripe scad*) and local ingredients (including local vegetables and souring ingredients) and the utilization of carrageenan from *Kappaphycus alvarezii* to produce an environment friendly pouch for seasoning ingredients. In this study, the physicochemical properties of the ingredients of the new product that were manufactured using a freeze drier and a conventional mechanical drier, were compared. Microbiological analyses were also conducted through Aerobic Plate Count and Total Yeast and Mold Count. The results indicated the superiority of freeze-dried samples over mechanically dried samples, in terms of rehydration capacity, moisture content, water activity, rheological properties, color difference (ΔE), and lightness index (ΔL), with all samples showing microbial loads within the acceptable range of safety standard. Meanwhile, bioplastic films have been developed using the carrageenophyte *Kappaphycus alvarezii*, with the production process of carrageenan-based bioplastic optimized using the Response Surface Methodology – Central Composite Design (RSM-CCD) approach. In terms of food safety, the presence of microplastics both in *K. alvarezii* used and the extracted phycocolloid, carrageenan, albeit in small quantities, has also been confirmed.



Utilization of Philippine marine fish species as sources of high value protein products

Lhumen A. Tejano

*Institute of Fish Processing Technology,
University of the Philippines Visayas, Philippines*

Marine organisms are considered good sources of balanced protein for nutrient supplementation and human consumption. A growing number of fishery and fisheries waste demand maximum utilization in order to products that can be used in the food, feed, nutraceutical, and pharmaceutical industries. This research study explored the utilization of bioavailable proteins and bioactive peptides from low-cost fish species from the Philippines, which can be used as a component of low-cost adjunct high protein drink products and for food supplementation. Protein hydrolysates were produced from 10 marine fish species namely: big-eye scad, sardines, slipper cupped oyster, snake mackerel, lesser bream, bullet tuna, island mackerel, green mussel, squid and seaweeds using appropriate hydrolysis conditions. A core blend, which was a high protein intermediate product, was formulated by combining the 10 protein hydrolysates. From the core blend, a formulated blended product was also produced using core blend and other ingredients to produce a high protein drink. Sensory evaluation revealed that the core blend and the formulated blended product were highly acceptable to the panelist. The determination of the physico-chemical and functional properties of the hydrolysates, and the core and formulated blended revealed the possible application and behavior of the products when incorporated in food systems. The biological activities of the core blend and the formulated blended product were also examined, and showed the potential applications of the products in the nutraceutical and pharmaceutical industries. In all, the results of the study present the exploitation of various marine fish species as good sources of highly acceptable high protein products with good functional and biological properties that can be utilized by different industries.

Young Scientist Presentation

YSL-1

Co-occurrence networks of school lunch menus using big data and text mining

Jimi Kim

*Department of Food and Nutrition,
Changwon National University*

With the advancement of digital devices, methods and technologies for collecting and analyzing large volumes of data distributed on social network services are rapidly evolving. Big data analysis using real-time acquired data offers vast amounts of high-quality, spontaneous information. Text mining is an information technology that extracts meaningful information and knowledge from extensive text datasets. This study utilized school lunch menu information from the Ministry of Education's open education data, based on the NEIS (National Education Information System) provided by provincial and metropolitan offices of education. Elementary, middle, and high schools under the 17 cities and provinces offices of education in Korea daily provide school lunch menus, including dish names, origin information, calorie content, and nutritional details, through the NICE program. Using big data from lunch menus updated daily at schools across 17 cities and provinces from 2021 to 2023, this study conducted a network analysis of preferred school lunch menus and the co-occurrence relationships between menus by school age. Based on approximately 790,000 daily school meal menus, we analyzed the food groups most consumed by different school ages, food menu names, and the correlations with concurrently appearing menus. The results of this study offer a comprehensive understanding of the current school meal menus used in Korea. Moreover, by understanding the food consumption behavior of Korean adolescents from a data-centric perspective, this study can predict changes related to chronic diseases such as obesity, diabetes, and eating disorders. This insight can inform new policies for precision nutrition and health. This approach demonstrates how big data analysis using innovative approaches can improve existing methods for modeling group meal menu compositions.



Early diagnosis system using nanotechnology

Youngsang You

Dankook University

Visible indication based on the aggregation of gold nanoparticles (AuNPs) is highly advantageous for rapid on-site detection of biological entities. The localized surface plasmon resonance (LSPR) effect of aggregating AuNPs has facilitated the development of colorimetric biosensors that can frequently be employed. The properties of AuNPs are attractive owing to their sensitivity, ease of measurement and the simplicity in the sensor construction. Use of AuNPs is justified by their highly tunable size-dependent optical properties, remarkable stability against oxidation, relative ease of preparation and the possibility of surface modification with virtually any functionality. Aggregation of AuNPs can change the color of colloidal dispersions which is recognizable by the naked eye, and this is directly associated with the change in LSPR. LSPR also occurs due to changes in particles size and inter-particle distance during the formation of aggregation. Rapid and highly sensitive immunosensing method for visible detection of bacteria was developed based on the aggregation of AuNPs. Proposed strategy was achieved LSPR signal enhancement and the attendant improvement in detection sensitivity and rapidity by different size of AuNPs. These different size AuNPs have different detection limits. 5, 25, 35, and 50 nm st-AuNPs can detect 20, 2, 0.2, and 0.02 nM of target protein and 103, 102, 101, and 101 of target bacteria, respectively, when holding absorbance constant. The detection times were also different because large AuNPs can make LSPR change in short time. 5, and 25 nm st-AuNPs can detect target within 2 h however, 35, and 50 nm st-AuNPs can detect target within 1 h, and 30 min, respectively.



The applicability of natural extracts and essential oil nano-emulsion to improve the microbiological safety and storability of fresh produce

Ji-Hoon Kang

*Department of Food Science and Biotechnology,
Hankyong National University*

The consumers who pursue healthier lifestyle have been demanded to secure the microbiological safety and improve the storability of fresh produce because foodborne outbreaks related to these foods have continuously occurred. To fulfill this consumers' demand, chlorine-based sanitizers such as NaOCl have been used for the decades due to their low cost and easy application. However, the sanitizers using chlorine have a severe problem that can be the formation of detrimental carcinogenic compounds such as trihalomethane. In this regard, natural extracts obtained from noni fruits (NF) and honeybush leaves (HL) and essential oil nano-emulsion (EONE) with cationic surfactants such as quaternary ammonium substances have gradually gained an attention as effective substitutes for chlorine-based sanitizers because of their safety, environment-friendly, and high antimicrobial activity. Natural extracts obtained from NF and HL have phenolic antimicrobials such as scopoletin, hesperidin, and luteolin that show a broad spectrum of antimicrobial activity against several types of pathogens. They can cause microbial cell death by damaging and destructing cell membrane. In addition, EONE with cationic surfactants can kill various pathogens by increasing cell membrane permeability through the electrostatic interaction with microbial cell membrane. The washing effect of natural extracts and EONE could be affected by a variety of surface properties of fresh produce. Particularly, the surface roughness of fresh produce could play a more important role in the effect of washing with sanitizers compared to the surface hydrophobicity. It has been verified that the washing effect of natural extracts and EONE on fresh produce with different surface properties were similar or higher than that of chlorine-based sanitizers. Therefore, nature extracts with phenolic antimicrobials and EONE with cationic surfactants could be effectively used for enhancing the microbiological safety and storability of fresh produce.



Recent technology for retarding starch retrogradation

Seon-Min Oh

*Food Processing Research Group,
Korea Food Research Institute*

The retrogradation of starch-based products poses a significant challenge, affecting their quality and shelf life. Starch retrogradation involves several changes, including increased crystallinity of B-type crystalline polymorphs, enhanced paste viscosity and turbidity, syneresis, gel network formation, and reduced digestibility. Delaying starch retrogradation has been a major concern for food scientists in the past and remains an ongoing challenge in the food industry. This presentation focuses on retarding starch retrogradation in starch-based products and discusses the underlying principles, structural changes, and retrogradation-retardation effects. Additionally, physical, chemical, and enzymatic methods are described that reduce the retrogradation tendency of starch by breaking down or inducing linkages between the intermolecular bonds composing the starch. It includes the structural changes that occur in starch molecules during these treatments and their impact on retrogradation. Future directions and areas for further research are proposed to optimize these technologies for industrial applications. Continued research and development in this area are essential to fully realize the potential of these technologies and improve the sustainability and functionality of starch-based food products.



Graduate Student Presentation

SPOC1-1

Dietary supplementation of cedryl acetate ameliorates adiposity and improves glucose homeostasis in high-fat diet-fed mice

Jingya Guo, Tao Tong*

*Key Laboratory of Precision Nutrition and Food Quality,
Key Laboratory of Functional Dairy, Ministry of Education;
College of Food Science and Nutritional Engineering;
China Agricultural University, China*

Cedryl acetate (CA), also called acetyl cedrene, is approved by the FDA as a flavoring or adjuvant to be added to foods. Here, we aimed to investigate the preventive benefits of CA on obesity and obesity-related metabolic syndrome caused by a high-fat diet (HFD). Three groups of C57BL/6J mice were fed Chow, an HFD, or an HFD with CA supplementation (100 mg/kg) for 19 weeks. We observed that CA supplementation significantly reduced weight gain induced by an HFD, decreased the weight of the visceral fat pads, and prevented adipocyte hypertrophy in mice. Moreover, mice in the CA group showed significant improvements in hepatic lipid accumulation, glucose intolerance, insulin resistance, and gluconeogenesis compared with the mice in the HFD group. Since 16S rRNA analysis revealed that the gut microbiota in the CA and HFD groups were of similar compositions at the phylum and family levels, CA may have limited effects on gut microbiota in HFD-fed mice. The beneficial effects on the metabolic parameters of CA were reflected by CA's regulation of metabolism-related gene expression in the liver (including *Pepck*, *G6Pase*, and *Fbp1*) and the epididymal white adipose tissues (including *PPAR γ* , *C/EBP α* , *FABP4*, *FAS*, *Cytc*, *PGC-1 α* , *PRDM16*, *Cidea*, and *COX4*) of the mice. In summary, a potent preventive effect of CA on HFD-induced obesity and related metabolic syndrome was highlighted by our results, and CA could be a promising dietary component for obesity intervention.



Upcycling technology for the valorization of kimchi cabbage by-products derived from the kimchi industry

Suk-Min Yun^{1,2*}, So Yoon Park^{1,2}, Ho Hyun Chun¹

¹*Kimchi Industry Promotion Division, World Institute of Kimchi*

²*Department of Integrative Food, Bioscience and Biotechnology,
Graduate School of Chonnam National University*

Kimchi cabbage by-products (KCBs), including outer cabbage leaves and salted cabbage pieces generated at kimchi manufacturing plants, are industrial vegetable residues that contribute to environmental pollution. Therefore, in this study, we aimed to develop a crushing and dehydrating system (CDS) to reduce the discharge of KCB and an effective pretreatment technology to improve their microbiological safety and physicochemical properties. Furthermore, the potential of pretreated KCB powder as a filler material for biodegradable packaging was evaluated. Our developed CDS successfully lowered the moisture content of KCB by approximately 85%, thereby reducing the amount of KCB waste discharged by a kimchi manufacturing plant by 65%. An eco-friendly pretreatment technique was established to pulverize high-moisture KCB into micron-sized powders with improved microbiological safety and physicochemical properties. Biodegradable corn starch foam containers incorporating 15 wt% KCB powder exhibited better tensile strength and water resistance than those without KCB powder.

Our findings demonstrate that upcycling of KCB using the developed CDS and pretreatment technology into biodegradable packaging as a sustainable approach to mitigate the environmental pollution caused by KCB discharge from the kimchi industry.



Preparation of a novel gas scavenger based on sodium carbonate hydrogel for enhanced removal of headspace carbon dioxide in packaging

Jae Young Kim^{1,2*}, Youn Suk Lee¹

¹Department of Packaging, Yonsei University

²R&D Center, Nature Farm Corp.

A new sodium carbonate-based CO₂ scavenger for active food packaging was developed. Hydrogel, a three-dimensional network structure with sodium carbonate that encapsulates massive amounts of water, is a potential solution for CO₂ scavenging. PAAS (polyacrylic acid sodium salt) can allow the sufficient water holding performance needed for the chemical reaction without relying on external sources.

An approach of incorporating PAAS (polyacrylic acid sodium salt) into a hydrogel has enhanced the CO₂ scavenging capacity by increasing the gas-liquid contact area with Na₂CO₃ and CO₂ in the sodium carbonate based compounds.

The evaluation CO₂ scavenging capacity followed the modified pressure drop method. We investigated the pressure decrease according to CO₂ absorption of the hydrogel by placing CO₂ and experimental hydrogels in a closed chamber with pressure gauge and storing them at 10°C and 25°C.

The amount of CO₂ absorption capacity of the hydrogel was calculated from Idea Gas Law using the change in pressure gauge values. Ultimately, the comparison of absorption capacities between hydrogels was based on the carbonation reaction capacity, which is defined as the amount of CO₂ absorbed per 1g alkali metal carbonate.

The morphology and chemical structure was analyzed using FE-SEM and FT-IR spectrometer.

The result showed that the scavenging capacity of CO₂ at 0.5 wt% PASS level had 416.17 mg CO₂/g Na₂CO₃ after a 9-hour reaction at 25°C, resulting in a four-fold increase of CO₂ scavenging capacity compared to the control without PAAS.

In addition, value of the CO₂ scavenging capacity at 10°C was faster than that at 25°C.

The innovative stand-up pouch was designed with a double-wall film structure and fabricated by adding a novel mixture of CO₂ scavenging gel compounds between its outer film layer and the insider film layer. This study can be useful for developing the proper packaging for long-term storage or export of fresh Kimchi products.



A novel *Salmonella*-specific phage, vB_SalM_SE, and its application in contaminated milk for dairy products

Jaein Choe*, Jeongeun Park, Su-Hyeon Kim,
Beong Hyeon Na, Hyung-Joon Kim, Mi-Kyung Park

*School of Food Science and Biotechnology,
Kyungpook National University.*

Cow milk, which is highly nutritious, creates an ideal environment for the growth of microorganisms. Microbial contamination of raw milk and dairy products has become a great concern, thereby prioritizing safety of milk in the dairy industry. Although heat treatment of milk permits its safety, *Salmonella* contamination can occur through cross-contamination during processing. In this study, the microbiota of raw milk was identified through metagenomic analysis and the effect of heat treatment on microbial and proximate composition was investigated. After isolation of lytic *Salmonella*-specific phage, vB_SalM_SE, from cow manure, its genetic and biological characteristics were evaluated. Furthermore, its in vitro and in vivo bactericidal effect against *Salmonella* was evaluated to identify potential for biocontrol application. Metagenomic analysis of raw milk revealed that the dominant genus was *Pseudomonas* spp. (73%). After heat treatment, no bacteria were detected and there was no significant difference in proximate composition. Genomic analysis of vB_SalM_SE revealed that there were no genes encoding antibiotic resistance, virulence, and lysogenicity. vB_SalM_SE was stable at pHs 3–8 for 6 h and temperatures at 4, 10, and 37°C for 21 days. The optimal multiplicity of infection (MOI) and exposure time of phage were determined to be 0.1 and 4 h, respectively, based on the highest bactericidal reduction of ~3.2 log CFU/mL. In heat-treatment milk, the phage treatment with MOI 0.1 reduced *S. Enteritidis* up to ~2.8 log CFU/mL at 8 h. Thus, *Salmonella*-specific phage has a potential as biocontrol agent in dairy products during processing steps.



Changes of mycosporine-like amino acids in laver by roasting and preventative effect of shinorine on macular degeneration

Si-Hun Song*, Jeong-Yong Cho

*Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University.*

Mycosporine-like amino acids (MAAs) have been reported to exert health-beneficial effects, including photoprotective, antioxidant, anti-inflammatory, and anti-adipogenic properties. MAAs such as shinorine and porphyra-334 are considered as bioactive compounds in lavers (*Porphyra* spp). In particular, heat treatment converts MAAs to dehydrated MAAs with strong antioxidant activity in laver. However, studies on MAAs behavior in laver during roasting are limited. Therefore, this study investigated the change of MAAs in laver according to roasting temperature and time using LC-MS metabolomic analysis. In the LC-MS results, 61 metabolites, including MAAs (shinorine, porphyra-334, etc.) and dehydrated MAAs, were detected in roasted laver. Dehydrated MAAs were produced in large amounts in laver at higher temperatures and longer times during roasting. In addition, three MAAs (shinorine, porphyra-334, dehydrated porphyra-334) isolated from the 80% methanol extract of roasted laver were identified by MS and NMR experiments. Of them, shinorine effectively prevented macular degeneration via suppression of apoptosis, oxidation stress, and inflammation-related factors on adult retinal pigment epithelial-19 cells.



Reduction of caffeine kombucha production and fermentation characteristics using *Komagataeibacter saccharivorans* KS1

Da Eun Jang^{1*}, Seong-Jin Hong³, Hye jin Kim¹,
Ok Cheol Kim¹, Young-Min Kim^{1,2}

¹*Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University,*

²*Department of Food Science and Technology,
Chonnam National University,*

³*Research Institute of Agricultural Science and Technology,
Chonnam National University*

Kombucha beverage was produced using sugar and fermentative symbiotic culture of bacteria and yeast (SCOBY) to black and green tea extract. According to the MFDS, excessive consumption of caffeine can cause side effects such as headache, heart palpitations, sleep disorders, digestive disorders, and anxiety. Therefore, in this study, screened caffeine-reducing strains and identified bacteria. Using the strain, we produced caffeine-reduced kombucha and evaluated its fermentation characteristics (°Brix, pH, organic acids, catechins and caffeine) during fermentation times (0, 2, 4, 8 and 16 day). The °Brix of all kombucha decreased to range of 5.50 to 4.67 as a result of sugar consumption, and pH ranged from 5.66 to 2.41 due to organic acids production increasing fermentation times. The D-gluconic acid content was increased in caffeine-decreasing groups (#3, 4, 5, 6). While all samples of catechin contents did not show significant differences, the caffeine content showed the greatest reduction in kombucha #6 compared to kombucha #3, 4 and 5. Thus, caffeine-reduced acetic acid bacteria can be applied in various future beverage developments, including the production of kombucha, fermented coffee, tea, and other caffeine-containing drinks.



Effect of ice pack placement and capacity on quality indicators of minced meat in transport-simulated condition

Jeong Heon Kim*, Yea-Ji Kim, Ji Yoon Cha, Tae-Kyung Kim,
Min Kyung Park, Jae Hwan Ahn, Yun-Sang Choi

Food Processing Research Group, Korea Food Research Institute

Fresh meat is perishable, so various cooling methods are used in packaging and transport. Ice packs are commonly used, however, the cooling efficiency can be affected by the placement and capacity of each ice pack in the package, even though the total weight of ice packs was identical. Therefore, this study aims to investigate the effect of the placement and capacity of ice packs on various quality indicators of fresh meat during transport-simulated condition. The experiment was conducted with 1kg of minced pork and 1.5kg of ice packs in a delivery box, which were placed around the meat sides of one to six (1S, 2S, 3S, 4S, 5S and 6S). The pork packed without ice packs reached the maximum temperature the fastest. Color and TBARS were not significantly different between samples. The pH, VBN and microbial changes were delayed during 48 h, when the ice packs were placed in the locations more than 3 sides. Volatile compounds of pork with ice packs had less quantitative changes compared to pork without ice packs. This study suggests that ice packs with all sides can help maintain quality of fresh meat.



Significant impact of photopollution on skin carcinogenesis and amelioration by oleanolic acid

Min Jeong Kim^{1*}, Jin Young Min², Eun Hee Han²,
and Sung Keun Jung^{1,3}

¹*School of Food Science and Biotechnology, Kyungpook National University*

²*Korea Basic Science Institute (KSBI)*

³*Tailored Food Technology, Kyungpook National University*

Air pollution, intensified by fossil fuel consumption and wildfires, poses a global health threat, particularly to the skin. Ultraviolet (UV) radiation, especially UVB, is a well-known risk factor for non-melanoma skin cancer, further exacerbated by ozone depletion. Our study focuses on the effects of photopollution, combining coarse particulate matter (PM) and UVB exposure, on skin carcinogenesis, an area that remains poorly understood. We utilized a photopollution model with SKH-1 hairless mice subjected to prolonged PM and UVB exposure over 21 weeks. Our findings revealed significant upregulation of tumor progression markers such as cyclooxygenase-2 (COX-2), and proliferation markers including Proliferating cell nuclear antigen (PCNA), Ki-67, and Cyclin D1, in the photopollution-exposed group. Proteomic analysis identified a significant decrease in carbonic anhydrase 3 (CA3) as a marker for photopollution exposure, with CA3 mRNA and protein expression notably reduced both *in vitro* and *in vivo*. Additionally, we demonstrated that oleanolic acid inhibits the ERK-MEK and mTOR-p70S6K signaling pathways, suggesting its potential as a nutraceutical for mitigating photopollution-induced skin carcinogenesis. These results underscore the critical role of photopollution in skin cancer development and highlight the urgent need for comprehensive strategies to develop anti-pollution nutraceuticals to protect skin health.



Characteristics of edible films made from fish skin collagen hydrolysates blended with green tangerine peel extract

Sunita Gaikwad^{1*}, Mi Jeong Kim^{1,2}

¹*Interdisciplinary Program in Senior Human Ecology,
Changwon National University*

²*Department of Food and Nutrition,
Changwon National University*

A fish skin collagen hydrolysate based edible films integrated with different amounts (0–5%) of green tangerine peel extract (GTPE) was fabricated using the solution casting method. The formed films were evaluated for their physical and mechanical properties, 2,2-diphenyl-1-picrylhydrazyl radical scavenging activity (DPPH), total phenolic content (TPC), total flavonoid content (TFC), scanning electron microscopy (SEM), and fourier-transform infrared spectroscopy (FTIR). The hydrolysate films incorporating GTPE exhibited a colored tint, enhanced mechanical strength, and reduced solubility, moisture content, transparency and water vapor permeability. The film with 5% GTPE exhibited higher DPPH of 86.52% which is 12% higher than that of the control film (77.54%). The addition of GTPE from 0–5% increased both TPC and TFC from 1.0 to 3.18 mg GAE/g and 0.11 to 0.92 mg CE/g of films, respectively. SEM results showed that control films had uniform, void-free, and smooth surfaces, while films with GTPE exhibited a grainy structure indicating altered molecular arrangements. FTIR results revealed no chemical alteration in collagen hydrolysate-based films induced by GTPE incorporation.



Effects of different storage temperatures and harvest maturity on pineapple quality

G.H Li^{1*}, L.J Liu², Y.W. Chang¹

¹*Department of Food Science, National Taiwan Ocean University,*

²*Kaohsiung Hsin Nung Cooperative Society*

Pineapple is one of Taiwan's most popular tropical fruits. Low-temperature storage is commonly used for pineapples, yet causes inner-part chilling injury symptoms. Nowadays, to avoid chilling injuries most transportation temperatures are controlled at 12–13°C, but this also makes pineapples less mature when harvested. This study aimed to the impact of storage temperatures of 8°C and 10°C and different harvesting maturity levels of level 1 (less ripe) and level 2 (riper) on the quality of pineapples for 15 days. From the cross-sectional view, it can be seen that both maturity levels stored at 8°C showed signs of browning on the 10th day, and the browning was observed on the 15th day. However, both maturity levels stored at 10°C showed signs of browning on the 15th day. Additionally, the browning of lesser harvest maturity groups was more noticeable and reduced the L* values. The color change of the 10°C stored-maturity level 2 group was more obvious. There were no significant differences in sugar content and pH value for each group. The hardness was generally increased with storage time, but the groups with higher maturity will have lower hardness. Additionally, chewiness showed a distinctive result due to the difference in ripeness during harvesting. The chewiness of the group harvested with maturity 1 gradually decreased over time, while the chewiness of the group harvested with maturity 2 gradually decreased over time, increased, but there was no significant difference in the final 15 days.

Comparative physicochemical characteristics of lactic acid bacteria fermented extracts of *Cordyceps militaris* using brown rice and seven edible insects mixed medium

Won Hee Lee^{1*}, Chang Ki Huh^{1,2}

¹Department of Food Science and Technology,
Suncheon National University,

²Research Institute of Food Industry,
Suncheon National University

This study aimed to enhance the bioactivity and value of *Cordyceps militaris* by using a mixed medium of brown rice and seven edible insects. Extracts from *Cordyceps militaris* were fermented with *Lactobacillus bulgaricus* (Lb) and *Streptococcus thermophilus* (St). After fermentation, acidity decreased, while pH and available amino group increased. Total polyphenol content was highest in the *Tenebrio molitor* larvae (TM) fermented by St, at 35.23 mg/g. The cordycepin content was highest in the *Oxya sinuosa* (OS), *Allomyrina dichotoma* larvae (AL), and TM, and it was higher both before and after fermentation compared to the CB. Antioxidant activities generally improved with fermentation. The OS fermented by Lb had the highest DPPH free radical scavenging activity (68.05%), AL had the highest SOD-like activity (72.15%), and TM had the highest ABTS radical scavenging activity (57.33%).

Acknowledgement: This work was supported by Innovative Human Resource Development for Local Intellectualization program through the Institute of Information & Communications Technology Planning & Evaluation(IITP) grant funded by the Korea government(MSIT)(IITP-2024-2020-0-01489)



Production and characterization of rebaudioside D-like compound using glucosyltransferases as a potential sweetener

Hye-jin Kim^{1*}, Seong-Jin Hong², Da Eun Jang¹, Ok Cheol Kim¹,
Jeong-Yong Cho^{1,3}, Boo-Su Park⁴, Young-Min Kim^{1,3}

¹*Department of Integrative Food, Bioscience and Biotechnology,
Graduate School of Chonnam National University,*

²*Research Institute of Agricultural Science and Technology,
Chonnam National University,*

³*Department of Food Science & Technology,
Chonnam National University,*

⁴*Food Biotech R&D Center, Samyang Corp.*

Steviol glycosides are plant-derived zero-calorie sweeteners from *Stevia rebaudiana* BERTONI. Rebaudioside D of the steviol glycosides is 200 ~ 300 times sweeter than sucrose and it has no bitter aftertaste. However, it was naturally only in trace amounts, it has water solubility of only 600 mg/L and it restricts use for human consumption. In this study, rebaudioside D-like compound was synthesized by bio-conversion of various glucosyltransferases. The glucosyltransferase from *Leuconostoc citreum* synthesized α -glucosyl stevioside. The synthesized product was confirmed to rebaudioside A-like compound and molecular mass was 967.4. Then, UGT91D2 enzyme from *Stevia rebaudiana* which catalyze formation of β -1,2-glucosylation was transfer glucose to rebaudioside A-like compound. The synthesized product was confirmed to rebaudioside D-like compound and molecular mass was 1129.5. According to the stability studies, Alpha-glucosylated rebaudioside D was thermos-stable even at temperatures of up to 120°C and high stability in the pH 2.0–10.0 for 2 h. Alpha-glucosylated rebaudioside D improved the water solubility than rebaudioside D at 25°C for 1 month. Thus, alpha-glucosylated rebaudioside D are potential food additive for sweetening a variety of beverages and food products.



Optimizing lyophilized bacteriophage powder: viability, stability, and characterization for food application

Putri Christy Artawinata*, Su-Hyeon Kim, Su-Min Roh,
Chae-Eun Lee, Mi-Kyung Park

*School of Food Science and Biotechnology,
Kyungpook National University*

Bacteriophage is a virus that specifically infects bacteria, offer significant potential as a natural preservative. However, maintaining phage stability during storage and liquid form remains a challenge. The development of phage powder has emerged as a promising solution to enhance phage stability. Thus, this study aimed to determine the effects of lyophilization with different cryoprotectants (trehalose and polyvinylpyrrolidone [PVP]) and concentrations (0.5 and 1.0 M ; 1% and 2% w/v) on the stability of lytic phage-specific to *Salmonella* Enteritidis during storage. Two lytic phages, KFS-SE1 and KFS-SE2, were lyophilized and the optimal cryoprotectant was determined based on their different protective effect mechanisms. Dry powder yield and phage survival rate after lyophilization were assessed. Bacterial challenge assay was conducted to evaluate the phage post-lyophilization lytic activity at MOI of 1. Subsequently, the lyophilized bacteriophage was characterized for particle size with Nanoparticle Tracking Analysis (NTA) and for morphology using Scanning electron microscopy (SEM). Finally, the post-lyophilization stability of phage KFS-SE1 and KFS-SE2 were evaluated after two months of storage. The lyophilization process yielded 53–59% of phage powders. Lyophilization with cryoprotectants did not exhibit a significant reduction in phage titer, with trehalose 0.5 M demonstrating the highest phage survival rate of ~99% ($p < 0.05$) even after two months. Additionally, lytic activity of the phages against their host were not affected after lyophilization and storage. Moreover, no detectable damage was observed on the lyophilized phage structures. These findings proposed that the lyophilization of phages KFS-SE1 and KFS-SE2 enhance the post-lyophilization stability of phage for further application in food preservation.



***In vitro* evaluation on physiological activity of gut bacteria by kimchi**

Yerim Choi^{1*}, Jiyeong Lee², JeongOk Lee³,
Bashistha Kanth³, Bokyoung Lee^{1,3}

¹Department of Health Sciences,
The Graduate School of Dong-A University,

²Department of Medicinal Biotechnology,
Dong-A University,

³Department of Food Science and Nutrition,
Dong-A University

In kimchi fermentation process, lactic acid bacteria produce lactic acid which regulates the growth of various bacteria affecting quality of fermented foods. In this study, we have aimed to develop Kimchi Environment Medium System(KEMS) and an evaluation system to measure growth and physiological activities (antibacterial and antioxidant activity) of gut microbiota *in vitro*. Firstly, we established the KEMS using freeze-dried kimchi powder with four different levels of fermentation and confirmed the growth of gut microbiota in the kimchi environment. The growth of *Bifidobacterium longum*, known as intestinal beneficial bacteria, in KEMS, were also evaluated to assess an optimal concentration of addition of each lyophilized kimchi powder with different fermentation levels. In addition, we studied and compared the antimicrobial activity of *B. longum* and *B. uniformis* against harmful bacteria (*R. gnavus*, *H. hathewayi*, *F. nucleatum*) in KEMS was compared to that in suitable medium. We also studied the change in the antioxidant activity of gut bacteria by the fermentation level of kimchi was investigated by evaluating the antioxidant activity of incubated gut bacteria in KEMS. Thus, this study provides basic data on physiological activity of gut microbiota changed by kimchi according to its different degree of fermentation *in vitro* and thereby showing a new possibility of kimchi as sustainable future foods.



Impact of drying and subsequent storage on red pepper metabolites based on ^1H NMR

Dong-Hyeok Shin^{1,3*}, Dae-Yong Yun¹, Gi-Un Seong¹,
Jeong-Seok Cho^{1,2}, Seul-Ki Park², Jeong Hee Choi^{1,2},
Kee-Jai Park^{1,2}, Jeong-Ho Lim^{1,2}, Ji hyun Lee³

¹Food safety and distribution research group,
Korea Food Research Institute

²Smart food manufacturing project group,
Korea Food Research Institute

³Department of Food Science and Technology,
Chung-Ang University

Red pepper (*Capsicum annuum* L.) is pungent edible crop consumed globally for its high nutritional value, such as vitamins and minerals.

However, its high moisture-content makes red peppers vulnerable to environmental factors. Thus, drying is necessary to increase its availability.

^1H NMR spectroscopy was used to analyze the changes in metabolites following different drying methods (freeze-dry, hot air-dry, and sun-dry) and long-term storage at low temperatures (5 °C).

The higher levels of amino acids and sugars were observed in freeze-dried samples, while hot-air dried samples had higher levels of alanine and histidine, respectively, compared to other drying treatments, Sun-dried samples had increased citric and malic acids.

During long-term storage, significant changes in ten potential metabolite markers related to amino acids, sugars, and organic acids were identified and mapped to the metabolic network. The metabolic changes during storage were attributed to hypoxic stress, low temperature stress, microbial factors, and moisture stress.

This study provides valuable insight in understanding the changes in metabolites according to the drying treatments and during the long-term storage of red peppers. This information will help maintain the quality of red peppers during distribution and storage, resulting in a better product for consumers.



Physicochemical characteristics and biological activities of Alaska pollock skin collagen hydrolysate extracted using kombucha and microbe

Hui Jeong Lee^{1*}, Mi Jeong Kim^{1,2}

¹*Interdisciplinary Program in Senior Human Ecology,
Changwon National University*

²*Department of Food and Nutrition,
Changwon National University*

Kombucha drinks are generally prepared by symbiotic fermentation with acetic acid bacteria, lactic acid bacteria, and yeasts. Fermentation alters physical characteristics and transforms compounds like flavonoids and amino acids through yeast and bacterial reactions. This study aims to explore the potential of reducing fishy and foul odor through the kombucha fermentation compared to using yeast alone. Samples were extracted from the control (CON), microbe-assisted extraction (MAE) using *S. cerevisiae*, and fermentation with Kombucha (KAE) categorized into 1, 4, 8, 12, and 16 days. Physical characteristics including proximate compositions, amino acid composition, and antioxidant activities including ferric reducing antioxidant power and hydrophilic oxygen radical absorbance capacity, were assessed. Additionally, sensory evaluation, gas chromatography–mass spectrometry analysis, and E–nose analysis were conducted to detect odor-related compounds. The longer the fermentation periods, the lower the crude protein content, in contrast to increasing amino acids content. Both FRAP and H–ORAC levels increased with longer fermentation periods. Sensory evaluation indicated lower fishy and foul odor intensities in samples fermented with kombucha for shorter durations (KAE_1, KAE_4). GC–MS analysis of aroma components identified decanal, 2–nonanone, and methyl salicylate as the main components, while E–nose analysis revealed the presence of dimethyl disulfide and 1–propanethiol in samples after KAE_8. In conclusion, this study demonstrated that Kombucha fermentation will be the promising method for reducing fishy and foul odor in collagen hydrolysate extracted from Alaska pollock skin.



Modification of characteristics for plant-based meat analogs through high hydrostatic processing

Jeongmin Kim*, Gi-Hyung Ryu, Bon-Jae Gu

*Department of Food Science and Technology,
Food and Feed Extrusion Research Center,
Kongju National University*

High hydrostatic pressure (HHP), an emerging technology, has been recognized for enhancing meat's tenderness. However, its effects on plant-based meat analogs have not been thoroughly investigated. This study examines the effects of HHP on the characteristics of plant-based meat analogs. These meat analog products were formulated by combining isolated soy protein, wheat gluten, and corn starch in a 70:20:10 ratio. The effects of pressure (100, 200, 300, 400, 500, and 600 MPa) and treatment time (1 to 5 min) were evaluated.

The untreated control group exhibited higher hardness and chewiness than the sealed control group and the HHP-treated samples. Springiness decreased with HHP treatment, while cohesiveness decreased at pressures below 200 MPa but showed no significant difference from the control group at pressures above 300 MPa. Cutting strength varied with the level of HHP treatment. Additionally, increased HHP levels resulted in the loss of microfibrils within the fibrous structure and a reduction in the size and number of pores. The degree of texturization, an indicator of fiber structure formation, decreased with HHP treatment.



