30th Anniversary

43rd International Symposium and Annual Meeting

Post COVID-19 : Innovation and Prospects of Sustainable Foods

August 16-18, 2022

Gyungju Hwabaek International Convention Center

주 관 사단법인 한국식품저장유통학회 The Korean Society of Food Preservation

주 최 KFRI 한국식품연구원 | 장흥군버섯산업연구원 | 식품의약품안전평가원 | 중앙대학교 식품안전규제과학과 | 농촌진흥청 국립농업과학원 | 영남대학교 생활과학연구소 | GAE 사단법인 경북세계농업포럼 | 경북대학교 식품생물산업연구소 | 경북대학교 발효생물공학연구소

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사단법인 한국식품저장유통학회
The Korean Society of Food Preservation

대한민국 치즈산업의 중심
재 임실치즈&
식품연구소

대한민국 치즈산업의 중심
(재)임실치즈앤식품연구소가 만들어 가겠습니다.

임실치즈의 대부(代父) **지정환**(벨기에명:디디에 세스테벤스) **신부님**이 임실 성당의 주임신부로 오셔서 가난한 농촌을 살리고자 1967년 유산양 2마리로 시작한 치즈 제조의 역사가 대한민국 치즈 산업의 초석이 되었듯이, **(재)임실치즈앤식품연구소**는 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 충실히하고, 동시에 새로운 발효 유산균주의 기능성 구명연구와 이용기술개발로 임실치즈의 차별화를 통한 명품화를 추진해 나가겠습니다. 전문화된 연구역량을 통해 작지만 강한 연구소로서의 위상제고와 경쟁력 강화에 최선을 다하겠습니다.

앞으로도 **(재)임실치즈앤식품연구소**가 더욱 발전할 수 있도록 아낌없는 성원과 격려를 보내주시기 바랍니다.

연구소 연혁

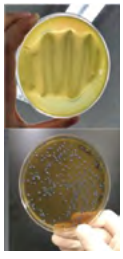
2020년 : 2020 대한민국 베스트 신상품 **향긋한 독활차** 대상 수상
2019년 : 중소벤처기업부 산학연협력기술개발사업 공동개발기관 지정
2018년 : 유제품가공사 민간자격증 시행기관 지정
2016년 : (재)임실치즈과학연구소→**(재)임실치즈앤식품연구소**로 명칭 변경
2014년 : 산업통상자원부 장관상 수상
2011년 : 연구소 개소

연구수행 내용

지역특산자원 활용 소재개발 연구 활발

중소벤처기업부 지원으로 독활, 작약, 감초 등 지역특산자원을 활용한 피부건강 및 수면건강 개선 기능성 소재개발 연구 추진

연구수행 내용



기능성 프로바이오틱스 균주개발 지속

산림청 지원으로 전통발효식품에서 분리한 식물성 유산균주의 장관면역 증진효과 확인을 통한 맞춤형 유산균 개발연구 지속 추진

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**전문성과 신뢰를 바탕으로 더 좋은, 더 나은
식품 원료 소재를 위해 끊임없이 나아갑니다.**

01	02	03	04	05	06
건강기능식품	일반식품 및 식품 첨가물	반려동물 기능성 원료	화장품 원료	OEM 생산	원료화 사업
식약처로부터 인증받은 다양한 기능성 원료	천연원료를 가공한 농축액, 분말, 한방원료와 각종 비타민류, 무기질, 천연보존제, 유화제 등	사료, 간식, 건강식품 등의 원료	미백, 주름개선, 피부탄력, 보습 등 기능성 천연원료	고객의 니즈에 맞는 건강기능식품, 기타 가공식품 등 정제, 캡슐, 앰플 스틱, 분말 제형으로 OEM 생산	연구개발한 자료를 바탕으로 목적에 맞는 맞춤형 원료 생산 및 공급






✓ 우수하고 다양한 기능성 원료 확보!
✓ 소량부터 대량까지 맞춤형 원료 소재 공급!
✓ 고객의 니즈에 맞는 생산&유통 솔루션 제공!

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자연발효의 생생함

Contents

▶ **발표장 안내(평면도)** ····· 6

▶ **학술대회 일정표** ····· 8

▶ **초청의 글** ····· 9

▶ **기조연설 및 학술상 강연** ····· 10

<Plenary Lecture> Mechanistic insight in microbe-microbe interactions with implications for selection of probiotics for use in food and gut health

<Academic Award Lecture> Application of bioassays and techniques for sustainable food and bio-industry

<International Session>

IS1. Safety and Quality of Sustainable Food ····· 13

IS2. Sustainability of Nutraceuticals and Functional Foods ····· 17

IS3. Probiotics, Gut Health, and Microbiome ····· 21

<Symposium Session>

S1. Human Microbiome-targeting Prebiotics and Probiotics ····· 27

S2. Scientific Evidence-based Efficacy of Korean Red Ginseng ····· 33

S3. Improvement plan of HACCP System ····· 39

S4. Microbiome and Effective Microorganisms Isolated from Agriculture, Food, and Livestock ····· 43

S5. The Challenges of Digitalization Technology for Sustainable Development of Agricultural and Food Products ··· 47

S6. Direction and Innovation of the Future Food Industry using Fermented Microbial Resources ····· 55

S7. International Harmonization and Standards of Food Safety with CODEX ····· 61

S8. Advanced Strategies of Bio-health Product and Materials based on Mushrooms ····· 67

S9. Development of Sustainable Fresh Fishery Products Distribution Technology ····· 73

S10. Introduction of Use by Date and Managemental Strategies of Food Industry ····· 79

S11. Climate Change; Future and Current Researches on Mycotoxins for Food Safety ····· 83

S12. Global Market Extension Strategy for Hanwoo (Korean Beef) and Status of Eco-friendly Biomaterials ····· 89

S13. Strategies for Building a Virtual Food Factory Based on Digital Twin ····· 95

S14. Understanding of Sarcopenia as a Disease ····· 99

S15. Big Data Driven Smart Agriculture Methods and Strategies ····· 105

S16. Emerging Technologies for Functional and Sustainable Food Packaging ····· 109