Exploration and standardization of functional compounds from milk thistle cultivated in Korea

Seung-Uk Yu^{1*}, Dong-Yup Hahn^{1,2}

¹*School of Food Science and Biotechnology,
Kyungpook National University,*

²*Department of Integrative Biotechnology,
Kyungpook National University*

Silymarin, a mixture of compounds rich in flavonolignans, exhibits varying compositions of functional ingredients depending on the species, cultivation methods, and environmental conditions. To establish a standardized methodology for evaluating milk thistle extracts as functional food materials, we explored the bioactive substances in milk thistle obtained through species development and cultivation methods. We also aimed to analyze individual isomers, which is a known challenge in the analysis of milk thistle's composition. In this study, 2.5 kg of milk thistle seeds provided by the Rural Development Administration (Jeonju, Korea) were extracted using methanol (MeOH). For the analytical methodology, HPLC, LC/MS, and NMR analyses were performed, and each compound was isolated using preparative HPLC. We identified and isolated individual isomers of flavonolignans and confirmed the molecular structure and bioactivity of the compounds. This study establishes a methodology for measuring and standardizing the value of milk thistle extract, contributing to its potential application as a functional food material.



Identification of marker compounds of lignans in *Schisandra chinensis* seeds and optimization of analytical methods

Seong Do Lee^{1*}, Dongyup Hahn^{1,2}

¹*School of Food Science and Biotechnology,
College of Agriculture and Life Sciences,
Kyungpook National University,*

²*Department of Integrative Biology technology,
Kyungpook National University*

This study aimed to isolate and identify lignans, the representative bioactive compounds in *Schisandra chinensis* seeds, and to explore compounds with novel structures or physiological activities, optimizing extraction methods accordingly. Using Vacuum Liquid Chromatography(VLC), we purified and analyzed the chemical structures through NMR and LC/MS. 9 compounds were isolated, all of which exhibited a dibenzocyclooctadiene lignan structure. The most bioactive compounds were identified, and an HPLC method for simultaneous analysis was established and validated. A standardized extraction method was developed based on the indicator compound content by adjusting the extraction solvent, temperature, and time. This study presented optimized extraction and analysis methods for *Schisandra Chinensis* seeds. The results revealed that dibenzocyclooctadiene lignans, with significant anti-inflammatory and immune-enhancing activities, are more abundant in seeds than fruits, highlighting their potential for developing new functional health foods.



Exploring functional ingredients from the seeds of red pepper (*Capsicum annuum* L.)

Hannah Chi^{1*}, Dongyup Hahn^{1,2}

¹Department of Integrative Biotechnology,
Kyungpook National University, .

²School of Food Science and Biotechnology,
College of Agriculture and Life Sciences,
Kyungpook National University

Capsicum annuum L., commonly known as the red chili pepper, is extensively used worldwide both as a spice and a vital element in traditional medicine. In Korea, it's particularly notable for being the most extensively cultivated spice. The seeds of this pepper, which make up about 4.14% of its fresh weight, are often discarded during the production of red pepper powder. However, recent studies have suggested that these seeds might hold valuable functional ingredients. This research aims to harness the potential of these overlooked by-products. The methanolic extract of the seeds of *C. annuum* was fractionated by vacuum liquid chromatography. Further subdivision of some fractions was achieved through size exclusion chromatography, followed by purification via preparative HPLC. Compound structure identification was conducted using ¹H NMR and LC/ESI/MS. This approach highlights the innovative utilization of red pepper seeds, typically discarded as by-products, in developing valuable functional ingredients, thereby contributing to sustainable practices in agricultural processing.



Evaluating the efficacy of fermented green tea in reducing inflammation and alleviating arthritis symptoms

Dong-Gyu Kim*, Deog-Hwan Oh

*Food Science and Biotechnology,
School of Agriculture and Life Sciences,
Kangwon National University*

Green tea is renowned for its health benefits, primarily due to its rich polyphenol content. Fermentation can enhance these bioactive compounds, potentially improving their efficacy. This study aimed to evaluate the anti-inflammatory and anti-arthritic effects of green tea fermented with specific bacterial strains. We screened 31 bacterial strains for their ability to ferment green tea. The fermentation process was monitored by measuring Total Phenolic Content (TPC), Total Flavonoid Content (TFC) and antioxidant activity. Three bacterial strains were selected based on their ability to significantly enhance these bioactive compounds and antioxidant activity. The safety profiles of these three strains were established through in-vitro hemolysis and functional activities were screened bacteria alone. Based on the bacterial screening F1- *Lactobacillus sakei* was identified as potential strain. The strain identified as F1, *Lactobacillus sakei*, demonstrated the most significant enhancement of bioactive compounds post-fermentation. To evaluate the anti-inflammatory effects, we utilized the macrophage cell line RAW 264.7. For assessing cell toxicity in an arthritis model, we used the HIG-82 cell line. The F1 fermented green tea samples were effective in inhibiting pro-inflammatory cytokines while enhancing anti-inflammatory cytokines in the RAW 264.7 macrophage cell line. These findings support the potential of F1- *Lactobacillus sakei* fermented green tea as a natural therapeutic agent for managing inflammation and arthritis symptoms.



Antioxidant quality characteristics according to ultrasonic extraction time of various varieties of persimmon leaves

Minh Huy Tieu¹, Johnson Olowoniyi¹, Hye Kyung Moon²,
Soo won Lee², Jong-Kuk Kim^{1*}

¹*Department of Food Service and Restaurant Industry,
Kyungpook National University.*

²*Center for Scientific Instruments Branch,
Kyungpook National University*

Extraction has long been thought to benefit from ultrasound as a complementary method to increase efficiency over the same length of time. In this experiment, we use ultrasonic waves at five, ten, twenty, thirty, and sixty minutes to apply extraction methods with a water:sample ratio of 1:10 on five different types of Korean persimmons leaf, including ‘Sangju–dungsi’, ‘Sangam–dungsi’, ‘Cheongdobansi’, ‘Gabjubaekmok’ and ‘Suhong’. After being collected, persimmon leaves are dried for thirty minutes at 100°C. Experiments on antioxidants such as total phenolic content, total flavonoid content, total tannin content, ABTS, and DPPH free radical scavenging capabilities were carried out. Our result revealed that all of ultrasonic–extracted samples performed better when compared to control samples. It’s also shown that ‘Gabjubaekmok’ persimmon are richer in antioxidant content and antioxidant activities among the sample. But for tannin content, the highest yield were found in ‘Suhong’ persimmon when extracted with sonication at 30 minutes.



Preserving areca nuts color: a combination of high-pressure processing and edible coating

T Sevi^{1*}, L.J Liu², Y.W. Chang¹

¹*Department of Food Science, National Taiwan Ocean University,*

²*Kaohsiung Hsin Nung Cooperative Society*

Areca nuts are the fourth most addictive commodity, following caffeine, nicotine, and alcohol. Around 700 million eastern and southern Asian individuals regularly chew the areca nut kernel, making it worth preserving. Areca nut characteristics will change during the shelf life, especially the physical quality. As the consumer, color plays a big role in the selection of areca nuts. Green-colored areca nuts are preferable to yellow ones, due to their tender texture and succulent taste. Furthermore, a browning reaction can occur during the storage, changing the skin color into a darker color. The practice of high-pressure processing (HPP) of 100, 200, 300, 400, 500, and 600 MPa combined with alginate-agar and chitosan edible coating on areca nut under cold storage ($5 \pm 1^\circ\text{C}$) has been conducted to maintain the color quality. The observation showed that higher pressure (200–600 MPa) promotes browning on areca nuts' skins and be seen on the first day which changed the visible color value (L, a, b, and ΔE). The observations were done for the 100 MPa-pressurized and edible-coated areca nuts for 14 days under cold storage. The combination of 100 MPa-pressure and alginate-agar on samples showed lesser color difference than other treatments (8.40 ± 0.93 , $p < 0.05$). Nevertheless, unpressurized and 100 MPa-pressurized and chitosan-coated groups showed lower total chlorophyll content (1.76 ± 0.077 and 2.15 ± 0.04 mg/100 g, respectively). The results provide a case for further exploration of preservation methods for areca nuts to prevent deterioration.



Changes in quality characteristics during storage of Korean soy sauce added with onion juice according to heat sterilization conditions

Eun Hye Kim^{1*}, Chang Ki Huh^{1,2}

¹*Department of Food Science and Technology,
Sunchon National University*

²*Research Institute of Food Industry,
Sunchon National University*

Soy sauce is a traditional fermented food in Korea, commonly used to enhance the flavors of soups and seasoned dishes with its salty and umami taste. Its high salt content provides excellent storability, but to prevent spoilage by halophilic microorganisms during storage and distribution at room temperature, a heat sterilization process is necessary. Onion (*Allium cepa* L.), widely grown as seasoning vegetables worldwide, contain functional compounds like quercetin, with higher concentrations in the peels than in the peeled onion. Despite this, onion peels are often discarded as they are considered inedible. The objective of this study was to integrate onion juice into traditional Korean soy sauce and to evaluate the sterilization conditions necessary for commercialization. As the sterilization temperature increased, pH decreased and titratable acidity increased. A reduction in °Brix was observed post-sterilization. In terms of chromaticity, the L value declined over the storage period, while the a and b values increased. The quercetin component exhibited light sensitivity, with no significant difference observed in the sample on the 60th day. Neither *Bacillus cereus* nor *Clostridium perfringens* were detected, and the total bacterial count was comparable to that of commercially available soy sauce. This indicates that samples sterilized at 85°C for 30 minutes fall within a safe quality range. Sensory evaluation revealed that samples sterilized at 85°C for 30 minutes exhibited consistently high ratings.

Acknowledgements: This work was carried out with the support of "Cooperative Research Program for Agriculture Science and Technology Development (Project No. RS-2021-RD009901)" Rural Development Administration, Republic of Korea.



Phage vB_LmS_LM3 for controlling *Listeria monocytogenes* in dairy products: characterization, genomic analysis, and application in heat-treated milk

Jeongeun park*, Jaein Choe, Dae-Ho Lee,
Seung-Wan Cho, Jeong-Ah Yun, Mi-Kyung Park

*School of Food Science and Biotechnology,
Kyungpook National University*

Over ten years, 46% of multi-state outbreaks caused by *Listeria monocytogenes* (LM) have been associated with dairy products. Phage-based applications for controlling LM in dairy products majorly required high MOIs (>100). For practical purposes, newly isolated three-tailed *Listeria*-specific phages (vB_LmS_LM1, vB_LmS_LM2, and vB_LmS_LM3) were characterized, and vB_LmS_LM3 was employed to reduce LM in raw milk. Three phages were specific to LM only among 43 foodborne pathogens and 9 lactic acid bacteria. All three phages were stable at cold temperatures (4 and 10°C) for one month. However, vB_LmS_LM3 was stable at broad pH ranges of 3 to 7 for 6 h. The genome of vB_LmS_LM3 consisted of 39,955 bp and 63 ORFs without genes encoding antibiotic resistance, virulence, and allergenicity. In vitro bactericidal effect of vB_LmS_LM3 was found to have excellent lytic activity (3.6 logs) at an MOI of 1. When employed to heat-treated raw milk, vB_LmS_LM3 inhibited LM growth by 2.4 logs for 24 h, even at an MOI of 1. This study demonstrated the efficient inhibitory effect of vB_LmS_LM3 in heat-treated raw milk, highlighting its potential as a biocontrol agent against LM in dairy products.



Application of deep learning for predictive modeling of foodborne pathogens in growth media and food samples

Hwa-Young Lee*, Sang-Soon Kim

*Department of Food Engineering,
Dankook University*

The accurate prediction of foodborne pathogen growth is important in food safety area. Recently, advanced machine learning algorithms are utilized to elucidate the intricate interactions between food environments and microbial growth. This study aims to propose an advanced deep learning framework to enhance the precision predictive models. Specifically, various strategies were implemented to improve the prediction accuracy of *Bacillus cereus* growth trends in diverse food metrics, through ComBase database. The predictive models comprised an approximation model for forecasting log growth values and a classification model for assessing risk levels. The models were developed using Neural Designer software and coded within the Colaboratory environment, followed by a performance comparison. Model enhancement was further validated through data filtering processes employing k-means clustering and DBSCAN techniques. To confirm the model's practical applicability in food safety predictions, experimental data from diverse environments were compared with the model's predicted outcomes. This innovative model framework provides an enhanced approach for the prediction of foodborne pathogen growth at various environmental conditions.



신선 농산물의 저장성 및 품질 향상을 위한 가공법 제시 및 병원성 대장균(*Escherichia coli* O157:H7) 제어 기술 개발

정민영*, 김연주, 배재우

서울여자대학교 식품공학과

최근, 신선편이식품 시장이 커지면서 밀키트 등의 새로운 형태의 식품이 제조 및 판매되고 있다. 하지만, 대다수의 밀키트는 소형 점포 및 무인 매장의 형태로 판매되고 있어 이에 대한 안전성 문제가 대두되고 있다. 이에 본 연구에서는 미생물 오염도 평가에 따른 가공 및 포장 방식을 제시하는 한편 위해 식중독균을 제어하기 위한 효과적인 방안을 개발하고자 하였다. 우선, 밀키트 제품에서 주로 사용되는 신선 농산물(파, 양파, 홍고추, 애호박)의 미생물학적 오염실태를 확인하고 다양한 절단 방법(어슷 썰기, 깍둑 썰기)과 포장 방법(밀봉, 진공)에 따른 저장성을 확인하였다. 그 결과, 파와 애호박의 경우 절단 방법에 관계없이 진공 포장 샘플에서 최대 3일 동안 일반 세균의 성장을 효과적으로 억제되었다. 하지만, 양파의 경우 어슷 썰기한 샘플에서, 홍고추의 경우 깍둑 썰기한 샘플에서 각각 저장 기간 동안 세균의 성장이 효과적으로 억제되었다. 다음으로, 신선 농산물에서 오염 문제가 심각한 장출혈성대장균(*E. coli* O157:H7)을 효과적으로 제어하기 위한 새로운 세척 방법을 개발하고자 하였다. 이를 위해, 다양한 농도의 카프릴산(Caprylic acid, CA)을 미열 처리(50℃)와 병용 처리하여 항균 활성을 확인하였다. 흥미롭게도, 병용 처리가 개별 처리에 비해 항균 효과를 유의적으로 향상시켰다. 이러한 항균 효과의 증대는 주로 세포막 손상의 증가로 인한 것임을 확인하였다. CA와 미열의 병용 처리를 4종의 신선 농산물에 적용하였을 때 모든 농산물에서 *E. coli* O157:H7를 효과적으로 제어했다. 병용 처리는 애호박을 제외한 모든 신선 농산물의 색상에 영향을 미치지 않았으며, 처리 전후 경도 차이도 모든 농산물에서 관찰되지 않았다. 본 연구의 결과는 신선 농산물에 따른 가공 방식과 포장 방식을 결정하는 데 있어 중요한 기초자료로 활용될 수 있을 것으로 생각된다. 또한 신선 농산물에서 *E. coli* O157:H7 오염을 효과적으로 제어할 수 있는 새로운 세척 방식으로써 CA와 미열 병용 처리의 적용 가능성을 보여준다.

Identification of quercetin and luteolin derivatives as osteoclast differentiation inhibitors from safflower leaves

Seon-Jin Lee*, Jeong-Yong Cho

*Department of Food Science & Technology,
Chonnam National University*

Safflower (*Carthamus tinctorius* L.) is widely cultivated for food and medicine materials in East Asia. Safflower seeds have been reported to exert anti-osteoporosis in several osteoblast, osteoclast, and animal experiments. However, studies on the anti-osteoporosis activity of safflower leaves are limited. Therefore, this study evaluated osteoclast differentiation inhibitory activities of safflower leaves and identified quercetin and luteolin derivatives as the bioactive compounds. Hot water and ethanol extracts of safflower leaves effectively inhibited RANKL-induced osteoclast differentiation in BMDMs. Fourteen compounds with seven quercetin and luteolin derivatives isolated from safflower leaves were structurally determined by MS and NMR experiments. Seven quercetin and luteolin derivatives significantly inhibited RANKL-induced osteoclast differentiation in BMDMs. Especially, quercetin derivatives showed more effective osteoclast differentiation inhibitory activity via NFATc1, TRAP, cathepsin K, and DC-STAMP than luteolin derivatives. Seven quercetin and luteolin derivatives mainly increased during the growth period of safflower leaves in LC-MS metabolite analysis.



Optimization of micro-encapsulated probiotics for *in vitro* digestion stability and evaluation of efficacy in atopic dermatitis

Se Won Park^{1*}, Changheon Lee¹,
Daeung Yu^{1,2}, Mi Jeong Kim^{1,2}

¹*Interdisciplinary program in Senior Human Ecology,
Changwon National University*

²*Department of Food and Nutrition,
Changwon National University*

This study aimed to develop micro-encapsulation technology to enhance the gut survival of *Lactobacillus* for treating atopic dermatitis. The research comprised three main parts: micro-encapsulation of *Lactobacillus casei* MCL (LC) and *Lactobacillus sakei* CVL-001 (LS); optimization of the mixture formulation including LC, LS, and *Saururus chinensis* (Lour.) extract (SE); and establishment of an *in vitro* atopic dermatitis (AD) skin model using the optimal mixture. The probiotics micro-encapsulation process was optimized using response surface methodology (RSM) to evaluate survival rate, yield, and nitric oxide assay (NO). The storage stability, *in vitro* simulated gastrointestinal digestion, anti-inflammatory properties, and characteristics of encapsulated LC (ELC) and encapsulated LS (ELS) were assessed. To obtain the optimal formulation (OF), a mixture design was employed using SE, ELC, and ELS with proportions determined by the NO (SE 80%, ELC 10%, and ELS 10%). The efficacy of OF in suppressing atopic dermatitis was evaluated using qRT-PCR and experiments on an artificial skin model mimicking human skin structure. ELC and OF significantly reduced relative levels of cytokines and chemokines in LPS-stimulated RAW 264,7 cells and TNF- α /IFN- γ induced HaCaT cells, confirming their anti-inflammatory and anti-atopic effects. These findings were also observed in the human skin model, demonstrating the effectiveness of OF in suppressing inflammatory responses.



Method validation and quantification of phospholipids in K-agricultural foods

Ho-Chang Kim*, Jeung-Hee Lee

*Department of Food and Nutrition,
Daegu university*

An analytical method using high performance liquid chromatography–evaporative light scattering detector (HPLC–ELSD) was validated for qualitative and quantitative analysis of phospholipids (PLs) to establish a functional component database of K–agricultural foods (grains, fruits, and vegetables) both before and after cooking. The PLs identified were N–acyl phosphatidylethanolamine (NAPE), phosphatidylethanolamine (PE), phosphatidylcholine (PC), sphingomyelin (SM), phosphatidylserine (PS), phosphatidylinositol (PI), lyso–phosphatidylethanolamine (LPE), and lyso–phosphatidylcholine (LPC). The PLs analysis method was validated by specificity, linearity, sensitivity, and precision. The coefficient of determination (R^2) of the calibration curve was all above 0.99, indicating good linearity. The each PL standard peak was well separated in HPLC chromatogram without interference, confirming the specificity. The limit of detection (LOD) and quantification (LOQ) were 0.4~2.6 $\mu\text{g/mL}$, and 1.0~9.6 $\mu\text{g/mL}$, respectively. Most K–agricultural foods contained PC in the highest amount, while NAPE, PE, LPE, LPC, SM and PS were present in small or trace amounts, except in mushrooms. Total PLs content was the highest in mushrooms (507.2~1,472.6 mg/100g DW) with the highest content of PE (1,046.4~2,799.7 mg/100g DW). Especially LPC in grains tended to be increased by 1.37~2.39 times during cooking in white rice, buckwheat noodles, and barley. This study validated the phospholipid analysis method, and confirmed that the composition and content of PLs in agricultural foods varied, and that the PLs content was influenced by cooking.



Isolation and bioactivity evaluation of phytochemical compounds from *Salvia hispanica* L. (Chia seed) seed oil residue

Hwanyun Lee^{1*}, Dongyup Hahn^{1,2}

¹Department of Integrative Biotechnology,
Kyungpook National University,
²School of Food Science and Biotechnology,
College of Agriculture and Life Sciences,
Kyungpook National University

This study investigates the underutilized residue of *Salvia hispanica* L. (chia seed) from chia oil extraction to enhance its value by exploring its phytochemical and bioactive properties. Phytochemical extraction utilized a dichloromethane/methanol (DCM/MeOH) mixture, followed by fractionation using hexane, ethyl acetate, butanol, and water. Hexane and ethyl acetate fractions underwent vacuum liquid chromatography, resulting in fractions HX1–HX4 and EA1–EA3. EA1–EA3 were further fractionated using Sephadex LH-20 size exclusion chromatography, and compounds were purified through preparative high-performance liquid chromatography (HPLC). Compound structures were elucidated using liquid chromatography–mass spectrometry (LC–MS) and proton nuclear magnetic resonance (¹H–NMR). A standardized extraction method was developed, optimizing temperature, time, and solvent parameters to maximize the bioactivity of the extracts. This method confirms the potential of chia seed residue as a high-added-value product. Further *in vitro* and *in vivo* testing is recommended to fully harness the residue's value.



Inhibitory effects of Chinese bushclover on adipogenesis of 3T3-L1 preadipocytes

Yeju Jeong^{1,2*} and Choon Young Kim^{1,2}

¹Department of Food and Nutrition, Yeungnam University,

²Research Institute of Human Ecology, Yeungnam University

Adipogenesis is one of the crucial molecular targets for combating obesity. Despite of Chinese bushclover (CB)'s diverse biological roles, its potential as an anti-obesity agent remains unknown. CB extract completely inhibited the intracellular lipid accumulation by suppressing the levels of genes related to adipogenic transcription factors and lipogenesis. Notably, CB extract exerted its inhibitory effects primarily during the early and intermediate stages of adipogenesis. In consistently, CB extract reduced the endoplasmic reticulum (ER) stress and the autophagy in the early and intermediate stages. Since CB extract suppressed the gene expression of peroxisome proliferator-activated receptor γ (PPAR γ) which is a master regulator of adipogenesis, the molecular docking study using AutoDockTools was performed. Among the polyphenols identified in CB extract by, ellagic acid and catechin exhibited a high affinity with PPAR γ protein. Thus, the results suggested that CB extract is a functional ingredient with anti-adipogenic activities through the suppression of ER stress, autophagy and PPAR γ .



Microbial communities altered by *Metschnikowia pulcherrima* improve makgeolli quality

Di Wang^{1*} and Sae-Byuk Lee^{1,2}

¹School of Food Science and Biotechnology,
Kyungpook National University,

²Institute of Fermentation Biotechnology,
Kyungpook National University

Saccharomyces cerevisiae is renowned for its high ethanol production capabilities and is widely utilized in various alcoholic beverage industries. Recently, various non-*Saccharomyces* yeasts have been found to produce diverse flavor compounds during the early stages of fermentation, prompting research into mixed fermentation with *S. cerevisiae* to enhance beverage quality. *Metschnikowia pulcherrima*, a non-*Saccharomyces* yeast, produces pulcherriminic acid during its growth, which sequesters environmental iron to form the reddish pigment pulcherrimin. This pigment is reabsorbed by the cell for metabolic use. The formation of pulcherrimin depletes iron from the environment, exhibiting an antagonistic effect that inhibits the growth of microorganisms lacking pulcherrimin transporter genes.

Microbial community analysis indicated a higher diversity of genera in *makgeolli* fermented with *M. pulcherrima*. The microbial community structure significantly varied with the inoculation levels of *S. cerevisiae*. Volatile aroma compound analysis by GC-MS revealed that *makgeolli* with higher *S. cerevisiae* inoculation in mixed fermentation with *M. pulcherrima* had the highest ester content. Sensory evaluation confirmed that this *makgeolli* received the highest scores for aroma and overall preference, with pronounced floral and fruity notes.

This study is demonstrated that the antagonistic effect of *M. pulcherrima* can alter microbial communities during fermentation, ultimately improving the sensory quality of *makgeolli* and potentially other alcoholic beverages. These findings are expected to significantly contribute to the quality improvement of various alcoholic drinks using non-*Saccharomyces* yeasts.



Antioxidant quality and characteristics of differently processed bee pollen

Johnson Olowoniyi¹, Minh Huy Tieu¹, Hye Kyung Moon²,
Soo won Lee², Jong-Kuk Kim^{1*}

*¹Department of Food Service and Restaurant Industry,
Kyungpook National University.*

*²Center for Scientific Instruments Branch,
Kyungpook National University*

Today's food industry is returning to natural foods, after emphasizing processed products due to the higher consumer demand for foods well-recognized with healthy nutrients. Bee pollen is known as a natural superfood due to its indispensable nutritional and medicinal properties. However, the antioxidant properties of bee pollen are ambiguous and vary greatly due to the difference in botanical and geographical origin. This study explored the antioxidant quality and characteristics of differently processed acacia bee pollen. Bee pollen samples used for this experiment were hot air-dried (30°C, 40°C, 50°C, and 80°C) and freeze-dried. The bee pollen samples were extracted with 70% ethanol in the proportion of 2:15, and shaken at 150rpm for 30 minutes at 70°C. The antioxidant parameters were measured, which include DPPH, ABTS, TPC, and TFC. It has been observed from this experiment that across all the parameters measured, bee pollen samples that were hot air-dried at 80°C had the highest yield. Also, in hot air-dried bee pollen samples, the experiment displayed a similar result trend in TPC and TFC. It shows that as the level of temperature increases, the yield of TPC and TFC also increases.



Capstone Design Competition

CDC-1

Upcycling of persimmon waste: a low-calorie sugar substitute for cookies and characterization of quality and sensory properties

Min Ji Choi^{1*}, Ui Jin Kim², Bo Young Jeon², Hae Su Hwang¹,
Hyeon Uk Kim¹, Su Jin Cha¹, Yeon Hee Kim¹, Mi Jeong Kim^{1,2}

¹Department of Food and Nutrition, Changwon National University
Interdisciplinary Program in Senior Human Ecology,

²Changwon National University

This study investigates the potential of persimmon powder (PP) prepared from imperfect produce of persimmons as a low-calorie sugar substitute in cookie. Cookies were formulated with different replacement levels of persimmon powder (0, 33%, 67%, and 100%) and their physicochemical, quality, and sensory characteristics were determined. The density and pH values of the dough were found to be highest in the control, with a gradual decrease observed upon the incorporation of PP. As the level of PP in the cookies increased, there was a corresponding increase in their moisture content. The spread ratio of cookies was positively correlated with the quantity of PP incorporated, while displaying negative correlation with the rates of loss and expansion. Furthermore, the lightness (L^* value) and hardness levels were decreased with the level of persimmon powder replacement. Sensory evaluation revealed high consumer preferences (appearance, taste, aroma, texture, and overall preference) for control cookies (0% persimmon powder) and those with 33% replacement. The intensity of the characteristic was heightened by quality attributes such as reduced loss rate, elevated moisture content, diminished hardness, and reduced L^* value, resulting in increased browning, reduced hardness, and heightened intensity of the sweet persimmon flavor and taste. These findings indicate the potential of imperfect persimmon powder as a functional ingredient in cookie production, promoting waste reduction and offering a potential low-calorie sugar substitutes with added flavor characteristics.

LC-MS-based metabolite analysis of laver hot water extract according to boiling time and quality characteristics of laver puree

Ji-Woo Hong*, Si-On Jung, Young-Hoon Jung, Seo-Hee Yang,
Seo-Jin Lee, Si-Hun Song, and Jeong-Yong Cho

*Department of Food Science & Technology,
Chonnam National University*

This study was aimed to investigate metabolite change of dried laver hot water extract according to extraction time by using LC-MS metabolomic analysis. Metabolite analysis of laver hot water samples prepared by boiling time (1–4 h) was carried out using UPLC-ESI-QToF-MS. Thirty-one metabolites, including 6 mycosporine-like amino acids (MAA) and 4 dehydrated MAA, were identified in the hot water extracts of laver. In principal component analysis (PCA) results for laver hot water samples prepared with different boiling time. There were clearly classified into three groups, Metabolites, including MAAs, dehydrated MAAs, and amino acids, gradually increased in laver during boiling. In addition, puree was prepared using dried and roasted lavers. Physicochemical characteristics of two puree samples were similar. The total phenolic compound content and ABTS+ radical-scavenging activity of the roasted laver puree were significantly higher compared to those of the dried laver puree. Dehydrated MAA produced by roasting might be partially contributed to radical-scavenging activity of the roasted laver puree.



일반 하우스 재배와 스마트팜 재배 딸기(설향)의 수확시기별 이화학적 조성 및 항산화 활성 비교

김성균^{1*}, 신지원^{1*}, 문서연¹, 허창기^{1,2}

¹순천대학교 식품공학과, ²순천대학교 식품산업연구소

스마트팜 재배는 작물의 생육 정보 및 환경 정보 등의 빅데이터를 활용하여 식물의 최적 환경 조건을 만들어 생산성과 품질을 높이는 기술로 참외나 콩 등 다양한 작물을 재배하는데 사용되고 있는 기술이다. 딸기 역시 시설 재배 작물로서 스마트팜을 활용하여 재배하기에 적합한 작물이다. 딸기는 비타민과 무기영양이 풍부하고 항산화 및 심혈관 질환 예방 등의 다양한 효능이 보고되고 있으나, 일반 하우스 재배와 스마트팜 재배 딸기의 품질특성 비교에 대한 연구는 아직 전무한 실정이다. 따라서 본 연구에서는 수확 시기별 일반 하우스 재배 및 스마트팜 재배딸기의 품질 특성을 비교하기 위해 일반성분과 항산화 활성을 비교하였다. 시료는 수확 즉시 세척 후 -40℃에서 동결하였고, 시료 수집이 완료된 후 동결건조하여 분말 상태로 -20℃에서 보관하며 사용하였다. 수분 함량은 동결 건조한 딸기 분말을 측정된 결과 24.48~26.78% 범위로 측정되었다. 일반성분 조성을 측정된 결과 일반 하우스 재배와 스마트팜 재배 딸기의 모든 시료구에서 조단백질, 조지방, 조회분 및 조섬유 함량의 유의적 차이를 보이지 않았고, 수확 시기에 따른 성분의 변화 또한 유의적 차이가 크지 않았다. 총 폴리페놀 함량은 일반 하우스 재배 딸기는 600.10~948.78 mg GAE/mg였고, 스마트팜 재배 딸기의 경우 517.61~535.16 mg GAE/mg로 일반 하우스 재배 딸기가 높게 나타났고, 총 플라보노이드 함량 또한 일반 하우스 재배 딸기는 18.37~52.89 mg QE/mg였고, 스마트팜 재배 딸기는 15.46~30.73 mg QE/mg로 대체적으로 일반 하우스 재배 딸기가 높게 나타났다.

Lipid profile of duck meat by parts and cooking

Myeong-Ju Kim*, Sang-Gyu Lee, Jeung-Hee Lee

Department of Food and Nutrition, Daegu University

The study compared the cholesterol and phospholipid content, and the fatty acid composition of different parts of duck meat (neck, drumette, wing, breast, thigh, drumstick, skin) before and after cooking (oven, 200°C, 20 min). Crude lipid content was highest in the skin; after cooking, it decreased in the drumette, breast, and skin, and increased in the neck, wing, thigh, and drumstick ($p < 0.05$). Cholesterol content in the skin (233,788 mg/100g) was significantly higher than in the other parts ($p < 0.05$). After cooking, cholesterol content increased in most parts (except for the breast and drumstick), with the highest content in the skin (309,271 mg/100g). The phospholipids in duck meat were composed of phosphatidylcholine (65 mg/100g–508.6 mg/100g), phosphatidylethanolamine (17.3 mg/100g–134.9 mg/100g), sphingomyelin (16.1 mg/100g–79.6 mg/100g), and phosphatidylserine (5.9 mg/100g–32.2 mg/100g). After cooking, the total phospholipid content increased in the neck, drumette, thigh, and skin, but decreased in the wing, breast, and drumstick ($p < 0.05$). The main fatty acids were oleic acid (31–51%), palmitic acid (18–24%), and linoleic acid (13–18%) with small amounts of palmitoleic acid and arachidonic acid. After cooking, palmitic and linoleic acids tended to increase, while oleic acid decreased. This study demonstrated that the composition of lipid profiles in duck meat varied and was affected by different parts and the cooking process.

Evaluation of microbial contamination in portable tumbler

Gippeum Kim*, Yejin Park, hyerim Ji, Jung-Beom Kim

*Department of Food Science & Technology,
Suncheon National University*

This study attempted to evaluate the hygiene status of the portable tumbler by investigating of microbial contamination inside the portable tumbler in use. The type of the portable tumbler was divided into 25 stainless steel sealed type, 25 stainless steel semi-sealed type, 25 plastic sealed type and 25 plastic semi-sealed type. The contamination of total aerobic bacteria was 3.4 ± 1.7 , 3.1 ± 1.8 , 2.8 ± 2.1 and 3.9 ± 1.9 log cfu/100 cm² in stainless steel sealed type, stainless steel semi-sealed type, plastic sealed type and plastic semi-sealed type, respectively. The detection of coliform bacteria was 5 (20%), 8 (32%), 6 (24%) and 4 (16%) in 25 stainless steel sealed type, 25 stainless steel semi-sealed type, 25 plastic sealed type and 25 plastic semi-sealed type, respectively. The results of a questionnaire on the washing cycle of 100 users of portable tumblers was once a week (16%), twice a week (13%), four times a week (29%), five times a week (8%), six times a week (1%), seven times a week (8%) and others (19%). From these results, it was judged that the correct cleaning frequency and method of the portable tumbler was necessary.



블랙베리옥수수 속대 첨가 막걸리 제조 및 그 품질특성

이영서*, 박혜진, 이가연, 이서진, 서수희, 조정용

전남대학교 식품공학과

블랙베리옥수수(*Zea mays L.*)는 심혈관질환, 비만, 당뇨 등 다양한 생리활성을 발휘하는 안토시아닌을 풍부하게 함유하고 있어 짙은 보라색을 띤다. 특히 블랙베리옥수수 알곡보다 속대에 월등히 높은 양의 안토시아닌을 함유하고 있다. 식품 부산물인 블랙베리옥수수 속대의 이용성을 높이기 위한 새로운 가치 창출에 관한 연구가 요구된다. 따라서 본 연구에서는 블랙베리옥수수 속대 추출물을 첨가하여 막걸리를 제조하고 그 막걸리의 품질특성 및 LC-MS 기반 대사체 분석을 실시하였다. 그 결과, 블랙베리옥수수 속대 추출물의 첨가는 알코올 생성에 영향을 주지 않았으나 높은 총산도와 낮은 pH에 영향을 끼쳤다. 또한, 블랙베리옥수수 속대 추출물 첨가 막걸리는 무첨가 막걸리에 비해 총 페놀성 화합물 함량, 총 플라보노이드 함량, 총 안토시아닌 함량 및 ABTS+ 라디칼 소거능이 높았으며, 농도 의존적으로 증가하였다. 또한 LC-MS 분석을 통해 막걸리의 제조 과정 중 블랙베리옥수수 속대 유래 안토시아닌과 플라보노이드의 변화 양상을 파악하였다. 이상의 결과로부터 기호성 및 건강기능성이 증진된 막걸리 제조에 있어서 블랙베리옥수수 속대 추출물의 활용이 기대된다.