▶ **대학원생 논문 발표대회** ····· 115

▶ **캡스톤 디자인 발표대회** ····· 138

▶ **UCC영상공모전** ····· 147

▶ **포스터 세션** ····· 149

○ PART Ⅰ. 저장/포장/유통 ····· 150

○ PART Ⅱ. 가공/품질 ····· 155

○ PART Ⅲ. 화학/분석 ····· 166

○ PART Ⅳ. 미생물/발효/안전성 ····· 169

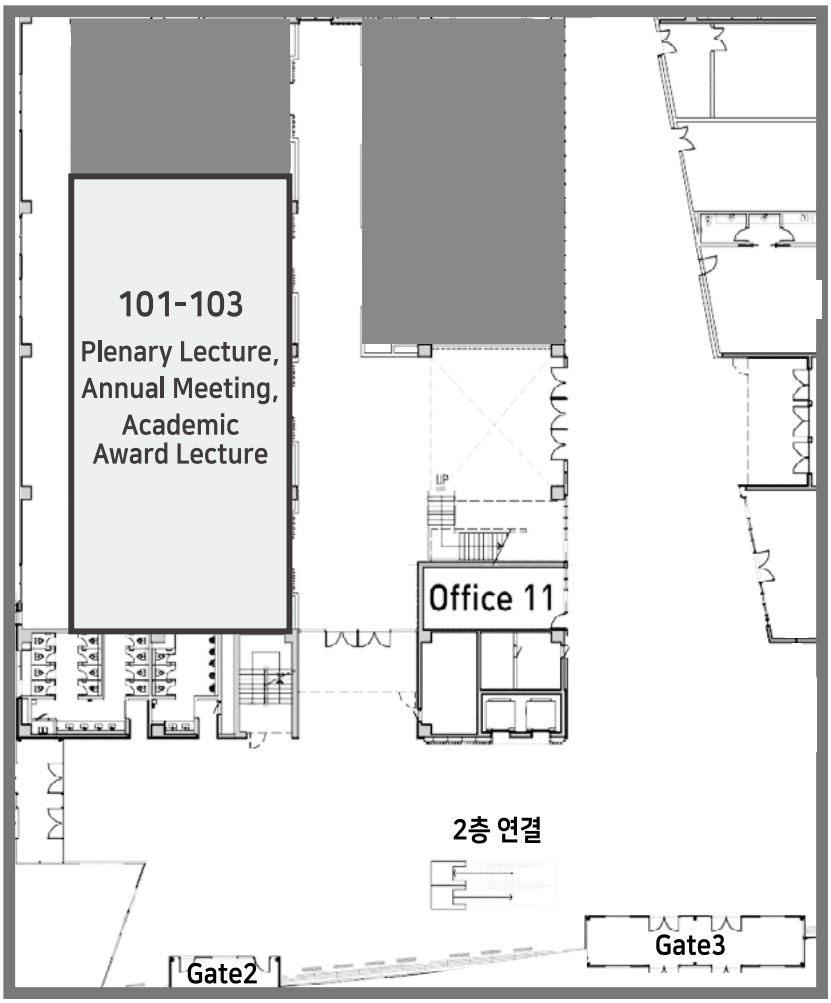
○ PART Ⅴ. 생리활성/영양/기능성 ····· 180

▶ **저자색인** ····· 188

▶ **참가업체 현황** ····· 195

▷▷▷ 발표장 안내 - 경주화백국제컨벤션센터

1층



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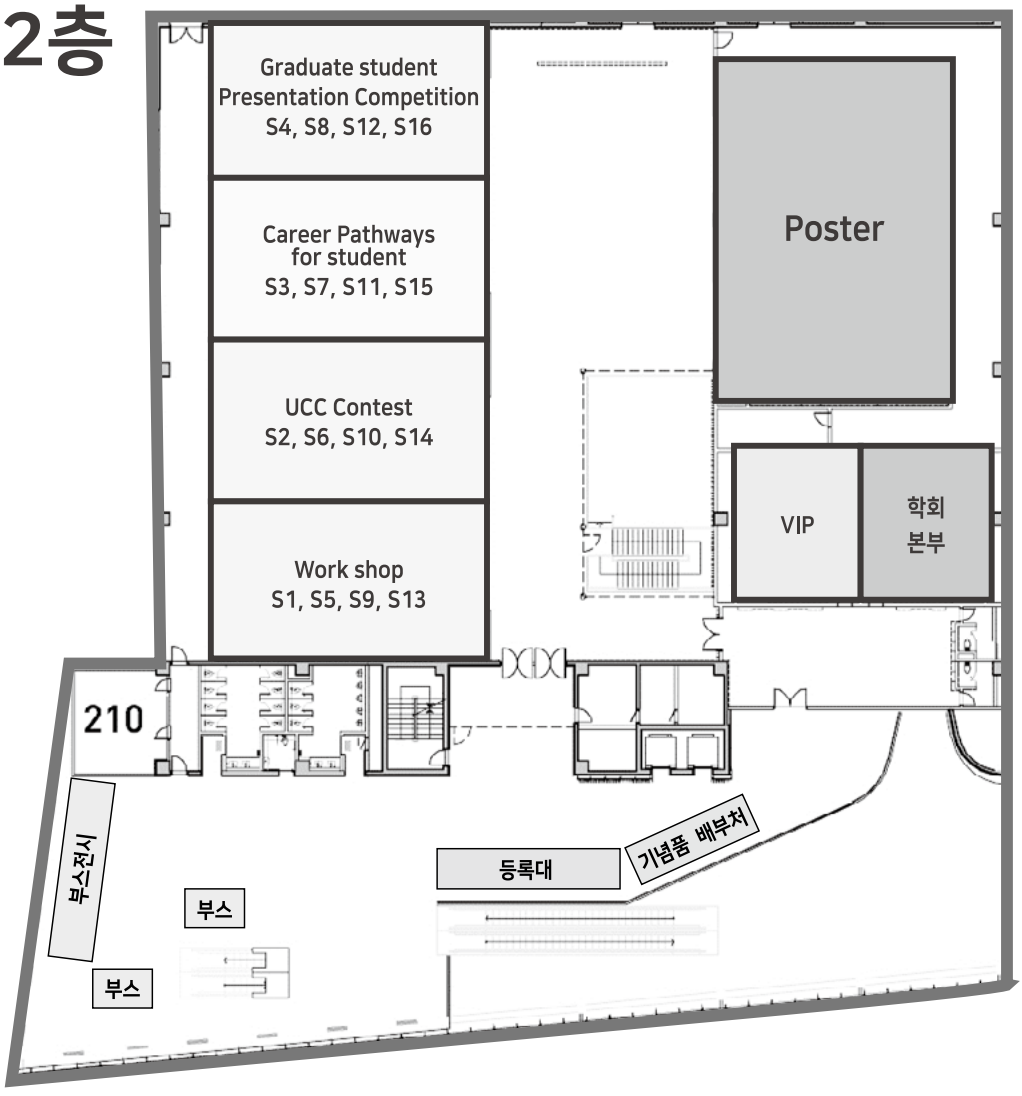
Graduate student
Presentation Competition
S4, S8, S12, S16
Career Pathways
for student
S3, S7, S11, S15
UCC Contest
S2, S6, S10, S14
Work shop
S1, S5, S9, S13
Poster
VIP
학회
본부
210
부스전시
부스
부스
등록대
기념품 배부처

▷▷▷ 학술대회 일정표

2022 KoSFoP International Symposium and Annual Meeting Program

August 16 (Tue)						
Time \ Place	Rm. 101	Rm. 201	Rm. 202	Rm. 203	Rm. 204	Rm. 205
12:30-17:00	Registration (Lobby, 2F)					
13:30 -17:00		Workshop	(13:30-15:00) UCC Contest (15:00-17:00) Graduate Student Presentation Competition	Career Pathways for Students	Graduate Student Presentation Competition	Capstone Design Competition
17:00-18:00	Board Member Meeting					
August 17 (Wed)						
Time \ Place	Rm. 101	Rm. 201	Rm. 202	Rm. 203	Rm. 204	Rm. 205
08:30-16:00	Registration (Lobby, 2F)					
09:30-11:10		[S1] Human Microbiome-targeting Prebiotics and Probiotics	[S2] Scientific Evidence-based Efficacy of Korean Red Ginseng	[S3] Improvement Plan of HACCP System	[S4] Microbiome and Effective Microorganisms Isolated from Agriculture, Food, and Livestock	Poster Session 1
11:10-11:20	Break					
11:20-12:00	<Plenary Lecture> Dr. Jan Peter van Pijkeren (Rm. 101-103)					
12:00-13:30	Lunch					
13:30-14:10	General Assembly Meeting / Award Ceremony (Rm. 101-103)					
14:10-14:20	Break					
14:20-16:00	[IS1] [S5]Safety and Quality of Sustainable Food	[S5] The Challenges of Digitalization Technology for Sustainable Development of Agricultural and Food Products	[S6] Direction and Innovation of the Future Food Industry and Fermented Microbial Resources	[S7] International Harmonization and Standards of Food Safety with CODEX	[S8] Advanced Strategies of Bio-health Products and Materials based on Mushrooms	Poster Session 2
16:00-16:10	Break					
16:10-17:50	[IS2] Sustainability of Nutraceuticals and Functional Foods	[S9] Development of Sustainable Fresh Fishery Products Distribution Technology	[S10] Introduction of Product Use by Date and Managemental Strategies of Food Industry	[S11] Climate Change; Future and Current Researches on Mycotoxins for Food Safety	[S12] Global Market Extension Strategy for Hanwoo and Status of Eco-friendly Biomaterials	Poster Session 3
17:50-18:00	Break					
18:00-18:30	30th Anniversary Ceremony of Korean Society of Food Preservation (Rm. 300A)					
18:30-19:30	Dinner (Rm. 300A)					
August 18 (Thu)						
Time \ Place	Rm. 101	Rm. 201	Rm. 202	Rm. 203	Rm. 204	Rm. 205
08:30-12:00	Registration (Lobby, 2F)					
09:30-10:10	<Academic Award Lecture> Dr. Sang-Han Lee (Rm. 101-103)					
10:10-10:20	Break					
10:20-12:00	[IS3] Probiotics, Gut Health and Microbiome	[S13] Strategies in Building a Virtual Food Factory Based on Digital Twin	[S14] Understanding Sarcopenia as a Disease	[S15] Big Data Driven Smart Agriculture Methods and Strategies	[S16] Emerging Technologies for Functional and Sustainable Food Packaging	Poster Session 4
12:00-12:30	Closing Remarks / Competition and Poster Award Ceremony (Rm. 101-103)					

IS, International symposium; S, symposium

▷▷▷ 초청의 글

존경하는 한국식품저장유통학회 회원 여러분!

1992년 9월 26일 토요일 경북대학교에서 '농산물의 저장 및 유통기술' 이란 제목의 창립기념 심포지엄으로 탄생한 한국식품저장유통학회는 올해로 창립 30주년을 맞아 제43차 국제학술심포지엄을 개최하기까지 많은 성장과 발전을 이루어 내었습니다.

출범 당시 한국농산물저장유통학회로 시작한 우리 학회는 2002년 9월 현재의 명칭으로 변경하였으며 29권 3호를 발행한 학술지 '한국시품저장유통학회지' 는 2017년 SCOPUS에 등재되었으며 향후 SCI 등재를 위해 많은 노력을 기울이고 있으며 년간 2회 발행되고 있는 산업지 '식품저장과 가공산업' 은 올해 21권의 발간을 앞두고 있습니다. 또한 2,000여명에 이르는 회원과 함께 한국식품저장유통학회가 명실상부한 전국규모의 큰 학회로 성장하고 발전한 것은 앞선 회장님들과 임원들의 열성적인 지원과 땀의 결실이라고 믿습니다.

이번 국제심포지엄은 코로나 상황이 계속됨에도 불구하고 우리 학회가 새롭게 도약하는 기틀을 마련하고자 'Post COVID-19; Innovation and Prospects of Sustainable Foods' 의 주제로 미국 위스콘신대학 J.P. van Pijkeren 박사의 기조강연을 비롯하여 학술상 강연, 16개의 학술세션 외에도 포스터 발표, 캡스톤디자인 경연대회, 통계워크숍, 대학원생 논문발표대회, UCC 경진대회, 기업의 인재상 소개 등 학회 역사 이래 가장 크고 다채로운 학술대회를 준비하였습니다.

금번 학술 대회를 통하여 우리학회가 더욱 성장하고 학문 후세대들이 마음껏 연구하고 교류할 수 있는 장을 마련하고자 노력하였습니다. 특히 30주년 기념 만찬은 학회의 역사를 돌아보고, 공연과 함께 젊은 세대들이 소통하고 교류하는 역동적인 자리가 될 것입니다.

아직도 코로나가 왕성한 시기이므로 우리 학회의 모든 임원들은 방역지침 및 위생지침을 잘 지키고 관리하여 안전한 학술대회가 되도록 최선을 다하고 있습니다. 회원 여러분께서도 개인 위생을 잘 관리하셔서 건강한 학술대회가 되도록 협조하여 주시기 바랍니다.

금번 창립 30주년 국제심포지엄을 위하여 많은 기관과 단체, 기업 및 대학들이 협조해 주셨기에 이에 깊은 감사를 드립니다. 귀중한 학문적 성취를 강연해 주실 모든 연사님들과 포스터 발표 연구자님들, 힘든 일이지만 자신의 일처럼 수고를 아끼지 않으신 학회의 모든 임원들께도 깊은 감사를 드리며 회원 여러분의 건강과 크신 학문적 성취를 기원합니다.

2022년 8월

(사)한국식품저장유통학회장 문 광 덕

▷▷▷ Plenary Lecture

Mechanistic insight in microbe-microbe interactions with implications for selection of probiotics for use in food and gut health

Jan Peter van Pijkeren
University of Wisconsin-Madison, USA

Probiotics are defined as “live micro-organisms, which when administered in adequate amounts, confer a health benefit on the host”. Most probiotic products are marketed for oral consumption, and food is a common carrier for probiotics. Often, strains are added to food products as mixtures. However, the interplay between probiotic bacteria in the food matrix and in the gut ecosystem are underexplored. To track probiotics in food matrices and the gastrointestinal tract, we developed and optimized a luminescent tagging system for use in lactic acid bacteria. The system is adapted from the NanoGlow HiBit (Promega). A gene of interest is tagged with 33 bases at either proximal end. Addition of the substrate, which also contains the complementary protein that interacts with the eleven amino acid peptide, yields a luminescent signal. We validated the luminescent tagging system to detect bacteria and their recombinant proteins in rich broth, food, and throughout the gastrointestinal tract of mice. In the gastrointestinal tract, bacteria are detected over a linear range from 102-109 CFU/g contents, which is comparable to the conventional-and more labor intensive-approach of standard plate count.

To investigate the interplay between probiotic bacteria in the gut ecosystem, we focused on the gut symbiont species Limosilactobacillus reuteri. Previously, intraspecies competition experiments in different vertebrate hosts revealed that select strains have superior fitness, including the probiotic strain L. reuteri R2lc. As a first step towards understanding the mechanisms that contribute to L. reuteri R2lc gut fitness, we characterized two polyketide synthase gene clusters (fun and pks). The pks, but not the fun, cluster encodes antimicrobial activity. Forty-one of 51 L. reuteri strains tested are sensitive to Pks products; this finding was independent of strains' host origin. Sensitivity to Pks was also established in intraspecies competition experiments in gnotobiotic mice. Nine strains were identified that were not killed by L.

reuteri R2lc Pks. Comparative genome analyses between Pks-resistant and -sensitive strains identified an acyltransferase gene (act) unique to Pks-resistant strains. Subsequent

cell-wall analysis of wild-type and act mutant strains showed that Act acetylates cell-wall components, providing resistance to Pks-mediated killing. Additionally, pks mutants lost their competitive advantage, while act mutants lost their Pks resistance in in vivo competition assays. These findings provide insight into how closely related gut symbionts can compete and co-exist in the gastrointestinal tract.

To understand competition and co-existence of probiotic mixtures in food and beverages, we envision that the luminescent HiBiT tagging tool will prove invaluable to study microbe-microbe interactions within these complex environments.