해조류 청각을 활용한 제빵 특성 연구

고흔주*, 김유빈, 모혜미, 김정목

국립목포대학교 식품공학과

세계적으로 해조류의 영양학적 우수성과 환경친화적인 가치가 주목받기 시작하면서, 해조류에 대한 수요와 공급이 증가하고 있다. 국내에서는 현재 김, 미역 등 한정된 소수의 해조류만이 주목받고 있다. 청각(*Codium fragile*)은 식품학적 가치가 충분함에도 불구하고, 제품 개발 및 상용화가 부족하여 김치의 부재료(또는 반찬) 따위로만 국한되어 활용되고 있다. 청각은 식이섬유와 미네랄(Mg, Ca, Fe 등)이 풍부하고 항산화능과 면역활성 기능도 알려져 있다. 그러나 이와 같은 식품학적 가치를 입증하는 연구 사례들이 존재함에도 불구하고, 청각에 대한 개발 및 제품화는 현재까지도 현저히 미흡하다. 본 연구에서는 기존의 생 청각보다 보관과 사용이 용이하고, 장기간 저장이 가능한 청각 분말을 원료로 사용하여 ‘청각 소금빵’을 개발하고자 하였다. 본 연구는 현시대 인기 소비트렌드인 ‘소금빵’을 접목시킨 ‘청각 소금빵’을 개발함으로써 청각의 이용 가능성과 활용도를 증대시키는 것을 최종 목표로 한다. 또한, 해당 제품의 품질 및 영양·기능성 평가를 통해 청각 활용 제품의 가치를 입증 하고자 한다. 품질 평가 항목으로는 발효 팽창력, 굽기 손실률, 반죽 수율, 내외부 색도, 내외부 경도 측정 실험으로, 빵의 일반적 품질특성 및 대조군과의 품질특성 차이 정도를 분석하였다. 영양·기능성 평가 항목으로는 Mg, Ca 함량, 총 식이섬유, 조단백 함량, DPPH 라디칼 소거 활성능과 총 페놀분석법을 통한 항산화능 활성이 있다. 본 연구를 통해 전라남도 특화 양식 수산자원인 청각의 이용 가능성을 확대 하고, 해조류 가공식품 개발에 기여함으로써 지역 해조류 산업의 활성화를 기대해 본다.

건강지향 어묵스낵 제조를 위한 진공어묵유탕기술의 온도 및 시간 최적화

최윤서^{1*}, 김호진¹, 안영현¹, 이정석¹

¹Department of Seafood Science Technology,
Institute of Marine Industry,
Gyeongsang National University

본 연구에서는 건강지향 어묵스낵 제조를 위한 진공저온유탕기술의 온도 및 시간 최적화를 실시하였다. 어묵스낵 제조의 경우 유탕 온도(A, X_1 , 88.7~111.3℃) 및 시간(B, X_2 , 6~18분)을 최적화하여 중심합성계획(Central Composite Design, CCD)에 따라 독립변수를 설정하였다. 이에 따라 X_1 및 X_2 를 5단계로 부호화하여 무작위로 제조한 11구 시료구의 종속변수는 수분(Y_1), 조직감(Y_2) 및 종합적 기호도(Y_3)로 설정하였다. 어묵스낵의 수분, 조직감 및 종합적 기호도를 모두 충족할 수 있는 최적 온도 및 시간은 각각 98.1℃에서 12분으로 도출되었다. 이들의 최적 조건을 적용하여 제조된 어묵스낵의 경우 수분은 2.6 ± 0.1 g/100 g, 조직감은 148.0 ± 5.0 및 종합적기호도는 8.1 ± 0.2 점이었으며, 예측값과 실측값 간의 유의적인 차이는 없었다. 따라서, 건강지향 어묵스낵 제조를 위한 진공저온유탕 기술의 온도 및 시간 최적화를 위한 최적조건에 대한 모델 설정은 적합한 것으로 판단되었다.



술지게미로 제조한 맥주의 품질 특성

진주영*, 김가현, 정승희, 이아름, 김현중

국립목포대학교 식품공학과

술지게미(주박)란 탁주를 빚을 때 발생하는 양조 부산물로서 식이섬유를 포함한 탄수화물, 단백질, 지방 등 3대 영양소가 풍부한 고부가 가치 원료이며 단백질과 아미노산이 풍부하여 일반식으로 섭취할 수 있는 수준의 영양성분을 가지고 있다. 최근 국제청 주류규계개선방안 발표로 술지게미의 엄격한 제조 시설 이용제한이 완화되면서 다양한 식품소재로 연구되고 있다. 본 연구는 술지게미의 맥주 원료로서의 가치를 평가하며 술지게미와 맥아를 비율별로 배합하여 제조한 맥주의 품질 특성 분석을 통해 폐기되는 술지게미의 활용 방안을 제안하고 이용량 증대에 목적을 두었다. 술지게미와 맥아의 일반성분인 수분, 조회분, 조지방, 조단백질, 탄수화물을 분석하였으며 배합 비율별로 제조된 맥주의 관능평가를 통해 맥아와 지게미의 비율을 5:5로 설정하고 제조한 맥주의 관능평가 및 가용성 고형분 함량, pH, 알코올 함량의 이화학적 품질 분석을 통해 진행하였다. 또한 제조된 맥주와 지게미의 항산화력은 DPPH법과 총 폴리페놀 분석을 통해 비교하였다. 일반성분 분석의 결과로 술지게미의 수분은 13.79%, 조회분 0.41%, 조지방 3.31%, 조단백질 1.68%, 탄수화물 80.81% 함유하고 있음을 확인하였다. 본 연구의 결과로 술지게미를 활용하여 맥주의 원료인 맥아의 대체 식품 소재로서의 가능성을 확인하였고 폐기되는 술지게미의 식품으로서의 활용 가치를 높일 수 있을 것으로 기대한다.

키토올리고당을 첨가해 보존성을 향상시킨 K 제육볶음 소시지의 개발

문채현*, 김대환, 이용환, 윤재승

목포대학교 식품공학과

본 연구는 K-food에 대한 전 세계적인 관심이 증가하는 추세에 맞춰, 한국의 전통 음식인 제육볶음을 외국인에게도 익숙한 소시지 형태로 개발하고자 하였다. 소시지의 생산 과정에서 필수적으로 사용되는 아질산염은 *Clostridium botulinum*에 대한 정균작용과 육색소 고정, 풍미 향상 등의 역할을 하지만, 그 자체의 독성과 소장에서 생성되는 니트로소아민의 위험성 때문에 건강에 유해할 수 있다. 이에 따라, 천연 항균물질인 키토산 및 키토올리고당을 사용하여 아질산염을 대체하거나 저감화한 소시지를 제조함으로써 더 건강하고 안전한 식품을 개발하고자 하였다.

소시지 제조 과정에서는 적육과 지방의 비율, 양념 배합, 케이싱 종류 등 다양한 변수를 조절하여 최적의 맛을 갖춘 제품을 개발하였다. 적육과 지방의 비율은 70:30이 가장 적절하였으며, 양념 배합은 유명 레시피를 따랐을 때 가장 높은 관능 평가 점수를 받았다. 양념을 볶아서 사용하는 방식이 소시지의 외관과 풍미에 긍정적인 영향을 미쳤으며, 케이싱은 양장이 가장 우수한 결과를 보였다.

키토올리고당은 키토산을 정제하여 얻은 물질로, 수용성이 강해 식품에 적용이 용이하다. 이들의 항균력을 확인하기 위해 paper disc법을 사용하였으며, *Salmonella typhimurium*로 실험 한 결과 아질산염 7ppm과 키토올리고당 1%를 사용한 소시지가 가장 뛰어난 항균력과 저장성을 보였다. 이를 통해, 아질산염의 사용을 최소화하면서도 건강하고 안전한 소시지를 제조할 수 있었다. 본 연구는 전통적인 한국 음식의 맛과 특성을 유지하면서도 현대적인 소비자들에게 건강한 식품 옵션을 제공함으로써 K-food의 세계화에 기여할 수 있을 것으로 기대된다.

인공지능을 활용한 식품 건조 공정 최적화를 위한 예측 모델 구현

이병욱^{1*}, 이승비², 배동호¹

¹건국대학교 축산식품생명공학과, ²경북대학교 식품공학부

식품을 오랫동안 저장하고 원거리 유통을 위한 건조 방법은 수 세기 동안 인류가 활용하고 발전 시켜온 기술이다. 최근 탄소 저감 이슈로 친환경 에너지를 사용하는 태양열 건조와 저에너지를 이용하여 효율적으로 식품의 수분을 제거할 수 있는 삼투 건조 방법이 주목 받고 있다. 식품 건조 공정의 최적화는 에너지 소비와 시간을 절약시켜 탄소 배출 감소와 자원 낭비를 방지할 수 있다. 본 연구에서는 미세천공 태양초 건조와 정과류 삼투 건조 최적화를 위해 수행되었다. 중심합성실험설계법에 따라 각 건조 방법의 독립변수(천공조건, 용액농도, 온도 등)를 설정하고 실험 조건에서 반응변수(중량변화, 건조속도, ASTA값 등) 데이터를 수집하였다. 수집한 데이터를 기반으로 Chat GPT를 활용하여 인공지능 학습에 필요한 데이터를 증강 생성시켰다. 생성된 데이터를 학습하여 랜덤 포레스트법으로 회귀 분석하고 건조 모델을 도출하였다. 인공지능 학습에 의해 도출된 랜덤 포레스트 회귀 분석 모델 적합도는 RMSE, R² 값으로 평가하였다. 미세천공 태양초의 ASTA값에 대한 건조 모델의 RMSE 0.2041, R² 0.9962였고, 당절임 중량감소율에 대한 삼투건조 모델의 RMSE 0.0192, R² 0.9999로 두 건조 모델 모두 높은 적합도를 나타냈다. 인공지능 건조 모델의 예측값을 실측값과 비교한 결과 ASTA 예측값은 63.9, 실측값은 62.9로 나타났고, 삼투건조 중량감소율 예측값은 75.2%, 실측값은 75.8%로 나타나 예측값의 신뢰도가 높음을 알 수 있었다. 이상의 결과에서 인공지능 분석기법을 활용하여 식품 건조 모델을 도출하고 건조공정을 최적화 할 수 있을 것으로 판단되었다.

Manufacturing process of anti-stress functional kombucha and kombucha jelly using *L*-theanine

Ji-Won Kim^{1*}, Min-Gyeong Kim¹, Min-Hyeong Kim¹,
Seoung-Yeon Kim¹, Da -Eun Jang², Young-Min Kim^{1,2}

¹*Department of Food Science and Technology,
Chonnam National University*

²*Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University*

L-Theanine has the effects of reducing stress and enhancing concentration in humans. This study aimed to manufacture anti-stress functional kombucha by increasing *L*-Theanine content using 'Geumda' and 'Anji Baicha' tea cultivars and compared it with kombucha supplemented with *L*-Theanine powder. Functional kombucha jelly was produced using this anti-stress kombucha. After 19 days of fermentation, the *L*-Theanine content was highest in Anji Baicha (24.93 ± 00.00 mg/100 mL). Kombuchas made with first flush tea from Boseong and Geumda showed a decrease in *L*-Theanine content over the 19-day fermentation period. Anji Baicha Kombucha maintained a relatively stable *L*-Theanine content throughout fermentation and recorded the highest overall preference in sensory evaluation. Kombucha supplemented with *L*-Theanine after fermentation ranked second in overall preference and showed no significant differences in pH, °Brix, total acidity, and texture compared to Anji Baicha kombucha. Through this experiment, we aimed to provide basic data on the green tea fermentation methodology and the study of changes in *L*-Theanine in the kombucha fermentation environment can be provided.



해조류를 활용한 쌀베이글 제조에 관한 연구

이혜리, 김서인*, 김세현, 정지호, 곽창환,
김민지, 김영현, 나승아, 차재윤

동아대학교 식품영양학과

생활 수준의 향상과 다양한 정보 입수 용이성에 따라 소비자의 건강에 대한 관심이 증가하면서 건강 지향적인 제품을 선호하고 있다. 식사 대용으로 많이 판매되고 있는 밀가루 베이글 대신 글루텐 알레르기가 있는 사람들까지 고려해 쌀가루를 사용한 베이글을 만들고 영양적 가치가 높은 해조류인 톳과 매생이를 접목시켜 건강한 베이글을 개발하고자 하였다. 글루텐프리 쌀가루에 빵의 식감을 살리기 위하여 타피오카 전분을 첨가하였다. 매생이와 오징어 먹물을 사용하여 영양적인 면을 충족시킴과 동시에 색감을 부여하였고, 톳을 이용하여 식감을 살림으로써 먹는 즐거움을 충족시키고자 하였다. 베이글의 식감을 살리기 위한 타피오카 전분의 첨가량은 글루텐프리 쌀가루 첨가량의 1/3로 하는 것이 가장 적합하였으며, 매생이와 오징어 먹물의 수분함량에 차이가 있기 때문에 물 첨가량을 달리하여 연구를 진행하였다. 두 베이글의 굽는 온도와 시간에도 차이를 두었는데, 매생이를 혼합한 쌀베이글은 180℃에서 15분을, 오징어 먹물을 혼합한 쌀베이글은 170℃에서 20분을 굽는 것이 가장 좋은 식감을 나타내었다. 베이글에 해조류인 톳과 매생이를 첨가하여 각각 칼슘 권장섭취량의 17%, 엽산과 철의 권장섭취량의 22.2%를 충족시킴으로써 현대인들에게 부족한 철분 칼슘 등의 다양한 무기질을 보충해줄 수 있고, 글루텐프리 및 저지방 고식이섬유 식품으로 건강적인 측면에서도 긍정적 효과를 줄 수 있었다.

아마란스를 이용한 기능성 비건 아이스크림 제작

최가원*, 문채은, 지성경, 한다운

동아대학교 식품영양학과

아마란스는 혈당 조절, 콜레스테롤 감소, 항산화 작용의 기능이 있는 곡물이다. 이러한 기능성을 활용하여 건강에 도움을 주는 '기능성 비건 아이스크림'을 제작하는 것을 본 연구의 목적으로 한다. 아마란스는 다른 곡물에 비해 단백질 함량이 17%로 높기 때문에 기존 아이스크림보다 단백질이 풍부한 제품을 만들 수 있다. 또한, 식물성 원료를 사용하여 건강과 환경을 고려한 비건 아이스크림을 개발하고자 한다. 본 개발 제품의 구성 재료는 불리고 삶은 아마란스를 베이스로 사용하고, 볶은 아마란스를 토포으로 채택하였다. 대체 감미료로는 알룰로스, 올리고당, 나한과를 혼합하여 사용하였고, 식물성 우유는 오투우유와 쌀우유를 혼합하여 베이스를 구성하였다. 최종 제품의 질감과 식감을 개선하기 위해 캐슈넛을 유지로 사용하였다.

최종 레시피에 따라 제조된 아마란스 비건 아이스크림은 1회 제공량인 100ml를 기준으로 기존 제품에 비해 낮은 열량 151kcal, 낮은 당류 5.45g(5%), 낮은 지방 6.1g(11%), 그리고 높은 단백질 4.64g(10%)의 영양성분을 구성한다. 혈당 실험을 통해 6명의 피실험자를 대상으로 아이스크림 섭취 후 혈당 변화를 확인한 결과, 공복 혈당 평균 93mg/dL에서 2시간 후 평균 91.1mg/dL로 혈당이 약 1.9 저하됨을 확인하였다. T-test를 통해 이러한 혈당 변화가 통계적으로 유의하다는 것을 확인하였으며, 통계적으로 유의한 결과를 보였다. 이는 개발해 낸 아마란스 비건 아이스크림이 혈당 조절에 긍정적인 영향을 줄 수 있다는 것을 나타낸다. 본 연구는 아마란스 비건 아이스크림의 개발 과정과 가능성 입증을 제시하였다.

아마란스 비건 아이스크림은 건강과 환경 뿐만 아니라 맛도 고려한 제품이다. 따라서 헬시플레저 푸드를 선호하는 요즘 시대에 국내외 어디서든 아이스크림 시장의 확장에 기여할 수 있다.

생기총총 “초석잠 곤약젤리”의 제조

박가연^{1*}, 손세열¹, 이동민¹, 장유진¹, 박소연¹,
 이다빈¹, 차지혜¹, 박상현¹, 홍가형¹, 박지현²,
 오수민², 임수빈², 김오연^{1,2}

¹동아대학교 식품영양학과, ²동아대학교 일반대학원 건강과학과

초석잠은 항산화 활성, 항염 효과가 있는 뿌리열매로 최근 집중력, 인지 향상에도 효과가 있을 것으로 보고되었다. 다만 특유의 알싸한 맛으로 활용도가 낮아, 생리활성 성분의 장점은 유지하되 남녀노소 편리하고 맛있게 섭취가능한 간식형 제품을 개발하고자 하였다. 실험을 통해 노년층 타겟 큐브형 저칼로리 초석잠 젤리와 청년층 타겟 짜먹는 스틱형 사과맛 초석잠 젤리를 선정하였다. 초석잠은 시간, 농도 의존적으로 높은 DPPH 라디칼 소거능을 보였고, 관능평가에서 평균 4.0, 4.4점의 높은 선호도를 보였으며, 쓴맛은 각각 2.3, 2.0점으로 개선됨을 보였다. 레올로지 테스트로 수분감 있는 시판 젤리와 비교하였을 때, 경도, 강도, 탄력성이 유사했다. 결론적으로 초석잠의 생리활성 성분은 유지하고 선호도에 맞게 맛을 개선하여 남녀노소 즐길 수 있는 젤리의 제품화 가능성을 제시하였다.

푸룬과 우유를 이용한 건강한 양갱 개발

홍한비*, 김민지, 정태규, 이나운, 박설화,
이경민, 최희선, 이보경

동아대학교 식품영양학과

푸룬은 칼륨, 비타민 K 등 뼈 건강에 도움이 되는 영양소가 풍부함에도 불구하고, 현재 푸룬관련 제품들은 장 건강 효능에 중점을 두고 소비되고 있으며, 푸룬을 활용한 제품의 종류도 단순 가공 제품에 국한되어 있다. 따라서, 본 연구에서는 노인분들의 장 건강 및 뼈 건강을 위한 간편 건강식품으로 푸룬에 우유를 첨가한 양갱 제품을 개발하였으며, 개발의 주안점은 다음과 같다. 첫째, 푸룬의 질긴 질감과 과한 신맛을 보완하기 위해 펄레 형태로 제조하여 섭취에 용이하게 하였다. 두 번째로, 양갱과 유사한 식감을 구현하기 위해 백앙금, 한천 가루, 젤라틴을 사용하여 단단하고 쫄쫄한 식감을 구현함과 동시에 고소한 맛까지 추가하였다. 백앙금은 부드러운 단맛을 제공하며, 한천가루와 젤라틴은 식품의 탄력성을 높여준다. 이러한 조합은 양갱 특유의 식감을 재현하는 데 중요한 역할을 한다. 마지막으로, 락토프리 우유와 대체당을 사용하여 노인의 소화 개선과 칼슘 섭취에 도움이 되도록 하였다. 개발된 최종제품은 푸룬과 우유를 통해 얻는 영양학적 효과와 간편한 섭취 방식을 제공하며 노년층에게 유익한 간식으로 인식될 것으로 예상된다. 또한 대체당의 사용으로 당뇨 등 노인성 질환이 있는 이들에게 부담 없는 간식 섭취가 가능하다. 틀에 넣어 만드는 제품 특성상 다양한 디자인의 적용이 가능하며, 영유아를 위한 크기와 디자인으로도 쉽게 변형이 가능한 장점이 있다.

All-in-one container for milk and cereal

Hojin Jung*, Minseong Son, Youn-Je Park

*Department of Food Science and Technology,
Kongju National University*

Generally, cereal has been ingested with milk. As cereal and milk are contained separately, another dish is needed to eat them. In this study, an all-in-one container was developed, in which cereal and milk are contained together and it is not necessary for an additional container to mix them. To make it, 1 liter milk cartons and polypropylene film were used. Milk and cereal were contained in one milk carton, however, they were separated by polypropylene film. To eat them, the polypropylene septum has to be pierced or eliminated to mix milk and cereal in one container. 5 kinds of designs were developed to open the septum. The most effective method was to tie the septum to the incision line and then eliminate the septum when the incision line was removed. The height of the incision line was determined, and the mixing time and milk residue volume were experimented according to the slope of the septum. Finally, the optimal size of the hole in the septum was 2×1 cm. It is considered that this container could be a convenient and innovative product to help people easily eat meals consisting of cereal and milk, anytime and anywhere.



소형화 스낵 개발을 통한 지속 가능한 제품 전략 연구

정윤성*, 김민혜, 류지성, 엄가은, 정종욱

동아대학교 식품생명공학과

본 연구는 지속 가능한 제품 개발을 목표로, 소비자 트렌드를 반영하여 장기적으로 판매 가능한 크루키(Crookie)를 소형화 한 마이크로키(Microookie)를 개발하고자 한다. 이를 위해 시장 조사(Market Research), 문헌 조사(Desk Research), 신규 트렌드(New Trend)를 분석하였다. 크루키는 크로와상과 쿠키를 결합한 독특한 과자로, 소비자 만족도 및 브랜드 충성도 증가, 시장 경쟁력 강화, 국내외 시장 진출 등의 효과를 기대할 수 있다.

통상적인 재료를 이용한 독창적인 조합을 통해 맛의 다양성을 극대화하고, 차별화된 텍스처와 풍미를 구현할 계획이다. 또한 사업화 및 창업, 제품 포트폴리오 확대, 마케팅 및 프로모션 전략을 통해 크루키의 성공적인 시장 진입을 도모하고자 한다. 제품의 소비자 수용성과 시장 경쟁력을 종합적으로 분석하여 마이크로키(Microookie)가 지속 가능한 식품으로 자리 잡을 수 있는 가능성을 상승시키는 것이 본 연구의 주요 목표다.

결론적으로, 최신 소비자 트렌드를 반영한 혁신적인 제품 개발을 통해 소비자에게 새로운 미각적 경험을 제공하고, 기업의 시장 경쟁력을 확보하는 데 기여하고자 한다.



Production of slow-digestible isomaltooligosaccharides and novel steviol glycosides using transglucosidase from *Thermoanaerobacter thermocopriae*

Jong-Hyeok Kim*, Yoon-Ju Seo, Jin-Hwa Lee, Young-Min Kim

*Department of Food Science and Technology,
Chonnam National University*

Transglucosidase derived from *Thermoanaerobacter thermocopriae* (TtTG) is an enzyme known to catalyze transglycosylation reactions by hydrolyzing α -1,4 glycosidic bonds and transfer into α -1,6 glycosidic linkages. Isomaltooligosaccharides (IMOs), which are mainly consist of α -1,6 glycosidic linkages, have been reported many studies to possess prebiotic effects and various functional properties. However, commercial IMOs predominantly contain oligosaccharides with a degree of polymerization (DP) of 4 or less. Recently, some studies have shown that IMOs are hydrolyzed by gastrointestinal enzymes, leading to a rapid increase in blood glucose levels. Therefore, global companies are focusing their research on producing high-DP IMOs using 4,6- α -glucosyltransferase (4,6-GT) to overcome the limitations of commercial IMOs. In this study, we investigated the production of high-DP IMOs by comparing the capabilities of TtTG and 4,6-GT, as well as examining the reaction of TtTG with commercial maltooligosaccharides (MOs) and IMOs. And TtTG was evaluated for its potential as a transglycosylation enzyme using stevioside. When TtTG and 4,6-GT were reacted with α -1,4 substrates for 12 h, TtTG produced IMOs DP 8, whereas 4,6-GT produced IMOs until DP 6. For α -1,6 substrates, reaction mixture using 4,6-GT did not react with α -1,6. However, TtTG measured IMOs ranged from DP 1 to 9. TtTG reacted with 10% commercial IMOs and MOs for 24 h, producing IMOs by the highest DP 7 and 8, respectively. And two novel glycosides were measured by a reaction using substrate (maltose 0.1%) and acceptor (stevioside 0.4%) with TtTG for 12 h. In conclusion, TtTG can produce high DP IMOs compared to 4,6-GT. This capability allows for the development of slow-digestible IMOs that overcome the limitations of commercial IMOs.



두부크림과 글루텐프리 페스츄리를 이용한 건강한 디저트 개발

정혜지*, 고수정, 김제언, 홍민서, 정종욱

동아대학교 식품생명공학과

이 연구에서는 식물성 단백질이 풍부한 두부를 활용한 두부크림과 밀가루 대신 쌀가루를 이용한 글루텐프리 페스츄리 생지를 이용하여 건강한 디저트를 개발했다. 이 디저트는 얇은 페스츄리 반죽에 두부크림과 팔랑금을 더해 얇은 페스츄리 반죽을 덮어 구워낸 형태로, 코로나 이후 건강한 간식에 대한 관심이 높아지는 점을 반영한 것이다. 두부크림은 일반 우유 생크림과 휘핑크림에 비해 포화지방 함량이 낮고, 식물성 단백질, 아미노산, 칼슘, 철분 등의 무기질이 풍부하다. 또한 식이섬유가 풍부하여 배변활동에도 도움을 주며, 두부의 고소함이 더해져 달콤한 생크림을 사용하는 것보다 맛이 더욱 풍부한 특징이 있다. 글루텐은 밀과 보리, 호밀 등 곡류에 함유 되어 있는 불용성 단백질로 특정 체질을 가진 사람에게 복통과 소화장애 등을 유발한다고 알려져 있다. 따라서 이 디저트는 밀가루를 못 먹거나 소화가 어려워 빵을 먹지 못하는 사람도 편하게 먹을 수 있게 100% 쌀가루를 이용해서 만든 글루텐 없는 반죽으로 만들어졌다. 이 연구는 두부를 활용한 식물성 크림의 활용과 글루텐 프리 페스츄리 기반의 디저트 개발을 통해 맛뿐만 아니라 건강과 영양상의 장점을 제공한다는데 의의가 있다.

배추 무름병 제어를 위한 박테리오파지 기반 친환경 생물학적 제어제의 개발

노수민*, 이재은, 박효진, 김민성, 박미경

경북대학교 식품공학부

배추 무름병은 원인균인 *Pectobacterium carotovorum* subsp. *carotovorum* (PCC)가 배추의 상처 부위로 침입하여 갈색 반점, 병반을 형성하며 감염 부위 및 배추 전체가 무르고 썩는 병이다. 무름병은 발병 후 치료가 거의 불가능하여 피해가 극심하며, 농림축산식품부의 보고에 따르면 무름병으로 인해 최대 30%의 배추 재배 면적에서 피해가 발생한 것으로 보고되었다. 현재 무름병 방제를 위해 농용항생제(가스가마이신, 옥시테트라사이클린, 옥솔린산, 폴리옥신비, 스트렙토마이신, 발리다마이신에이)가 주로 사용되고 있으나, 이는 PCC 외 다른 유용 미생물의 사멸, 환경오염, 항생제 내성균 출현 등의 문제를 초래할 수 있다. 이에 대응하여 최근에는 숙주 세균을 특이적으로 감염 및 용균시키는 박테리오파지가 새로운 방제 기술로 주목받고 있다. 따라서, 본 연구는 PCC에 특이적 박테리오파지를 이용하여 배추 무름병 제어를 위한 친환경 생물학적 제어제를 개발하고자 한다. 경상북도 배추밭에서 수거한 흙으로부터 PCC 특이적 박테리오파지 KFS-PCC6를 분리 및 정제한 후, 농업 환경에서의 안정성을 확인하기 위하여 KFS-PCC6를 UV와 농용항생제 6종에 1시간 동안 노출시킨 후 plaque assay를 수행하여 역가를 비교·검토하였다. 이후, 다양한 multiplicity of infection(MOI) 조건(0.001 - 10)에서 KFS-PCC6를 PCC에 처리한 후 PCC 저감화 효과를 관측하여 KFS-PCC6 최적 처리 조건을 결정하였다. 또한, in vivo 상 PCC 제어 효과를 검증하기 위해 배추 모종에 KFS-PCC6와 농용항생제를 분무법으로 각각 단독 및 병용 처리한 후, 질병 중증도를 비교 분석하였다. 실험 결과, 본 연구에서 분리한 KFS-PCC6는 UV 처리 및 농용항생제 6종에 대해 모두 안정하였으며, 가장 낮은 MOI 0.001 조건에서 3시간 처리 시, PCC를 약 5 log CFU/mL 만큼 유의적으로 감소시켰다($p < 0.05$). 또한, 배추 모종 대상 KFS-PCC6 단독 및 병용 처리한 결과, 대조군에 비하여 무름병 중증도가 각각 87.78%, 51.28% 감소하여 in vivo에서 무름병 제어 효과를 입증하였다. 따라서, KFS-PCC6은 PCC에 대해 효과적인 생물학적 제어제로서의 활용 가능성을 제시하였으며, 이를 바탕으로 증량제 첨가 및 제제 개발 시 배추 무름병 방제에 더욱 효과적으로 기여할 수 있을 것으로 기대된다.

천연 항균 소재를 첨가한 저염동치미의 저장성 연장

오승연*, 하승연, 박동희, 민영서

국립목포대학교 식품공학과

동치미는 가염(加鹽)의 방법을 사용하여 무를 소금에 담가 발효시킨 것으로 무나 배추를 주로 섭취하는 김치류와 달리 국물을 함께 섭취하며 즐기는 우리나라 전통발효식품이다. 동치미의 국물은 상큼하고 기분 좋은 청량감을 줌과 동시에 많은 섭취하는 염의 양을 증가시키는 요인이 된다. 본 연구는 염도를 낮춘 저염 동치미에 천연항균물질을 첨가하여 저장기간을 향상시킨 저염 동치미를 개발하고자 하였다.

먼저, 동치미의 저장성 연장과 풍미향상에 도움을 줄 것으로 기대되는 천연소재로써 녹차, 매실, cardamom을 선정하였다. 이어서 선발된 녹차, 매실, cardamom을 열수, 70% 에탄올, 95% 에탄올을 이용하여 추출하였다. 이들 각 추출물을 김치류 발효에 관여하는 주요 젖산균인 *Lactobacillus plantarum*, *Leuconostoc mesenteroides*, 발효 시 산막을 발생시키는 산막효모인 *Candida sake*, *Pichia kluyveri* 에 대한 paper disc 실험과 최소억제농도(MIC)실험을 진행하였다.

그 결과, 매실과 녹차 70% 에탄올 추출물 뛰어난 항균활성을 보였다. 또한 매실과 녹차 70% 에탄올 추출물을 첨가하여 일반적인 동치미의 소금농도(2%)에 비해 50%이상 소금농도를 낮춘 동치미(소금농도 0.3%, 0.5%, 1%)를 제조하였다. 각각의 조건으로 제조한 동치미를 30일간 pH, 산도, 염도, 총균수, 젖산균수 등을 측정하였다. 그 결과 천연 항균소재 첨가에 의해 염도를 낮춘 저염 동치미의 저장 연장 가능성이 확인되었으므로 이를 보고하고자 한다.

식품 보존성 향상을 위한 청도반시 추출물 기반의 식품포장용 친환경 항균 젤라틴 필름 제작

김형준*, 윤정아, 박민건, 임준영, 박미경

경북대학교 식품공학부

코로나-19 이후 HMR, 배달음식 시장이 급격히 성장함에 따라, 식품의 저장과 유통에 사용되는 플라스틱 포장재의 배출량이 증가하였다. 그러나 플라스틱의 낮은 분해능으로 인해 생태계 파괴와 환경오염이 심각해지면서 이를 해결하고자 생체고분자 기반 생분해성 필름 연구가 주목받고 있다. 그 중, 젤라틴은 FDA로부터 GRAS 물질로 분류되어 인체 안전성을 인정받았으며, 필름 형성능 및 산소 차단성이 우수한 필름 포장 소재이지만 높은 습도 조건에서 수분을 흡수하여 포장재 내 미생물 증식을 촉진할 수 있다. 이를 보완하고자, 천연 항균 소재가 첨가되는 연구가 진행되었으며, 청도반시는 탄닌, 폴리페놀, 카테킨 등 생리활성 물질이 풍부하여 항균 활성을 갖는 것으로 알려져 있다. 따라서, 본 연구에서는 청도반시 추출물을 첨가하여 친환경 항균 젤라틴 필름을 제작하고, 이를 식품 산업에서 활용하기 위해 항균 활성을 분석하였다. 경상북도 청도군[㈜행복한감]으로부터 제공받은 미숙과를 추출 및 동결건조하여 감 추출물을 제조한 후 수율과 탄닌 함량을 측정하였다. 감 추출물의 항균 활성을 측정하기 위해 21종의 식중독균에 대해 dot assay를 실시하였다. 감 추출물 젤라틴 필름 제조를 위해, 젤라틴을 2.7% 글리세롤과 혼합 및 중탕하였고 다양한 농도의 감 추출물을 첨가 후 건조하였다. 제조된 감 추출물 젤라틴 필름의 항균활성을 확인하기 위해 식중독균을 접종 및 배양 후, 농도를 측정하였다. 청도반시 추출물의 수율과 탄닌 함량은 각각 15.4%, 2.3 mg CE/g로 결정되었고 *L. monocytogenes*, *Salmonella spp.*, *E. coli* O157:H7에 대해 높은 항균 활성을 나타낸 것으로 확인되었다. 또한, 감 추출물을 필름에 첨가하였을 때 3종의 식중독균을 $\sim 2.0 \log$ CFU/g 저감화하였다. 따라서 청도반시 감 추출물이 첨가된 친환경 항균 젤라틴 필름의 식품 포장재로서의 활용 가능성을 확인하였고 이는 기존의 젤라틴 기반 식품 포장 필름의 한계점을 보완하여 식품의 보존성 향상에 기여할 것으로 기대된다.

Antidiabetic efficacy evaluation and material research of fermented sorghum using lactic acid bacteria strains

Dong Ho Kim*, Dong Gyu Kim, Deog Hwan Oh

*Department of Food Biotechnology,
Kangwon National University*

Diabetes is the fastest growing health problem worldwide over the past 20 years. Synthetic drugs used to treat diabetes can cause gastrointestinal side effects such as abdominal distension and diarrhea, raising the need for research into natural treatments. Sorghum, one of the major grains, contains a large amount of polyphenols that are beneficial for preventing metabolic syndromes such as diabetes, but research on this is still insufficient. Based on the inhibitory activity test of TPC, DPPH, α -amylase, and α -glucosidase of sorghum extracts, M19, M20, and S07 showed high antidiabetic activity. Among the three types of sorghum that showed high antidiabetic activity, M20 was used to select the optimal lactic acid bacteria through a bioconversion process. *Pediococcus acidilactici* was selected as the optimal lactic acid bacteria strain and the optimal bioconversion process time is 72 hours. M19 and M20, which underwent a bioconversion process using *Pediococcus acidilactici*, showed higher antidiabetic activity before milling. This study is expected to contribute to solving the problem of side effects of diabetes treatments and increase the possibility of using domestic agricultural products, including sorghum, as high value-added products.



Timetable for Poster Sessions

Poster Presentation Schedule

8.28(WED) 14:00 ~ 8.30(FRI) 11:30 (BEXCO, Rm 5A)

1. All posters are required to be posted on 8/28.
2. Remove your poster by the Closing Ceremony on 8/30.

Poster Session Evaluation I	Time	Poster No.
	<u>Standing Time</u> 8.29(THU) 11:30-12:30	Even Number
Poster Session Evaluation II	Time	Poster No.
	<u>Standing Time</u> 8.29(THU) 17:30-18:10	Odd Number

◆ Please check your poster number in the conference proceedings

◆ Poster Presentation Guidelines

- You are required to complete both the posting and removal of your poster personally.
- Please use 3M tape and pins to attach your poster; double-sided tape is prohibited.
- The recommended poster size is 90 cm wide × 120 cm~130 cm high.
- Presenters are required to be at their poster during the designated Standing Time to answer questions. Failure to do so will result in exclusion from the poster awards.
- The announcement of the Outstanding Poster Award winners will take place on August 30 (Fri) at 11:10 AM in Room 5A.