▷▷▷ Academic Award Lecture

Application of bioassays and techniques for sustainable food and bio-industry

Sang-Han Lee
Kyungpook National University

The food industry is complexly related to other industries such as nutraceuticals, cosmetics, and pharmaceutical industry, therefore, we need to converge various disciplines to promote its development in the recent economic growth. There are new trends in the food industry in the post-COVID 19 era. Kroger's 2021 US Food Trend Forecast includes (1) Futureproof foods, (2) Comfort foods, (3) Ketotarian foods, (4) Global flavors and restaurant favorites, (5) Mushroom mania, (6) For the planet, and (7) Fresh innovation. Recently, Korea Agro-Fisheries & Food Trade Coporation (aT) has also discussed the changing demands of diet, delivery, fresh and convenient food, processed meat, and alternative proteins in the sea and the revival of home-cooked meals and the freshness of produce. Since 2005, my lab has established various in vitro and in vivo enzyme-based assay systems to contribute to the development of the food industry locally and globally. We have conducted studies on the effect and mechanism of action of food ingredients, including bioassay technology used to study the antidiabetic effect and its mechanism, isolation of antioxidants and their application, mechanism study of anti-atopic/anti-asthma food ingredients, signal transmission for delayed skin aging, and discovering food ingredients using new extraction/analysis methods. These bioassays and techniques can be used to develop functional and bio-healthy food, and I hope that this helps bring about biotech innovation in the food and bioindustry during the post-COVID-19 era. Therefore, I want to pass on my experience to the next generation of academic/industry professionals and hope for rapid development in the field of food preservation and distribution.

International Session 1

Safety and Quality of Sustainable Food

Chaired by **Myunghee Kim** (Yeungnam University)

Venue : Room 101

14:20-14:45

Nutraceutical properties of sustainable foods

Sun-Ok Lee (University of Arkansas)

14:20-14:45

Sustainable sensory science: How do we continue sensory evaluation research du ring pandemic?

Han-Seok Seo (University of Arkansas-Fayetteville)

14:20-14:45

The emerging role of CSN6 in cancer metabolism

Hyun Ho Choi (The University of Texas Health Science Center at Houston)

>>> IS1

Safety and Quality of Sustainable Food

Chaired by Myunghee Kim (Yeungnam University)

>>> IS1-1

Nutraceutical properties of sustainable foods

Sun-Ok Lee

University of Arkansas, USA

Over one-third of all food produced globally goes to waste. Twenty-eight million tons of food waste are sent to landfills in the U.S. each year and less than 5% is recovered for recycling. Therefore, it is important to reduce food waste for improving food security and sustainability and increasing efficiency. The wasted foods (byproducts) could not only provide sustenance for the population but contain potential health-promoting properties that are not well investigated. These properties come from their bioactive compounds, namely phytochemicals. Phytochemicals are usually present in small quantities as natural constituents in food, but they have received scientific attention due to their protective effect against chronic diseases. Current research efforts are focused not only on the development of functional foods for health maintenance throughout the life cycle but also on investigating phytochemicals to evaluate the necessary dosage for optimum health. The ability of a compound to exert its biological effects depends on its bioavailability dose, rather than the administrated dose. Our recent data have shown the health benefits or bioavailability of phytochemicals in berries, sweet potato leaves, and onion peels. A better understanding of the nutraceutical properties of food waste/byproducts will enable determining their dietary utility as functional foods

>>> IS1-2

Sustainable sensory science: How do we continue sensory evaluation research during pandemic?

Han-Seok Seo

University of Arkansas, USA

Since the outbreak was declared a pandemic in March 2020, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (also known as Coronavirus Disease 2019 or COVID-19) has impacted on global agricultural and food systems. Emergent guidelines and orders for reducing rapid growth in lethal cases have been implemented in many regions and countries around the world. In this way, food industries and research institutions have paused or stopped their face-to-face human studies, including sensory evaluation and consumer-related testing during regional or national lockdown periods. However, because sensory evaluation is an important operational component in quality control, product development, consumer insight, marketing, and sales-related functions, sensory professionals have been seeking alternative ways to continue sensory evaluation and consumer research. This presentation will provide information and insight about how to sustain sensory evaluation and human research during epidemic or pandemic period. More specifically, safety protocols and alternative methods to laboratory sensory testing, such as “drive-in booth”, that could be applied to conducting sensory studies during pandemic period will be introduced. This presentation will also offer key takeaway messages and topics that will be explored at a group level.

>>> IS1-3

The emerging role of CSN6 in cancer metabolism

Hyun Ho Choi
The University of Texas Health Science Center, USA

Forkhead-Box Class O 4 (FOXO4) is involved in critical biological functions, but its response to EGF-PKB/Akt signal regulation is not well characterized. Here, it is reported that FOXO4 levels are downregulated in response to EGF treatment, with concurrent elevation of COP9 Signalosome subunit 6 (CSN6) and E3 ubiquitin ligase constitutive photomorphogenic 1 (COP1) levels. Mechanistic studies show that CSN6 binds and regulates FOXO4 stability through enhancing the E3 ligase activity of COP1, and that COP1 directly interacts with FOXO4 through a VP motif on FOXO4 and accelerates the ubiquitin-mediated degradation of FOXO4. Metabolomic studies demonstrate that CSN6 expression leads to serine and glycine production. It is shown that FOXO4 directly binds and suppresses the promoters of serine-glycine-one-carbon (SGOC) pathway genes, thereby diminishing SGOC metabolism. Evidence shows that CSN6 can regulate FOXO4-mediated SGOC gene expression. Thus, these data suggest a link of CSN6-FOXO4 axis and ser/gly metabolism. Further, it is shown that CSN6-COP1-FOXO4 axis is deregulated in cancer and that the protein expression levels of CSN6 and FOXO4 can serve as prognostic markers for cancers. The results illustrate a pathway regulation of FOXO4-mediated serine/glycine metabolism through the function of CSN6-COP1 axis. Insights into this pathway may be strategically designed for therapeutic intervention in cancers.

International Session 2

Sustainability of Nutraceuticals and Functional Foods

Chaired by Jinah Hwang (Myongji University)

Venue : Room 101

16:10-16:35

Novel active films based on PLA and alginate containing chestnuts shells (Castanea sativa)

Cristian Rogel-Castillo (University of Concepcion)

16:35-17:00

Clean label extraction of polyphenols through green extraction techniques from plant matrices

Kashif Ameer (University of Sargodha)

17:00-17:25

Alternative source of omega-3 essential fatty acid: Health benefits throughout life

Preuttiporn Supaphon (Thaksin University)

>>> IS2

Sustainability of Nutraceuticals and Functional Foods

Chaired by Jinah Hwang (Myongji University)

>>> IS2-1

Novel active films based on PLA and alginate containing chestnuts shells (Castanea sativa)

Cristian Rogel-Castillo

University of Concepcion, Chile

In the Food Industry, it is estimated that around 30~40% of fruits and vegetables are loss during postharvest due to mishandling, spoilage and pest infestation. As a consequence, quality problems may appear such as physiological deterioration in the form of oxidation reaction such as browning reactions or fungal infection. In this aspect, plastic materials (e.g. plastic films) have been used for the food industry to reduce fruits and vegetables losses, therefore, maintaining quality and extending the shelf life of the product. However, the excessive use of plastic has had a negative impact on the environment due to their non-biodegradable nature. Therefore, it is imperative for the food industry to search for alternative to plastic materials to develop new food packaging such as active films to be used on fruits and vegetables. A promising alternative is the use of active compounds extracted from agroindustrial waste products that could be incorporated into biopolymers such as poly(lactic acid) (PLA) and alginate. The Chilean chestnut industry presents a great opportunity as a renewable source for the generation of active compounds that could be used as new raw materials for the development of a novel biodegradable active film. Hence, PLA and alginate films containing biologically-active compounds with antioxidant activity obtained from chestnut shells will be used to develop a new biodegradable active film. The expected results are that the new active film will present better mechanical properties than the current plastic film used as food packaging for the protection of fruits and vegetables.

>>> IS2-2

Clean label extraction of polyphenols through green extraction techniques from plant matrices

Kashif Ameer

University of Sargodha, Pakistan

Polyphenols as phytochemicals are naturally found abundantly in plant matrices. Recently, the polyphenols have garnered the attention of researchers worldwide owing to different health benefits and therapeutic effects associated with polyphenols in order to mitigate the lifestyle-related disorders and oxidative stress to improve the overall health and wellness. Conventional extraction methods have been exploited for centuries for extraction of polyphenols. These conventional methods exhibit several inherent limitations, and to date, efficient, rapid and clean recovery of polyphenols has remained a challenging task through development of a single standard and optimized method. Based on greener approach, the exploitation of phenolic compounds as supplements and natural antioxidants commercially has escalated the exploration efforts for cost-effective, efficient and eco-friendly extraction methods. In this overview, updated technical information regarding modern extraction techniques, such as supercritical fluid extraction, ultrasound-assisted extraction, microwave-assisted extraction, pressurized liquid extraction, and pressurized hot water extraction-as green alternatives to conventional extraction methods-was presented along with their advantages, disadvantages, factors governing extractions mechanisms and applications with regard to clean-label extraction of phenolic compounds from plants matrices. Furthermore, the prominent advantages offered by modern extraction techniques comprise of reduced solvent and time consumption with considerably lower operational costs by overcoming limitations of conventional methods for polyphenol extraction. Further research is a need of time to investigate the mechanisms underpinning the extraction kinetics of green extraction methods to scale up on industrial scale for extracting polyphenols from plant matrices and their by-products.

>>> IS2-3

Alternative source of omega-3 essential fatty acid: Health benefits throughout life

Preuttiporn Supaphon

Thaksin University, Thailand

Thraustochytrids are a group of marine heterotrophs. They are classified under the eukaryotic group and Kingdom Stramenopila. Thraustochytrids are generally isolated from marine and estuarine habitats. They play important role in the environment. Furthermore, they are considered an alternative source of essential fatty acid production because of their high amount polyunsaturated fatty acid, especially docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). DHA and EPA are composition of cell membrane and play important role for health. They have been associated with inflammation and many disease. Our research aimed to evaluate the effect of carbon and nitrogen sources on the production of cell mass and omega-3 fatty acids by thraustochytrids, analysis phylogenetic relationships of the potential isolates based on their nucleotide sequences and assess the effect of dietary polyunsaturated fatty acid supplementation on quality and quantity of Oreochromis niloticus. The maximum dried cell weight (32.87 g/L) was obtained from isolate TC9-TSU using initial concentrations of 6% glucose and 1% yeast extract, peptone and tryptone. Under these conditions, this isolate gave the highest level of PUFAs production (52.56%), with DHA (docosahexaenoic acid, 22:6n3), DPA (docosapentaenoic acid, 22:5n3), and EPA (eicosapentaenoic acid, 20:5n3). In addition, the potential isolate TC9-TSU was identified based on 18S rDNA nucleotide sequences as Aurantiochytrium limacinum (accession number MG279107). Then, they were used as dietary food for O. niloticus. The results showed that A. limacinum was the most active isolate which can promote growth and increase the survival rate of O. niloticus. On the other hand, dietary food supplemented with A. limacinum showed the highest quality and quantity of fish fillet. This result showed that thraustochytrids are an interested alternative source of omega-3 polyunsaturated fatty acids production for further application.