Poster Session

PART I

저장/포장/유통

P1-01

Evaluation of storage safety and quality characteristics of wheat under different packaging conditions in plasma storage

Hyun-Joo Kim^{1*}, You-Geun Oh¹, Kyeong-Hoon Kim², Jin Hee Park³,
Seungmin Ryu⁴, Hong Sik Kim¹, Yu-Young Lee¹, Moon Seok Kang¹

¹Department of Central Area Crop Science, National Institute of Crop Science,
Rural Development Administration, ²Rural Development Administration,

³Wheat Research Team, National Institute of Crop Science,
Rural Development Administration,

⁴Plasma Technology Research Center, Korea Institute of Fusion Energy,

P1-02

Development of postharvest handling manual of green onions (*Allium fistulosum* L.) in Korea

Ji Weon Choi^{1*}, Mi Ae Cho², Ji Hyun Lee¹, Min-Sun Chang¹,
Hyang Lan Eum¹, Haejo Yang¹, Yoon Pyo Hong¹

¹Postharvest Technology Division, NIHHS, RDA

²Cheonsu Mountain Medicinal Herb Research Association

P1-03

Effects of low-dose electron beam irradiation on the quality characteristics of *Pa*-kimchi during refrigerated storage

So Yoon Park^{1,2*}, Suk-Min Yun^{1,2}, Ho Hyun Chun¹

¹Kimchi Industry Promotion Division, World Institute of Kimchi

²Department of Integrative Food, Bioscience and Biotechnology,
Graduate School of Chonnam National University

P1-04

Effect of the cold plasma treatment on the quality of the shiitake mushrooms during storage

Yonghyun Kim*, Hyun Ji Eo, Chul-Woo Kim, Uk Lee

Special Forest Resources Division, Forest Bioresources Department,
National Institute of Forest Science

P1-05

저온 숙성한 과일 농축액의 품질 특성

이은지*, 안지혜, 김소현, 문혜빈, 손일권, 김국환

(주)웰파인 R&D 연구소

P1-06

Development of compulsory air circulation curing chamber for sweetpotato storability improvement

Kim Yong Hoon*, Park June Hyuck, Choi Dong Soo,
Kim Jin Se, Park Chun Wan
Department of Agricultural Engineering,
National institute of Agricultural science

P1-07

레토르트 조건에 따른 칼라옥수수 품질특성 비교

권혜정*, 임재길, 박지선, 이하연, 맹진희, 엄남용,
임계현, 윤정애, 장경아
강원도특별자치도농업기술원 농식품연구소

P1-08

발효 기간에 따른 뜰보리수 열매 식초의 품질 특성 변화

최원영^{1*}, 위건¹, 김명성², 김영민¹, 조정용¹
¹전남대학교 융합식품바이오공학과
²참발효영농조합법인

P1-09

다양한 온습도 조건의 선별장에서 결로현상 방지를 위한 저온저장 사과의 온도 조절 지침

장소정*, 박윤문, 김종기, 박미향, 임은화, 임희택
(사)한국농식품유통품질관리협회

P1-10

채소 품목 별 산지유통센터에서의 수확후 관리기술 변화 분석

장소정*, 박윤문, 김종기, 박미향, 임은화, 임희택
(사)한국농식품유통품질관리협회

P1-11

주요 과실 품목별 소비자 선호 품질인자 분석과 활용

장소정^{1*}, 임희택¹, 박미향¹, 임은화¹, 황인근², 안재경³, 김종기¹
¹(사)한국농식품유통품질관리협회,
²(주)푸르센,
³협동조합 농식품산자유통연구원



P1-12

Influence of state/phase transitions on ice recrystallization in kimchi during frozen storage

Miran Kang^{1,2*}, MinJi Kim¹, Hyun-Jung Chung², Sung Hee Park¹

¹Technology Innovation Research Division, World Institute of Kimchi,
²Department of Integrative Food, Bioscience and Biotechnology,
Graduate School of Chonnam National University

P1-13

저장 기간에 따른 초절임 자색가지고추의 품질 특성 변화

박유진*, 서수희, 송시훈, 조정용

전남대학교 융합식품바이오공학과

P1-14

Optimization of blanching temperature and concentrations of vitamin c and sucrose for inhibition of browning in apple dices

Dawun Lee^{1*}, Jae-Hee Kim², Soo-Jung Kim^{1,2}

¹Department of Food Tech,
²Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University

P1-15

수분함량에 따른 MA포장 쌀의 품질변화

이현동*, 박희만, 손재용

농촌진흥청 국립농업과학원

P1-16

누룽지 장기보관 시 발생하는 이취 제어 방법에 대한 보고

박민수*, 김두은

전남대학교 푸드테크학과

P1-17

소비자 구매 후 저장 조건별 어묵류 소비기한 비교 연구

정수진^{1,2}, 강준구¹, 이하림², 하상도^{1,2*}

¹중앙대학교 일반대학원 식품안전규제과학과, ²식품생명공학과



P1-18

Quality characteristics of onions in different storage environments

Hyang Lan Eum^{1*}, Jae-Han Cho¹, Jeong Gu Lee¹,
Ji-Hyun Lee¹, Min-Sun Chang¹, JiWon Han²

¹Postharvest Technology Division,
National Institute of Horticultural and Herbal Science, RDA,
²Pallium Vegetable Research Institute,
National Institute of Horticultural and Herbal Science, RDA

P1-19

온도관리 및 세척방법에 따른 상추의 품질평가

김효진*, 김상섭, 이다음, 이상봉, 정문철, 최정희

한국식품연구원

P1-20

프로바이오틱스의 선박 운송 과정에서 생균 수 변화 연구

이세원^{1*}, 임정목², 장도연³, 정준재³, 조중상³, 허준³, 오병택¹

¹전북대학교 환경생명자원대학 생명공학부, ²(주) 이노비사이언스,
³한국식품산업클러스터진흥원 식품패키징팀

P1-21

신선도유지제 1-MCP의 제형별 처리 후 '태추' 단감의 품질변화 조사

이선미*, 안광환, 김태영, 정재은, 최성진

경상남도농업기술원 단감연구소

P1-22

감자의 녹변방지 및 온도상승억제를 위한 생분해성 필름 개발

정대원*, 이하준, 이현민, 문민욱, 허재영

국립목포대학교 식품공학과

P1-23

A study on the correlation between internal temperature and quality according to packaging method of small-package refrigerated beef for distribution

Jae-Yong Kim*, Yea-Ji Kim, Ji-Yoon Cha, Jeong-Heon Kim, Min-Kyung Park,
Seon-Min Oh, Jae-Hwan Ahn, Yun-Sang Choi

Korea Food Research Institute



P1-24

신품종 '화이트문' 사과 활용 신선편이 과일 제조 시 품질특성

홍정진*, 김현수, 손진향, 오주열, 정은호
경상남도농업기술원 사과이용연구소

P1-25

신품종 '마이' 사과 활용 건조스낵 제조 시 품질특성

홍정진*, 김현수, 손진향, 오주열, 정은호
경상남도농업기술원 사과이용연구소

P1-26

이상기후에 따른 농업리스크 위험도 평가 연구 - FMEA분석을 중심으로

구본우*, 장현욱
지역농업네트워크 호남 협동조합

P1-27

Field trials of postharvest CO₂ treatment effects on selected peach cultivars

Jinsu Lee*, Yeo-Eon Yun, Na-Yeong Kwon, Jae-Han Cho
National Institute of Horticultural and Herbal Science, RDA

P1-28

Evaluation of peel yellowing in 'Baekdadagi' and 'Mini' cucumbers during postharvest storage

Siva Kumar Malka*, Jinsu Lee, Hyang-Lan Eum, Me-Hea Park
National Institute of Horticultural and Herbal Science, RDA

P1-29

Preparation and characterization of PLA-based composite films incorporated with zinc oxide nanoparticles and lavender essential oil

Hyo-Lyn Kim, So-Yoon Park, Chanhyeong Kim, Jae-Young Her*
Department of Food Engineering,
Mokpo National University

P1-30

마늘 품종별 능동형 CA 저장 효과 분석

박천완^{1*}, 이진주², 박기훈², 김민지¹, 김용훈¹, 최동수¹, 김진세¹
¹농촌진흥청 국립농업과학원, ²풀무원



P1-31

농산물 수확후처리시설 내부의 총부유세균 및 곰팡이 측정

박천완*, 김민지, 김용훈, 최동수, 김진세

농촌진흥청 국립농업과학원

P1-32

Exploration of biochemical indicators associated with quality degradation of non-thermal processed crab meat

Ga-Yang Lee*, Min-Jeong Jung, Jong-Woong Nam, Jin Lee, Ju-Yeon Park,
Ji-Seong Hong, Byoung-Mok Kim, Joon-Young Jun

Korea Food Research Institute

P1-33

The quality changes of paprika (*Capsicum annum* L.) by packaging materials during the export process

Mi-Ryung Kim^{1*}, Jun-Hyung Lim¹, Chan Suk Yoon², Chang-Soo Kang²

¹*Department of Food Science and Culinary Art, Silla University,*

²*Department of Agriculture and Fisheries Processing,
Korea National College of Agriculture and Fisheries*

P1-34

Quality characteristics according to mixing conditions of fresh-cut salad vegetables

Min-Sun Chang*, Ji Weon Choi, Jihyun Lee, Jae-Han Cho,
Hyang Lan Eum, Haejo Yang, Jeong Gu Lee

*Postharvest Technology Division,
National Institute of Horticultural and Herbal Science, RDA*

P1-35

Introduction to preparing the system for storing apples at 10°C with plasma technology

Hyeongwon Jeon*, Sunghoon Jee, Eunhee Park, Seungil Park

Institute of Plasma Technology, Korea Institute of Fusion Energy

P1-36

Quality analysis of potato soup with fermented soybean powder

Jae-Geel Lim*, Hye-Jeong Kwon, Ji-Seon Park, Nam-Young Um,
Eun-Kyung Yeom, Yoon-Ji Goh, Yun-Mi Ko, Seo-Hyun Yoon

*Agro-food Research Institute,
Gangwon State Agricultural Research and Extension Services(GARES)*

P1-37

Enhancing the physical properties of microcrystalline cellulose films and hydrogels through tailored curing conditions

Maria Jose Silva Pincay*, Yeongjun Kim, Nahyeon Kim,
Deokyeon Choe

School of Food Science and Biotechnology, Kyungpook National University

P1-38

Effects of various pretreatment methods on physicochemical properties of salted kimchi cabbage during freezing storage

Hui Eun Kim^{1,2*}, Yun-Jeong Choi¹, Dong Hyeon Park¹,
Sung Hee Park¹, Mi-Ai Lee¹

¹Kimchi Industry Promotion Division, World Institute of Kimchi
²Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University

P1-39

A study on RFID tag and GPS integrated module for smart logistics management of agricultural products

Jongmin Park^{1*}, Hyun Mo Jung², Eon Uck Kang³

¹Dept. of Bio-industrial Machinery Engineering, Pusan National University,

²Dept. of Logistics Packaging, Kyongbuk Science College.,

³Research & Development Center of RESCO Co., Ltd

P1-40

Application of nano-zeolite to extend post-harvest shelf life of tomato

Yue Zhao^{1*}, Jiyeon Chun¹

¹Sunchon National University

P1-41

Development of packaging technology to prevent condensation in storage and distribution of agricultural products after harvest

Hyun Mo Jung^{1*}, Jong-min Park²

¹Division of Smart Farm & Food, Kyongbuk Science University

²Dept. of Bio-industrial Machinery Engineering, Pusan National University

P1-42

Evaluation of antimicrobial activity of photofunctional polymer films against food-borne pathogens and spoilage bacteria

Rye Gyeong Park^{1*}, Ji Hyeon Lee¹, Soo Hyun Han¹, Sang-Jae Lee¹,
Il Kwon Bae³, Jae Hak Sohn^{1,2}

¹Department of Food Science and Culinary Arts, Silla University,

²Seafood Research Center, IACF, Silla University,

³Department of Companion Animals, Silla University



P1-43

Regeneration of Pd@ZSM-5 adsorbent using non-thermal plasma for the post-harvest ethylene removal

Eunhee Park*, Hyeonwon Jeon

Korea institute of fusion energy

P1-44

Changes in quality of winter mushrooms depending on storage temperature and application of packaging film

Seong-Woo Jin, Kyung-Je Kim, Seung-Bin Im, Dong-Uk Kim,
Young-Woo Koh, Neul I Ha, Hee-Gyeong Jeong, Dong-Hyeon Lee,
Sang-Wook Jeong, Kyoung-Sun Seo*

Jangheung Research Institute for Mushroom Industry

P1-45

Evaluation of smart unit load system for agricultural products storage and distribution

Dongsoo Choi^{1*}, Jinse Kim¹, Yonghoon Kim¹, Chunwan Park¹,
Hyun-Mo Jung², Ghi-Seok Kim³, Jong-Min Park⁴

¹Postharvest Engineering Division, National Institute of Agricultural Sciences,
Rural Development Administration

²Dept. of Logistic Packaging, Kyongbuk Science College,

³Dept. of Biosystems Engineering, Seoul National University,

⁴Dept. of Bio-industrial Machinery Engineering, Pusan National University

P1-46

Effects of deep-freezing temperature on the physicochemical properties of diced radish kimchi (Kakdugi) during long-term storage

Minji Kim^{1,2}, Dong Hyeon Park¹, Min Jung Lee¹, Sung Jin Park¹,
Seung-Joo Lee², Sung Hee Park¹

¹Kimchi Industry Promotion Division, Practical Technology Research Group,
World Institute of Kimchi,

²Department of Hospitality, Tourism and Culinary, Sejong University

P1-47

Characteristics of polycaprolactone/chitosan/nano-zeolite antimicrobial nanofibrous for food packaging

Yue Zhao*, Jiyeon Chun

Sunchon National University



P1-48

A study on prediction of shelf-life for the laver chip prototype

Jeong-min Heo^{1*}, Sug-jin Seo¹, -min Kim¹, JeonYong-hee Jung¹,
Yu-eun Jeong¹, Kyeong-hwan Hwang², Yong-Jun Cha¹, Daeung Yu^{1,2}

¹Department of Food and Nutrition, Changwon National University

²Interdisciplinary Program in Senior Human Ecology, Major in Food and Nutrition,
Changwon National University

P1-49

매생이 동결건조 Block 제조를 위한 성형기의 개발

신영우

전남대학교 냉동공학과

P1-50

LED 저온 저장 시스템에 의한 갓김치의 품질 특성 향상

김민용

전남대학교 냉동공학과



PART II

가공/품질

P2-01

가공 식품 이미지 인식을 위한 AI 학습용 DB구축과 성능에 관한 연구

김영덕*, 박준우

대구경북과학기술원 ICT연구본부

P2-02

Physicochemical characteristics and anti-inflammatory potential of *zophobas morio* (Super Mealworm) protein extracted by different methods

Haseong-Cho^{1*}, Ju-Hwi Park¹, Ibukunoluwa Fola Olawuyi¹,
Ju-Ock Nam^{1,2} and Wonyoung Lee^{1,2}

¹School of Food Science and Biotechnology, Kyungpook National University,

²Research Institute of Tailored Food Technology, Kyungpook National University

P2-03

Comparison and characterization of hempseed protein isolate obtained different modified methods: structural, physicochemical and functional properties

Inha-Baek^{1*}, Nurul Saadah Said¹, Haseong-Cho¹, Wonyoung Lee^{1,2}

¹School of Food Science and Biotechnology, Kyungpook National University,

²Research Institute of Tailored Food Technology, Kyungpook National University

P2-04

Comparative analysis of baromi-2 (powdered rice) gluten-free bread quality and properties enriched with various types of fiber

Yun-Ju Jang^{1*}, Nurul Saadah Said¹, Wonyoung Lee^{1,2}

¹School of Food Science and Technology, Kyungpook National University,

²Research Institute of Tailored Food Technology, Kyungpook National University

P2-05

Development of betacyanin-infused pectin-based intelligent films from pitaya peel extract with titanium dioxide nanoparticles for monitoring fish fillet freshness

Huimin Du¹, Nurul Saadah Said¹, Ibukunoluwa Fola Olawuyi¹,
Wonyoung Lee^{1,2*}

¹School of Food Science and Technology, Kyungpook National University,

²Research Institute of Tailored Food Technology, Kyungpook National University

P2-06

Pectin/PLA bilayer films with schiff base infusion: pH-responsive release of bioactive ingredients as active packaging in fruit preservation

Nurul Saadah Said¹, Won-Young Lee^{1,2*}

¹School of Food Science and Technology, Kyungpook National University,
²Research Institute of Tailored Food Technology, Kyungpook National University.

P2-07

Effect of fermented *Angelica keiskei* extract, vitamin C, and ultrasound treatment on the quality of cured pork meat

Yea-Ji Kim^{1*}, Jeong Heon Kim¹, Jae Hoon Lee¹, Ji Yoon Cha¹,
Jae Hwan Ahn², Tae-Kyung Kim¹, Yun-Sang Choi¹

¹Research Group of Food Processing, Korea Food Research Institute,
²Food Safety and Distribution Research Group, Korea Food Research Institute

P2-08

추출 방법별 갈색거저리(*Tenebrio molitor*) 기름의 이화학적 특성

임윤지*, 최덕수, 김선암, 이유범, 오상아,
김지수, 이주영, 권혜영, 주경천

전남농업기술원 곤충잡업연구소

P2-09

유산균을 첨가한 발효화분빵의 기능성 분석

김선암*, 최덕수, 이유범, 오상아, 김지수, 임윤지, 이주영, 권혜영, 주경천

전남농업기술원 곤충잡업연구소

P2-10

Comparison of biological activities of red sage(*salvia miltiorrhiza*) and polygonatum sibiricum from different extraction solvents

Jae Eun Park*, Hyun-Ju Eom, Hye Jin Park,
Hye Jeong Kang, Min-Ja Kim

Chungcheongbukdo Agricultural Research and Extension Services

P2-11

Quality characteristics and antioxidant activities of sweet potato liqueur with grapes cultivated in Korea

Hye Jin Park*, Hyun-Ju Eom, Jae Eun Park,
Nu Ri Gwon, Min-Ja Kim

Chungcheongbukdo Agricultural Research and Extension Services



P2-12

Quality characteristics of paprika mixed jam with different types of sugar

Hyun-Ju Eom*, Hye Jin Park, Jae Eun Park,
Hye Jeong Kang, Min-Ja Kim

Chungcheongbukdo Agricultural Research and Extension Services

P2-13

Quality characteristics of paprika mixed jam with different types of 'cheong'

Hyun-Ju Eom*, Hye Jin Park, Jae Eun Park,
Hye Jeong Kang, Min-Ja Kim

Chungcheongbukdo Agricultural Research and Extension Services

P2-14

The physicochemical characteristics of *nurungji* added with radish root juice

Dieudonne Iradukunda^{1*}, Ga Yeon Yoon²,
Yoon-Han Kang^{2,3}, Dong-Jin Kwon^{2,3}

¹Department of Food Processing and Distribution,

²Department of Marine Bio Food Science,

³East Coast Research Institute of Life Science,

Gangneung-Wonju National University

P2-15

국산 커피를 활용한 커피맥주 제조 공정 개발

백세은^{1*}, 문세희¹, 최현아¹, 백다예¹, 백지환¹, 차상화², 손동모²

¹광주대학교 식품영양학과, ²마이크로맥스영농조합법인

P2-16

국산 커피 생두를 활용한 커피 증류주 제조 공정 개발

문세희^{1*}, 백세은¹, 최현아¹, 백다예¹, 백지환¹, 차상화², 손동모²

¹광주대학교 식품영양학과, ²마이크로맥스영농조합법인

P2-17

Study on the quality characteristics and sensory evaluation of fermented milk added with fermented lactic acid bacteria extract of *Cordyceps militaris* derived from three types of edible insects

Won Hee Lee^{1*}, Su Hwan Kim², Eun Hye Kim¹,
Jun Seo Jang¹, Hye Mi Jang³, Chang Ki Huh^{1,2}

¹Department of Food Science and Technology, Suncheon National University

²Research Institute of Food Industry, Suncheon National University

³Jangheung Research Institute for Mushroom Industry



P2-18

Development of automatically circulate brine (ACB) system to improve efficiency and quality of salted kimchi cabbage

Sung Jin Park*, Min Jung Lee, Dong Hyeon Park,
Min Ji Kim, Ji Young Choi, Sung Hee Park

World Institute of Kimchi

P2-19

A study on extending the shelf life of *Kimbugak* through improved processes to reduce rancidity

Hee-Jin Jo^{1*}, JiYeong Choi², SoJeong Park²,
Se-Young Cho³, Duwoon Kim^{1,2,3}

¹Department of FoodTech, Chonnam National University,

²Department of Food Science and Technology, Chonnam National University,

³Foodborne Virus Research Center, Chonnam National University

P2-20

Effect of drying conditions on the functional compounds in *Paeonia lactiflora* Pall. roots

Yonghyun Kim¹, Hyun Ji Eo¹, Chung Ryul Jung², Uk Lee^{1*}

¹Special Forest Resources Division, National Institute of Forest Science

²Forest Entomology and Pathology Division, National Institute of Forest Science

P2-21

Improved quality of black ginseng via fermentation with stevia

Yeon-Ju Kwak, Su-Byung Hwang, Jin-Ju Yang, Geum-Joung Youn

Research Institute of GH BioFarm,

Agricultural Corporation GAGOPA-HEALING FOOD

P2-22

소스 제품에 적용 가능한 당류 및 칼로리 저감 감미료 조성물 개발

길선미*, 최충효, 송요한, 김수영, 주동일, 허성용, 임지혁

(주)우리식품

P2-23

패션프루트 와인 제조를 위한 희석비율별 품질 특성 변화

송영은^{1*}, 한현아¹, 이승이¹, 최유림¹, 안민실², 김민지³

¹전북특별자치도농업기술원 작물식품과, ²전북특별자치도농업기술원 원예과,

³포도청와이너리



P2-24

A Study on the effect of milling on reduction of mycotoxins in wheat and barley

Han-Yeol Bang*, Jun-Hyuk Choi, Song-Yi Woo, Ji-Hyun An,
Gwang-Rok Yoon, Woo-Yong Bae

*Gyeongnam Provincial Office,
National Agricultural Products Quality Management Service*

P2-25

갈색겨저리 유산균 발효소재를 활용한 기능성 팻푸드의 품질특성

유영희^{12*}, 나영숙², 김현진², 허창기¹

¹순천대학교 식품공학과, ²유플레이스

P2-26

The comparative analysis of chemical characteristics and nutritional assessment of legume and yeast protein supplements.

Hyun-A An*, Jeung-Hee Lee

Department of Food and Nutrition, Daegu University

P2-27

Determination of physiochemical characteristic differences in wheat *soju* mash fermented with N9 strain by different cultivar

In-Seo Hwang*, Boram Kim, Chan-Woo Kim, Bo-Ra Lim, Ji Ho Choi

*Fermented and Processed Food Science Division,
National Institute of Agricultural Science, RDA*

P2-28

Determination of physiochemical characteristic differences in wheat *soju* mash fermented with commercially available yeast by different cultivar

In-Seo Hwang*, Boram Kim, Chan-Woo Kim, Bo-Ra Lim, Ji Ho Choi

*Fermented and Processed Food Science Division,
National Institute of Agricultural Science, RDA*

P2-29

Quality characteristics of Korean traditional barley-based Nuruk according to grinding ratio and inoculation rates

Yejin Shin*, Bora Lim, Chanwoo Kim, Ji-Ho Choi

*Fermented and Processed Food Science Division,
National Institute of Agricultural Sciences, RDA*



P2-30

Quality characteristics of *makgeolli* added with *Humulus lupulus*

Ji-Youn KIM *, Bo-Ra Im, Ji-Ho Choi

*Fermented & Processing Food Science Division,
National Institute of Agricultural Sciences*

P2-31

**Vacuum-assisted low-temperature frying: process optimization
for scallop snacks production**

Young Hyun An^{1*}, Jin Kim¹, Ga Bin Lee¹, Sun Young Park¹,
Hye Jeong Cho², Jung-Suck Lee¹

¹*Department of Seafood Science Technology/Institute of Marine Industry,
Gyeongsang National University*

P2-32

A study on the 'use-by' date of *Gambas al ajillo* retort food with scallops

Jin Kim^{1*}, Young Hyun An¹, Ga Bin Lee¹, Sun Young Park¹,
Ji-Hoon Park², Jung-Suck Lee¹

¹*Department of Seafood Science and Technology/Institute of Marine Industry,
Gyeongsang National University*

²*Department of R&D, Daesang Food Plus*

P2-33

**Changes in freshness of frozen mackerel (*Scomber japonicus*) with different
packaging methods for refrigerated distribution over storage time**

Ga Bin Lee*, Jin Kim, Young Hyun An, Sun Young Park, Eun Bi Jeon,
Shin Young Park, Jung-Suck Lee

*Department of Seafood Science and Technology /
Institute of Marine Industry, Gyeongsang National University*

P2-34

식용곤충 소재별 탈지분말 및 유지추출물의 이화학적 특성 분석

조영희*, 강상국, 김성완, 박종우, 김성렬, 이지혜

농촌진흥청 국립농업과학원 농업생물부



P2-35

Utilization of foam structured *Tenebrio molitor* larvae protein oleogels and their application as a solid fat replacer in sweet pan bread

Chae Young Jung*, Imkyung Oh

Department of Food Science & Technology,
Suncheon National University

P2-36

Effects of oak mushroom (*Lentinula edodes*) and chickpea flour incorporation proportions on the physicochemical characteristics of plant-based meat analogues

Bo Ra Lee*, Ha Eun Lee, Imkyung Oh

Department of Food Science & Technology,
Suncheon National University

P2-37

Development of protein-enriched fried snack with *Tenebrio molitor* powder

Yujin Choi*, Minsu Park, Imkyung Oh

Department of Food Science & Technology,
Suncheon National University

P2-38

딸기(설향)의 재배 환경(하우스 및 스마트팜)에 따른 품질특성 비교

김해원¹, 김은혜², 허창기^{1,2,3*}

¹순천대학교 스마트융합학부 스마트농업전공, ²순천대학교 식품공학과, ³순천대학교 식품산업연구소

P2-39

일반하우스 재배와 스마트팜 재배 딸기(설향)의 저장 기간에 따른 품질특성 비교

김해원¹, 김은혜², 허창기^{1,2,3*}

¹순천대학교 스마트융합학부 스마트농업전공, ²순천대학교 식품공학과, ³순천대학교 식품산업연구소

P2-40

Quality characteristics of defatted soybean flour texturized vegetable protein according to the degree of mixing of isolated soybean protein

Sunyoung Jung*, Misook Seo, Seul Lee, Boram Park,
Shinyoung Park, Kyungmi Kim, Chansoon Park

¹Fermented Processing Food Science Division, National Institute of
Agricultural Sciences, RDA



P2-41

Storage characteristics of defatted soybean flour texturized vegetable protein (TVP) with rice flour and pH adjusting agent

Mi Sook Seo*, Chan Soon Park, Sun Young Jung,
Bo Ram Park, Kyung Mi Kim, Shin Young Park

*¹Fermented & Processed Food Science Division, National Institute of
Agricultural Sciences, RDA*

P2-42

Development of a color model and colorimetric analysis of different rice varieties using machine vision

Dong-Gwan Shin^{1,2*}, Hoon Kim¹, Hong-Sik Kim¹, Jae-Woong Han²

¹Korea Food Research Institute

²Division of smart farm Engineering, Kongju National University

P2-43

Comparison of quality and flavor characteristics of imported, domestically produced, and developed brandy

Jueun Lee*, Bora Lim, Jiho Choi, Chanwoo Kim

*Fermented & Processed Food Science Division,
National Institute of Agricultural Sciences*

P2-44

Physicochemical and flavor characteristics of wine depending on persimmon varieties.

Jueun Lee*, Youngmi Kim, Bora Lim, Jiho Choi, Chanwoo Kim

*Fermented & Processed Food Science Division, National Institute
of Agricultural Sciences*

P2-45

가공 후 남은 매실 부산물의 식품 소재로서 활용성

정민영

주식회사 케이에프

P2-46

Jack bean-based upcycled candies: roasting optimization and antioxidant analysis

Rheeno Lee*, Do-Yeon Go^{2,3}, Yong-Suk Kim

Department of Food Science & Technology, Jeonbuk National University,

²Department of FoodTech, Jeonbuk National University,

³Green Road corp.



P2-47

나주배를 활용한 젤리스틱형 숙취해소제 개발

김혜연*, 정일겸, 신유정, 이현준

국립목포대학교 식품공학과

P2-48

Comparison of physicochemical properties of wheat flour and *Makgeolli* for selecting suitable wheat varieties for brewing

Bo-Ram Kim*, In-Seo Hwang, Chan-Woo Kim, Ji-Ho Choi

*Fermented and Processed Food Science Division,
National Institute of Agricultural Sciences*

P2-49

Comparative physicochemical and sensory properties of *Yakju* made from different rice varieties for selecting suitable for brewing

Bo-Ram Kim^{1*}, Hyun-Ho Kang^{1,2}, Chan-Woo Kim¹, Ji-Eun Kang¹, Ji-Ho Choi¹

¹*Fermented and Processed Food Science Division,
National Institute of Agricultural Sciences,*

²*Department of World Brewing and Distilling, Daekyeung University*

P2-50

Comparative analysis of physicochemical and sensory characteristics for selecting suitable rice varieties for distilled *Soju*

Bo-Ram Kim^{1*}, Hyun-Ho Kang^{1,2}, Chan-Woo Kim¹,
Ji-Eun Kang¹, Ji-Ho Choi¹

¹*Fermented and Processed Food Science Division, National Institute
of Agricultural Sciences, Korea,*

²*Department of World Brewing and Distilling, Daekyeung University, Korea*

P2-51

Growth and volatile compounds of sweet basil from different cultivation conditions

Seoyoung Jeon^{1*}, Ahna kim², Kihyun Kwon^{1,2}

¹*Food safety and distribution research group, Korea Food Research Institute*

²*Research group of digital factory, Korea Food Research Institute*

P2-52

Analysis of the growth and functional compounds of hydroponic sprout barley with different light conditions

Seoyoung Jeon^{1*}, Wooduck Seo³, Kihyun Kwon^{1,2}

¹*Food safety and distribution research group, Korea Food Research Institute*

²*Research group of digital factory, Korea Food Research Institute*

³*Division of crop foundation, National institute of crop science (NICS),
Rural Development Administration (RDA)*



P2-53

Effect of different salt types on the fermentation of kimchi

Yun-Jeong Choi^{1*}, Hee Eun Kim^{1,2}, Sung Hee Park¹, Mi-Ai Lee¹

¹Kimchi Industry Promotion Division, World Institute of Kimchi
²Department of Integrative Food, Bioscience, and Biotechnology,
Chonnam National University

P2-54

Physicochemical properties of edible insect oil affected by drying method

Ji Yoon Cha^{*}, Yea-ji Kim, Jeong Heon Kim,
Tae-Kyung Kim, Yun-Sang Choi

Research Group of Food Processing,
Korea Food Research Institute

P2-55

갯 시래기 건조조건에 따른 품질특성

이유석^{1*}, 지수현¹, 이선경¹, 김표현¹, 강현주¹, 마경철², 고숙주¹

¹전라남도농업기술원 친환경농업연구소, ²식량작물연구소

P2-56

Deep learning-based prediction of consumer preference for pre-packaged shrimp (Gambas) meal kits

Ui Jin Kim^{2*}, Bo Young Jeon², Hyun Sub Kim², Mi Jeong Kim^{1,2}

¹Department of Food and Nutrition, Changwon National University
²Interdisciplinary Program in Senior Human Ecology,
Changwon National University

P2-57

가루쌀 로스팅 조건에 따른 품질특성 및 가공적성 비교

이유석^{1*}, 이선경¹, 지수현¹, 김표현¹, 김주현¹, 마경철², 고숙주¹

¹전라남도농업기술원 친환경농업연구소, ²식량작물연구소

P2-58

아린 맛 성분을 저감한 토란 반가공소재 비교

이선경^{1*}, 이유석¹, 김표현¹, 지수현¹, 이세라¹, 마경철², 고숙주¹

¹전라남도농업기술원 친환경농업연구소, ²식량작물연구소



P2-59

수산물 단백질 활용 유자 음료의 첨가물에 따른 비린맛 저감 효과 비교

이선경*, 이유석, 김표현, 지수현, 조한라, 고숙주

전라남도농업기술원 친환경농업연구소

P2-60

양파 전처리 조건에 따른 양파당의 품질특성 및 주요 성분 비교

이선경^{1*}, 이유석¹, 김표현¹, 지수현¹, 김주현¹, 마경철², 고숙주¹

¹전라남도농업기술원 친환경농업연구소, ²식량작물연구소

P2-61

건조 방법 및 온도에 따른 양배추 분말의 품질특성 변화

김표현^{1*}, 이유석¹, 이선경¹, 지수현¹, 이은실¹, 마경철², 고숙주¹

¹전라남도농업기술원 친환경농업연구소, ²식량작물연구소

P2-62

데치기 시간을 달리한 건 취, 곤드레의 복원 방법별 품질특성

김표현*, 이유석, 이선경, 지수현, 신정엽, 고숙주

전라남도농업기술원 친환경농업연구소

P2-63

Changes of antioxidant activity and lignan contents in schisandra extract by enzymatic processing

Ji Seon Park*, Nam-Yong Um, Hyejeong Kwon, Jae Geel Lim, Jeung Ae Yoon, Kye Hyun Lim, Han Ul Park, Sun Young Kim, Kyung Ah Jang

Agro-food Research Institute, Gangwondo Agricultural Reserach and Extension Services(ARES)

P2-64

Development of novel sericin bigel beads for co-encapsulation of L-ascorbic acid and β -carotene: Evaluation of stability and *in-vitro* gastrointestinal release profile

Thinzar Aung^{1*}, Nayab², Egwumah Ojochenemi Rebecca², Mi Jeong Kim^{1,2}

¹Department of Food and Nutrition, Changwon National University

²Interdisciplinary Program in Senior Human Ecology, Changwon National University



P2-65

Upcycling coffee grounds in extruded snacks for enhanced functionality and sustainability

Hojin Jung*, Gi-Hyung Ryu, Bon-Jae Gu

*Department of Food Science and Technology,
Food and Feed Extrusion Research Center, Kongju National University*

P2-66

동물성 지방을 모방하기 위한 곤약 글루코만난, 알긴산나트륨 및 라드 기반 에멀션 겔의 개발

성진수^{1*}, 김지윤¹, 김정수¹, 문광덕^{1,2}

¹경북대학교 식품공학부, ²경북대학교 식품생물산업연구소

P2-67

초음파 전력과 처리 시간을 달리하여 제조한 홍삼 전분의 품질 특성 비교

서유민^{1*}, 김지윤, 김정수¹, 성진수¹, 김수현¹, 임정호², 문광덕^{1,3}

¹경북대학교 식품공학부, ²한국식품연구원, ³경북대학교 식품생물산업연구소

P2-68

Observation of physicochemical properties of radish by various drying method

Seong Hun Oh^{1*}, Un Ha Mun², Seung Hyun Bae³,
Change Gyu Go³, Gye Hwa Shin¹

*¹Department of Food and Nutrition, Kunsan National University,
²Sane Food,
³FOODPOLIS, Korea national food cluster*

P2-69

Effects of pH-shifting and ultrasound power on the functional properties of co-treatment extracted *Locusta migratoria* protein

Soo Hyun Kim^{1*}, Jung Soo Kim¹, Jiyeon Kim¹, Kwang-Deog Moon^{1,2}

*¹School of Food Science and Biotechnology, Kyungpook National University
²Food and Bio-Industry Research Institute, Kyungpook National University*

P2-70

Chemical composition and physicochemical properties of dried laver (*Pyropia* spp.) in Korea

Jong Bong Lee*, Suk Kyung Sohn, Ga Yeon Kwon, Hyo Rim Lee,
Hyeong Jun Kim, Min Jae Kim, Ha Eun Park, Kil Bo Shim

Department of Food Science and Technology, Pukyong National University

P2-71

Development of nutrient-rich fish cakes using fish oil and egg yolk emulsion

Jong Bong Lee*, Suk Kyung Sohn, Ga Yeon Kwon, Hyo Rim Lee,
Hyeong Jun Kim, Min Jae Kim, Ha Eun Park, Kil Bo Shim

Department of Food Science and Technology, Pukyong National University

P2-72

Physicochemical analysis and sensory evaluation of Chungtaejeon according to *Camellia sinensis* cultivars

Byung-Hyuk Kim*, Yun-Suk Kwon, Ha Rim Hong, Eun Yong Song,
Hyun-Hee Han, Doo-Gyung Moon

Research Institute of Climate Change and Agriculture, NIHHS, RDA

P2-73

Physicochemical characteristic of marinated abalone (*Haliotis discus hanna*) in seasoned soy sauce for the elderly using texture Modification Technology

Suk Kyung Sohn*, Jong Bong Lee, Ga Yeon Kwon, Hyo Rim Lee,
Hyeong Jun Kim, Min Jae Kim, Ha Eun Park, Kil Bo Shim

Department of Food Science and Technology, Pukyong National University

P2-74

The inhibitory effect of cordycepin isolated from *Cordyceps militaris* cultivated with *Tenebrio molitor* larvae on PC-9 cell

Neul-I Ha, Seung-bin Im, Kyung-Je Kim, Seong-Woo Jin,
Young-Woo Koh, Hee-Gyeong Jeong, Sang-Wook Jeong,
Min-Woong Kim, and Kyoung-Sun Seo*

Jangheung Research Institute for Mushroom Industry

P2-75

Quality characteristics of sauces using fermented *Lentinula edodes* by plantal lactic acid bacteria

Kyung-Je Kim¹, Dong-Hyeon Lee¹, Seong-Woo Jin¹, Young-Woo Koh¹,
Seung-Bin Im¹, Sang-Wook Jeong¹, Neul-I Ha¹, Hee-Gyeong Jeong¹,
Dong-Uk Kim¹, Yu-Jin Choi², Min-Gyeol Kim², Kyoung-Sun Seo^{1*}

¹*Jangheung Research Institute for Mushroom Industry*

²*Imsil Cheese and Food Research Institute*



P2-76

Establishment of optimal folic acid extraction condition from *Pleurotus ostreatus* according to the useful components

Young-Woo Koh¹, Kyung-Je Kim¹, Seong-Woo Jin¹, Seung-bin Im¹,
Sang-Wook Jung¹, Neul-I Ha¹, Hee-Gyeong Jeong¹, Dong-Hyeon Lee¹,
Dong-Uk Kim¹, Min-Woong Kim¹, Ki-Man Kim², Kyoung-Sun Seo*

¹Jangheung Research Institute for Mushroom Industry

²Department of Health Functional Food, Gwangju University

P2-77

Production a high solid concentration of microfibrillated cellulose derived from *Gellidium amansii* through introduction of fed-batch milling

Hye Jee Kang*, Nur Istianah, Jeong Hwa Jang,
Ju Hyun Min, Young Hoon Jung

School of Food Science and Biotechnology, Kyungpook National University

P2-78

Quality characteristics of vegan cookies using defatted rice bran

Hyejeong Kim^{1*}, A-Young Lee^{1,2}, Seung-Bin Han², Hyun-A An²,
Dong-Jin Moon¹, Jeung-Hee Lee²

¹Corporate R&D Center, The Bread Blue, Corp.,

²Department of Food and Nutrition, Daegu University

P2-79

Evaluation of deep eutectic solvents for the sustainable production of levulinic acid from biomass

Yeon Ju Lee*, Young Hoon Jung

School of Food Science and Biotechnology, Kyungpook National University

P2-80

Useul ingredients of processed foods using *Mycoleptodonoides aitchisonii*

Hee-Gyeong Jeong, Kyung-Je Kim, Seong-Woo Jin, Young-Woo Koh,
Seung-bin Im, Neul-I Ha, Dong-Hyeon Lee, Dong-Uk Kim,
Sang-Wook Jeong, Kyoung-Sun Seo*

Jangheung Research Institute for Mushroom Industry



P2-81

Evaluation of physicochemical properties in rendered animal fats: insights from chicken fat, lard, and tallow

Jiyeon Kim^{1*}, Jung Soo Kim¹, Jinsu Sung¹, Soo Hyun Kim¹,
Yu Min Seo¹, Kwang-Deog Moon^{1,2}

¹*School of Food Science and Biotechnology,
Kyungpook National University,*

²*Food and Bio-Industry Research Institute,
Kyungpook National University*

P2-82

The suitability of surimi ink for food 3D printing based on the type and content of sugars

Da-Sol Jeong^{1*}, So-Hee Park², Yun-Seo Han³, Ga-Won Kim³,
A-Jin Yoon⁴, Soo-Jung Kim

¹*Department of Food Science and Technology, Graduate School of Industry,
Chonnam National University,*

²*Department of Food Science and Technology, Chonnam National University,*

³*Department of Bioenergy Science and Technology, Chonnam National University,*

⁴*Department of Food Science, Jeonbuk National University,
Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University*

P2-83

Effect of drying condition to physicochemical properties of bee pollen

Minh Huy Tieu¹, Johnson Olowoniyi¹, Hye Kyung Moon²,
Soo won Lee², Jong-Kuk Kim^{1*}

¹*Department of Food Service and Restaurant Industry, Kyungpook National University,*

²*Center for Scientific Instruments Branch, Kyungpook National University*

P2-84

Effect of cooking methods on physicochemical properties of beef round

Jung Soo Kim^{1*}, Jiyeon Kim¹, Soo Hyun Kim¹,
Jinsu Sung¹, Kwang-Deog Moon^{1,2}

¹*School of Food Science and Biotechnology,
Kyungpook National University,*

²*Food and Bio-Industry Research Institute,
Kyungpook National University*

P2-85

Vitamin B6 profiles in leafy vegetables affected by heat treatment

Hui-jin Lee^{1*}, Seo-Eun Park, Jiyeon Chun^{1,2}

¹*Department of Food Science and Technology,
Suncheon National University*



P2-86

Current status of Korean sauces and dressings that lead K-food exports

Do-Kyung Kim¹, Hyun-Jung Ko¹, Wha-young Choei¹, Kwontack Hwang^{1*}

¹*Department of Food and Nutrition, Nambu University*

P2-87

Effects of *Sardinops melanostictus* powder on the quality of fermented soybean paste during storage

Danhui Kim*, Jieon Kim, Yuni Noh, Wonju Kwak, Hyunjung Yun,
Jae-Young Oh, Kwang-Soo Ha, Kajeong Lee

*Department of Food Safety and Processing Research Division,
National Institute of Fisheries Science*



PART III

화학/분석

P3-01

발효균주에 따른 발효 마페이스트 이화학적 특성

최소영*, 전수경, 임경란, 이종필

경상북도농업기술원 생물자원연구소

P3-02

Metabolomic discrimination of safflower leaves according to growth period

Seon-Jin Lee^{1,*}, Si-Hun Song¹, You-Seok Lee², Sun-Kyung Lee²,
Pyo-Jueon Kim², Jeong-Yong Cho¹

¹Department of Food Science & Technology, Chonnam National University

²Environment-Friendly Agricultural Research Institute,
Jeollanamdo Agricultural Research and Extension Services

P3-03

국내산 및 일본산 마른김의 UPLC-QTOF-MS 기반 대사체 분석

송시훈^{1*}, 홍지우¹, 김형균², 조정용¹

¹전남대학교 융합식품바이오공학과, ²목포수산식품지원센터

P3-04

Cyanidin and pelargonidin malonylglucosides in corncobs of *Zea mays* L.

Seo-Jin Lee^{1,*}, Ye-seon Won¹, Yu-Gin Park¹,
Heon-Woong Kim², Jeong-Yong Cho¹

¹Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University

²Department of Agro-Food Resources, National Institute of Agricultural Sciences,
Rural Development Administration

P3-05

Comparative study of phospholipid and fatty acid composition in pork by different cuts and boiling

Ho-Chang Kim*, Eun-Ju Cho, Jeung-Hee Lee

Department of Food and Nutrition, Daegu university

P3-06

Investigation of sulfur dioxide(SO₂) in domestically distributed and sold dried fruits and vegetables

Do-Woo Kim*, Hyo-Hee Kim, So-Young Lim, Su-Yeon Choi, Jin Jeong,
Se-Mi Lee, In-Sook Kang, Ae-Gyeong Kim

Health and Environment Research Institute of Gwangju Metropolitan City

P3-07

Qualitative and quantitative analysis of cholesterol in domestic pork

Eun-Ju Cho*, Ho-Chang Kim, Jeung-Hee Lee

Department of Food and Nutrition, Daegu university

P3-08

Investigation for unripe and ripe chili peppers across pericarp, placenta, and seeds through NMR-based metabolomics approach

Gi-Un Seong^{1*}, Dae-Yong Yun¹, Dong-Hyeok Shin¹,
Jeong-Seok Cho^{1,2}, Seoul-Ki Park², Gyuseok Lee²,
Jeong Hee Choi^{1,2}, Kee-Jai Park^{1,2}, Jeong-Ho Lim^{1,2}

¹Food safety and distribution research group, Korea Food Research Institute

²Smart food manufacturing project group, Korea Food Research Institute

P3-09

Analysis of polycyclic aromatic hydrocarbons (PAHs) in food samples using the QuEChERS method

Gee-Hyeon Kim*

Seoul National University of Science and Technology

P3-10

High purity phosphatidylcholines: synthesis and application to liposome formulation

Hyeon-Jun Chang*, Jeung-Hee Lee

Department of Food and Nutrition, Daegu University

P3-11

사료 중 멜라민 및 대사산물 다성분 시험법 정립

이지혜^{1*}, 김대중¹, 장은희¹, 김효영¹, 조형욱², 이지원²

¹국립농산물품질관리원 시험연구소, ²한경국립대학교 산학협력단

P3-12

호박씨유 첨가가 대두유 및 카놀라유의 산화 안정성에 미치는 영향

이우진^{1,2*}, 장신¹, 원예선³, 채승훈³, 조정용^{2,3}

¹유맥, ²전남대학교 푸드테크학과, ³전남대학교 융합식품바이오공학과



P3-13

Trichlorobenzenes quantification in food: method development and validation

Ki-Yun Kim*, Jun-Hyeong Park, Hye-Gyeong Lee,
Adebayo J. Akinboye, Gee-Hyeon Kim, Joon-Goo Lee

*Department of Food Science and Biotechnology,
Seoul National University of Science and Technology*

P3-14

Feasibility of substituting a platinum crucible in purity test for alkaline or magnesium in nutrient fortifiers(calcium oxide)

Geun hee Cho^{1*}, Ji-Hyun Im², Da-Hyun Ko³, Tae-Woong Song³,
Geon Oh², June seok Lim², Xiaolu Fu², Hee-Jae Suh⁴,
Sun-Il Choi¹, Ok-Hwan Lee²

¹*Department of Food Biotechnology, KangwonNational University*

²*Department of Food Biotechnology and Environmental Science,*

KangwonNational University

³*Department of Food Science and Biotechnology, KangwonNational University*

⁴*Department of Food Science, Research Center for Food and Bio Convergence,*

Sun Moon University

P3-15

Development and validation of analytical method for sarmentosin in *Sedum sarmentosum* extract

Da-Hyun Ko^{1*}, Tae-Woong Song¹, Geun hee Cho², Sang Min Park³,
Jeong Hyun Seo³, Sun-Il Choi²

¹*Department of Food Science and Biotechnology, Kangwon National University,*

²*Department of Food Biotechnology, Kangwon National University,*

³*Pharmsville Co., Ltd.*

P3-16

SWCNT/Graphite/cobalt/chitosan based nanobiosensor for metabolite detection

Dong Sup Kim¹, Jiwon Park², Gyeongrim Jeong², Jinyoung Lee^{1*}

¹*Department of Green Chemical Engineering, Sangmyung University,*

²*Department of Plant and Food Sciences, Sangmyung University*

P3-17

대파 건조 조건에 따른 indoxacarb의 잔류량 변화

조미현*, 김명현, 임재빈, 서창교, 박창현, 임무혁

대구대학교 식품공학과



P3-18

Establishing an HPLC analysis method of Cheonma active ingredients and harvest time comparison

Hyun Jin Choi^{1,2*}, Ye Seul Kwon^{1,2}, Han-Seok Choi¹

¹*Department of Agriculture and Fisheries FoodTech, Korea National University of Agriculture and Fisheries,*

²*Department of Food Science and Technology, Jeonbuk National University*

P3-19

Shortwave infrared hyperspectral imaging for rapid detection of spoiled red pepper powder

Sang Seop Kim^{1*}, Jeong-Seok Cho^{1,2}, Gi-Un Seong¹,
Gyuseok Lee², Seungmin Moon², Jeong-Ho Lim^{1,2}

¹*Food safety and distribution research group, Korea Food Research Institute*

²*Smart food manufacturing project group, Korea Food Research Institute*

P3-20

Validation of test methods for 2-chloroethanol in livestock and fishery products using QuEChERS and GC-MS/MS

Hyeon Hee Gwak, Jeong Ah Park, Ga Hyun Baek, Ji Won Lee,
Taek Kyun Choi, Sang Rag Lee, Jae Sung Kim*

KOTITI Testing and Research Institute

P3-21

Estimation of lycopene, beta-carotene, and lutein contents in freeze-dried tomato powder using sWIR and Vis-NIR spectroscopy with machine learning and 1D-CNN models

Eunghye Kim^{1*}, Jong-Jin Park¹, Gyuseok Lee¹, Jeong-Seok Cho^{1,2},
Seul-Ki Park¹, Dae-Yong Yun², Kee-Jai Park^{1,2}, Jeong-Ho Lim^{1,2}

Korea Food Research Institute



P3-22

**Comparison of useful chemical properties of mycelium and fruit body
from *Tuber borchii***

Seung-Bin Im, Dong-Uk Kim, Kyung-Je Kim, Seong-Woo Jin,
Young-Woo Koh, Neul I Ha, Hee-Gyeong Jeong, Dong-Hyeon Lee,
Sang-Wook Jeong, Kyoung-Sun Seo*

Jangheung Research Institute for Mushroom Industry

P3-23

**Temporal trends in polychlorinated dibenzo-*p*-dioxins and dibenzofurans (dioxins)
in shellfish from Korean Coastal areas**

Yoonmi Lee, Mi-Ra Jo, Hyung Jun Park, Hongsik Yu, Kwang Soo Ha*

*Food Safety and Processing Research Division,
National Institute Fisheries Science*



PART IV

미생물/발효/안전성

P4-01

Selection of *Bacillus amyloliquefaciens* MYR1-3 for traditional jang production and comparison with commercial jang manufacturing strains in meju production

Ju-Ho Yeom¹, Jong-Sik Kim², Ho-Yong Sohn^{1*}

¹Dept. of Food and Nutrition,

²Dept. of Life Science, AndongNational University

P4-02

Pepper-leaves of *Salicho*(*Capsicum annuum* L. *qhxhdc*p) as noble fermentation additive

Ju-Ho Yeom¹, Jong-Sik Kim², Chan-Yong Kim³,
Sang-Seok Lee³, Ho-Yong Sohn^{1*}

¹Dept. of Food and Nutrition,

²Dept. of Life Science, AndongNational University,

³Yeongyang Pepper Research,
Gyeongsangbuk-Do Agricultural Research & Extension Services

P4-03

Microbiological quality and microbial community profile of salted shrimp (*Saeu-jeot*) fermented in underground tunnel

Yeongsil Lim¹, Hyungjin Cho¹, Heeyeong Lee², Jeeyeon Lee^{1*}

¹Department of Food & Nutrition, Dong-Eui University,

²Food Standard Research Center, Korea Food Research Institute

P4-04

Antibacterial activity of *Vaccinium oldhamii* fruit against *Helicobacter pylori*

Jungwoo Chae¹, Huiseon Jo^{1*}, Jong-Hun Ha²,
Min-Kyoung Shin², Woo-Kon Lee²

¹Gyeonggido Forest Environment Research Center

²Department of Microbiology,
Gyeongsang National University College of Medicine

P4-05

Application of deep learning for predictive modeling of foodborne pathogens in growth media and food samples

Hwa-Young Lee*, Sang-Soon Kim

Department of Food Engineering, Dankook University



P4-06

Correlation of functional components by microbial community of fermentants (Nuruk)

Su Jeong Lee*, Woo Soo Jeong, Soo-Hwan Yeo,
Chan-Woo Kim, Bo-Ra Lim

*Fermented and Processed Food Science Division,
Department of Agrofood Resource, NIAS, RDA*

P4-07

Changes in quality characteristics during storage of Korean soy sauce added with onion juice according to heat sterilization conditions

Eun Hye Kim^{1*}, Su Hawn Kim², Won Hee Lee¹,
Jun Seo Jang¹, Seong Gyun Kim¹, Chang Ki Huh^{1,2}

¹*Department of Food Science and Technology, Suncheon National University*

²*Research Institute of Food Industry, Suncheon National University*

P4-08

산업용 유산균 starter(10종)를 이용한 갈색거저리 유충(*Tenebrio molitor* larva)의 발효적성 탐색 및 선별

Jun Seo Jang^{1*}, Su Hawn Kim², Eun Hye Kim¹, Won Hee Lee¹,
Ji Won Shin¹, Hyun jin Kim³, Yeng hee Yu³, Chang Ki Huh^{1,2}

¹*Department of Food Science and Technology, Suncheon National University*

²*Research Institute of Food Industry, Suncheon National University*

³*Wormplace*

P4-09

Comparison of quality characteristics based on the fermentation period of mealworms fermented with an industrial lactic acid bacteria starter (5 types)

Jun Seo Jang^{1*}, Su Hawn Kim², Eun Hye Kim¹, Won Hee Lee¹,
Hyun jin Kim³, Yeng hee Yu³, Chang Ki Huh^{1,2}

¹*Department of Food Science and Technology, Suncheon National University*

²*Research Institute of Food Industry, Suncheon National University*

³*Wormplace*

P4-10

경기도내 유통 와인의 잔류농약 실태조사

신상운*, 김재관, 이현경, 이유진, 김지은, 백은진, 김병태, 최종철, 이상남, 박명기

경기도보건환경연구원 농수산물검사부 서부농산물검사소



P4-11

Characterization of potential probiotics isolated from fermented foods from an island region

Bohyun Yun^{1,2*}, Jung Up Park^{1,2}, Seo-Young Kim^{1,2}, Ji-Won Park^{1,2},
Sungmin Hwang^{1,2}, Chul-Min Park^{1,2}, Hyun-Kyung Song^{1,2},
Haneul Kim², Sori Kang², Go Kyoung Na^{1,2}, Jisoo Kim^{1,2},
SongYi Han^{1,2}, Kyung-Min Choi^{1,2}, Won Woo Lee^{1,2}

¹Departement of Integrative Bioresources,
Honam National Institute of Biological Resources

²Advanced Research Center for Island Wildlife Biomaterials,
Honam National Institute of Biological Resources

P4-12

친환경 및 저탄소 농산물의 잔류농약 실태조사

김지은*, 김재관, 신상운, 이정희, 이유진, 백은진, 김병태, 이성남, 박명기

경기도보건환경연구원 안산농수산물검사소

P4-13

Comparison of the thermal resistance between *Bacillus* strains and sterilization indicator microorganism

Ju-Hee Nam*, Du-Yeong Jung, Zi-On Choi, Hyun-Jung Jung, Jung-Beom Kim

Department of Food Science and Technology, Sunchon National University

P4-14

머신러닝기반 음성인식 의도 분석 시스템을 통한 수입 식품 정보 전달 기법

박준우, 김영덕*

대구경북과학기술원 ICT연구본부

P4-15

IoT기반 수입 식품 정보 조회 및 전달을 위한 스마트 TV 어플리케이션 개발

박준우, 김영덕*

대구경북과학기술원 ICT연구본부

P4-16

Enhanced control efficacy of *Bacillus subtilis* NM4 via integration of chlorothalonil on potato early blight caused by *Alternaria solani*

Ye-Seon Won^{1*}, Si-Hun Song¹, Jun Su Noh², Seo Hyun Hwang²,
Chaw Ei Htwe Maung³, Jeong-Yong Cho¹, Kil Yong Kim²

¹Department of Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University

²Department of Agricultural Chemistry, Chonnam National University

³Department of Agricultural and Biological Chemistry, Chonnam National University

P4-17

발효기반 국산 곡물원료를 사용한 비건 제과·제빵류 개발

정윤지^{1*}, 백세은¹, 김명선¹, 백지환¹, 윤지애²

¹광주대학교 식품영양학과, ²힐사이드양림

P4-18

Characterization of acid production and aroma profiles in four *Acetobacter pasteurianus* strains isolated from Korean traditional vinegar

Rich Son*, Joo-Yeon Kim, Soo-Hwan Yeo, Ji-Ho Choi,
Chan-Woo Kim

*Fermented and Processed Food Science Division,
National Institute of Agricultural Sciences, RDA*

P4-19

흰점박이꽃무지 유충 세척수 및 열수 데침 시간에 따른 미생물 분석

이에슬¹, 박경민², 이현동^{1*}

¹농촌진흥청 국립농업과학원 수확후관리공학과,
²농촌진흥청 국립농업과학원 유해생물과

P4-20

The effects of high-temperature treatment on the quality of *makgeolli*

Ji-Youn Kim*, Ji-Eun Kang, Gui-Jung Han, Bo-Ra Im

*Fermented & Processing Food Science Division,
National Institute of Agricultural Sciences, RDA*

P4-21

Monitoring result of mycotoxins from foods distributed in Daegu

Eun-Ji Ha*, Hyeon-Min Jang, Eun-Jin Lee,
Soo-Jin Kwon, Yeon-Soo Kim, Jun-Tag Lee

Health and Environment Research Institute of Daegu

P4-22

그린바이오기술을 활용한 바이오양액 제조 및 천연물 소재화

백다예^{1*}, 최현아¹, 서경민¹, 백지환¹, 윤지환²

¹광주대학교 식품영양학과, ²아파달다



P4-23

Analysis of quality characteristics of black barley makgeolli according to production and fermentation periods

Soo-Young Lee*, Hee-Min Gwon, Joo-Yeon Kim,
Soo Jeong Lee, Ji-Ho Choi, Hyun-Wook Jang,

*Fermented & Processing Food Science Division,
Department of Agrofood Resource,
National Institute of Agricultural Sciences, RDA*

P4-24

Optimization of culture conditions for *Acetobacter pasteurianus* strains for fermentation starter production

Joo-Yeon Kim*, Rich Son, Sun-Hee Kim, Soo-Hwan Yeo,
Ji-Ho Chio and Chan-Woo Kim

*Fermented And Processed Food Science Division,
National Institute of Agricultural Science, RDA*

P4-25

Production of γ -aminobutyric acid by batch fermentation of *Lactobacillus brevis* FBL-4 from agricultural wastes such as rice bran and wheat bran

Hyun-Gyu Lee^{1*}, Jong-Hun Jang², Ji-In Kim¹, Young-Jung Wee¹

¹*Department of Food Science and Technology, Yeungnam University*
²*R&D Institute, MSC Co., LTD.*

P4-26

Rebaudioside A and rebaudioside E with α -1,6-glucosylated derivatives were simultaneously produced from the *Leuconostoc citreum*

Ok Cheol Kim*, Seong-Jin Hong, Da Eun Jang, Hye-Jin Kim,
Young-Min Kim

¹*Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University*

P4-27

Enterotype-specific changes in the intake soybean paste and their effects on the human gut microbiota

Ji-Won Seo, Gwang Su Ha, Hee-Jong Yang, Do-Youn Jeong*

Microbial Institute for Fermentation Industry (MIFI)



P4-28

**Microbial biomarker discovery and comparative microbiome analysis
in Cheonggukjang supplied *Bacillus subtilis* SRCM102751,
using next generation sequencing**

Hee Gun Yang, Ji Won Seo, Gwangsu Ha,
Hee-Jong Yang, Do-Youn Jeong*

Microbial Institute for Fermentation Industry (MIFI)

P4-29

**Quality analysis of cheonggukjang using complex microbial starters isolated
from traditional cheonggukjang**

Myeong Seon Ryu, Young Kyoung Park, Jinwon Kim,
Hee-Jong Yang, Do-Youn Jeong*

Microbial Institute for Fermentation Industry (MIFI)

P4-30

**Enhancement of microbial safety and quality maintenance of fresh produce
by using caprylic acid and mild heat**

Minyeong Jung*, Yeonju Kim, Jaewoo Bai

*Department of Food Science and Technology,
Seoul Women's University*

P4-31

Effect of disinfectant on microbial reduction of vegetables

Du-Yeong Jung*, Ju-Hee Nam, Zi-On Choi, Hyun-Jung Jung,
Jung-Beom Kim

*Department of Food Science and Technology,
Suncheon National University*

P4-32

**Complete genome sequences of acetic acid-producing
Acetobacter pasteurianus GHA7**

Sun Hee Kim*, Hyun-Wook Jang, Jin-Ju Park, Chan-Woo Kim,
Su Jeong Lee, So-Young Kim

*Fermented and Processed Food Science Division,
Department of Agrofood Resources, NIAS, RDA*



P4-33

Identification of the antibacterial substances from a fermented extract from green tea leaves with *Saccharomyces cerevisiae*

Jong-Woong Nam*, Ga-Yang Lee, Min-Jeong Jung, Jin Lee,
Ju-Yeon Park, Ji-Seong Hong, Byoung-Mok Kim, Joon-Young Jun

Korea Food Research Institute

P4-34

Quality characteristics of mash depending on quantity of barley added for developing barley-distilled soju

Ye Seul Kwon^{1,2*}, Jisu Lee^{1,2}, Han-Seok Choi¹

¹*Department of Agriculture and Fisheries FoodTech, Korea National University of Agriculture and Fisheries,*

²*Department of Food Science and Technology, Jeonbuk National University*

P4-35

Cyclodextran synthesis from starch utilizing TtClTase from *Thermoanaerobacter thermocopriae*

Seong-Jin Hong^{1,2*}, Chang Hee Park², Young-Min Kim²

¹*Research Institute of Agricultural Science and Technology, Chonnam National University,*

²*Department of Integrative Food, Bioscience and Biotechnology, Chonnam National University*

P4-36

Physicochemical properties of Doanjang fermented with *Monascus Koji* and *Aspergillus Koji*

Jun-Hyung Lim*, In-Ja Lee, Yong-Soo Lee, Mi-Ryung Kim

Department of Food Science and Culinary Art, Silla University

P4-37

Analysis of the setomimycin biosynthetic gene cluster from *Streptomycesnojiriensis* JCM3382 and evaluation of its α -glucosidase inhibitory activity using molecular docking and molecular dynamics stimulations

Kyung-A Hyun^{1*}, Xuhui Liang², Yang Xu², Seung-Young Kim³,
Kyung-Hwan Boo¹, Jin-Soo Park⁴, Won-Jae Chi⁵, Chang-Gu Hyun²

¹*Dept, Biotech, Coll. Appl. Life Sci, Jeju Univ.,*

²*Dept, Beaut, Cosmetol, Jeju Inside Agy, Cosmetic Science Ctr, Jeju Univ.,*

³*Dept, Pharm, Eng, Biotech, Sunmoon Univ.,*

⁴*Nat, Prod, Info, Res, Ctr, KIST Inst, Nat, Prod.,*

⁵*Gen, Res, Ass, Div, Nat, Inst, Bio, Res,*



P4-38

고춧가루 조제 과정 중 이산화염소를 활용한 농약의 저감화 효과 검증

유다영*, 조재운, 이호섭, 김향희

국립농업과학원 농산물안전성부 잔류화학평가과

P4-39

고추 중 이산화염소를 이용한 Indoxacarb 등 5종 농약의 저감화 효과 검증

조재운*, 유다영, 이호섭, 김향희

국립농업과학원 농산물안전성부 잔류화학평가과

P4-40

A novel encapsulation system using sodium alginate/cellulose nanofiber for increasing the stability of *probiotic Lactiplantibacillus plantarum* CJLP 133

Hyeon Ji Jeon*, Gyu Ri Shin, Hye Min Jeong, Young Hoon Jung

School of Food Science and Biotechnology, Kyungpook National University

P4-41

Anti-diabetic and anti-inflammatory effects of heat-killed *Lactococcus lactis* subsp. *cremoris* IMCCL013 in LPS-stimulated RAW 264.7 Macrophages

Min Gyeol Kim, Baul Yang, Yu Jin Choi*

Imsil Cheese and Food Research Institute

P4-42

Synthesis and characterization of alpha-glucosylated rebaudioside D using glucosyltransferases

Hye-Jin Kim^{1*}, Seong-Jin Hong², Da Eun Jang¹, Ok Cheol Kim¹,
Jeong-Yong Cho¹, Boo-Su Park³, Young-Min Kim¹

¹Department of Integrative Food, Bioscience and Biotechnology,
Graduate School of Chonnam National University,

²Research Institute of Agricultural Science and Technology,
Chonnam National University,

³Food Biotech R&D Center, Samyang Corp.

P4-43

Production of caffeine-reduced kombucha and measurement of fermentation characteristics

Da Eun Jang^{1*}, Seong-Jin Hong³, Hye Jin Kim¹,
Ok Cheol Kim¹, Young-Min Kim^{1,2}

¹Department of Integrative Food, Bioscience and Biotechnology,
Chonnam National University,

²Department of Food Science and Technology, Chonnam National University,

³Research Institute of Agricultural Science and Technology,
Chonnam National University



P4-44

참여외의 스마트 세척기술 개발 및 현장검증 연구

민주현^{1*}, 이효섭², 김향희², 정건희³

¹경북대학교 식품공학부, ²국립농업과학기술원 농산물안전성부 잔류화학평가과
³입실치즈엔식품연구소

P4-45

A study of the quality characteristics of wine made from Imsil peaches

Se Yeon Choi*, Youn Kyung Cho*, Joo Hee Hong,
Gun Hee Jung, Young Yoon

*Food Research and Development Team,
Imsil Cheese and Food Research Institute

P4-46

Evaluation of anti-inflammatory effects of *Lactocaseibacillus rhamnosus* L22-FR28 (KACC 92513P) isolated from infant feces in an animal model

Seoyeon Kwak*, So-Young Kim

Department of Agrofood Resources,
National Institute of Agricultural Science, RDA

P4-47

Development of a phage cocktail as a novel antibacterial strategy against pathogenic *Escherichia coli*

Gahyeon Nam^{1*}, Wonjae Lee¹, Hakdong Shin², Bokyung Son¹

¹Department of Food biotechnology, Dong-A University,
²Department of Food Science and Biotechnology, Sejong University

P4-48

Isolation and characterization of novel bacteriophages as biological control agents against *Bacillus licheniformis* in dairy products

Minji Kim*, Jae Hyeok Jeon, Bokyung Son

Department of Food Biotechnology, Dong-A University

P4-49

Antibacterial activity and physiological characteristics of lactic acid bacteria isolated from pet dogs

Hwa Seol Ryu, Chun Pyo Jeon, Seung Hun Han*

Department of Bio Vaccine and Pharmaceutical, Andong Science College



P4-50

Development and validation of a strain-specific genome marker for monitoring *Bacillus velezensis* NY12-2 among *Bacillus Species*

SeongEui Yoo*, SeoYeon Kwak, SeungA Woo,
Hyun-Wook Jang, So-Young Kim

*Department of Agrofood Resources,
National Institute of Agricultural Sciences, RDA*

P4-51

Intake of major microorganisms in *Meju* and *Cheonggukjang*: analysis using KNHANES data

Seung-A Woo*, SeungEui Yoo, So Young Kim

National Institute of Agricultural Science, RDA

P4-52

Development of bacterial nanocellulose based core-shell gels as a novel encapsulant for target delivery of probiotics

Gyu Ri Shin*, Hyeon Ji Jeon, Hye Min Jeong, Young Hoon Jung

*School of Food Science and Biotechnology,
Kyungpook National University*

P4-53

Quality assessment of fermentation agents (Koji and Nuruk) for the production of collagen Makgeolli

Rye Gyeong Park^{1*}, Jun-Hyung Lim¹, Soo Hyun Han¹, Sang-Jae Lee¹,
Yong-Soo Lee¹, Jae Hak Sohn^{1,2}, Mi-Ryung Kim¹

¹*Department of Food Science and Culinary Arts, Silla University,*
²*Seafood Research Center, IACF, Silla University*

P4-54

Isolation and identification of proteolytic and acidogenic microorganisms from squid viscera

Ji-Yun Oh^{1*}, So-Yeon Sim¹, Divya Gupta¹, Jong-Hyeon Lee¹,
Jun-Hwan Bae¹, Hyeon-Ki Choi², Sae-Byuk Lee^{1,2,3}

¹*School of Food Science and Biotechnology, Kyungpook National University,*
²*Department of Fermentation Biotechnology, Kyungpook National University,*
³*Institute of Fermentation Biotechnology, Kyungpook National University*



P4-55

Quality characteristics and nutritional properties of high-oleic acid *Doenjang*

Bu-Gyeong Son^{1*}, Yeong-Jun Kim¹, Su-Hyun Lee¹, Jong-Hyeon Lee¹,
Jun-Hwan Bae¹, So-Yeon Kim², Jeong-Dong Lee³, Sae-Byuk Lee^{1,2,4}

¹School of Food Science and Biotechnology, Kyungpook National University,

²Department of Fermentation Biotechnology, Kyungpook National University,

³School of Applied Biosciences, Kyungpook National University,

⁴Institute of Fermentation Biotechnology, Kyungpook National University

P4-56

Optimization of production conditions of microbial exopolysaccharide by *Mitsuaria chitosanitabida* for industrial applications

Ye-Na Lee^{1*}, Yeong-Jun Kim¹, Su-Hyun Lee¹, So-Yeon Sim¹,
Divya Gupta¹, So-Yeon Kim², Hyeon-Ki Choi², Sae-Byuk Lee^{1,2,3}

¹School of Food Science and Biotechnology, Kyungpook National University,

²Department of Fermentation Biotechnology, Kyungpook National University,

³Institute of Fermentation Biotechnology, Kyungpook National University

P4-57

Optimization of Monacolin-K production and physiological activities for fermentation products of solid-stated fermentation with *Monascus ruber* KACC45308

Jeong-Ha Lee, Jun-Tae Kim, Suyeon Gu, Seungwha Jo,
Sung-ho Cho, Do-Youn Jeong

Microbial Institute for Fermentation Industry(MIFI)

P4-58

Enhanced quality characteristics of brandy aged with oak chips from domestic Grapes

Jun-Su Choi^{1,2*}, Bu-Gyeong Son¹, Ji-Yun Oh¹, Ye-Na Lee¹,
Kyu-Taek Choi¹, Sae-Byuk Lee^{1,2}

¹School of Food Science and Biotechnology, Kyungpook National University,

²Institute of Fermentation Biotechnology, Kyungpook National University

P4-59

Analysis of quality characteristics of *Meju* and *Doenjang* by type of mold starter with *Aspergillus oryzae*

Jin-Kyeong Kim *, Sung-Ho Cho, Do-Youn Jeong

Microbial Institute for Fermentation Industry



P4-60

Screening of citrinin-free *Monascus ruber* KACC45308 for Monacolin-K production and optimization of spore production in submerged culture

Jun-Tae Kim*, Jeong-Ha Lee, Sung-ho Cho, Do-Youn Jeong

Microbial Institute for Fermentation Industry(MIFI)

P4-61

Development of initial screening model for pesticide residues in agricultural fields using national and regional monitoring data

Sang-Ik Suh^{1*}, Chang-Jun Lee¹, Jinuk Jang¹, Boram Kim²,
Dawon Kim², Bumseok Lee², Hyo-Sub Lee³, Min-Ho Son⁴, Seo Jin Ki²

¹*Department of Energy System Engineering, Gyeongsang National University,*

²*Department of Environmental Engineering, Gyeongsang National University,*

³*Chemical Safety Division, Agro-Food and Crop Protection Departement, NAS,* ⁴*Podo inc.*

P4-62

Fermentation characteristics of green and red kimchi cabbages (*Brassica rapa. L. ssp. pekinensis*) with WiKim0121

Seung-Min Oh^{1*}, Jiyeon Chun^{1,2}

¹*Department of Food Science and Technology, Suncheon National University,*

²*Kimchi Science and Industrialization Institute, Suncheon National University*



PART V

생리활성/영양/기능성

P5-01

Comparison of physicochemical properties between pepper leaf and pepper fruit harvested from Korean native pepper variety

Ju-Ho Yeom¹, Eun-Seo Im¹, Jong-Sik Kim², Chan-Yong Kim³,
Sang-Seok Lee³, Ho-Yong Sohn^{1*}

¹Dept. of Food and Nutrition,

²Dept. of Life Science, Andong National University,

³Yeongyang Pepper Research,

Gyeongsangbuk-Do Agricultural Research and Extension Services

P5-02

***Typha* sp., domestic freshwater aquatic plants could be developed as potent anti-thrombotic, anti-diabetic and anti-oxidant agent**

Ju-Ho Yeom¹, Eun-Seo-Im¹, Jong-Sik Kim², Ho-Yong Sohn^{1*}

¹Dept. of Food and Nutrition,

²Dept. of Life Science, Andong National University

P5-03

Comparison of functional components and biological activities in domestic legumes of soybean and adzuki bean

Narae Han^{1*}, Hyun-Joo Kim¹, Jung Hyun Seo², Jin Young Lee¹,
Hyeonmi Ham¹, Jiyoung Park¹, Mihyang Kim¹,
Yu-Young Lee¹, Moon Seok Kang¹

¹Crop Post-Harvest Technology Division, Department of Central Area Crop Science,
National Institute of Crop Science, Rural Development Administration,

²Department of Southern Area Crop Science, National Institute of Crop Science,
Rural Development Administration

P5-04

***Catalpa bignonioides* extract improves exercise performance through regulation of growth and metabolism in skeletal muscles**

Su-Hyeon Cho*, Kil-Nam Kim

Gwangju Center, Korea Basic Science Institute



P5-05

Anti-oxidant, whitening and anti-obesity effects of red fleshed pitaya (*Hylocereus polyrhizus*) extract

Rina Lee*, Myunghyup Oh, Jungmin Lee, Hyunju Lee,
Jaehong Park, Aekyoung Moon, Soonyeong Kim

¹Jeju Special Self-Governing Province Agricultural Research and Extension Services

P5-06

LC-MS 기반 품종에 따른 자색무의 무와 무청의 유용성분 변화

채승훈¹, 이선진², 최원영², 홍지우²,
이상현¹, 문재학², 조정용^{2*}

¹전남대학교 원예학과 및 IT-Bio융합시스템전공
²전남대학교 융합식품바이오공학과

P5-07

Emodin-8-β-D-glucoside derived from *Reynoutria japonica ameliorates Dermatophagoides farinae* extract-induced atopic dermatitis-like skin inflammation in mice by inhibiting JAK/STAT signaling

Hyun-Kyung Song^{1*}, Ki-Shuk Shim², Musun Park³, Hye Jin Kim²,
Seol Jang², WonWoo Lee¹, Kyung-Min Choi¹, Ki Mo Kim², Taesoo Kim²

¹Division of Practical Research, Honam National Institute of Biological Resources
²KM Convergence Research Division, Korea Institute of Oriental Medicine
³KM Data Division, Korea Institute of Oriental Medicine

P5-08

Inhibitory effect of Quercetin of pro-inflammatory cytokines in *Pseudomonas aeruginosa* infected A549 cells

Ji-Won Park^{1*}, Jung Up Park^{1*}, Hyeln Ahn⁴, Seung-Ho Kim^{2,3},
Da-Yun Seo², SongYi Han¹, Kyung-Seop Ahn², Won Woo Lee¹

¹Practical Research Division, Honam National Institute of Biological Resources (HNIBR),
²Natural Medicine Research Center, Korea Research Institute of Bioscience and Biotechnology,
³Division of Life Sciences, Korea University,
⁴Life Science Research Center, Nine BiopharmCo., LTD.