International Session 3

Probiotics, Gut Health and Microbiome

Chaired by Chikwang Kim (Chungwoon University)

Venue : Room 101

10:20-10:45

Arabinoxylans and their effects on colonic microbiota: Structure-function relationship

Yunus Emre Tunçil (Necmettin Erbakan University)

10:45-11:10

The development and innovation of probiotic in China: From lab to industry, from food to medicine

Bingfeng Leng (Shenzhen NexStrain Biotech Co., Ltd)

11:10-11:35

Utilization of indigenous fruits in the production of functional foods through lactic acid fermentation

Rona Camille M. Lizardo (University of the Philippines Los Baños)

11:35-12:00

Vitamin degradation in crystalline and amorphous state

Seda Arioglu-Tuncil (Necmettin Erbakan University)

>>> IS3

Probiotics, Gut Health and Microbiome

Chaired by Chikwang Kim(Chungwoon University)

>>> IS3-1

Arabinoxylans and their effects on colonic microbiota: Structure-function relationship

Yunus Emre Tunçil

Necmettin Erbakan University, Türkiye

Arabinoxylans (AXs) are non-starch polysaccharides present in many cereal grains and are resistant to digestion in the upper gastrointestinal tract. Thus, when consumed, AXs go to the colon where they are fermented by residing microorganisms. Although AXs are composed mainly of linear β-1,4 xylose residues with α-1,3 and/or α-1,2 arabinose branching units, AXs from different botanical sources (even from different anatomical parts of a cereal grain) have varied structural features such as altered degree of substitutions, arabinose/xylose ratio, molecular size, linear chain lengths and branch chain compositions. Moreover, different processing and extraction techniques also result in formation AXs with varied structural features. Considering that variations in carbohydrate chemical and fine structures affect their utilizations by colonic microbiota, AXs from different botanical sources show different colonic function. In this presentation, structural features of AXs from different botanical sources and their impacts on colonic microbiota and microbial metabolites will be first discussed. Then, the opportunities to produce structurally altered AXs with better colonic function will be covered.

>>> IS3-2

The development and innovation of probiotic in China: From lab to industry, from food to medicine

Bingfeng Leng

Shenzhen NexStrain Biotech Co., Ltd. China

Probiotics are well known as a supplementary or functional food that consists of live bacteria helpful for human health. Now increasing evidence has shown that gut microbiota could be a target of several diseases, ranging from digestive diseases to immune diseases such as cancer. During the last twenty years, our lab has collected more than 35,000 lactic acid bacteria strains, partial of which have been applied in more than 60 clinical trials to support the beneficial effects of our probiotic products. Recently, we found that Lactobacillus rhamnosus Probio-M9 and KEX02 both could enhance the aPD-1 antitumor impact. In vivo studies suggested that KEX02 could reduce tumor burden in mice synergistically with anti-PD-1 antibody treatment by eliciting an antitumor host immune response, including superior recruitment and effector function of tumor-infiltrating lymphocytes, such as IFN-γ+ CD8+ T cells and CD86+ CD11c dendritic cells. The results indicate that KEX02 can be a promising candidate for treating cancer diseases combined with aPD-1 immunotherapy.

>>> IS3-3

Utilization of indigenous fruits in the production of functional foods through lactic acid fermentation

Rona Camille M. Lizardo

University of the Philippines, Philippines

Fruits, particularly berries and plums, are known to contain significant levels of compounds and substances which have high biological activities. Many countries, like the Philippines, are abundant in these fruits. Most of which, although indigenous in one country, remained underutilized and understudied. Through lactic acid fermentation, a traditional food processing method, the biological activities and the quality of these fruits can be further enhanced. Food products and ingredients with enhanced biological activities such as antioxidant effect and inhibitory property against enzymes linked to certain conditions can be beneficial to body health and wellness and can boost immunity against certain diseases. In this lecture presentation, the application of lactic acid fermentation to potentially enhance the biological activities and overall quality of selected indigenous berries and plums will be presented. The development of high-quality food products with enhanced health-promoting properties that can be further studied for commercialization and marketability will also be discussed. This will lead to the increase in utilization of locally available fruits and will broaden their application in the food and agricultural and health industries, specifically in the area of research and development of high-value food products and ingredients, that promote health and wellness as well as prevention of diseases.

>>> IS3-4

Vitamin degradation in crystalline and amorphous state

Seda Arioglu-Tuncil

Necmettin Erbakan University, Türkiye

Vitamins as immune system boosters have gained much attention during the COVID-19 pandemic. A balanced diet containing vitamins and minerals is required for a healthy immune system which could reduce the symptoms and rate of hospitality for many diseases. Among the vitamins, Vitamin B1 is an essential nutrient which requires continues intake via diet since it can be reserved in human body for only 2-4 weeks.

Deficiency of Vitamin B1 at early stages is associated with irritability, confusion, muscle weakness and blurred vision. Since Vitamin B1 is one of the most unstable vitamins, its delivery is challenging. Two crystalline salt forms of Vitamin B1 are used for fortification purposes in food industry.

Although its salt forms are present in crystalline form, amorphization of Vitamin B1 in the presence of a variety of polymeric ingredients was observed. Amorphous solids are known to be physically less stable than their crystalline counterparts, having tendency to convert into their thermodynamically more favorable crystalline form. Recrystallization during processing and storage is an undesirable event which causes quality defects, structural changes and redistributing water. Moreover, amorphous solids are more susceptible to chemical degradation, which is a concern for nutrient delivery. Since Vitamin B1 was shown to potentially exist in amorphous form in food formulations, it is important to investigate how its amorphous form affects vitamin loss. In this presentation, the importance of crystalline and amorphous form of Vitamin B1 in the absence and presence of polymeric ingredients for vitamin degradation will be first explained. Vitamin fortification strategies which could be used to fulfill labeling requirements, to maintain quality of final products, and to assure adequate vitamin intake for target populations will then be discussed.

Session 1

Human Microbiome-targeting Prebiotics and Probiotics

Chaired by Sangnam Oh (Jeonju University)

Venue : Room 201

9:30-9:55

Safety evaluation of a new probiotic strain and production of marine-derived oligosaccharides as the potential prebiotics

Dong Hyun Kim (Gangneung-Wonju National University)

9:55-10:20

Cooperative actions between two different human gut bacteria on seaweed carbohydrate conferring various health benefits

Eun Ju Yun (eonbuk National University)

10:20-10:45

Validation of screening method for personalized probiotics using intestinal environmental simulation fermentation

Jin Seok Moon (Research Laboratories, ILDONG Pharmaceutical Co., Ltd.)

10:45-11:10

Enhanced ceramides production by Lactobacillus rhamnosus IDCC 3201 and its proposed mechanism

Myunsoo Kim (ICBIO)

>>> S1

Human Microbiome-targeting Prebiotics and Probiotics

Chaired by Sangnam Oh(Jeonju University)

>>> S1-1

Safety evaluation of a new probiotic strain and production of marine-derived oligosaccharides as the potential prebiotics

Dong Hyun Kim

Gangneung-Wonju National University

Probiotics play an important role in health benefits on the host, improving intestinal microbial balance, and have been widely consumed as dietary supplements. This talk will cover two topics. First is about the safety evaluation of a new probiotic strain. It is well known that probiotics-derived health benefits are strain-specific. We investigated whether Bifidobacterium animalis ssp. lactis IDCC 4301 (IDCC 4301), isolated from breast milk-fed infant feces, is adequate as a new probiotic strain based on the guidelines suggested by the Food and Agriculture Organization of the United Nations and the World Health Organization. The strain's safety such as antibiotic susceptibility, hemolysis, biogenic amine production, single-dose acute oral toxicity, D-lactate formation, and endogenous enzyme activities was evaluated. In addition, the potential of IDCC 4301 was evaluated as a functional supplementary by investigating antimicrobial activities against various pathogenic microorganisms using its supernatant. Second is about the production of marine-derived oligosaccharides as the potential prebiotics. We produced laminarioligosaccharides from laminarin, which is one of the representative polysaccharides in brown algae, using a novel β-glucosidase by its transglycosylation

>>> S1-2

Cooperative actions between two different human gut bacteria on seaweed carbohydrate conferring various health benefits

Eun Ju Yun

Jeonbuk National University

Numerous health beneficial outcomes associated with seaweed diets have been claimed, but the scientific molecular explanations to support the positive impacts of seaweed diets in aspect to the actions of gut bacteria have not been elucidated. Here, we investigated the enzymatic and metabolic cooperations between two human gut symbionts, a certain Bacteroides isolated from seaweed-eating humans and a Bifidobacterium with regard to red seaweed agarose degradation. We discovered that the complementary cooperative actions of two human gut symbionts, Bacteroides plebeius and Bifidobacterium longum ssp. infantis, decompose agarose into 3,6-anhydro-L-galactose (AHG) and D-galactose. Notably, we revealed the in vitro anti-colon cancer activity of AHG; this implies that AHG can be regarded as a crucial molecule conferring beneficial physiological effects on the host. Our results suggest that the cooperative degradation of agarose by two human gut symbionts can be considered as a possible molecular-level clue of the beneficial effects of red seaweed diets.

>>> S1-3

Validation of sceening method for personalized probiotics using intestinal environmental simulation fermentation

Jin Seok Moon

ILDONG Pharmaceutical Co., Ltd

Modulation of the gut microbiota using probiotics has been widely used to treat or prevent several intestinal diseases. However, inconsistent results have compromised the efficacy of this approach, especially in functional foods such as gut health. The purpose of our study was to verify a personalized probiotic strategy and assess its efficacy in the antibiotic-treated mice model. For this, gut dysbiosis was successfully induced in mice by treatment with an antibiotic cocktail. High-performance liquid chromatography and 16S rRNA high-throughput sequencing techniques were used to investigate short-chain fatty acid content and gut microbial diversity and composition. The results showed that probiotic supplementation significantly improved the diversity of the gut bacterial community in antibiotic-treated mice. The group that received the responding probiotic showed reduced susceptibility to antibiotic-indued as compared to a non-responding probiotic. Moreover, the personalized probiotic was more effective in modulating the host metabolites. In conclusion, our study suggests that personalized probiotics may possess an advantage over commercial probiotics in treating dysbiosis-related conditions.

>>> S1-4

Enhanced ceramides production by *Lactobacillus rhamnosus* IDCC 3201 and its proposed mechanism

Myunsoo Kim

Future Technology R&D Center, ICBIO

The use of probiotics has been applied for a variety of fields (e.g., immune system, mental health, and heart). In this study, the feasibility of lysates from L. rhamnosus IDCC 3201 for cosmetic ingredients was evaluated. More specifically, enhanced ceramides production in human epidermal keratinocytes by the lysates and its proposed mechanism were investigated through in vitro and genome analysis. In results, enhanced sphingomyelinase activity and thereby increased ceramides production by the lysates from L. rhamnosus IDCC 3201 was observed. Furthermore, it was found that the existence of glucosylceramidase in L. rhamonsus IDCC 3201 was attributed to enhanced ceramides production. Finally, it was verified that the lysates from L. rhamnosus IDCC 3201 was regarded as safe for its use as cosmetic materials. Thus, these findings have significant implications that might lead to the development of functional and safe cosmetic products from probiotics.

Session 2

Scientific Evidence-based Efficacy of Korean Red Ginseng

Chaired by Seung ho Lee (Korea Ginseng Corporation)

Venue : Room 202

9:30-9:55

Current status of Korean red ginseng in market of health functional food

Chae-Kyu Park (Korea Ginseng Corporation)

9:55-10:20

Anti-obesity effects of Korean red ginseng extract in mice fed a high-fat diet

Yong Bum Song (Korea Ginseng Corporation)

10:20-10:45

Protective effects of Korean red ginseng against virus infections

Chang-Kyun Han (Korea Ginseng Corporation)

>>> S2

Scientific Evidence-based Efficacy of Korean Red Ginseng

Chaired by Seung Ho Lee(Korea Ginseng Corporation)

>>> S2-1

Current status Korean red ginseng in market of health functional food

Chae-Kyu Park
KOREA GINSENG CORP.