P5-09

A study on the metabolite profiling of traditional meju produced by region using GC-TOF

Daejung Kim*, Haejin Kim, Hyunjeong Cho

Experiment & Research Institute,
National Agricultural Products Quality Management Service



P5-10

Evaluation of the usability of leaves of Korean tea cultivar 'Sangnok' as food additives

Yun-Suk Kwon, Ha Rim Hong, Byung-Hyuk Kim,
Eun Yong Song, Doo-Gyung Moon*

*Research Institute for Climate Change and Agriculture,
National Institute of Horticultural and Herbal Science*

P5-11

Antioxidant effect and total polyphenol contents of leaves of Korean tea cultivar 'Kumnok'

Yun-Suk Kwon, Byung-Hyuk Kim, Ha Rim Hong,
Eun Yong Song, Doo-Gyung Moon*

*Research Institute for Climate Change and Agriculture,
National Institute of Horticultural and Herbal Science*

P5-12

해남산 참ս의 수확시기별 항균활성 및 항산화활성

김남의^{1,2*}, 김현진³, 유명희^{1,3}, 허창기¹

¹순천대학교 식품공학과, ²해남군농업기술센터, ³원플레이스

P5-13

갈색거저리 발효산물을 이용한 장건강 기능성 펩투드의 항산화 활성

유명희^{1,2*}, 나영숙², 김현진², 허창기¹

¹순천대학교 식품공학과, ²원플레이스

P5-14

Anti-oxidant and anti-inflammatory effect of beneficial bacteria and harmful components in ethanol extraction from traditional Korean *Cheonggukjang*

Kyung Eun Moon^{1*}, Hyeon Hwa Oh¹, Byung-Min Oh¹,
Do Youn Jeong², Young-Soo Kim¹

¹Department of Food Science and Technology, Jeonbuk National University,
²Microbial Institute for Fermentation Industry (MIFI)

P5-15

Effect of beneficial bacteria and harmful components in traditional soybean paste on the anti-oxidant and anti-inflammatory activities

So-Won Jang^{1*}, Do Youn Jeong², Geun-Seoup Song¹

¹Department of Food Science and Technology, Jeonbuk National University,
²Microbial Institute for Fermentation Industry (MIFI)



P5-16

Inhibitory activities of lignanamides on tyrosinase

Jang Hoon Kim*, Kyung-Sook Han, Eun-Song Lee, Yong-Goo Kim,
Yong-IL Kim, Jin-Tae Jeong, Dong Hwi Kim

*Department of Herbal Crop Research,
National Institute of Horticultural and Herbal Science, RDA*

P5-17

오디 속도에 따른 폴리페놀 화합물 함량 및 항염증 활성 비교

이지혜*, 조영희, 박종우, 김성완, 김성렬

농촌진흥청 국립농업과학원 농업생물부

P5-18

Development of energy bars using apples, pomegranates, and beet wastes for elderly health, and their antioxidant activities

So Hyun An*, So Yeon Kim, Hye Won Kang, Hye-Lim Jang

Department of Food and Nutrition, Dong-eui University

P5-19

약용식물 열수추출물의 기능성분 및 인체 폐암세포 항증식 활성

조미애*, 이창무, 최호철, 박종철

사단법인 천수 산약초연구회

P5-20

Preparation of soy protein hydrolysate by enzymatic hydrolysis

Eun Chae Lee^{1*}, Min Ji Kang¹, Eun Ji Lee¹, Hae Jin Kim¹,
Do Wan Kim², Kyung Young Yoon¹

¹*Department of Food and Nutrition, Yeungnam University,*

²*Department of Food and Pharmaceuticals, Jungwon University*

P5-21

α -Ionone alleviates chronic UVB exposure-induced skin photoaging in mice

Ruixuan Geng, Jingya Guo, Tao Tong*

*Key Laboratory of Precision Nutrition and Food Quality,
Key Laboratory of Functional Dairy, Ministry of Education;
College of Food Science and Nutritional Engineering;
China Agricultural University*



P5-22

Optimization of enzyme-assisted extraction condition for producing soluble dietary fiber with antidiabetic activity from brewer's spent grain using response surface methodology

Se Yul Lee*, Si Hyung Lee, Min Ji Kang, Eun Chae Lee,
Kyung Young Yoon

Department of Food and Nutrition, Yeungnam University

P5-23

Molecular docking of the *Gardenia jaminoides* seed ingredients for tyrosinase and elastase inhibition

Jae-Sik Nah^{1*}, Bo-Rim Song¹, Young-Jin Jo¹,
Won-Sik Choi² and Sang-Han Lee^{1,3}

¹Department of Food Science and Biotechnology, Kyungpook National University,

²Research Institute, Jeonjin Bio Co., Ltd.,

³Food and Bio-Industry Research Institute, Inner Beauty/Anti-Ageing Center,
Kyungpook National University

P5-24

Fangchinoline, a major alkaloid of *Stephania tetrandra* S. Moore, inhibits adipogenesis of 3T3-L1 cells

Gyu-Hyeon Park*, Su-bi Lee, Syng-Ook Lee

Department of Food Science and Technology, Keimyung University

P5-25

Fetal bovine serum substitution efficacy of mealworm (*Tenebrio molitor*) protein hydrolysates and its physicochemical properties

Jeong-Min Lee*, Hyo-Seon Lee, Syng-Ook Lee

Department of Food Science and Technology, Keimyung University

P5-26

Anti-oxidant and anti-proliferation effect of *Euonymus alatus* (Thunb.) Siebold. leaf extract

Seong-mi Park^{1*}, Hye-ji Min¹, Won-joo Yoon², Kwon-il Seo¹

¹Department of Food Biotechnology, Dong-A University,

²Department of Bioscience and Biotechnology, Kyushu University, Japan



P5-27

Antioxidative activities of various solvent extracts from leaves and fruits of fig (*Ficus carica* L)

Hyo-jeong Yun¹, Cho-eeen Kim¹, Jaeyong Kim¹, So Mi Lee²,
Gyuok Lee^{1*}

¹Jeonnam Bio Foundation,
Jeonnam Institute of Natural Resources Research (JINR),
²Fruit Research institute of Jeollanamdo Agricultural Research and Extension Services

P5-28

청태전 농축액 가글이 구강 미생물에 미치는 영향

김은혜*, 안호섭, 김지영, 박현석, 정수진, 조혜성, 최정, 고숙주
전라남도농업기술원

P5-29

Polyphenol and flavonoid compound contents, and antioxidant activity of *Carica papaya* seed water extract

Jeong Sook Moon, Yang Suk Lee, Su Jeong Seo*

Department of Herbal Biotechnology,
Daegu Haany University, Gyeongsan

P5-30

Useful ingredients and antioxidant activities of extracts from seeds of *Carica papaya*

Yang Suk Lee, Jeong Sook Moon, Su Jeong Seo*

Department of Herbal Biotechnology, Daegu Haany University

P5-31

Changes in the functional ingredient content of *S. glabrescens* hot water extract according to the number of steaming times using makgeolli

Cha-Yeon Kim, Su-Jeong Seo, Yang-Suk Lee*

Department of Herbal Biotechnology, Daegu Haany University

P5-32

Antioxidative activities of hot water extract from of *S. glabrescens* steaming using Makgeolli

Su-Jeong Seo, Cha-Yeon Kim, Yang-Suk Lee*

Department of Herbal Biotechnology, Daegu Haany University



P5-33

Amino acid derivatives of monascus pigments with inhibitory activity against cholesterol biosynthesis

Dayoung Bok^{1*}, Hana Cho², Yeongjun Kim¹, Nahyeon Kim¹,
Deokyeong Choe¹

¹*School of Food Science and Biotechnology, Kyungpook National University,*

²*Department of Biotechnology, Yonsei University*

P5-34

Study on the antioxidant and anti-inflammatory efficacy of strawberries cultivated in Imsil from Korea in HaCaT keratinocytes

Joo Hee Hong*, Gun Hee Jung, Se Yeon Choi,
Youn Kyung Cho, Young Yoon

**Food research & development Team,
Imsil Cheese and Food Research Institute*

P5-35

Development of a beverage with antibacterial, antioxidant, and anti-inflammatory activities from a mixture containing extracts of Omija (*Schizandra chinensis*), pear (*Pyrus pyrifolia*), and Doraji (*Platycodon gradiflorum*)

Hyeonsoo Lim, Jihye Lee, Chun Pyo Jeon, Seung Hun Han*

*Department of Bio Vaccine and Pharmaceutical,
Andong Science College*

P5-36

Development of herbal medicine complex composition effective for inflammation and insomnia

Moonseok Kwon¹, Youngjun Kim¹, Yun-Hoe Kim², Chun Pyo Jeon¹,
Seung Hun Han^{1*}

¹*Department of Bio Vaccine and Pharmaceutical, Andong Science College*

²*Agricultural Corporation Natural N Co., Ltd,*

P5-37

Comparative analysis of antioxidant and antimicrobial activities of wild berries from Mongolia

Buyanbadrakh Enkhbolor, Jun-Hyun Oh

Department of Food Science and Technology, Sangmyung University



P5-38

Production and functional properties of phycocyanin obtained from *Galdieria sulphuraria* 074G2

Ga-Min Choi, Jun-Hyun Oh

Department of Food Science and Technology, Sangmyung University

P5-39

Enzymatic preparation and antioxidant activities of protein hydrolysates from *Locusta migratoria*

Go-Eun Ko*, Woo-Jeong Do, Chae-Eun Kim,
Dong-Min Shin, Syng-Ook Lee

Department of Food Science and Technology, Keimyung University

P5-40

Development and refinement of a personalized health functional food recommendation algorithm based on the National Health and Nutrition Examination Survey(KNHANES)

Jun Gu Lee^{1,2,3*}, Sang Gyeong Lee², Hyeock Yoon², Jung Hyeon Park^{1,3},
Bok Kyung Han^{1,2}, Young Jun Kim^{1,2,3}, Ji Youn Hong^{1,2}

¹*Department of Food and Biotechnology,*

²*Department of Food Regulatory Science*

³*BK21 FOUR Research Education Team for Omics-based Bio-health on Food Industry, Korea University*

P5-41

Useful components and biological activity of *Houttuynia cordata* whole plant ethanol extract

Kyeong-Won Yun¹, Kyung-Je Kim², Seong-Woo Jin², Young-Woo Koh²,
Seung-bin Im², Neul I Ha², Hee-Gyeong Jeong², Sang-Wook Jeong²,
Yu Jin Choi³, Kyoung-Sun Seo^{2*}

¹*Department of Oriental Medicine Resources, Suncheon National University*

²*Jangheung Research Institute for Mushroom Industry*

³*Imsil Cheese and Food Research Institute*

P5-42

Whitening activity of *Stachys sieboldii* tuber fermented with ushroom mycelia

Seung-bin Im¹, Kyung-Je Kim¹, Seong-Woo Jin¹, Young-Woo Koh¹,
Neul I Ha¹, Hee-Gyeong Jeong¹, Sang-Wook Jeong¹, Dong-Hyeon Lee¹,
Dong-Uk Kim¹, Kyeong Won Yun², Yu Jin Choi³, Kyoung-Sun Seo^{1*}

¹*Jangheung Research Institute for Mushroom Industry*

²*Department of Oriental Medicine Resources, Suncheon National University*

³*Imsil Cheese and Food Research Institute*



P5-43

A 4-week, randomized, double-blind clinical trial to evaluate the efficacy and safety of red pepper paste (Gochujang powder) intake on intestinal microbiome and improved bowel movements

Hui-Yeon Jang^{1*}, Eun-Ock Park¹, Mi-Rae An¹, Su-Jin Jung^{1,3},
Hee-Jong Yang², Gwang-Su Ha², Seung-Ok Lee^{1,3,4}, Soo-Wan Chae^{1,3}

¹Clinical Trial Center for Functional Foods, Jeonbuk National University Hospital

²Microbial Institute for Fermentation Industry(MIFI)

³Biomedical Research Institute, Jeonbuk National University Hospital

⁴Division of Gastroenterology and Hepatology, Jeonbuk National University Hospital

P5-44

Anti-inflammatory effect of fucoidan from *Saccharina japonica* on particulate matter (PM)-stimulated skin cells *in vitro* and TPA-induced ear edema in an *in vivo* mouse model

Kirinde Gedara Isuru Sandanuwan Kirindage^{1*},
Arachchige Maheshika Kumari Jayasinghe¹,
Hitihami Mudiyansele Chalani Bhagya Deshapriya¹,
Hewayalage Madushika Kumari Ranasinghe¹,
Nam-Ki Cho², Seok-Ho Cho³, Ginnae Ahn¹

¹Department of Food Technology and Nutrition, Chonnam National University,

²College of Pharmacy, Chonnam National University,

³Department of Clothing and Textiles, Chonnam National University

P5-45

Comparison of imputation models for missing data in food nutrient databases

Haeseong Yang^{1*}, Yeonsu Do¹, Yubin Lee¹, Jihwan Lim¹,
Minkyu Song¹, Jung Hyeon Park^{1,3}, You Jin Yang², Jung Won Park²,
Young Jun Kim^{1,2,3}, Ji Youn Hong^{1,2}

¹Department of Food and Biotechnology,

²Department of Food Regulatory Science

³BK21 FOUR Research Education Team for Omics-based Bio-health on Food Industry,
Korea University

P5-46

Antioxidant properties of 'Sangjudungsil' leaf extracts using different extraction methods and extraction time.

Johnson Olowoniyi¹, Minh Huy Tieu¹, Hye Kyung Moon²,
Soo won Lee¹, Jong-Kuk Kim^{1*}

¹Department of Food Service and Restaurant Industry, Kyungpook National University.

²Center for Scientific Instruments Branch, Kyungpook National University

P5-47

Effect of *Saccharina japonica* ethanol extract on skin dryness in fine dust-stimulated HaCaT keratinocyte and its biological mechanism

Hewayalage Madushika Kumari Ranasinghe^{1*},
Kirinde Gedara Isuru Sandanuwan Kirindage¹,
Arachchige Maheshika Kumari Jayasinghe¹,
Hitihami Mudiyansele Chalani Bhagya Deshapriya¹,
Nam-Ki Cho², Seok-Ho Cho³, Ginnae Ahn^{1,4*}

¹Department of Food Technology and Nutrition, Chonnam National University,

²College of Pharmacy, Chonnam National University,

³Department of Clothing and Textiles, Chonnam National University,

⁴Department of Marine Bio-Food Sciences, Chonnam National University

P5-48

Protective effect of *Curcuma longa* L. leaves and pseudostems extract on IgE/BSA-stimulated mast cell activation and DNCB-induced atopic dermatitis in a BALB/c mouse model

Arachchige Maheshika Kumari Jayasinghe^{1*},
Kirinde Gedara Isuru Sandanuwan Kirindage¹,
Hitihami Mudiyansele Chalani Bhagya Deshapriya¹,
Hewayalage Madushika Kumari Ranasinghe¹,
Sun-Hyung Kim², Seok Lee², Ginnae Ahn¹

¹Department of Food Technology and Nutrition,
Chonnam National University,

²French Korea Aromatics Co., Ltd.

P5-49

Effect of subcritical water extract from *Saccharina japonica* against skin dryness in fine dust-stimulated HaCaT keratinocytes

Hitihami Mudiyansele Chalani Bhagya Deshapriya^{1*},
Arachchige Maheshika Kumari Jayasinghe¹,
Kirinde Gedara Isuru Sandanuwan Kirindage¹,
Hewayalage Madushika Kumari Ranasinghe¹,
Nam-Ki Cho², Seok-Ho Cho³, Ginnae Ahn^{1,4}

¹Department of Food Technology and Nutrition, Chonnam National University,

²College of Pharmacy, Chonnam National University,

³Department of Clothing and Textiles, Chonnam National University,

⁴Department of Marine Bio-Food Sciences, Chonnam National University



P5-50

Antioxidant characteristics of green and black teas traditionally manufactured in the Jeonnam region of Korea

Seo-Eun Park, Hui Jin Lee, Jiyeon Chun

¹Department of Food Science and Technology, Suncheon National University

P5-51

Anti-skin aging *centella asiatica*-meditated green synthesis with gold nanoparticles using deep eutectic solvents

Young-Jin Jo^{1*}, Bo-Rim Song¹, Jae-Sik Na¹,
Chang Hyung Lee², Sang-Han Lee^{1,3}

¹Department of Food Science and Biotechnology,
Kyungpook National University,

²School of Pharmacy, Sungkyunkwan University, Suwon 16419, Korea

³Food and Bio-Industry Research Institute, Inner Beauty/Anti-Ageing Center,
Kyungpook National University

P5-52

Beyond conventional solvents: enhanced antioxidant effect of natural hydrogen bond solvents from *Dillenia indica* L. bark

Bo-Rim Song^{1*}, Jae-Sik Nah¹, Young-Jin Jo¹, Chang Hyung Lee²,
Chi-Yeol Yoo³, Sang-Han Lee^{1,4}

¹Department of Food Science and Biotechnology, Kyungpook National University,

²School of Pharmacy, Sungkyunkwan University,

³knu B&F Co.,

⁴Food and Bio-Industry Research Institute, Inner Beauty/Anti-Ageing Center,
Kyungpook National University

P5-53

Natural Hydrogen Bond Solvents (NHBS): increasing antioxidant potential and marker compound content beyond traditional solvents

Bo-Rim Song^{1*}, Jae-Sik Nah¹, Young-Jin Jo¹, Chang Hyung Lee²,
Chi-Yeol Yoo³, Sang-Han Lee^{1,4}

¹Department of Food Science and Biotechnology, Kyungpook National University,

²School of Pharmacy, Sungkyunkwan University,

³knu B&F Co.,

⁴Food and Bio-Industry Research Institute, Inner Beauty/Anti-Ageing Center,
Kyungpook National University



P5-54

Antioxidant and tyrosinase and elastase inhibitory and UV protection effect of seaweed extracts(*Hizikia fusiformis*, *Laminaria japonica*, *Ulva lactuca*, and *Undaria pinnatifida*)

Do-Kyung Kim¹, Hyun-jung Ko¹, Wha-young Choei¹,
Min Jung Ryu², Kwontack Hwang^{1*}

¹Department of Food and Nutrition, Nambu University,

²Department of Cosmetology science, Nambu University

P5-55

Nutritional profile of proximate and fat-soluble composition content generally consumed imported fisheries in Korea

JinWoo Yang*, Bo Gyeong Seol, Young Eun Park, Yu-Rin Jeong,
Ji-Eun Kim, Su-Jin Han, Su-Bin Park, Ji-Young Kwon, Na-Young Yoon

Food Safety and Processing Research Division, National Institute Fisheries Science



Exhibition

업 체 명	뷰키코리아(유)		
대표자 성명	로저바우만, 피우스슐러		
전 화 번 호	02-6718-7500	팩스번호	02-6718-7599
이 메 일	kr-sales@buchi.com		
홈 페이지	www.buchi.com/ko		
주 소	경기도 광명시 덕안로 104번길 17 광명역엠클러스터 520호		
주 요 기 술 및 취 급 품 목	<p>BUCHI는 1939년 스위스에서 창립 이후 85년 이상 R&D, 품질관리 및 생산을 위한 실험실 기술을 전 세계에 제공하는 선도적인 역할을 하고 있습니다. BUCHI는 "Quality in your Hands"라는 이념으로 식음료, 사료, 환경, 제약, 화학 등 다양한 산업 분야와 학계에 최상의 제품과 솔루션을 제공합니다.</p> <p>[취급 품목]</p> <ul style="list-style-type: none"> - 실험실 및 산업용 회전증발농축기 (Laboratory & Industrial Evaporation) - 병렬증발농축기 (Parallel Evaporation) - 분무건조기 및 캡슐화 장비 (Spray Drying & Encapsulation) - 융점측정기 (Melting Point) - 동결건조기 (Freeze Drying) - 분취 크로마토그래피 (Prep LC, Flash LC) - 초임계 유체 크로마토그래피 (SFC) - 질소/조단백 측정 장비 (Kjeldahl) - 추출 장비 (Extraction) - 근적외선 분광기 (NIR) - 생산공정용 근적외선 분광기 (NIR-Online) 		

업 체 명	(재)순천바이오헬스케어연구센터		
대표자 성명	노관규		
전 화 번 호	061-742-5448	팩스번호	061-742-5449
이 메 일	kimjeoho@sbrc.kr		
홈 페이지	http://www.sbrc.kr/		
주 소	전라남도 순천시 역전광장3길54(풍덕동), 생태비즈니스센터		
주 요 기 술 및 취 급 품 목	<p>◎ 주요기술</p> <p>천연자원의 보고인 전라남도의 유전·생명자원의 발굴 및 활용을 통해 산업적 가치 창출</p> <p>① 중소기업지원</p> <ul style="list-style-type: none"> · 창업자 기술 지원 및 맞춤형 마스터플랜 컨설팅 · 시제품제작 지원 · 기술이전을 통한 기업가치성 제고 <p>② 자체 및 국가연구개발사업 수행</p> <ul style="list-style-type: none"> · 자립화를 위한 수익성 연구 사업 진행(시험분석) · 연구기반 마련을 위한 연계 국가연구개발사업 수주 · 공동연구개발사업 · 신소재 및 기술 연구개발 사업 수행 <p>③ 지역인재 양성을 위한 산관학연 연구협력</p> <ul style="list-style-type: none"> · 지역인재 양성 및 발굴을 위한 연구협력 · 대외 신규 연구개발 프로젝트 발굴 <p>④ 바이오헬스케어소재 및 기술 개발</p> <ul style="list-style-type: none"> · 유전 생명자원의 발굴 및 소재화 · 생물전환 기술 적용 바이오소재 개발 · 고유가치를 가지는 생물전환 기술개발 <p>◎ 취급품목</p> <p>① 아이케어 홍삼아로니아</p> <ul style="list-style-type: none"> · (재)순천바이오헬스케어연구센터 자체개발 제품으로 '아이케어 홍삼 아로니아' 관련 5개의 특허(제10-2078671호, 제10-2180527호, 제10-2330845호, 제10-2557702호, 제10-2585641호)를 보유함. 		

주요 기술
및
취급 품목

- ③ 나디카 갈대발효 콜라겐 마스크팩
 - 갈대의 뿌리(노근)을 상항버섯 균사체로 발효한 주원료인 나이아신 아미이드는 미백 기능성 원료로, 부원료인 아데노신은 주름개선 기능성 원료로 식약처(KFDA)인증을 완료함.
- ④ 땡땡 멀티 케어 스틱밤
 - 국내 최초 반려동물 대상 3중 견체적용시험(피부 겹보습 개선효과, 피부 속보습 개선효과, 피부장벽 개선 효과)을 통해 만든 제품.
- ⑤ 땡땡 워드 개비자 트리플 솔루션 샴푸
 - 국내 최초 강아지용 샴푸 3중 견체적용시험(피부 보습 개선효과, 피부장벽 개선효과, 윤기개선 효과) 진행으로 안심하고 사용가능.
- ※ ④ 땡땡이 스틱밤 & ⑤ 땡땡이 샴푸 공통사항
 - 전남에서만 자생하는 개비자나무 가지. 잎 추출물에서 발견된 염증 개선 효과에 대한 특허를 출원함.[특허출원 제10-2022-0054113호]



업 체 명	(재)전남바이오진흥원 천연자원연구센터		
대표자 성명	이학성		
전 화 번 호	061-860-2600	팩스번호	061-864-7105
이 메 일	jykim761217@jbf.kr		
홈 페이지	http://www.jbf.kr		
주 소	전남 장흥군 안양면 우드랜드길 288 (재)전남바이오진흥원 천연자원연구센터		
주 요 기 술 및 취 급 품 목	<p>본 기관은 300여종의 첨단장비와 시설 구축·40여명의 석·박사급 전문인력을 중심으로 천연자원 기반 식·의약·향장소재 등의 유효성 검증·(전)임상 연구개발(R&D) 및 국가·지자체·기업 등과 공동 R&D 사업을 진행하는 R&D에 특화된 공공연구기관입니다. 이를 통해 개발된 소재 및 기술을 중소·중견 기업에 이전하고 원활한 원재료 수급을 위해 농가와 계약재배를 함으로써 기술의 제품화와 농가수의 증대의 선순환 생태계를 구축하고 있습니다. 또한 입주기업제도 및 창업 보육센터의 운영을 통해 벤처기업의 창업 및 보육을 활성화 시키고 산업체를 위한 현장인력양성과 마케팅 지원등 다각적인 기업지원 활동을 수행하고 있습니다.</p> <p>- one stop service</p> <p>일반식품/영양품 → 건강기능식품/천연 유기농화장품 → 건강기능식품/기능성화장품 → 천연물/약품</p> <p>추출·분리·분석 시스템 생리활성 물질 스크리닝 연구 물질 규명 및 물질 표준화 연구 기능성 기전 규명 연구 동물실험 시스템 안전성 검증 시스템 제품화 공정 연구</p> <p>농축기, MPLC HTS NMR, GC/MS 공초점 현미경 동물 실험 장비 공정연구장비</p> <p>1. 분야별 전문 인력 2. HTS용 첨단 장비 3. 60여종 세포주 보유 4. 다양한 질병 실험동물 모델 5. 60여 개도성 검역시스템</p> <p>One stop service(152종 312대) - 자원에서 제품까지 -</p>		
	<ul style="list-style-type: none"> 추출 · 농축 분리 · 정제 		
	<ul style="list-style-type: none"> 생리활성검색 · 세포배양계 동물수준 · Biomarker 		
	<ul style="list-style-type: none"> 생체 외 실험 · 생체 내 실험 전임상실험 · 임상실험(위탁) 		

업 체 명	국립낙동강생물자원관 담수생물자원은행		
대표자 성명	유호		
전 화 번 호	054-530-0700	팩스번호	-
이 메 일	-		
홈 페이지	https://fbp.nnibr.re.kr/fbcc/		
주 소	경상북도 상주시 도남2길 137(도남동)		
주요 기술 및 취급 품 목	<p>국립낙동강생물자원관 담수생물자원은행(Freshwater Bioresources Culture Collection)은 국내 유일의 담수 야생생물 소재은행으로, 2016년 고부가가치 잠재력을 지닌 담수 야생생물 소재의 지속가능한 이용에 기여하기 위해 설립되었습니다.</p> <p>담수 야생생물 소재는 생활사 중 전부 혹은 일부 기간에 담수 서식지를 이용하거나 담수 생물에 기생하는 종(동물, 식물, 균류·지의류, 원생생물, 원핵생물)을 포함하여 이들로부터 얻어지는 천연물(추출물, 2차 대사산물 등), 유전자원(조직, DNA 등)을 말합니다. 담수생물자원은행은 첨단시설을 갖춘 유전자원 수장고, 동결건조 앰플 수장고, 생물소재 배양실, 담수 미세조류 배양 보존실, 추출 농축실, 분리 정제실 등을 운영하여 고품질 소재의 안정적인 보존 및 분양 업무를 수행하고 있습니다. 24,200개 이상의 소재(미세조류, 세균, 진균, 천연추출물)를 보존·관리하고 있으며, 지난 7년 동안 산·학·연 연구자에게 약 23,300개의 소재를 제공하였습니다. 제3차 국가생명연구자원 관리·활용 기본계획에 따른 야생생물 소재 클러스터 육성 사업을 통하여 소재의 품질관리 체계를 국제적 수준으로 고도화하고, 보유 소재로부터 수요자가 원하는 주요 활용정보를 확보·관리하기 위해 “담수생물소재선진화연구단”을 구성하였습니다. 2026년까지 품질경영시스템(ISO9001) 및 생물자원은행(ISO20387) 인증으로 국제적 수준의 품질관리 체계를 구축하고, 소재 특성에 따른 기초유용성 정보(항염, 항당뇨, 항산화, 항균 등) 67,000건 및 오믹스 정보(유전체, 대사체 등) 520건의 연구데이터를 생산하여, 수요자가 원하고 신뢰하는 담수 야생생물 소재를 제공함으로써 국가 바이오 산업 활성화에 기여하는 세계적 수준의 소재은행이 되고자 합니다.</p> <p>담수생물자원은행은 국내 바이오 연구·산업현장에 최고 품질의 담수 야생생물 소재의 공급 및 연구데이터 활용 강화 실현에 앞장서겠습니다.</p>		



업 체 명	주식회사 애니랩		
대표자 성명	조 병 호		
전 화 번 호	02-2027-2626	팩스번호	02-2027-2629
이 메 일	ys7066@naver.com		
홈 페이지	www.anylab.co.kr		
주 소	서울시 금천구 가산디지털1로2, 812(우림라이온스밸리 2차 812호)		
주 요 기 술 및 취 급 품 목	<ol style="list-style-type: none"> 1. 자동 종량희석기 2. 자동 배지분주펌프 3. 건조필름배지 MCMP(식품공전 건조필름배지법 II 등재) 4. 회전농축기 5. 자동질소농축기 6. 멀티볼텍스믹서 및 볼텍스믹서 7. 상하진탕기 8. 자동배지제조장치 및 자동배지분주장치 9. 금속이물채취기 10. SPE카트리지와 퀘처스 키트 11. 시린지필터 12. 바이알 및 캡 13. 마이크로피펫 및 마이크로피펫 팁 14. CRM급 표준품 15. BIOKAR 배지 16. 덕트레스 홀 후드 17. 파우더 웨이 캐비넷 		

업 체 명	경상북도농업기술원 감수출농업기술지원단		
대표자 성명	김종국		
전 화 번 호	054-530-1305	팩스번호	054-530-1309
이 메 일	gamsuchul@naver.com		
홈 페이지	-		
주 소	경북 상주시 경성대로 2559 경북대학교 상주캠퍼스 식품외식산업학과		
주요 기술 및 취급 품 목	<ul style="list-style-type: none"> ■ 사업명 : 경북 감의 수출 확대 및 부가가치 향상을 위한 현장으로 기술지원단 ■ 추진배경(필요성) <ul style="list-style-type: none"> ◦ 경상북도는 전국 뽕은감 생산량의 51%를 차지하는 전국 최대의 주산지로 상주동시 꾀감, 청도반시 감말랭이 은풍준시 꾀감 등 세계적인 품질 경쟁력을 가지고 있으나, 최근 생산량의 증가, 소비정체 등으로 지역 감 산업의 성장 이 둔화되고 있어 소비확대, 수출시장 개척 등 새로운 도약이 필요한 실정임 ◦ 감 산업은 최근 기후변화로 인한 생산의 불안정과 Covid 19로 인한 수출 감소 등으로 인하여 어려운 여건하에 있으며 특히 꾀감은 생산량이 빠른 속도로 증가하는 추세를 나타내고 있으나 아직까지 재래적인 방법에 의한 건조와 기술에 의존하고 매년 날씨에 의해 생산량이 크게 영향을 받는 등의 문제점을 안고 있어 꾀감 건조시의 이러한 애로사항을 해결하고 꾀감 산업의 발전을 위해서는 다양한 측면에서의 대응방안이 필요한 실정임 ◦ 수출용 고품질 감 재배기술과 다양한 감 가공제품 개발 및 마케팅 · 수출까지 전 단계에 걸쳐 현장에서 필요한 기술 지도 및 컨설팅 지원이 필요함 ■ 사업추진 목표 <ul style="list-style-type: none"> ◦ 감 및 꾀감 가공제품 수출확대 <ul style="list-style-type: none"> · 수출용 감 생산을 위한 주요 품종 특성표 제작 보급 · 수입국 기호도에 맞는 마케팅 전략 수립 및 재배생산 시스템 확보 · 감 가공품 수출을 통한 부가가치 향상 · 감(꾀감) 수출 작목반 육성 ◦ 수출 고품질 감 생산기술 향상 <ul style="list-style-type: none"> · 감나무 수고 낮추기 기술 보급으로 고품질 원료감 생산 · 수입국 기호도에 맞는 재배생산 시스템 확보 · 수출용 감 생산을 위한 수출대상국의 농약 잔류허용 기준(MRL) 작성 및 농약에 대한 안전관리 허용물질(PLS)작성 후 농가보급 · Global GAP 인증을 위한 기준안 마련 및 추진 ◦ 감 및 꾀감을 활용한 다양한 감 가공제품 개발 및 부가가치 향상 <ul style="list-style-type: none"> · 위생적인 감 가공품 생산을 위한 HACCP 시설 확대 · 수출용 고품질 꾀감 및 다양한 감 가공제품 기술 개발 · 유행대체 처리를 통한 위생적이고 안전한 고품질 꾀감 생산 기술 개발 · 포장재, 저장유통기술 개발 및 소비자 신뢰 확보를 위한 인증제도 구축 		

주요 기술
및
취급 품목

■ 주요 사업 성과 및 애로사항 해결

- 감 및 감가공품 수출작목반 소규모 교육 활동
 - 감나무 재배 기술과 정지 전정법 및 결실관리와 낙과방지 대책
 - 해외 수출 감 생산을 위한 글로벌 GAP 인증기준에 따른 관리 방안



- 수출용 고품질 감 생산을 위한 재배관리 현장컨설팅 및 애로기술 해결



- 떫은감 최신 연구 동향 및 기술정보 공유를 위한 워크숍 및 세미나



- 감 및 곱감 수출 확대를 위한 수출작목반 구성 및 MOU 체결



- 해외시장 분석 및 수출 활성화
 - 홍콩 및 중국(광저우) 수출을 위한 해외 시장 조사
 - 홍콩의 우수한 물류 인프라를 이용한 감 및 감가공품의 대중국(홍콩포함) 전자상거래 수출방안 모색

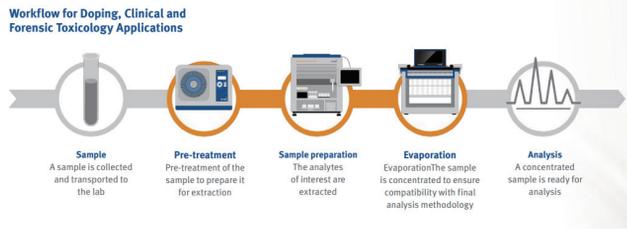


- 다양한 감 가공품 개발 및 부가가치 향상
 - 떫은감 홍시를 이용한 향산화 활성이 강화된 프리미엄 와인 개발
 - 유황혼증처리 대체 이산화염소가스혼증 감말랭이 제조 기술이전 및 이산화염소가스혼증제 보급
 - 감을 활용한 다양한 가공품 개발에 따른 농가 체험형 교육 및 기술 보급
 - 떫은감(청도반시) 이산화염소가스 혼증 처리로 저장기간 연장 효과



업 체 명	(주) 에버캠텍		
대표자 성명	이성민		
전 화 번 호	031-221-0023	팩스번호	031-226-0189
이 메 일	sales@everchemtech.com		
홈 페이지	http://www.everchemtech.com/		
주 소	경기도 화성시 마도면 청원산단7길 38		
주 요 기 술 및 취 급 품 목	<p>1. 주요 기술</p> <ul style="list-style-type: none"> 에버캠텍은 천연물 기반의 고차단성 코팅제인 NEXRIER 제품의 원천기술 및 포장 필름에 대한 국내·외 총 14건의 지식재산권을 확보하고 있습니다. NEXRIER는 단백질 및 다당류와 같은 천연물로부터 만들어져 재활용이 용이하며 Mono-layer 필름의 핵심 소재로 적용 가능한 소재입니다. 이 밖에도 TPS 열가소성 전분을 이용한 친환경 생분해 소재 및 기능성 코팅제의 개발로 ESG 기업 경영을 실천하고 있습니다. 		
	<p>2. 주요 취급 품목</p> <ul style="list-style-type: none"> 천연물 기반의 산소차단성 코팅제 (NEXRIER GS series, GF series, GP Series), 천연 전분을 이용한 생분해성 플라스틱 및 기능성 코팅제 (EVER-TPS) 		



업 체 명	바이오타지코리아(주)		
대표자 성명	서희선		
전 화 번 호	031-706-8500	팩스번호	031-706-8510
이 메 일	Jungwoo.Han@biotage.com		
홈 페이지	www.biotage.com		
주 소	경기도 성남시 분당구 양현로322, 803호 (야탑동, 코리아디자인센터)		
주요 기술 및 취급 품 목	<p>Biotage는 스웨덴 읍살라에 본사를 두고 있으며, 유럽, 미국, 아시아 등지에 지사를 두고 70개 이상의 국가에 제품을 공급하고 있습니다. Biotage Korea는 2016년에 본사의 100% 출자로 설립된 지사로서 국내 제품영업과 고객지원을 담당하고 있습니다.</p> <p>주요 기술 : 식품 안전, 깨끗한 물 및 환경 지속가능성에 중점을 둔 조직 외에도 제약, 생명 공학, 계약 연구 및 제조업체는 물론 임상, 법의학 및 학술 실험실을 포함한 광범위한 시장 에서 워크플로우 솔루션과 제품을 공급하고 있습니다.</p> <p>주요 취급품목 : MPLC, Microwave, Evaporation, Automatic Peptide Synthesizer, Nitrogen(N₂) Evaporator, Automated SPE System</p>		
	<p>Small Molecule Workflow</p>  <p>Design Scientist designs a reaction for a drug molecule</p> <p>Synthesis Organic molecules and peptides are synthesized</p> <p>Purification Unwanted contaminants are removed from the product</p> <p>Evaporation Solvents are removed</p> <p>Product Pure drug product ready for the next step</p> <p>Workflow for Doping, Clinical and Forensic Toxicology Applications</p>  <p>Sample A sample is collected and transported to the lab</p> <p>Pre-treatment Pre-treatment of the sample to prepare it for extraction</p> <p>Sample preparation The analytes of interest are extracted</p> <p>Evaporation EvaporationThe sample is concentrated to ensure compatibility with final analysis methodology</p> <p>Analysis A concentrated sample is ready for analysis</p>		

업 체 명	Anton Paar Korea		
대표자 성명	Lamperstorfer Ingrid		
전 화 번 호	02-6747-5771	팩스번호	02-6747-5772
이 메 일	office.kr@anton-paar.com		
홈 페이지	https://www.anton-paar.com/kr-kr/		
주 소	부산시 해운대구 센텀동로 99 벽산e센텀클래스원 1차 1102호(재송동, 48059)		
주 요 기 술 및 취 급 품 목	<p>Anton Paar Korea Ltd. 회사 개요 정보</p> <p>Anton Paar는 매우 정확한 실험실 장비와 공정 계측 시스템을 개발, 생산 및 유통하고 맞춤형 제작된 자동화 및 로봇 솔루션을 제공합니다. 당사는 밀도, 농도 및 CO₂ 측정과 유변 물성 측정 분야의 세계적인 선두 기업입니다. Anton Paar GmbH의 소유주는 자선 단체인 Santner 재단입니다.</p> <p>그라츠 본사와 전 세계 37개 판매 자회사에서 일하는 4,400명 이상의 직원들은 Anton Paar 제품의 매우 높은 품질 및 평판을 보장합니다. Anton Paar의 핵심 역량인 고정밀 생산 및 과학 커뮤니티와의 긴밀한 관계는 Anton Paar 기기의 우수한 품질로 연결됩니다.</p>		
	<p>취급 품목</p> <p>밀도계, 레오미터, 마이크로웨이브 분해, 점도계, 유량계, 공정 센서, 입도 분석기, 알코올 농도 측정기, 굴절계, 흡착 분석기, 토크 레오미터, 압출기</p>		



업 체 명	제주대학교산학협력단 / 제주지역혁신클러스터사업단		
대표자 성명	강철웅 / 현창구		
전화 번호	064-754-1879	팩스번호	-
이 메 일	mimihii@naver.com		
홈 페이지	https://www.jnucc.or.kr/		
주 소	제주특별자치도 제주시 첨단로8길36 제주대학교 첨단캠퍼스 412호		

주요 기술
및
취급 품 목



제주 국가혁신클러스터 경쟁력 강화

국가혁신클러스터 기획 → R&D/BI/R&D 총괄 관리 → 혁신 네트워크
 발전방향 제시, 규제-행정 개선, 정책제언
지역 주도형 내생적 발전
 지역의 발전 여건 및 클러스터 혁신 자산과 역량 활용
 과제기획, 산업특목별 발전전략, 정책수요발굴
 융복합단지 추진단 구성 및 운영

투자유치 + 혁신네트워크 운영 + 인력양성 고용창출 + 기업지원 사업화역량 + 성과관리 + 애로규제 발굴

제주 바이오산업 클러스터

제주 국가혁신융복합단지

업 체 명	고려대학교 식품규제과학과		
대표자 성명	김희석		
전 화 번 호	044-860-1392	팩스번호	-
이 메 일	hlogos@korea.ac.kr		
홈 페이지	https://sejong.korea.ac.kr/mbs/home/mbs/kf/rs/		
주 소	세종특별자치시 조치원읍 세종로 2511, 고려대학교 세종캠퍼스 내		
주 요 기 술 및 취 급 품 목	<ul style="list-style-type: none"> ■ 고려대학교(세종) 식품규제과학 분야 정부지원 석·박사과정 인재모집 안내 <ul style="list-style-type: none"> - 첨단과학(멀티오믹스 기반연구), 특성화(생리활성평가 생물통계 산업화), 정책(사회변화연구 빅데이터 분석)- 식품, 생명, 빅데이터, 사회과학 등의 다학제간 융·복합 전문교육과 연구 성과의 정책 반영을 통해 제품화 촉진과 식품산업의 활성화에 기여할 수 있는 인재양성 - 다학제 융합형 인재양성의 산학협력체계 구축 - PBL형 연구프로젝트 운영, 인턴십 교육프로그램 운영 - 재직자 대상 단기 교육프로그램 운영 - 산업체 수요 기반 전문교육 트랙 운영 및 분야별 전문가 배출 ■ 식품규제과학과 <ul style="list-style-type: none"> - 사업명 : 기능성 식품 규제과학 분야 인재양성 사업 - 지원기관 : 식품의약품안전처 - 모집대상 : 신진연구자(Full-Time), 현장전문가(Part-Time) 선발 - 지원내용 : Full-Time 등록금 100% 지원, Part-Time 등록금 30% 지원, 공동연구사업 지원 - 상세문의 : 고려대학교 식품규제과학과, hlogos@korea.ac.kr (044-860-1392) 		



업 체 명	(주)씨엠코퍼레이션에이티		
대표자 성명	02-451-9001		
전 화 번 호	02-451-9001	팩스번호	02-451-8991
이 메 일	info@cm-corp.co.kr		
홈 페이지	www.cm-corp.co.kr		
주 소	서울 송파구 법원로 11길 7 현대지식산업센터 C동 624~626호		
주요 기술 및 취급 품 목	<ul style="list-style-type: none"> ▪ 킬달 / 듀마스, 조지방, 조섬유, 전자동 가수분해 시스템 ▪ 곰팡이 독소 컬럼 ▪ 박층크로마토그래피 ▪ 원심 진공 농축기 		



업 체 명	한국핵융합에너지연구원 플라즈마기술연구소		
대표자 성명	오영국		
전 화 번 호	063-440-4029	팩스번호	-
이 메 일	sehnhhn@kfe.re.kr		
홈 페이지	https://www.kfe.re.kr/		
주 소	전북특별자치도 군산시 동장산로 37 (플라즈마기술연구소)		
주 요 기 술 및 취 급 품 목	<ul style="list-style-type: none"> ▪ 수확 후 작물의 저장을 위한 플라즈마 기술 개발 <ul style="list-style-type: none"> - 부패 억제를 위한 플라즈마 살균 기술 - 과숙 방지를 위한 플라즈마 에틸렌 제거 기술 ▪ 수확 후 작물의 저장용 플라즈마 장치 개발 <ul style="list-style-type: none"> - 장치 구성 <ul style="list-style-type: none"> · 플라즈마 발생원 · 전원 장치 · 플라즈마 활성종 및 저장 환경 측정용 모니터링 장치 · 플라즈마 장치 제어 시스템 · 데이터 저장 장치 - 플라즈마 장치 운전 조건 결정 <ul style="list-style-type: none"> · 작물 종류에 따른 저장 조건 · 저장 환경에 따른 장치 운전 조건 		



업 체 명	엔피케이(주)		
대표자 성명	김상준		
전 화 번 호	061-383-8653	팩스번호	061-383-8654
이 메 일	ehdus603@npkor.co.kr		
홈 페이지	https://npkor.co.kr		
주 소	전라남도 담양군 담양읍 예코길 61(57309)		
주 요 기 술 및 취 급 품 목	<p>[자사 보유 핵심 기술 요약]</p> <ul style="list-style-type: none"> - 다양한 제품군 보유(600여가지 건강기능식품 품목제조신고 보유) - 자체 품질분석, 전문인력 보유 - 기업부설 연구소 활성화: 연구진을 통한 개별 인정형 원료/제품 개발 - 제제개발 활성화: 시제품 생산능력 보유, 제품개발의 경쟁력 보유 - 각종 설비 구축: 칭량, 혼합설비, 타정설비, 코팅설비, 선별 설비, 포장설비 등 - 無합성부형제: 화학첨가물 합성부형제를 사용하지 않는 포프리 공법 제조 <p>[특허현황]</p> <ul style="list-style-type: none"> - 2024 글루텐 분해능을 갖는 곡물발효효소, 이의 제조방법 및 이를 포함하는 식품 조성물 특허 등록 - 2024 평화 처리에 의해 효소활성이 향상된 평화곡물 발효효소, 이의 제조방법 및 이를 포함하는 식품 조성물 특허 등록 - 2022 산조인 및 영실 추출물의 추출방법 특허 등록 - 2022 산조인 분말 및 영실 분말을 포함하는 수면 장애의 예방 또는 개선용 조성물 특허 등록 - 2021 쌀단백질 음료 조성물 및 그의 제조방법 특허 등록 - 2020 정제 및 분말제형에서 천연 복합제 조성물 및 제조방법 특허 등록 - 2020 전통 미생물 공서배양 발효법 특허 출원 - 2019 기능식품연구소, 프리바이오틱스와 유산균 코팅기술 특허 출원 - 2018 누룩과 혼합곡물을 이용한 유산균 배양 특허 등록 - 2018 정대나무 잎 추출물을 포함하는 피부 미백용 화장료 특허 등록 <p>[취급 품목]</p> <p>K-낙산균, K-낙산, K-저분자효모, K-글루텐분해효소, NPK 푸드자임E5프로바이오틱스, 발효나토키나제 15000, 발효태반추출물, 식물성 유산균, 초임계 rTG 오메가-3(스페인 솔루텍스사), 뉴질랜드산 고품질 TG 조류 식물성오메가-3 등</p>		

업 체 명	경북대 IP융합인재양성사업팀		
대표자 성명	이상한		
전 화 번 호	010-2537-7659	팩스번호	-
이 메 일	https://instagram.com/knu_foodbio?igshid=Y2lzZGU1MTFhOQ==		
홈 페이지	sang@knu.ac.kr		
주 소	대구광역시 북구 대학로 80, 경북대학교 농생대 3호관 213호		

주 요 기 술
및
취 급 품 목

- 지식재산에 대한 인식 확산 노력.
- 지식재산에 학부생 및 대학원생에 대한 교육 및 연구방법에 대한 교육, 및 세미나 특강 실시.
- 한국발명진흥회와 주기적으로 교류하면서 지식재산권의 가치를 공유하며 지역의 산업발전을 위하여 노력.
- 2차년도 교육과정 운영, IP인식제고세미나, 경진대회, IP융합장학금, 발명특허 등 다양한 영역으로 추진해 옴. 그 중 지식재산 교과목 수강생 만족도, 학생 참여IP출원건 수 달성률을 초과함. 특히 IP출원건수도 기준목표의 900%를 넘게 달성함.

Chapter 02

2차년도 핵심 성과 지표

항목	기준값 (22년도 초기 사업계획서 목표 값)	목표값 (23년도 사업계획서 목표 값)	달성값	달성률(%)
① 신산업 분야 지식재산 교육과정 구성 및 운영성과(강좌수)	2	3	4	133.3
② 신산업 분야 지식재산 교육과정 수강생 수(명)	30	40	119	297.5
③ 신산업 분야 지식재산 교육과정 수강생 만족도(점)	70	80	87.72	109.65
④ 신산업 분야 지식재산 교육과정 교원 확보 수(명)	2	3	3	100
⑤ 신산업 분야 지식재산 교육과정 담당 직원 수(명)	1	1	1	100
합계				

Chapter 03

2차년도 자율 성과 지표

항목	기준값 (22년도 초기 사업계획서 목표 값)	목표값 (23년도 사업계획서 목표 값)	달성값	달성률(%)
①전담교수 대상 IP인식제고 특강 건수	1	2	2	100
②참여학생 취창업 목적을 위한 기업 IP멘토링	5	8	16	200
③학생 참여 IP출원 건수	2	4	36	900
④산학연 IP관련 초청 강연수	1	2	3	150
⑤IP관련 행사에 참여하는 참여학생의 만족도 (100점 만점 대비)	70	75	89.53	119.4
합계				

- 3차년도에도 바이오헬스에 관련된 지식재산 교육과정 증설, 학생 상표등록교육 실시, 지식재산 씬머스쿨 지원 등 다양한 프로그램을 운영할 계획

업 체 명	(재)남해안권발효식품산업지원센터		
대표자 성명	김광현		
전 화 번 호	061-750-8201	팩스번호	061-750-8239
이 메 일	ohjunseok@ffic.kr		
홈 페이지	www.ffic.kr		
주 소	전라남도 순천시 승주읍 승주로 538-4		
주요 기술 및 취급 품 목	<p>주요역할 발효식품산업 창업·육성, 전문인력양성(발효아카데미) 컨설팅지원, 연관산업 발굴, 발효식품 연구개발 및 분석 등</p> <p>산업화지원 발효차 및 발효음료 주력제품의 포장 유형에 따른 포장라인 설비 발효 및 추출 공정라인을 활용한 결선티링 지원 시제품개발 및 수탁생산 등 기술지원 우리 농산물 활용 고부가가치 제품개발</p> <p>연구개발 발효차 및 발효음료 품질분석, 유용성분 및 생리활성 분석 발효식품 신기술 및 신제품 RnD 수행 우리 농산물 활용 고기능성 소재개발</p>		
			
			
	<p>발효아카데미</p>		<p>클루치 개발(3종)</p>
	 <p style="text-align: center;">HACCP인증 4종</p>		



Author Index

A

Abdus Sobhan	IS1-3
Adebayo J. Akinboye	P3-13
Ae-Gyeong Kim	P3-6
Aekyoung Moon	P5-5
Ahna kim	P2-51
A-Jin Yoon	P2-82
Alexander Myoung Min	IS2-1
and Kyoung-Sun Seo	P2-74
Angelica F. Dumigpi	IS3-3
Arachchige Maheshika Kumari Jayasinghe	P5-44
	P5-47
	P5-48
	P5-49
A-Young Lee	P2-78

B

Bashistha Kanth	SPOC2-9
Baul Yang	P4-41
Beong Hyeon Na	SPOC1-4
Bo Gyeong Seol	P5-55
Bo Ra Lee	P2-36
Bo Ram Park	P2-41
Bo Young Jeon	CDC-1
	P2-56
Bohyun Yun	P4-11
Bok Kyung Han	P5-40
Bokyung Lee	SPOC2-9
Bokyung Son	P4-47
	P4-48
Bon-Jae Gu	P2-65
	SPOC2-15
Boo-Su Park	P4-42
	SPOC2-6
Bo-Ra Im	P2-30
	P4-20
Bo-Ra Lim	P2-27

Bo-Ra Lim	P2-28
Bora Lim	P2-29
	P2-43
	P2-44
Bo-Ra Lim	P4-6
Boram Kim	P2-27
	P2-28
Bo-Ram Kim	P2-48
	P2-49
	P2-50
Boram Kim	P4-61
Boram Park	P2-40
Bo-Rim Song	P5-23
	P5-51
	P5-52
	P5-53
Bo-Gyeong Son	P4-55
	P4-58
Bumseok Lee	P4-61
Buyanbadrakh Enkhbolor	P5-37
Byoung-Mok Kim	P1-32
	P4-33
	P2-72
	P5-10
Byung-Hyuk Kim	P5-11
Byung-Min Oh	P5-14

C

Chae Young Jung	P2-35
Chae-Eun Kim	P5-39
Chae-Eun Lee	SPOC2-7
Chan Soon Park	P2-41
Chan Suk Yoon	P1-33
Chang Hee Park	P4-35
Chang Hwa Jung	S17-3
Chang Hyung Lee	P5-51
	P5-52
	P5-53

Chang Ki Huh	P2-17
	P4-7
	P4-8
	P4-9
	SPOC2-3
	SPOC2-4
Chang,Y.W	SPOC2-1
	SPOC2-2
Change Gyu Go	P2-68
Chang-Gu Hyun	P4-37
Changheon Lee	SPOC2-13
Chang-Jun Lee	P4-61
Chang-Soo Kang	P1-33
Chanhyeong Kim	P1-29
Chansoon Park	P2-40
Chan-Woo Kim	P2-27
	P2-28
Chanwoo Kim	P2-29
	P2-43
	P2-44
Chan-Woo Kim	P2-48
	P2-49
	P2-50
	P4-18
	P4-24
	P4-32
	P4-6
	S16-3
Chan-Yong Kim	P4-2
	P5-1
Chaw Ei Htwe Maung	P4-16
Cha-Yeon Kim	P5-31
	P5-32
Chi-Yeol Yoo	P5-52
	P5-53
Cho, Seung Yong	S9-2
Cho-eeun Kim	P5-27
Choi Byung-Kuk	S15-3

Choi Dong Soo	P1-6	Divya Gupta	P4-56	Doo-Gyung Moon	P5-10
Choon Young Kim	SPOC2-20	Do Wan Kim	P5-20		P5-11
Chul-Min Park	P4-11	Do Youn Jeong	P5-14	Do-Woo Kim	P3-6
Chul-Woo Kim	P1-4		P5-15	Do-Yeon Go	P2-46
Chun Pyo Jeon	P4-49	Do-Kyung Kim	P2-86	Do-Youn Jeong	P4-27
	P5-35		P5-54		P4-28
	P5-36	Dong Gyu Kim	CDC-24		P4-29
Chung Ryul Jung	P2-20	Dong Ho Kim	CDC-24		P4-57
Chunwan Park	P1-45	Dong Hwi Kim	P5-16		P4-59
		Dong Hyeon Park	P1-46		P4-60
			P2-18		S14-1
			P1-38	Duwoon Kim	P2-19
D		Dong Sup Kim	P3-16	Du-yeong Jung	P4-13
Da -Eun Jang	CDC-12	Dong-Gwan Shin	P2-42		P4-31
Da Eun Jang	P4-26	Dong-Gyu Kim	SPOC2-23		
	P4-42	Dong-Hyeok Shin	P3-8	E	
	P4-43		SPOC2-11	Egwumah Ojochenemi	P2-64
	SPOC1-6	Dong-Hyeon Lee	P1-44	Rebecca	
	SPOC2-6		P2-75	Encarnacion Emilia S. Yap	IS3-3
Dae-Ho Lee	SPOC2-5		P2-76	Eon Uck Kang	P1-39
Daejung Kim	P5-9		P2-80	Eun Bi Jeon	P2-33
Daeung Yu	P1-48		P3-22	Eun Chae Lee	P5-20
	S3-2		P5-42		P5-22
	SPOC2-13	Dong-Jin Kwon	P2-14	Eun Hee Han	SPOC1-8
Dae-Yong Yun	P3-21	Dong-Jin Moon	IS2-2	Eun Hye Kim	P2-17
	P3-8		P2-78		P4-7
	SPOC2-11	Dong-Min Shin	P5-39		P4-8
Da-Hyun Ko	P3-14	Dongsoo Choi	P1-45		P4-9
	P3-15	Dong-Uk Kim	P1-44		SPOC2-3
Danhui Kim	P2-87		P2-75	Eun Jeong Hong	S12-1
Da-Sol Jeong	P2-82		P2-76	Eun Ji Lee	P5-20
Dawon Kim	P4-61		P2-80	Eun Yong Song	P2-72
Dawun Lee	P1-14		P3-22		P5-10
Dayoung Bok	P5-33		P5-42		P5-11
Da-Yun Seo	P5-8	Dongyup Hahn	SPOC2-16	Eunbee Cho	S17-1
Deog Hwan Oh	CDC-24	Dong-Yup Hahn	SPOC2-17	Eunghee Kim	P3-21
	SPOC2-23	Dongyup Hahn	SPOC2-18	Eunhee Park	P1-43
Deokyeong Choe	P1-37		SPOC2-19		P1-35
	P5-33	Don-Kyu Kim	S20-2	Eun-Jeong PARK	S1-4
Di Wang	SPOC2-22	Doo-Gyung Moon	P2-72	Eun-ji Ha	P4-21
Dieudonne Iradukunda	P2-14			Eun-jin Lee	P4-21
Divya Gupta	P4-54				

Eun-Ju Cho	P3-5	Go-Eun Ko	P5-39	Han-Seok Choi	P4-34
	P3-7	Grace N. Palmos	IS3-4	Han-Yeol Bang	P2-24
Eun-Kyung Yeom	P1-36	Gui-Jung Han	P4-20	Haseong-Cho	P2-03
Eun-Ock Park	P5-43	Gun Hee Jung	P4-45		P2-02
Eun-Seo Im	P5-1		P5-34	Hee Eun Kim	P2-53
	P5-2	Gwang su Ha	P4-27	Hee Gun Yang	P4-28
Eun-Song Lee	P5-16	Gwang-Rok Yoon	P2-24	Hee Jeong Chae	S15-1
		Gwangsu Ha	P4-28	Hee Jong Yang	S14-1
G		Gwang-Su Ha	P5-43	Hee-Gyeong Jeong	P1-44
Ga Bin Lee	P2-31	Gye Hwa Shin	P2-68		P2-74
	P2-32	Gyeongrim Jeong	P3-16		P2-75
	P2-33	Gyu Ri Shin	P4-40		P2-76
			P4-52		P2-80
Ga Hyun Baek	P3-20	Gyu-Hyeon Park	P5-24		P3-22
Ga Yeon Kwon	P2-70	Gyuok Lee	P5-27		P5-41
	P2-71	Gyuseok Lee	S4-1		P5-42
	P2-73		P3-19	Hee-Jae Suh	P3-14
Ga Yeon Yoon	P2-14		P3-21	Hee-Jin Jo	P2-19
Gahyeon Nam	P4-47		P3-8	Hee-Jong Yang	P4-27
Ga-Min Choi	P5-38				P4-28
Ga-Won Kim	P2-82				P4-29
Ga-Yang Lee	P1-32	H			P5-43
	P4-33	Ha Eun Lee	P2-36		P4-23
Gee-Hyeon Kim	P3-13	Ha Eun Park	P2-70	Hee-Min Gwon	P4-23
	P3-9		P2-71	Hee-Seok Lee	S11-6
Geon Oh	P3-14		P2-73	Heeyeong Lee	P4-3
Geun hee Cho	P3-14	Ha Rim Hong	P2-72		S1-2
	P3-15		P5-10	Heon-Woong Kim	P3-4
Geun-Seoup Song	P5-15		P5-11	Hewalayage Madushika	P5-49
Ghi-Seok Kim	P1-45	Hae Jin Kim	P5-20	Kumari Ranasinghe	
Gi-Hyung Ryu	P2-65	Hae Su Hwang	CDC-1		P5-44
	SPOC2-15	Haejin Kim	P5-9		P5-47
Ginnae Ahn	P5-44	Haejo Yang	P1-34		P5-48
	P5-47		P1-2	Hitihami Mudiyanselage	P5-44
	P5-48	Haeseong Yang	P5-45	Chalani Bhagya Deshapriya	
	P5-49	Hakdong Shin	P4-47		P5-47
Gippeum Kim	CDC-5	Han Ul Park	P2-63		P5-48
Gi-Un Seong	P3-19	Hana Cho	P5-33		P5-49
	P3-8	Haneul Kim	P4-11	Hey Kyung Moon	S18-1
	SPOC2-11	Hannah Chi	SPOC2-16	Hi-Deok Lee	S12-2
Go Kyoung Na	P4-11	Han-Seok Choi	P3-18	Ho Hyun Chun	P1-3



Ho Hyun Chun	SPOC1-2	Hye jin Kim	SPOC1-6	hyerim Ji	CDC-5
Ho-Chang Kim	P3-5	Hye Jin Park	P2-13	Hye-Yeon Jung	S20-2
	P3-7		P2-11	Hyo Rim Lee	P2-70
	SPOC2-21		P2-12		P2-71
Hojin Jung	CDC-17		P2-10		P2-73
	P2-65	Hye Kyung Moon	P2-83	Hyo-Hee Kim	P3-6
Honey Lyn Gomez	IS3-4		P5-46	Hyo-jeong Yun	P5-27
Hong Sik Kim	P1-01		SPOC2-24	Hyo-Lyn Kim	P1-29
Hong-Sik Kim	P2-42		SPOC2-25	Hyo-Seok Chae	S20-2
Hongsik Yu	P3-23	Hye Mi Jang	P2-17	Hyo-Seon Lee	P5-25
Hoon Kim	P2-42	Hye Min Jeong	P4-40	Hyo-Sub Lee	P4-61
Ho-Yong Sohn	P4-1		P4-52	Hyoung-sik, Park	S13-3
	P4-2	Hye Won Kang	P5-18	Hyun Ji Eo	P2-20
	P5-1	Hye-Gyeong Lee	P3-13		P1-4
	P5-2	HyeIn Ahn	P5-8	Hyun Jin Choi	P3-18
Hui Eun Kim	P1-38	Hyejeong Kim	P2-78	Hyun jin Kim	P4-8
Hui Jin Lee	P5-50	Hye-Jeong Kwon	P1-36		P4-9
Hui-jin Lee	P2-85	Hyejeong Kwon	P2-63	Hyun Mo Jung	P1-41
Huimin Du	P2-05	Hye-ji Min	P5-26		P1-39
Huiseon Jo	P4-4	Hye-Jin Kim	P4-26	Hyun Sub Kim	P2-56
Hui-Yeon Jang	P5-43		P4-42	Hyun-A An	P2-26
Hwa Seol Ryu	P4-49		SPOC2-6		P2-78
Hwa-Jung Choi	S5-5	Hye-Lim Jang	P5-18	Hyung Jun Park	P3-23
Hwang Su-Byung	P2-21	Hyeock Yoon	P5-40	Hyungjin Cho	P4-3
Hwanyun Lee	SPOC2-18	Hyeon Hee Gwak	P3-20	Hyung-Joon Kim	SPOC1-4
Hwa-Young Lee	P4-5	Hyeon Hwa Oh	P5-14	Hyun-Gyu Lee	P4-25
	SPOC2-8	Hyeon Ji Jeon	P4-40	Hyun-Hee Han	P2-72
Hyang Hyun Cho	S20-2		P4-52	Hyun-Ho Kang	P2-49
Hyang Lan Eum	P1-34	Hyeon Uk Kim	CDC-1		P2-50
	P1-18	Hyeong Jun Kim	P2-70	Hyunjeong Cho	P5-9
	P1-2		P2-71	Hyun-Joo Kim	P1-01
Hyang-Im Baek	S8-1		P2-73		P5-3
Hyang-Lan Eum	P1-28	Hyeongwon Jeon	P1-43	Hyun-Ju Eom	P2-10
Hye Jee Kang	P2-77		P1-35		P2-13
Hye Jeong Cho	P2-31	Hyeon-Jun Chang	P3-10		P2-11
Hye Jeong Kang	P2-10	Hyeon-Ki Choi	P4-54		P2-12
	P2-12		P4-56	Hyunju Lee	P5-5
	P2-13	Hyeonmi Ham	P5-3	Hyun-Jung Chung	P1-12
Hye jin Kim	P4-43	Hyeon-min Jang	P4-21	Hyun-jung Jung	P4-13
Hye Jin Kim	P5-7	Hyeonsoo Lim	P5-35		P4-31



Hyun-jung Ko	P2-86	Jae-Geel Lim	P1-36	Jeongeun park	SPOC2-5
	P5-54	Jae-Han Cho	P1-18	Jeong-Ha Lee	P4-57
Hyunjung Yun	P2-87		P1-27		P4-60
Hyun-Kyung Song	P4-11		P1-34	Jeong-Heon Kim	P1-23
	P5-7	Jae-Hee Kim	P1-14	Jeong-Ho Lim	P3-19
Hyun-Mo Jung	P1-45	Jaehong Park	P5-5		P3-21
Hyunsuk Lee	S19-3	Jae-Hwan Ahn	P1-23		P3-8
Hyun-wook Jang	P4-23	Jae-Il Park	S20-2		SPOC2-11
	P4-32	Jaein Choe	SPOC1-4	Jeong-min Heo	P1-48
	P4-50		SPOC2-5	Jeongmin Kim	SPOC2-15
		Jaejin Kim	S5-1	Jeong-Min Lee	P5-25
		Jae-Kyung Kim	S3-1	JeongOk Lee	SPOC2-9
		Jae-Sik Nah	P5-23	Jeong-Seok Cho	P3-19
			P5-52		P3-21
			P5-53		P3-8
		Jae-Sik Na	P5-51		SPOC2-11
		Jaewoo Bai	P4-30	Jeong-Yong Cho	CDC-2
		Jae-wook Shin	S13-2		P3-2
		Jae-Woong Han	P2-42		P3-4
		Jae-Yong Kim	P1-23		P4-16
		Jaeyong Kim	P5-27		P4-42
		Jae-Young He	P1-29		SPOC1-5
		Jae-Young Oh	P2-87		SPOC2-12
		Jang Hoon Kim	P5-16		SPOC2-6
		Jeeyeon Lee	P4-3	JeonYong-hee Jung	P1-48
		Jeong Ah Park	P3-20	Jeung Ae Yoon	P2-63
		Jeong Gu Lee	P1-34	Jeung-Hee Lee	CDC-4
			P1-18		P2-26
		Jeong Hee Choi	P3-8		P2-78
			SPOC2-11		P3-10
		Jeong Heon Kim	P2-07		P3-5
			P2-54		P3-7
			SPOC1-7		SPOC2-21
		Jeong Hwa Jang	P2-77	Ji Ho Choi	P2-27
		Jeong Hyun Seo	P3-15		P2-28
		Jeong Sook Moon	P5-29	Ji Hyeon Lee	P1-42
			P5-30	Ji Hyun Lee	P1-02P
		Jeong-Ah Yun	SPOC2-5		SPOC2-11
		Jeong-Dong Lee	P4-55	Ji Seon Park	P2-63
		Jeongeun Park	SPOC1-4	Ji Weon Choi	P1-34