Ginseng (Panax ginseng C. A. Meyer) is one of Korea's representative products. It is known as the world's most valuable herbal medicine with a history of more than 2,000 years. In particular, Korean ginseng is evaluated as the best quality in the world due to its growth characteristics such as specific climate and soil conditions. Korean ginseng has been widely used for various purposes such as food (health functional food), medicine, and cosmetics, and its value is recognized. Ancient Koreans washed fresh ginseng and dried it in the sun to make white ginseng, but they realized that the quality and efficacy of ginseng had to do with processing, so they steamed fresh ginseng to make red ginseng. Scientific researchers have found that red ginseng has better quality stability and more diverse components than white ginseng, and has a greater pharmacological effect.Since the Health Functional Food Act was enacted and announced in 2004, consumer interest has increased and the health functional food industry has growth. Korean red ginseng has been recognized by the Ministry of Food and Drug Safety as six health claims (improvement of immunity, recovery from fatigue, improvement of blood circulation, enhancement of memory, antioxidant, and improvement of postmenopausal women's health). The functionality of red ginseng is shown in the diversity of active components. The active components of red ginseng are saponins (more than 40 types), polysaccharides, and non-saponins such as polyacetylene phenol compounds.

In the 1990s, the types of ginseng products were limited to ginseng roots, extracts, tablets, powders, capsules, and beverages. However, as interest in health food increases, consumer markets of red ginseng and related products are expected to continue to expand. In 2019, there were 508 health functional food companies, the number of products was 2.95 trillion, and the sales were 2.95 trillion won (KRW), and it is growing every year. Among health functional food companies, there were 249 red ginseng companies with sales of 1.6 trillion won which ranked as Number 1. I joined Korea Ginseng Corporation (KGC) in 1990 as a researcher and have been conducting research on red ginseng processing and new product development. During the time I have developed and launched about 250 products, published about 73 papers on the development of red ginseng processing technology, and registered 79 patents. In this symposium, I would like to introduce the current status of red ginseng and processing technology in the health functional food market that I have researched and experienced so far.

>>> S2-2

Anti-obesity effects of Korean red ginseng extract in mice fed a high-fat diet

Yong Bum Song, Soo Kyung Jong , Joon Wee Jae, Young Sook Kim
Korea Ginseng Corporation R&D Headquarters

Ginseng, the root of Panax ginseng C.A. Meyer is traditionally used as an important herbal medicine in Korea, China, Japan and other Asian countries. One of the most commonly used and researched of the ginsengs is Panax ginseng, also called Asian or Korean ginseng. The active materials of ginseng are ginseng extract, polyssachrides and ginsenosides which have been shown to have a variety of beneficial effects, including anti-inflammatory, antioxidant, anticancer effects, support memory function, help to relieves from fatigue and healthy blood flow by inhibiting platelet aggregation and menopause. Obesity is a complex disease involving an excessive amount of body fat.

It's a medical problem that increases the risk of other diseases and health problems, such as heart disease, diabetes, high blood pressure and certain cancers. In this study, we examined the effects of korean red ginseng extract(KRGE) on the prevention of hepatic steatosis and injury in a high fat diet-induced murine obesity model. The mice were fed four types of diet for 12 weeks, which include normal, high-fat diet (HFD), HFD+KRGE 0.5% and HFD+KRGE 1.0%. KRGE supplementation significantly decreased body weight gain and epididymal fat mass compared to HFD. KRGE reduced the serum levels of cholesterol, low-density lipoprotein-cholesterol (LDL-C), serum triglycerides, and atherogenic indices. Levels of leptin, adiponectin and insulin, which regulate glucose and lipid metabolism, were impaired profoundly by HFD. However, KRGE treatment brought these levels back to normal. Therefore, leptin, insulin, and adiponectin, which carry out critical functions in energy and lipid metabolism, were shown to be modulated by KRGE. In hepatic histology, KRGE supplementation markedly improved the HFD-induced fat droplet accumulation, hepatocelluar swelling and cyoplasmic vaculolation in association with the decreases of hepatic fat content and the hepatic triglyceride(TG), cholesterol concentrations. Serum levels of hepatic function marker such AST, ALT and LDH, which were elevated by the HFD-feeding, were also significantly improved in the KRGE group.These results suggest that the hepatic-protective effects and regulates of lipid metabolism of KRGE are associated with the anti-obesity effects of KRGE in the HFD-fed mice.

>>> S2-3

Protective effects of Korean red ginseng against virus infections

Chang-Kyun Han

Korea Ginseng Corp

Panax ginseng C. A. Meyer (Araliaceae), namely Korean ginseng is an indigenous plant and a representative economic plant of Korea. The root of ginseng has been traditionally used as a tonic as it is stated to have the capacity to normalize body functions and strengthen systems that are caused by various stresses. Korean red ginseng extends the preservation of fresh ginseng, as it is preserved for longer than 30 years of storage while also strengthening the active components including hydrolyzed saponins, phenolic compounds and acidic polysaccharides. Korean red ginseng is a functional food with the functionalities certified by Ministry of Food and Drug Safety in Korea, of which are recovery from fatigue, supporting immune system, beneficial effects on menopausal disorders, anti-oxidative activity, improvement on memory functions and blood circulation. In this study, we investigated whether Korean red ginseng extracts (KRGE) has preventive effects on various virus infections in vitro and in vivo. In particular, a lot of research has been done on the respiratory syncytial virus, influenza virus that cause colds, and human immunodeficiency virus (HIV). There are also studies on hepatitis, herpes, coronavirus, etc. Briefly, to summarize the research on the virus of Korean red ginseng, Korean red ginseng not only directly inhibits virus proliferations, but also has an immune-enhancing actions. In addition, KRGE administration in transgenic mice inhibited the proliferation of coronavirus and promotes antibody production to suppress virus infections. As a result of a clinical study on long COVID19 syndrome, it was confirmed that fatigue and lethargy improved and the stress resistance index increased in the KRGE group. Therefore, KRGE might have the potential beneficial effects on preventing various virus infections, via its multiple immune-modulatory functions, and also it is believed to be helpful in alleviating the sequelae caused by virus infections.

Session 3

Improvement Plan of HACCP System

Chaired by Cheol Soo Lee (Korea Advanced Food Research Institute)

Venue : Room 203

9:30-9:55

Policy of HACCP in Korea

Young-Wook Kim (Ministry of Food and Drug Safety)

9:55-10:20

Improvement plan of small-scale HACCP and mandatory application food items

Jung-Beom Kim (Sunchon National University)

10:20-10:45

Advanced plan of HACCP certification and follow-up management

Sung-Joo Bae (Korea Advanced Food Rearch Institute)

>>> S3

Improvement Plan of HACCP System

Chaired by Cheol Soo Lee (Korea Advanced Food Research Institute)

>>> S3-1

Policy of HACCP in Korea

Young-Wook Son

Ministry of Food and Drug Safety

Hazard Analysis and Critical Control Point(HACCP) is a preventive management system that can control hazards during the manufacturing process of food and livestock products. The legal basis of the HACCP for food was newly established in 1995 and that of HACCP for livestock products was made in 1997. Afterwards, The work of HACCP for livestock was transferred from the Ministry of Agriculture, Food and Rural Affairs(MAFRA) to the Ministry of Food and Drug Safety(MFDS). In 2017, the Korea Agency of HACCP Accreditation and Services(KAHAS) was established to integrate and manage HACCP for food and livestock products altogether. With the mandatory application of food and livestock HACCP in stages, the current status of HACCP certification is 9,251 food businesses and 7,492 livestock products businesses, accounting for 89.6% of the total processed food production (As of December 31, 2021). As the public's interest in food has increased, and food incidents have continuously occurred, MFDS has responded to social demands to increase the effectiveness of HACCP. While revising the main contents of Hazard Analysis and Critical Control Point notification, the focus was on substantiality rather than quantitative growth of HACCP. Evaluation criteria for the food freezing and refrigerating industry were prepared, and children's preferable food and meat packaging industry were designated as mandatory applications. In addition, the follow-up management of HACCP certified businesses was strengthened by implementing unannounced evaluation, implementing the "One Strike Out" system, and revising the evaluation method of small-scale business. Introduction of a smart HACCP, which is Automatic Record Management System, enhanced credibility of the monitoring and made the systematic HACCP management possible. Moreover, it is expected that the company using the smart HACCP will be able to focus on food safety management by increasing the production efficiency of the company. In order to train HACCP professionals, the current "Engineer Food Processing" qualification is being reorganized into "Engineer Food Safety" and measures are under consideration to increase the efficiency of HACCP certification management.

>>> S3-2

Improvement plan of small-scale HACCP and mandatory application food items

Jung-Beom Kim

Sunchon National University

HACCP operation is essential for the production, distribution and sale of food and livestock products. As of 2020, 7,685 food companies and 14,205 livestock companies received HACCP certification. HACCP in Korea was introduced in 1995 and made a significant contribution to strengthening food safety by designating the system of mandatory food items in 2006. In addition, in order to introduce HACCP for small companies, small-scale HACCP, which has more relaxed standards than general HACCP, was introduced. However, cases of insufficient operation of small-scale HACCP certified companies and HACCP uncertified companies continue to occur. Therefore, it is necessary to improve the system of mandatory food items and small-scale HACCP standards. The improvement plan was derived by comparing it with the domestic HACCP system by expert, consumer, and HACCP certified company surveys and foreign HACCP operating systems such as USA, EU, Canada, Japan and China. As a result of this study, it was proposed that it was necessary to expand the mandatory application of HACCP to whole foods and to strengthen the small-scale HACCP standards. As a process to expand the mandatory application, it was proposed to expand the mandatory application of HACCP sequentially from companies with sales of 5 billion Korean won or more. As for the small-scale HACCP improvement plan, it was proposed to simplify the standard for small-scale HACCP-applied companies to less than 500 million Korean won in sales.

>>> S3-3

Advanced plan of HACCP certification and follow-up management

Sungjoo Bae

Korea Advanced Food Research Institute

The purpose of this study was to ensure continuous food safety by suggesting efficient and effective certification, re-certification, and follow-up management of Hazard Analysis Critical Control Point (HACCP) certified companies, which are increasing due to the expansion of HACCP mandatory application in food and livestock processing industries. We investigated the status of HACCP certification and follow-up management systems in various foreign countries, the methods of auditing, and the qualification of auditors. In addition, a survey of experts, corporations, consumers, etc. was conducted to derive the development of the HACCP certification and follow-up system. In a survey of entities related to the subject of certification authority, the maintenance of government certification was 63.5%, which is much higher than the 19.5% of private certifications. In a survey on the need to separate audit roles between the MFDS (Ministry of Food and Drug Safety) and HACCP Accreditation and Services and to qualify as an auditor, 92% answered in the affirmative. Collectively, as a way to improve the examination system, we proposed that the government maintains the certification body and clarify the audit work of the MFDS and HACCP Accreditation and Services. In addition, it was proposed to create and implement an auditor qualification system to improve the quality of the audit. The cycle of certification and follow-up management examination proposed a differential application to strengthen the regular survey evaluation cycle to 2 times a year for companies that have violated the law, the rate of non-conformity in HACCP audits, and for non-heated foods and facilities providing meals with high food safety risks. Business operators that score more than 90 on the follow-up assessment will ease the post-assessment cycle. In addition, the excellent business operators that received more than 90 points during the post-assessment for 3 consecutive years proposed a realistic management method that exempts them from follow-up management and conducts an unannounced evaluation 1 time out of 3 years.