I

Ibukunoluwa Fola Olawuyi P2-02

P2-05

Il Kwon Bae P1-42

Imkyung Oh P2-35

P2-36

P2-37

Inha-Baek P2-03

In-Ja Lee P4-36

In-Seo Hwang P2-27

P2-28

P2-48

In-Sook Kang P3-6

J

Jae Eun Park P2-11

P2-12

P2-13

P2-10

Jae Geel Lim P2-63

Jae Hak Sohn P1-42

P4-53

Jae Hoon Lee P2-07

Jae Hwan Ahn P2-07

SPOC1-7

Jae Hyeok Jeon P4-48

Jae Sung Kim P3-20

Jae Young Kim SPOC1-3

Ji Weon Choi	P1-02	Jin Ju Lee	S2-2	Jiyeon Chun	P5-50
Ji Won Lee	P3-20	Jin Kim	P2-31	JiYeong Choi	P2-19
Ji Won Seo	P4-28		P2-32	Jiyeong Lee	SPOC2-9
	S14-1		P2-33	Ji-Yoon Cha	P1-23
Ji Won Shin	P4-8	Jin Lee	P1-32	Jiyoon Kim	P2-69
Ji Yoon Cha	P2-07		P4-33		P2-81
	P2-54	Jin Young Lee	P5-3		P2-84
	SPOC1-7	Jin Young Min	SPOC1-8	Jiyou Han	S10-2
Ji Yoon Chang	S16-2	Jingya Guo	P5-21	Jiyoun Hong	S19-2
Ji Youn Hong	P5-40		SPOC1-1	Ji-Youn KIM	P2-30
	P5-45	Jin-Hwa Lee	CDC-19		P4-20
Ji Young Choi	P2-18	Jin-Ju Park	P4-32	Ji-Young Choi	S7-2
Jieon Kim	P2-87	Jin-Kyeong Kim	P4-59	Ji-Young Kim	S6-3
Ji-Eun Kang	P2-49	Jinse Kim	P1-45	Ji-Young Kwon	P5-55
	P2-50	Jin-Soo Park	P4-37	Jiyoung Park	P5-3
	P4-20	Jinsu Lee	P1-27	JiYun Ahn	S17-2
Ji-Eun Kim	P5-55		P1-28	Ji-Yun Oh	P4-54
Ji-Ho Chio	P4-24	Jinsu Sung	P2-81		P4-58
	P2-29		P2-84	Johnson Olowoniyi	P2-83
	P2-30	Jin-Tae Jeong	P5-16		P5-46
	P2-48	Jinuk Jang	P4-61		SPOC2-24
	P2-49	Jinwon Kim	P4-29		SPOC2-25
	P2-50	JinWoo Yang	P5-55	Jong Bong Lee	P2-70
	P4-18	Jinyoung Lee	P3-16		P2-71
	P4-23	Ji-Seon Park	P1-36		P2-73
Jiho Choi	P2-43	Ji-Seong Hong	P1-32	Jong kuk Kim	P2-83
	P2-44		P4-33		P5-46
Ji-Hoon Kang	YSL-3	Jisoo Kim	P4-11		SPOC2-24
Ji-Hoon Park	P2-32	Jisu Lee	P4-34		SPOC2-25
Jihwan Lim	P5-45	JiWon Han	P1-18	Jong-Hun Ha	P4-4
Jihye Lee	P5-35	Ji-Won Kim	CDC-12	Jong-Hun Jang	P4-25
Ji-Hyun An	P2-24	Jiwon Park	P3-16	Jong-Hyeok Kim	CDC-19
Ji-Hyun Im	P3-14	Ji-Won Park	P4-11	Jong-Hyeon Lee	P4-54
Jihyun Lee	P1-34		P5-8		P4-55
Ji-Hyun Lee	P1-18	Ji-Won Seo	P4-27	Jong-Jin Park	P3-21
Ji-In Kim	P4-25	Ji-Woo Hong	CDC-2		S7-3
Jimi Kim	YSL-1	Jiyeon Chun	P1-40	Jong-Min Park	P1-45
Jin Hee Park	P1-01		P1-47	Jongmin Park	P1-39
Jin Hong Mok	S3-3		P2-85	Jong-min Park	P1-41
Jin Jeong	P3-6		P4-62	Jong-Sik Kim	P4-1



Jong-Sik Kim	P4-2 P5-1 P5-2	Jung Up Park	P4-11 P5-8	Kihyun Kwon	P2-51 P2-52
Jong-Woong Nam	P1-32 P4-33	Jung Won Park	P5-45	Kil Bo Shim	P2-70 P2-71 P2-73
Joo Hee Hong	P4-45 P5-34	Jung-Beom Kim	P4-13	Kil Yong Kim	P4-16
Joon-Goo Lee	P3-13	Jungmin Lee	P5-5	Kil-Nam Kim	P5-4
Joonhyuk Suh	IS1-2	Jung-Suck Lee	P2-31	Kim Jin Se	P1-6
Joon-Young Jun	P1-32 P4-33	Jungwoo Chae	P2-32 P2-33	KIM MIN GYOO	S11-4
Joo-Yeon Kim	P4-18 P4-23 P4-24	Jun-Hwan Bae	P4-4 P4-54 P4-55	Kim Yong Hoon	P1-6
Jose P. Peralta	IS3-4	Jun-Hyeong Park	P3-13	Ki-Man Kim	P2-76
Ju Hyun Min	P2-77	Jun-Hyuk Choi	P2-24	Kirinde Gedara Isuru	P5-44
Jueun Lee	P2-43 P2-44	Jun-Hyun Oh	P5-37	Sandanuan Kirindage	P5-47 P5-48 P5-49
Ju-hee Nam	P4-13 P4-31	Jun-Hyung Lim	P5-38 P1-33	Ki-Shuk Shim	P5-7
Ju-Ho Yeom	P4-1 P4-2 P5-1 P5-2	Jun-Su Choi	P4-36 P4-53	Ki-Yun Kim	P3-13
Ju-Hwi Park	P2-02	Jun-Tae Kim	P4-58 P4-57 P4-60	Kwak Yeon-Ju	P2-21
Jun Gu Lee	P5-40	Jun-tag Lee	P4-21	Kwang Soo Ha	P3-23
Jun Hyun Sung	S10-1	Ju-Ock Nam	P4-58 P4-57	Kwang-Deog Moon	P2-69 P2-81 P2-84
Jun Seo Jang	P2-17 P4-7 P4-8 P4-9	Ju-Yeon Park	P2-02	Kwang-Soo Ha	P2-87
Jun Su Noh	P4-16	Ju-Yeong Myeong	P1-32 P4-33	Kwon-il Seo	P5-26
June seok Lim	P3-14	K	S20-2	Kwontack Hwang	P2-86 P5-54
JUNG GUN HEE	S8-2	Ka Kyung Mun	S18-3	Kye Hyun Lim	P2-63
Jung Hyeon Park	P5-40 P5-45	Kajeong Lee	P2-87	Kyeong Won Yun	P5-42
Jung Hyun Seo	P5-3	Kang, Byeong-Chgul	S1-3	Kyeong-Hoon Kim	P1-01
Jung Soo Kim	P2-69 P2-81 P2-84	Karie Mae D. Tolones	IS3-3	Kyeong-hwan Hwang	P1-48
		Karmeli Jane M. Monaya	IS3-4	Kyeong-Won Yun	P5-41
		Kee-Jai Park	IS3-4 P3-21 P3-8	Kyoung-Sun Seo	P1-44
			SPOC2-11		P2-75 P2-76 P2-80 P3-22 P5-41 P5-42
		Ki Mo Kim	P5-7		
		Ki Yang Park	S4-4	Kyung Ah Jang	P2-63

Nayab	P2-64	Ruixuan Geng	P5-21	Se hoon Ki	S12-1
Na-Yeong Kwon	P1-27	Rye Gyeong Park	P1-42	Se Won Park	SPOC2-13
Na-Young Yoon	P5-55		P4-53	Se Yeon Choi	P4-45
Neul I Ha	P1-44	Ryu, Sangdon	S15-2		P5-34
	P3-22			Se Yul Lee	P5-22
	P5-41	S		Se-Mi Lee	P3-6
	P5-42	Sae-Byuk Lee	P4-54	Seo Hyun Hwang	P4-16
	P2-74		P4-55	Seo Jin Ki	P4-61
	P2-75		P4-56	Seo-Eun Park	P2-85
	P2-76		P4-58		P5-50
	P2-80		SPOC2-22	Seo-Hee Yang	CDC-2
Nu Ri Gwon	P2-11	Sang Gyeong Lee	P5-40	Seo-Hyun Yoon	P1-36
Nur Istianah	P2-77	Sang Kuy, Han	S4-5	Seojae Jeon	S5-2
Nurul Saadah Said	P2-04	Sang Min Park	P3-15	Seo-Jin Lee	CDC-2
	P2-05	Sang Rag Lee	P3-20	Seo-Jin Lee	P3-4
	P2-06	Sang Seop Kim	P3-19	Seok Lee	P5-48
	P2-03	Sang-Do Ha	S13-1	Seok-Ho Cho	P5-44
		Sang-Gyu Lee	CDC-4		P5-47
		Sang-Han Lee	P5-23		P5-49
			P5-51	Seol Jang	P5-7
			P5-52	Seong Do Lee	SPOC2-19
			P5-53	Seong Gyun Kim	P4-7
			S12-3	Seong Hun Oh	P2-68
		Sanghoo PARK	S9-3	SeongEui Yoo	P4-50
		Sang-hun Lee	S17-1	Seong-Jin Hong	P4-26
		Sanghyun Lim	P4-61		P4-35
		Sang-ik Suh	P1-42		P4-42
		Sang-Jae Lee	P4-53		P4-43
			P4-2		SPOC1-6
		Sang-Seok Lee	P5-1		SPOC2-6
			P4-5	Seong-mi Park	P5-26
		Sang-Soon Kim	SPOC2-8	Seong-Woo Jin	P1-44
			P1-44		P2-74
		Sang-Wook Jeong	P2-74		P2-75
			P2-75		P2-76
			P2-80		P2-80
			P3-22		P3-22
			P5-41		P5-41
			P5-42		P5-42
			P5-42	Seon-Jin Lee	P3-2
			P2-76		SPOC2-12

O

Ok Cheol Kim	P4-26
	P4-42
	P4-43
	SPOC1-6
	SPOC2-6
Ok-Hwan Lee	P3-14

P

Park Chun Wan	P1-6
Park Chunwan	S2-1
Park June Hyuck	P1-6
Putri Christy Artawinata	SPOC2-7
Pyo-Jueon Kim	P3-2

R

Raymund B. Parcon	IS3-3
Rheeno Lee	P2-46
Rich Son	P4-18
	P4-24
Rina Lee	P5-5

Seon-Min Oh	P1-23 YSL-4	Seung-Young Kim	P4-37 SPOC2-1	Soo-Jung Kim	P1-14 P2-82
Seoung-Yeon Kim	CDC-12	Se-Young Cho	P2-19	Soomin Lee	S12-2
Seoyeon Kwak	P4-46 P4-50	Shin Young Park	P2-33 P2-41 P2-40	Soonyeong Kim	P5-5 P5-43
Seoyoung Jeon	P2-51 P2-52	Si Hyung Lee	P5-22	Soo-Wan Chae	P4-23
Seo-Young Kim	P4-11	Si-Hun Song	CDC-2 P3-2	Soo-Young Lee	P4-11
Seul Lee	P2-40		P4-16	Sori Kang	P5-15
Seul-Ki Park	P3-21 P3-8 SPOC2-11	Si-On Jung	SPOC1-5 CDC-2	So-Won Jang	P4-55 P4-56 P4-54 P4-56
Seul-Ki, Park	S7-1	Siva Kumar Malka	P1-28	So-Yeon Kim	P1-29
Seung Hun Han	P4-49 P5-35 P5-36	So Hyeon Cho	S6-1	So-Yoon Park	P4-32 P4-46 P4-50
Seung Hyun Bae	P2-68	So Hyun An	P5-18 P5-27		P3-6
SeungA Woo	P4-50	So Mi Lee	P5-18 P1-3	Su Hawn Kim	P4-7
Seung-A Woo	P4-51	So Yeon Kim	SPOC1-2		P4-8
Seung-Bin Han	P2-78	So Young Kim	P4-51		P4-9
Seung-Bin Im	P1-44 P2-75 P3-22	So-Hee Park	P2-82	Su Jeong Lee	P2-17 P4-32 P4-6
Seung-bin Im	P2-74 P2-76 P2-80 P5-41 P5-42	SoJeong Park	P2-19	Su Jeong Seo	P5-29 P5-30
		SongYi Han	P4-11 P5-8	Su Jin Cha	CDC-1
		Song-Yi Woo	P2-24	Su-bi Lee	P5-24
		Soo Hyun Han	P1-42 P4-53 P2-69	Su-Bin Park	P5-55
			P2-81	Sug-jin Seo	P1-48
SeungEui Yoo	P4-51		P2-84	Su-Hyeon Cho	P5-4
Seung-Ho Kim	P5-8	Soo Jeong Lee	P4-23	Su-Hyeon Kim	SPOC1-4
Seungil PARK	P1-35	Soo won Lee	P2-83 P5-46		SPOC2-7
Seung-Joo Lee	P1-46		SPOC2-24	Su-Hyun Lee	P4-55 P4-56
Seungmin Moon	P3-19		SPOC2-25	Su-Jeong Seo	P5-31
Seung-Min Oh	P4-62	Soo-Hwan Yeo	P4-18		P5-32
Seungmin Ryu	P1-01 S12-1		P4-24	Su-Jin Han	P5-55
Seung-Ok Lee	P5-43		P4-6	Su-Jin Jung	P5-43
Seung-Uk Yu	SPOC2-17		S18-2	Su-Jin Jung	S14-3
Seung-Wan Cho	SPOC2-5	Soo-IL, KIM	P4-21	Suk Kyung Sohn	P2-70
Seungwha Jo	P4-57	Soo-jin Kwon			

	P2-71				WonWoo Lee	P4-11
	P2-73					P5-7
Suk-Min Yun	P1-3		T			P5-8
	SPOC1-2	Taek Kyun Choi		P3-20		S20-1
Su-Min Roh	SPOC2-7	Tae-Kyung Kim		P2-07	Won-Young Lee	P2-06
Sun Hee Kim	P4-32			P2-54		P2-04
Sun Young Jung	P2-41			SPOC1-7		P2-05
Sun Young Kim	P2-63	Tae-Sik Jang		S5-4		P2-03
Sun Young Park	P2-31	Taesoo Kim		P5-7	Woo Soo Jeong	P4-6
	P2-32	Tae-Woong Song		P3-14	Wooduck Seo	P2-52
	P2-33			P3-15	Woo-Jeong Do	P5-39
Sung Hee Park	P2-18	Tao Tong		P5-21	Woo-Kon Lee	P4-4
	P1-12			SPOC1-1	Woong Kim	S5-3
	P1-38	Thinzar Aung		P2-64	Woo-Yong Bae	P2-24
	P1-46	Tin-Chen Hsu		IS3-1		
	P2-53					
Sung ho Lee	S16-1		U			
Sung Jin Park	P2-18	Ui Jin Kim		CDC-1	Xiaolu Fu	P3-14
	P1-46			P2-56	Xuhui Liang	P4-37
Sung Keun Jung	SPOC1-8	Uk Lee		P2-20		
Sungeun Cho	IS1-1			P1-4		
SungHee Park	S2-3	Um Nam-yong		P2-63	Y	
Sung-ho Cho	P4-57	Un Ha Mun		P2-68	Yang Jin-Ju	P2-21
	P4-59				Yang Suk Lee	P5-29
	P4-60					P5-30
Sunghoon Jee	P1-35		W			P4-37
Sungmin Hwang	P4-11	Wha-young Choei		P2-86	Yang-Xu Lee	P5-31
Sun-Hee Kim	P4-24			P5-54		P5-32
Sun-Hyung Kim	P5-48	Wilnie Joy A. Pahilanga		IS3-4	Ye Seul Kwon	P3-18
Sun-Il Choi	P3-14	Won Hee Lee		P2-17		P4-34
	P3-15			P4-7	Yea-Ji Kim	P2-07
Sunita Gaikwad	SPOC1-9			P4-8		P1-23
Sun-Kyung Lee	P3-2			P4-9		P2-54
Sunmin Park	S14-1	Won young Lee		SPOC2-4		SPOC1-7
Sunyoung Jung	P2-40	Won-Bo Shim		P2-02	Yejin Park	CDC-5
Su-Yeon Choi	P3-6	Won-Jae Chi		S11-5	Yejin Shin	P2-29
Suyeon Gu	P4-57	Wonjae Lee		P4-37	Yeju Jeong	SPOC2-20
Syng-Ook Lee	P5-24	Wonjoo Yoon		P4-47	Ye-Na Lee	P4-56
Syng-Ook Lee	P5-25	Wonju Kwak		P5-26		P4-58
	P5-39	Won-Sik Choi		P2-87	Yeng hee Yu	P4-8
				P5-23		P4-9

Yeo-Eon Yun	P1-27		P4-40	Youn-Je Park	CDC-17
Yeon Hee Kim	CDC-1		P4-52	Youn-Soo Cha	S14-2
Yeon Ju Lee	P2-79		S6-2	You-Seok Lee	P3-2
Yeong ju Yeo	S17-1	Young Hyun An	P2-31	Yu Jin Choi	P4-41
Yeongjun Kim	P1-37		P2-32		P5-41
	P5-33		P2-33		P5-42
Yeong-Jun Kim	P4-55	Young Jun Kim	P5-40	Yu Min Seo	P2-81
	P4-56		P5-45	Yubin Lee	P5-45
Yeongsil Lim	P4-3	Young Kyoung Park	P4-29	Yue Zhao	P1-47
Yeonju Kim	P4-30	Young Yoon	P4-45		P1-40
Yeon-soo Kim	P4-21		P5-34	Yu-eun Jeong	P1-48
Yeonsu Do	P5-45	Young-Bae, Chung	S4-2	Yu-gin Park	P3-4
Yerim Choi	SPOC2-9	Young-Hoon Jung	CDC-2	Yujin Choi	P2-37
Ye-seon Won	P3-4	Younghoon Kim	S20-3	Yu-Jin Choi	P2-75
	P4-16	Young-in Lim	S19-1	Yu-Jin, Kim	S11-2
Yi-Chen Chen	IS3-2	Young-Jin Jo	P5-23	Yun-Hoe Kim	P5-36
Yong-Goo Kim	P5-16		P5-51	Yuni Noh	P2-87
Yonghoon Kim	P1-45		P5-52	Yun-Jeong Choi	P1-38
	P2-20		P5-53		P2-53
Yonghyun Kim	P1-4	Youngjun Kim	P5-36	Yun-Ju Jang	P2-04
Yong-IL Kim	P5-16	Young-Jun Kim	S3-4	Yun-Mi Ko	P1-36
Yong-Jun Cha	P1-48	Young-Jung Wee	P4-25	Yun-Sang	P1-23
Yong-Soo Lee	P4-36	Youngmi Kim	P2-44	Yun-Sang Choi	P2-07
	P4-53	Young-Min Kim	CDC-12		P2-54
Yong-Suk Kim	P2-46		CDC-19		SPOC1-7
Yoon Pyo Hong	P1-3		P4-26	Yun-Seo Han	P2-82
Yoon-Han Kang	P2-14		P4-35	Yun-Suk Kwon	P2-72
Yoon-jeong, Choi	S11-1		P4-42		P5-10
Yoon-Ji Goh	P1-36		P4-43		P5-11
Yoon-Ju Seo	CDC-19		SPOC1-6	Yu-Rin Jeong	P5-55
YOONMI LEE	P3-23		SPOC2-6	Yu-Wei Chang	IS1-4
You Jin Yang	P5-45	Youngsang You	YSL-2	Yu-Young Lee	P1-01
You-Geun Oh	P1-01	Young-Soo Kim	P5-14		P5-3
You-Jee Jang	S20-2	Young-Woo Koh	P1-44		
Youn Geum-Joung	P2-21		P2-74	Z	
Youn Kyung Cho	P4-45		P2-75	Zi-on Choi	P4-13
	P5-34		P2-76		P4-31
Youn Suk Lee	SPOC1-3		P2-80		
Young Eun Park	P5-55		P3-22	ㄱ	
Young Hoon Jung	P2-77	Young-Woo Koh	P5-41	강상국	P2-34
	P2-79		P5-42		



강준구	P1-17		P2-09		P4-12
강현주	P2-55	김성균	CDC-3	김진세	P1-31
고수정	CDC-20	김성렬	P2-34		P1-30
고숙주	P2-55		P5-17	김태엽	P1-21
	P2-57	김성완	P2-34	김표현	P2-55
	P2-58		P5-17		P2-57
	P2-59	김세현	CDC-13		P2-58
	P2-60	김소현	P1-5		P2-59
	P2-61	김수영	P2-22		P2-60
	P2-62	김수현	P2-67		P2-61
	P5-28	김연주	SPOC2-10		P2-62
고흔주	CDC-7	김영덕	P2-01	김해원	P2-38
곽창환	CDC-13		P4-14		P2-39
구본우	P1-26		P4-15	김향희	P4-38
권혜영	P2-08	김영민	P1-8		P4-39
	P2-09	김영현	CDC-13		P4-44
	P1-7	김오연	CDC-15	김현수	P1-24
길선미	P2-22	김용훈	P1-30		P1-25
김가현	CDC-9		P1-31	김현중	CDC-9
김국환	P1-5	김유빈	CDC-7	김현진	P2-25
김남의	P5-12	김은혜	P2-38		P5-12
김대중	P3-11		P2-39		P5-13
김대환	CDC-10		P5-28	김형균	P3-3
김두운	P1-16	김재관	P4-10	김형준	CDC-23
김명선	P4-17		P4-12	김혜연	P2-47
김명성	P1-8	김정목	CDC-7	김호진	CDC-8
김명현	P3-17	김정수	P2-66	김효영	P3-11
김민성	CDC-21		P2-67	김효진	P1-19
김민용	P1-50	김제언	CDC-20		
김민지	P2-23	김종기	P1-10	L	
	P1-30		P1-11	나승아	CDC-13
	P1-31		P1-9	나영숙	P2-25
	CDC-13	김주현	P2-57		P5-13
	CDC-16		P2-60	노수민	CDC-21
김민혜	CDC-18	김지수	P2-08		
김병태	P4-10		P2-09		
	P4-12	김지영	P5-28		
김상섭	P1-19	김지윤	P2-66		
김서인	CDC-13	김지윤	P2-67		
김선암	P2-08	김지은	P4-10		



ㄹ

류지성

CDC-18

ㄱ

마경철

P2-55

P2-57

P2-58

P2-60

P2-61

맹진희

P1-7

모혜미

CDC-7

문광덕

P2-66

P2-67

문민욱

P1-22

문서연

CDC-3

문세희

P2-15

P2-16

문재학

P5-6

문채은

CDC-14

문채현

CDC-10

문혜빈

P1-5

민영서

CDC-22

민주현

P4-44

ㅂ

박가연

CDC-15

박경민

P4-19

박기훈

P1-30

박동희

CDC-22

박명기

P4-10

P4-12

박미경

CDC-21

CDC-23

박미향

P1-11

P1-10

P1-9

박민건

CDC-23

박민수

P1-16

박상현

CDC-15

박설화

CDC-16

박소연

CDC-15

박유진

P1-13

박윤문

P1-10

P1-9

박종우

P2-34

P5-17

박종철

P5-19

박준우

P2-01

P4-14

P4-15

P1-7

박지선

CDC-15

박지현

P3-17

박창현

P1-30

박천완

P1-31

박현석

P5-28

박혜진

CDC-6

박희만

P1-15

박효진

CDC-21

배동호

CDC-11

배재우

SP0C2-10

백다예

P2-15

P2-16

P4-22

P2-15

P2-16

P4-17

P4-10

P4-12

P2-15

P2-16

P4-17

P4-22

백세은

백은진

백지환

ㅅ

서경민

P4-22

서수희

P1-13

서유민

CDC-6

P2-67

서창교

P3-17

성진수

P2-66

P2-67

손동모

P2-15

P2-16

손세열

CDC-15

손일권

P1-5

손재용

P1-15

손진향

P1-24

P1-25

송시훈

P1-13

P3-3

송영은

P2-23

송요한

P2-22

신상운

P4-10

P4-12

신영우

P1-49

신유정

P2-47

신정엽

P2-62

신지원

CDC-3

ㅇ

안광환

P1-21

안민실

P2-23

안영현

CDC-8

안재경

P1-11

안지혜

P1-5

안호섭

P5-28

엄가은

CDC-18

엄남용

P1-7

오병택

P1-20

오상아

P2-08

P2-09

오수민

CDC-15

오승연

CDC-22

오주열

P1-24

P1-25

원예선

P3-12

위건

P1-8

유다영

P4-38

유다영	P4-39	이유범	P2-08	임수빈	CDC-15
유영희	P2-25		P2-09	임윤지	P2-08
	P5-12	이유석	P2-55		P2-09
	P5-13		P2-57	임은화	P1-10
윤재승	CDC-10		P2-58		P1-11
윤정아	CDC-23		P2-59		P1-9
윤정애	P1-7		P2-60	임재길	P1-7
	P4-17		P2-61	임재빈	P3-17
윤지환	P4-22		P2-62	임정묵	P1-20
이가연	CDC-6	이유진	P4-10	임정호	P2-67
이경민	CDC-16		P4-12	임준영	CDC-23
이나윤	CDC-16	이은실	P2-61	임지혁	P2-22
이다빈	CDC-15	이은지	P1-5	임희택	P1-10
이다움	P1-19	이정석	CDC-8		P1-11
이동민	CDC-15	이정희	P4-12		P1-9
이병욱	CDC-11	이종필	P3-1		
이보경	CDC-16	이주영	P2-08		
이상봉	P1-19		P2-09		
이상현	P5-6	이지원	P3-11	장경아	P1-7
이서진	CDC-6	이지혜	P2-34	장도연	P1-20
이선경	P2-55		P3-11	장소정	P1-10
	P2-57		P5-17		P1-11
	P2-58	이진주	P1-30		P1-9
	P2-59	이창무	P5-19	장신	P3-12
	P2-60	이채은	CDC-21	장유진	CDC-15
	P2-61	이하림	P1-17	장은희	P3-11
	P2-62	이하연	P1-7	장현욱	P1-26
이선미	P1-21	이하준	P1-22	전수경	P3-1
이선진	P5-6	이현경	P4-10	정건희	P4-44
이성남	P4-10	이현동	P1-15	정대원	P1-22
	P4-12		P4-19	정문철	P1-19
이세라	P2-58	이현민	P1-22	정민영	P2-45
이세원	P1-20	이현준	P2-47		SPOC2-10
이송이	P2-23	이혜리	CDC-13	정수진	P1-17
이승비	CDC-11	이효섭	P4-38		P5-28
이아름	CDC-9		P4-39	정승희	CDC-9
이영서	CDC-6		P4-44	정윤성	CDC-18
이예슬	P4-19	임경란	P3-1	정윤지	P4-17
이용환	CDC-10	임계현	P1-7	정은호	P1-24
이우진	P3-12	임무혁	P3-17		P1-25
				정일겸	P2-47

ㄱ

정재은	P1-21	차지혜	CDC-15	홍정진	P1-24
정종욱	CDC-18	채승훈	P3-12		P1-25
	CDC-20		P5-6	홍지우	P3-3
정준재	P1-20	최가원	CDC-14		P5-6
정지호	CDC-13	최덕수	P2-08	홍한비	CDC-16
정태규	CDC-16		P2-09	황인근	P1-11
정혜지	CDC-20	최동수	P1-31		
조미애	P5-19		P1-30		
조미현	P3-17	최성진	P1-21		
조영희	P2-34	최소영	P3-1		
	P5-17	최원영	P1-8		
조재윤	P4-38		P5-6		
	P4-39	최유림	P2-23		
조정용	P1-13	최윤서	CDC-8		
	P1-8	최정	P5-28		
	CDC-6	최정희	P1-19		
	P3-12	최종철	P4-10		
	P3-3	최충효	P2-22		
	P5-6	최현아	P2-15		
조중상	P1-20		P2-16		
조한라	P2-59		P4-22		
조형욱	P3-11	최호철	P5-19		
조혜성	P5-28	최희선	CDC-16		
주경천	P2-08				
주경천	P2-09	ㅎ			
주동일	P2-22	하상도	P1-17		
지성경	CDC-14	하승연	CDC-22		
지수현	P2-55	한다운	CDC-14		
	P2-57	한현아	P2-23		
	P2-58	허 준	P1-20		
	P2-59	허성용	P2-22		
	P2-60	허재영	P1-22		
	P2-61	허창기	CDC-3		
	P2-62		P2-25		
진주영	CDC-9		P2-38		
			P2-39		
			P5-12		
			P5-13		
ㄷ		홍가형	CDC-15		
차상화	P2-15	홍민서	CDC-20		
	P2-16				
차재윤	CDC-13				





경북 감 수출 확대 및 부가가치 향상을 위한 현장애로 기술지원

고품질 감 가공품 개발 및 수출 경쟁력 강화

수출용 감(곶감)제품의 표준화

가공제품에
적합한 감
품종개발

고품질
원료 감 생산

위생적인 다양한
감 가공품 개발

해외현지
유통체계 구축

감 및 곶감
수출활성화

비전

경북 감의 수출 확대 및 부가가치 향상

목표

목표1

- 감 및 곶감 가공제품 수출 확대

목표2

- 수출용 고품질 감 생산기술 향상

목표3

- 감 및 곶감을 활용한 다양한 감 가공제품 개발 및 부가가치 향상

핵심
전략

- 수출 대상국의 검역 및 잔류농약 허용 기준 준수
- 해외 현지 온라인 시장 조사
- 수출용 감 및 곶감 가공제품 품질 개선

- 감나무 수고 낮추기를 통한 생산량 증대 및 고품질 원료 감 생산
- 수입국 기준에 맞춘 농약사용기준 설정 및 기술지도
- 수출과실의 병해충 관리 기술지원

- 다양한 감 및 곶감 가공품 개발
- 감 가공품의 지역특산물화 및 기술이전
- 포장재 개발 및 유통관리체계 구축

감수출농업기술지원단

최김특허법률사무소는 클라이언트의 연구성과를 소중히 여기겠습니다

51년의 축적된 경험과 노하우
다국적 제약사 외 다수 외국 기업 대리
특허청 심사관 출신의 최적화된 서비스
박사급 실무가에 의한 효율적인 커뮤니케이션
경력 20년 이상의 각 분야 실무가들에 의한 융합기술 협업

최김특허법률사무소

서울시 서초구 고무래로10길 23, 유화빌딩 2층

Tel : 02-3481-2001

CHOI, KIM & PARTNERS

2F., Youhwa Bld., 23, Gomurae-ro10-gil, Seocho-gu, Seoul, Republic of Korea

Tel : +82-2-3481-2001

주식회사 리젠피엔엠



Freshness Solution Center 비관통 통기성 필름 제조

주요 생산품

Thermal Blade Casing film(TBC) 열폭주 방지 필름

Agriculture&Food Casing(AFC) 농/식품 포장 필름

보유기술

미세 천공 장치(10-2641405)

레이저 유도 탄소물질 기반 전극 제조 (10-2486556)

다공성 구조체의 제조방법(10-1706313)

통기성 필름의 특징

신선도 유지



투과도 조절 필름

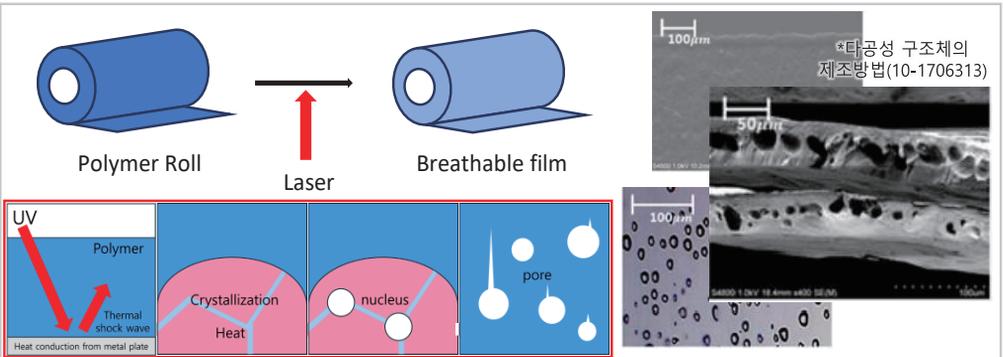
오염 안전성



비관통 통기성



통기성 필름 제작 기술 모식도 및 사진



Geneka™

NGS SERVICE

Hybrid Whole genome sequencing

Long-read + Short-read sequencing

Complete genome sequence

More reasonable price than conventional
long-read sequencing

Metagenome Sequencing

Amplicon metagenome

Bacteria의 대표적인 bio-marker인

16S rRNA gene의 variable region 염기서열 분석을 통해,
해당 미생물 군집의 종류를 추정하는 microbiome 분석법

Shotgun metagenome

특정 환경에서 분리한 모든 유전체 DNA(metagenome)의
염기서열 분석하는 microbiome 분석법



www.sanigen.kr
T.1833-8010

BACT/ALERT® 3D

멸균식품에 적용 가능한 신속 미생물 검출 솔루션

Simple Workflow, Fast Results

BACT/ALERT는 세균발육 시험/멸균 시험에 소요되는 시간을 3-5일 정도로 단축시킬 뿐만 아니라*, 세 단계의 워크플로우로 작업 시간을 최소화합니다.

1



INOCULATE

2



SCAN

3



LOAD

10분마다 지속적인 샘플 모니터링을 통해 미생물 성장 시 알람을 제공하여 실시간으로 미생물 검출 및 확인이 가능합니다.

* 샘플에 따라 배양 시간 조절 가능



Your Ally in Advancing Quality

PIONEERING DIAGNOSTICS

문의전화 1588-8529

VITAMIN HOUSE

약국출시

한국인은 K-낙산균

세계에서 인정받는 K-낙산균
최초의 한국형 낙산균입니다.

비타민하우스 K-낙산균 프로바이오틱스



K-낙산균

K-낙산균

국내 최초 한국인 유래
특허 낙산균

OLYMPUS[®]

Your Vision, Our Future

Comprehensive Catalog

Biological Microscope

For Biological Applications



STARLAB
SCIENCE

| 주소 : 강원특별자치도 춘천시 동면 서부대성로 441-7
| 전화 : 033-252-5514 | 팩스 : 070-7966-5080
| 이메일 : starlabsci@starlabsci.co.kr

자연을 이롭게, 내 몸에 이로운



과일



채소



이로운 군위



토마토



복숭아



오이



소고기(삼겹살)



대추



사과

삼국유사의 군위가
홍익인간의 정신으로 다시 태어납니다!



군위군



군위군조합공동사업법인

(참여조직: 군위농협, 팔공농협, 대구경북농협)

美 FDA GRAS 세계 최다 균주 등재

기능성이 아닌 원료의 안전성에 대한 내용

안전한 유산균 듀오락 CBT* 균주



장내 환경에 영향을 주는 유산균!
정말 안전한 유산균인지 꼼꼼하게 살펴보아야 합니다.

듀오락은 유산균의 품질과 안전성을 위해
29년간 오직 유산균만 연구하며 까다로운 여정을 걸어왔습니다.

*CBT 유산균이란? 29년 유산균 전문기업 듀오락이 직접 개발한 균주의 고유 명칭을 뜻하며,
FDA GRAS에 CBT 11종의 균주가 등재 되었습니다.
FDA GRAS 등재는 기능성이 아닌 원료의 안전성에 대한 내용입니다.

PROBIOTICS
DUOLAC®

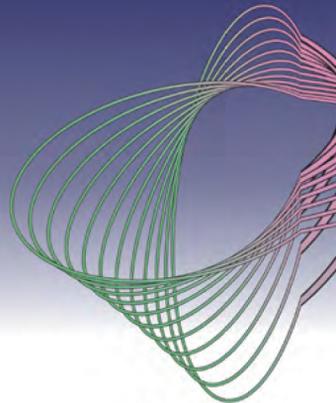


DIGITAL



The Korean Society of Food Preservation

FOODTECH



This work was supported by the Korean Federation of Science and Technology Societies(KOFST) Grant funded by the Korean Government.