Session 4

Microbiome and Effective Microorganisms Isolated from Agriculture, Food, and Livestock

Chaired by **Kwontack Hwang** (Nambu University)

Venue : Room 204

9:30-9:55

Characterization of animal-originated microbiome using metagenomic and culturomic analysis

Younghoon Kim (KSeoul National University)

9:55-10:20

Isolation and application of effective microorganisms from agricultural soil

Jeong-Muk Lim (Jeonbuk National University)

10:20-10:45

Biotechnological potential of plant-associated microbes

Jiyoung Lee (Korea Research Institute of Bioscience & Biotechnology)

>>> S4

Microbiome and Effective Microorganisms Isolated from Agriculture, Food, and Livestock

Chaired by Kwontack Hwang (Nambu University)

>>> S4-1

Characterization of animal-originated microbiome using metagenomic and culturomic analysis

Younghoon Kim
Seoul National University

The concept of microbiome is a totality of ecological community of commensal, symbiotic and pathogenic microorganisms that exists in multicellular organisms including human and animal. Recently, it has been established that dynamics of microbiome were significantly influenced by various factors such as diets, environments and diseases in animal health and also, in contrast, affected on the quality of animal and dairy products. In this study, we described on the importance of gut microbiota in animal health as well as on oral and nasal microbiota using metagenomic and culturomic analysis. In addition, we indicated longitudinal changes in microbial communities in animal foods including dry-aged beef and ripened cheese using a multi-omics platform. As a result of metagenomic analysis, featured alteration of microbiota showed a significant relationship with animal health as well as quality and safety of animal products. Collaborating metagenomic approach, various microbial dynamics were matched by identified strains in gut microbiome using culturomic analysis. Taken together, our metagenomic and culturomic approaches could provide on the new strategy for discovering and applying microbiome in animal-originated food/feed industry

>>> S4-2

Isolation and application of effective microorganisms from agricultural soil

Jeong-Muk Lim, Byung-Taek Oh

Jeonbuk National University

Recently, rapid climate change by global warming has deteriorated the farming environment of food crops, causing food problems worldwide. In particular, the deterioration of farming environment is responsible for limited plant growth, and research on agricultural materials is being conducted to maintain and promote eco-friendly crop growth. Effective microorganisms (EM) are being used as bio-fertilizers and biological control agents in the agricultural industry, and are spotlighted as a factor for eco-friendly farming. For this reason, research for improving crop productivity and controlling pests through effective microorganisms has been actively studied for a long time. In the agricultural environment, microorganisms are one of the vital biotic factors that influence the growth of crops. Correlation between microorganisms and crops in the soil environment is being studied, and a lot of studies have been reported to PGPB, which have a positive effect on crop growth. In addition, many researches of biocontrol are being studied to create and eco-friendly farming environment. For useful utilization of these effective microorganisms, It is considered important both of which discovery of effective microorganisms for various purposes and research of industrial technology. Most commercial effective microorganisms are utilized based on correlations with target crops and pathogenic microorganisms. However, since each crop has a difference in the soil environment and thus there is a difference in effectiveness, a study based on the correlation with soil characteristics is needed to improve the efficiency of effective microorganism. In particular, it is possible to improve the efficiency by seeking naturalization methods in the farming environment of microbial materials. It is considered important both of which discovery of effective microorganisms for various purposes and research of industrial technology. In conclusion, effective microorganisms in agriculture are being used for the purpose of crop growth and disease control, and their importance is increasing. In order to expand the use of effective microorganisms in agriculture and secure reliability, it is not only necessary to discover useful microorganisms with various characteristics, but also it is very important to study their correlation with the soil and crop microbiome.

>>> S4-3

Biotechnological potential of plant-associated microbes

Jiyoung Lee
Korea Research Institute of Bioscience & Biotechnology (KRIBB)

Plant-associated microorganisms, collectively termed the "phytomicrobiome" (epiphytes, endophytes, root microbiome, and phyllosphere microbiota), are known to produce valuable molecules which can be used in the agricultural industry, in medicine, and in other industries, as well as in the fields of environmental protection and bioremediation. In the last decade, many investigations on this subject have been conducted, attracting the attention of the scientific community as an answer to some existing as well as emerging problems. The plant microbiome plays multiple roles in its relationships with host plants and with other microorganisms, being able to indirectly protect the plant against phytopathogens by biochemical mechanisms, and is considered an excellent source of bioactive products. This talk on "Biotechnological potential of plant-associated microorganisms" aims to present novel research in the field of such microorganisms and their potential as an answer to the current needs of the industrial biotechnological sector.

Session 5

The Challenges of Digitalization Technology for Sustainable Development of Agricultural and Food Products

Chaired by Jeong-Ho Lim (Korea Food Research Institute)

Venue : Room 201

14:20-14:40

Development of food production process monitoring system for food quality recognition for sustainable food production

Jeong-Ho Lim (Korea Food Research Institute)

14:40-15:00

Developmemt of operating system for optimizing Kimchi salting and red ginseng steaming process

Chang-Won Cho (Korea Food Research Institute)

15:00-15:20

Development of process automation robot based on AI image analysis and recovered blood foodization for slaughtering ducks

Sang Kuy Han (Korea Institute of Industrial Technology)

15:20-15:40

Automation plan for control of kimchi ingredients mixing process

Hye-Young Seo (World Institute of Kimchi)

15:40-16:00

Pork deboning robot automation system technology for sustainable growth of the meat processing industry

Kiyang Park (DOOLIM-YASKAWA)

>>> S5

The Challenges of Digitalization Technology for Sustainable Development of Agricultural and Food Products

Chaired by Jeong-Ho Lim (Korea Food Research Institute)

>>> S5-1

Development of food production process monitoring system for food quality recognition for sustainable food production

Jeong-Ho Lim
Korea Food Research Institute

Due to the development of the 4th Industrial Revolution technology, the food industry's demand for food safety and quality, lack of human resources in the food industry, collaboration robots, and automation considering food characteristics are increasing.

In the industry, measurement and analysis technologies such as machine vision and AI have developed in recent years. In addition, manufacturing innovations such as data, network technology, the Internet of Things (IIoT), virtual physical systems (CPS), cloud computing, VR/AR, big data, 5G, and 3D printers have emerged. This advancement of intelligent factory technology is accelerating innovation beyond automation in food processes and changing the paradigm. However, although the technology field for improving quality and productivity in the food industry is the basis of intelligent manufacturing, it has not overcome limitations on product diversity, digitalization technology for quality, and human error. And various technologies are rapidly being introduced to improve the quality and productivity of the food industry, but the dependence on human resources is very high in the industrial field. In addition, digital transformation is rapidly taking place according to the demands of the times, and the introduction of technologies required in the contactless era is necessary in food production sites; the trend of the times is to resolve the rigidity of the labor force and secure reliability for food quality safety. Quality recognition food production process monitoring system for food production is a technology that secures

the development of quality digitization technology that determines the quality of food based on image recognition and spectroscopic information. The food quality recognition and rating system have been continuously developed to hyperspectral image and artificial intelligence inspection tech. Imaging, light, laser, near-infrared, 3D scanner technology, deep learning technology, and sophisticated learning data construction are essential technologies to increase the accuracy of systems and decisions. Since these technologies can bring various benefits to consumers and producers, more advanced models will continue to emerge in the food industry. The number of producers and consumers presenting quality, technology, and IoT utilization services will increase, and this development is expected to enhance the food industry's reliability.

>>> S5-2

Development of operating system based on 5G technology for optimizing Kimchi salting and red ginseng steaming process

Chang-Won Cho
Korea Food Research Institute

The domestic manufacturing industry is in a situation where its product competitiveness has decreased compared to developing countries due to a decrease in the working-age population and high labor costs. Government-level support policies are expanding to secure the competitiveness of the manufacturing industry following these social structural changes, and the introduction of factory automation and smart factories to ensure their productivity and increase efficiency is accelerating. In the food manufacturing industry, factors impeding industrial development such as an increase in management costs, shortage of human resources, and obsolescence of facilities and equipment are continuously intensifying. Therefore, the demand for mechanization, automation, and unmanned systems is increasing to overcome this problem. Kimchi and red ginseng manufacturers are primarily small businesses, and skilled workers manually do many parts of the manufacturing process. The kimchi salting process is a process that requires a lot of time and human resources or is being done manually. In the case of the red ginseng steaming process, research and development related to process automation have not been done correctly, so most of them depend on skilled human resources and remain in empirical process management.

Therefore, the most severe difficulty for manufacturers is the uniformity of the quality of salted cabbage and steamed red ginseng, which varies depending on the characteristics of raw materials. Therefore, in this study, to improve quality and productivity in the production of kimchi and red ginseng, the optimization production process algorithm and facility automatic control technology were developed by linking the parameters of raw materials and processes. This research is expected to transform the food production system from experience-based manufacturing (depending on the intuitive experience and know-how of engineers) to data-based manufacturing (based on raw material and manufacturing process data)

>>> S5-3

Development of process automation robot based on AI image analysis and recovered blood foodization for slaughtering ducks

Sang Kuy Han

Korea Institute of Industrial Technology

Duck slaughter process requires repetitive and dangerous labors and labors are constantly exposed to physical and psychological hazards including blood and filth. In order to overcome this problem, artificial intelligence and robot technologies has 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-RCNN, the most general deep learning models 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. 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 a duck neck-background segmentation was trained. The binary mask for the duck neck region estimated by the trained deep learning model based on the dataset is applied to the input images. The time required for masking binary object region of duck neck was about 8 ms per a frame. For the automatic process system of duck slaughtering, a high speed SCARA(Selective Compliance Assembly Robot Arm) robot is implemented. In addition, it was studied how to recycle recovered blood extracted from slaughtering ducks. With preliminary result from this study, we anticipate the possibility of estimating the cervical vertebrae for the duck neck region and the precise bleeding area can be used for automatic slaughtering process.

>>> S5-4

Automation plan for control of kimchi ingredients mixing process

Hye-Young Seo
World Institute of Kimchi

Recently, a smart factory concept has been introduced that can ensure the safety and quality of food by checking historical information on food production and manufacturing in real time along with IoT technology. Moreover, environmental changes such as high consumer expectations for food quality and safety, and a decrease in the production age population are expected to accelerate the introduction of smart factories in the food industry. Kimchi, one of the representative multi-consumption foods, has many manual processes, so it is an industry that desperately needs to introduce a smart factory for safe production of uniform quality. In particular, most of the mixing and transport processes of seasoning are not automated, so the establishment of infrastructure that can standardize the quality of the seasoning and ensure the sanitary safety of the final product should be preceded. The manufacturing process of kimchi seasoning consists of the preparation, weighing, crushing, input, and mixing stage of raw materials, and the crushing and mixing process is mechanized, but weighing and input are carried out manually. In order to automate the kimchi seasoning manufacturing process, the weighing and input stages must be mechanized, and depending on the property of the seasoning material, weighing and input methods can be classified into three types: solid (such as powder), liquid (such as broth, etc.), and semi-solid (onions, etc.). In addition, since the environment for mixing raw materials for kimchi seasoning is humid, the existence of a service tank and the installation of a cooling system should be considered in the case of powder, and raw materials that require the crushing stage should be designed to be automatically injected into the mixer after crushing. Liquid raw materials can be input using a pump, and if necessary, they can be input into a mixer after preliminary mixing with semi-solid raw materials. Management of quality indicators is needed to check whether the final produced seasoning deviates from the standard, and color, salinity, pH, sugar content, and viscosity may be used. For real-time control of the kimchi seasoning manufacturing process, it shall be designed so that the measurement results of process indicators such as the weight of raw materials and quality indicators such as color, salinity, and pH of the seasoning shall be automatically recorded to check whether they deviate from the standard. This automation of the kimchi seasoning manufacturing process is expected to promote the management efficiency of the kimchi industry as it can contribute to reducing errors by workers and reducing management costs.

>>> S5-5

Pork deboning robot automation system technology for sustainable growth of the meat processing industry

Kiyang Park
DOOLIM-YASKAWA

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, image recognition 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 in order to optimized 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.

Session 6

Direction and Innovation of the Future Food Industry Using Fermented Microbial Resources

Chaired by Jin Song (Rural Development Administration)

Venue : Room 202

14:20-14:45

Study on sensory characteristics of beer using domestic raw materials

Ji-eun Kang (Rural Development Administration)

14:45-15:10

Meta-metabolomics based Interpretation of Fermented Foods

Choong Hwan Lee (Konkuk University)

15:10-15:35

Isolation and development of potent yeast starters

Myoung-Dong Kim (Kangwon National University)

15:35-16:00

The importance of developing fermentation starters in the baking industry

Sangmin Shim (SPC group)

>>> S6

Direction and Innovation of the Future Food Industry Using Fermented Microbial Resources

Jin Song (Rural Development Administration)

>>> S6-1

Study on sensory characteristics of beer using domestic raw materials

Ji-eun Kang
Rural Development Administration

The domestic beer market accounts for about 41.2% of the total alcoholic beverage market, and the shipment amount is KRW 3,688.3 billion won. Despite the active beer market, 95% of malt, 99.5% of yeast, and hops are mostly imported. This study is to induce an increase in the use of local agricultural products by monitoring the quality characteristics of beer using domestic raw materials. The malt, the raw material for beer, produced in 2021 at the Gunsan Agricultural Technology Center in Jeollabuk-do was used, and the yeast Y263, YM55, and N9 were selected as brewing yeast by the National Institute of Agricultural Sciences was used. For hops, aroma hops (Saaz) produced in Buan, Jeollabuk-do, and bitter hops (Cascade) produced in Uiseong, Gyeongsangbuk-do were used. In the case of Saaz, the content of alpha acid expressing a bitter taste was about 10.41%, beta acid showed antibacterial activity at 30.14%, and the content of xanthohumol showed an anticancer effect was about 0.46%. In addition, myrcene, which has a fruity and lemony flavor, caprylic acid, which has a wine flavor, and propanol, which has a nutty flavor, were detected in beer. In the case of Cascade, alpha acid was 18.43% and beta acid was 11.68%, and propanol (nut flavor), methyl acetate (fruit flavor), alpha-phellandrene (lemon flavor, geranium flavor) were detected. When fermented at 10°C with domestic malt, yeast, and hops, amino acid content, FAN, reducing sugar, and IBU values were significantly lower in Y263 beer. In sensory evaluation, when fermented at 25℃, the Y263+ Saaz beer, which was evaluated to have excellent sensory characteristics, showed the highest alcohol content but the lowest IBU value and the YM55+ Cascade beer showed the highest soluble solid content. Y263 beer showed a different flavor pattern from other beers as a result of electronic nose analysis for both top and bottom-fermented beer. We will continue to provide information necessary for the industrialization of craft beer using domestic raw materials in the future.

>>> S6-2

Meta-metabolomics based Interpretation of Fermented Foods

Choong Hwan Lee
Konkuk University

The umpteen varieties of traditional fermented foods deliver a wallop of savor, aroma, nutrients, probiotics, and functional bioactives. However, our surprisingly limited comprehensions of the associated metabolomes, related phenotypes, and health effects maneuvered through the perplexing interplay of fermentative microflora turns their empirical analyses a non-trivial undertaking. Meta-metabolomics, the community-based version of individual organism metabolomics, is useful for understanding microbiome based food fermentation, on which microbe-microbe and microbe-metabolite interactions take place. In this presentation, I will discuss the current trends towards the application of MS-based metabolomics and related methodologies to probe their metabolite contents and functionality.

>>> S6-3

Isolation and development of potent yeast starters

Myoung-Dong Kim
Kangwon National University

The importance of fermentation starters such as yeasts for brewing and baking is becoming one of the most critical factors in the respective industry. Institute of Fermentation and Brewing(IFB), Kangwon National University, was established in 2021 and is supported by Chuncheon City, the Ministry of Education, and brewing and baking companies. Significantly six hundred Saccharomyces cerevisiae strains were isolated over the last two years, and potent strains are now tested in the local breweries. IFF collaborates with the National Institute of Biological Resources to isolate yeast strains that show excellent stress tolerance and baking properties from high mountains in Gangwon Province. A thermo-tolerant S. cerevisiae strain that successfully ferments grain hydrolysates is also finding its way to ethanol production. IFF utilizes small-volume bioreactors (Log phase 600), electric nose, LC, and GC-MS are used to evaluate and characterize yeast isolates. From 2022 to 2026, Rural Development Administration will support IFF, Suwon Fermentation, and SPC Research Institute of Food and Biotechnology to develop fungal starters, including Aspergillus oryzae, for brewing and baking. Productions of flavor compounds, ethanol, and hydrolytic activities of the fungal starters will be systematically examined.

A database of the IFF yeast strain collection is being constructed to provide detailed information for specific applications of the yeast starters.

>>> S6-4

The importance of developing fermentation starters in the baking industry

Sangmin Shim, Seong Bong Song, Moon Young Jung, Jihwan Yoon

SPC group

In the baking industry, fermentation starters such as yeast and lactic acid bacteria (LAB) are one of the most important factors affecting the quality of bread. The SPC Research Institute of Food and Biotechnology (SPC-RIFB) has successfully developed 2 types of fermentation starters for baking and patented in the Korea, U.S., France, China and Japan. The first fermentation starter based on Saccharomyces cerevisiae SPC 70-1(baker's yeast) was developed in 2015 using adaptive engineering of wild yeast strains. The second fermentation starter (SPC Sourdough) composed of one S. cerevisiae and four LAB was developed in 2019 based on the symbiosis principle of natural ecosystems. More than 200 bread products / (made from these fermentation starters) / have been released / through SPC brands (Paris Croissant, SPC Samlip), And they have an excellent quality and health benefits. SPC RIFB will focus on research capabilities in order to further improve the performance of fermentation starters and will develop next generation fermentation starters for the globalization of K-bread.

Session 7

International Harmonization and Standards of Food Safety with CODEX

Chaired by Dae Weon Choi (Ministry of Food and Drug Safety)

Venue : Room 203

14:20-14:45

Achievements and plans for CODEX

Yujeong Choi (Ministry of Food and Drug Safety)

14:45-15:10

A planning research for establishing international food standards of exporting foods

Joon-Goo Lee (Dong-A University)

15:10-15:35

Establishment of pesticide maximum residue limits of codex for export foods

Moo-Hyeog Im (Daegu University)

15:35-16:00

Import sanitation assessment process for livestock products

Jin-mock Jeong (Ministry of Food and Drug Safety)

>>> S7

International Harmonization and Standards of Food Safety with CODEX

Chaired by Dae Weon Choi (Ministry of Food and Drug Safety)

>>> S7-1

Achievements and plans for CODEX

Yujeong Choi
Ministry of Food and Drug Safety

Since officially joining CODEX Alimentarius Commission as a member country in 1971, Republic of Korea has put efforts to protect the health of consumers through food safety and promote smooth international food trade through the establishment and harmonization of food standards. Recognizing the importance of CODEX standard used as the only international standard in the food trade, Republic of Korea continues to actively participate.

To figure out the importance and status of CODEX, an overview of CODEX Alimentarius Commission including its composition and organization will be introduced. An explanation of the procedure of developing and adopting CODEX standard will also follow. It would help to increase the understanding of CODEX in general. As Republic of Korea made a lot of participation in this field so far, it is worth looking at its major achievements. For instance, CODEX standards established under the leadership of Republic of Korea and activities currently being promoted will be introduced. At last, it is planned to share the schedule of the upcoming committees for this year and share the countermeasures for each meeting.

››› S7-2

A planning research for establishing international food standards of exporting foods

Joon-Goo Lee

Dong-A university

Under the global free trade agreement system, the importance of international harmonization of food standards has been increased for reduction of non-tariff trade barriers. In particular, the internationalization of Korean food standards to revitalize the export of Korean food has been important as the status of Korean food in the international food markets has been increased through the wave of Korean culture. In this study, we aim to investigate Codex allimentarius committee as an agency of establishing international food standards and develop a mid-to long term roadmap for the internationalization of Korean food. In the roadmap, a list of the main exporting foods is set for establishing international food standards, and Korean and international standards of foods in the list was compared. Furthermore, Korea Codex office was proposed, which is composed of experts in industries, academia, and regulatory agencies to strengthen Korean activities in Codex.

>>> S7-3

Establishment of pesticide maximum residue limits of codex for export foods

Moo-Hyeog Im
Daegu University

Setting Codex standards for food can have a significant impact on their exports. For example, when Codex standards for food pesticides are established, almost all countries around the world, such as the United States, Europe, Japan, and Australia, accept or refer to these standards in addition to setting their own. Therefore, in order to export processed food and agricultural products from Korea to foreign countries, it is necessary to set the Codex Maximum Residue Limits (MRLs) on pesticides. The Ministry of Food and Drug Safety (MFDS) lowered the default factor from 10 to 7 mg/kg when setting the MRL for dried chili pepper in Codex. Setting pesticide MRLs for ginseng and ginseng-processed foods contributed to their export activity. Among the foods produced and distributed in Korea, perilla seeds and leaves, yuzu, tree onion, Sanmaneul leaves, Chamnamul, Chamchi, and Chamssuk were omitted from the International Food Classification. However, these foods were listed in the International Food Classification by MFDS. Japanese persimmons and jujubes, which were classified as tropical fruits, were classified as pome and stone fruits, respectively. Recently, the MRL setting project was conducted for four types of pesticides for rice and rice products, and the results were submitted to Codex this year to establish appropriate standards. From 2022, a research project is underway to establish the pesticide standards for the Codex of dried Welsh onion used in instant noodle soup. The pesticides thiamethoxam, indoxacarb, and boscalid used in Welsh onion cultivation hinder its export as there are no MRLs set in Codex for USA, Europe, and Australia. Since these pesticides are widely used in domestic Welsh onion cultivation, there is an urgent need to set a Codex standard. In this study, we will analyze Welsh onions cultivated as per the conventional cultivation method in Korea and dried using commercial methods. In the future, we plan to further this research by collecting the necessary opinions for export from the Korean food industry.

››› S7-4

Import sanitation assessment process for livestock products

Jin-mock Jeong

Ministry of Food and Drug Safety

In Korea, as the Special Act on Imported Food Safety Control has been established and enacted since February 4, 2016, the Import Sanitation Assessment(hereinafter, "ISA") on imported livestock products has been introduced. ISA is aiming at evaluating overall sanitation control system of countries exporting livestock products to the Korean market and determining import approval when verified that the control system is equivalent to that of Korea. The World Organization for Animal Health (OIE) has recommended its member states conduct risk analysis on livestock products in order to prevent hazards possibly originated from animal products. In this regard, Korea has carried out ISA when a country makes a request for import approval to the Korean government for the first time or when considered as necessary due to revision on international standards such as CODEX Alimentarius Commission or any changes made in the exporting country's food sanitation system after import approval. Targets of ISA are total 57 kinds of products under 6 product types: 13 types of edible meat, 2 types of raw milk, 3 types of edible eggs and 39 types of processed products such as sterilized meat products, dairy products and processed egg products. Currently, total 65 countries are listed on the Countries (Regions) Allowed for Import of Livestock Products and Import Sanitation Requirements and details of approved type of products are also specified. According to analysis of MFDS against 19 cases of ISAs conducted after enactment of the Special Act, average time consumed for the assessment is 49.5 months (4.13 years) and 6 cases took over 4 years which occupying 31.5% of the statistics, which indicates that if equivalence of a country's sanitation control system to the relevant Korean system is not objectively verified, it takes considerable time until the final approval of import is determined. Generally, the assessment process starts when a country requests import approval of its livestock products to the Korean government and the competent authority of Korea provides import sanitation questionnaire. After reviewing answers submitted by the country, on-site audit is conducted to inspect the sanitation control system in the country. The import approval is finally enabled only after import sanitation requirements are negotiated with the country and establishments intended to export livestock products to Korea are inspected and registered to the relevant Korean system. As of June 2022, ISA is being processed against 119 applications from 55 countries: 89 cases from 46 countries for new approval and 30 cases from 20 countries requesting for addition of products to the approved list.

Session 8

Advanced Strategies of Bio-health Products and Materials based on Mushrooms

Chaired by Ho Jin Heo (Gyeongsang National University)

Venue : Room 204

14:20-14:40

Currents status of valuable forest mushrooms for health functional food materials

Rhim Ryoo (National Institute of Forest Science)

14:40-15:00

Food science positioning and utilization of useful fungus resources

Kyungje Kim (Jangheung Institute for Mushroom Industry)

15:00-15:20

Development of functional ingredients for individually recognized health functional foods derived from fungi

Namgil Kang (Nutrione Co., Ltd.)

15:20-15:40

GMP(Good Manufacturing Practice) The necessity, scope, and composition of strategies for upgrading bio-health materials and products based on fungi

Young-Won Seo (FD Solution Co.,Ltd.)

15:40-16:00

Construction and information strategy of fungus (mushroom) DB

Young chul Lee (Dfine & Co)

>>> S8

Advanced Strategies of Bio-health Products and Materials based on Mushrooms

Chaired by Ho Jin Heo (Gyeongsang National University)

>>> S8-1

Currents status of valuable forest mushrooms for health functional food materials

Rhim Ryoo

National Institute of Forest Science

According to the National Standard Mushroom List of the Korea Forest Service, 2,077 species of forest mushrooms are known in Korea, among which 420 species of edible mushrooms, 77 species of medicinal mushrooms, and 238 species of poisonous mushrooms were found. Based on these forest bio-resources, the National Institute of Forest Sciences has preserved about 5,000 strains of mushrooms, and the strains have been distributed for research purposes in academia and industry.

The National Institute of Forest Sciences has researched new functional substances of forest mushrooms through research collaborations with research institutes and universities. Sparassis latifolia and Lentinula edodes which were known as edible and medicinal mushrooms, analyzed the contents of beta-glucan strengthen immunity. New anticancer substances, attracting attention from the pharmaceutical industry, were found from Gymnopilus spectabilis and Podostroma cornu-damae which were known as poisonous mushrooms. In addition, Amanita hemibapha sub. javanica, Dictyophora indusiata f. lutea and Calvatia gigantean showed fat regulatory cell activity inhibition, Helicobacter pylori activity inhibition, and anti-inflammatory effects, respectively.

In the future, we will continue to study of functional mushrooms to discover new materials in various industrial fields such as health functional foods and pharmaceuticals etc.

>>> S8-2

Food science positioning and utilization of useful fungus resources

Kyungje Kim

Jangheung Institute for Mushroom Industry

Eumycetes are an essential resources of the high value-added bio industry in preparation for the future economy. Eumycetes include fungi, yeasts, and mushrooms, with 72,000 species reported worldwide. According to the World Data Center for Microorganisms data of the World Federation of Culture Collections, Korea is the fifth largest microbial strains possess country in the world after the USA, Japan, India, and China, and has excellent ability to discover new microorganisms. Mushroom or macro-fungi, a widely distributed group in the eumycetes, is an important source of food containing a good amount of protein, dietary fiber, phenolic compounds, vitamins and minerals. As a pool of a large number of functional compounds, there is a huge prospect of mushroom-derived various bio materials usage. The intake of mushrooms as food is divided into fruiting body form and mycelium fermentation products. Fruit body form have a unique texture have good aroma, taste and flavor that differs from other food crops among the useful parts of mushrooms. Edible mushrooms having high fiber, low fat and low starch, also, it has been considered to be ideal food for prevent obesic, diabetics and hyperglycaemia. Also, they are known to possess promising antioxidative, cardiovascular, hypercholesterolemia, antimicrobial, hepato-protective and anticancer effects. As report of Barros et al., more than 3000 mushrooms are mainly edible species. However, only 100 species are cultivated commercially, and just ten species are used at industrial scale. The fruiting body production using solid culture necessitates a long period of time than mycelium fermented production. For these kind of reasons, we will conduct establishing the professional control system - 'Commercialization Support Center for Eumycetes Based Bio-Health Materials', and establish a domestic eumycetes resource discovery and preservation system, and to lay the foundation for industrialization of microbial resources. Through the development of high value-added products using eumycetes, such as health functional foods, raw food materials, and bio-active materials, we aim to secure competitiveness and promote sustainable growth of SMEs (Small and medium enterprises)

>>> S8-3

Development of functional ingredients for individually recognized health functional foods derived from fungi

Namgil Kang
Nutrione Co, Ltd.

Covid-19 has brought major changes to various areas of our daily life during the two-year pandemic period from 2020.The health functional food industry has also undergone dynamic changes like a roller coaster, and in the transition period from with corona to post corona, we must predict and prepare for market changes in the future. Researchers and marketers in the health functional food field predict that consumers will consume more health functional food in the post-corona era. In particular, basic nutritional products such as vitamins, minerals, and proteins are predicted to be the growth areas that receive the most attention, and immune-enhancing products are also expected to grow. Fungi, including mushrooms, require very little land and water compared to plant resources in agronomic terms. The world is making efforts to reduce carbon due to global warming, but water shortage is a serious global environmental problem. Since Korea has four distinct seasons, its international competitiveness is low in securing raw materials through mass production for localization of health functional food materials. Therefore, fungi that can solve international environmental problems by using little water without being affected by the seasons with a small cultivation space are optimal raw materials for the development of globally useful health functional food materials, and are particularly useful resources for Korea. There are about 3.8 million species of fungi, including mushrooms, molds and yeasts. The ecological characteristics, nutritional characteristics, and health characteristics of these species are very different, so there are more unconfirmed areas of biological resources than revealed facts. Consumers who will live in the post-CoVid era have the greatest need for protein products that will improve muscle strength and basic health among health functional foods, and immunity boosting products that will enhance disease prevention ability. Certain strains of fungi have already been commercialized and sold overseas as alternative protein materials and immune-enhancing materials, but research related to this is still lacking in Korea. However, the global level is also in the early stage, so there are still ample opportunities open to us.

>>> S8-4

Strategies to build fungus resources and product reliability through HACCP and GMP application

Young-Won Seo
FD Solution Co.,Ltd.

Nutraceuticals is a food that is manufactured using nutrients or functional raw materials and helps to maintain health. The Ministry of Food and Drug Safety evaluates scientific evidence such as animal tests and human application tests to recognize functional ingredients. Functional raw materials related to fungi are limited to three raw materials (Phellinus linteus extract, Gardernoma lucidum fruiting body extract, and Auricularia auricula-judae dietary fiber), and individually recognized raw materials such as Lentiula edodes mycelium extract and Phellinus linteus extract complex are registered. Good Manufacturing Practice(GMP) is manufacture and supply excellent health functional food with guaranteed quality. In the case of nutraceuticals GMP, it is a system certified by the Ministry of Food and Drug Safety that businesses can always guarantee product quality to a specific standard through standardized work management and hygiene management to manufacture neutraceuticals. In order to produce health functional food using fungus, GMP certification must be obtained, and related standards must be established in accordance with the 'Excellent Health Food Manufacturing Standards' announced by the Ministry of Food and Drug Safety. HACCP certification is a system for supplying safe and hygienic food to consumers by analyzing biological, chemical, and physical hazards in the raw materials and manufacturing process of food, and blocking the causes of residual and contamination in advance. The industries and types of HACCP mandatory application include retort food, frozen food, non-heated beverage, ready-to-eat food, special purpose food, and beverage. The 5 steps of HACCP preparation consist of HACCP team formation, product manual preparation, product usage confirmation, process flow diagram preparation, and process flow on-site confirmation. The 7 Principles consist of hazard analysis, determination of critical control points, setting of critical control point limit standards, establishment of monitoring system for critical control points, establishment of improvement measures, establishment of verification procedures and methods, documentation and maintenance of records.

>>> S8-5

Construction and information strategy of fungus(mushroom) DB

Young Chul Lee
Dfine & Co

Competition for the preoccupy and industrialization of natural resources is intensifying around the world. Especially, among various life resources, fungus (mushrooms) have potentials for high value as health care and food materials such as anticancer drugs and health functional foods. The Jangheung Research Institute for Mushroom Industry has been developing the 'FMB platform (Fungus)that provide a database (eg, product information, biological active information) on fungus (mushrooms) materials for the purpose of establishment the industrial base using fungal resources. The FMB platform is designed for the purpose of revitalizing the industry using fungal (mushroom) materials. First, information that can be applied to the market, including academic information held by the platform site that provides the existing fungal (mushroom) related material DB are being upgraded by specifically classifying and extracting them. Second, We will planning to provide specialized services based on user demands so that they can acquire necessary information for each industry participant. Basic guidelines for data collection were prepared through standardization of DB classification system establishment. Two-Depth information structure design (Information Architect) was used. In addition, the database collection structure was designed to establish correlation between data. We will plan to continuously expand the DB categories by setting the collection scope that provides drug information, service information, and consumer market response information in the future platform DB collection direction. The platform service activation stage linking the services (eg, efficacy evaluation) provided by Jangheung Research Institute for mushroom Industry as a mid- to long-term operation roadmap for the platform will be the platform service expansion stage to link services with other institutions and refine data. Finally, the user's The goal was to set the sharing/distribution service stage through the development of an open API for voluntary participation. Strategy of fungus (mushroom) DB construction and informationization is significant in that it can serve as an exemplary information construction project for the industrialization of other natural resources.

Session 9

Development of Sustainable Fresh Fishery Products Distribution Technology

Chaired by **Kee Jai Park** (Korea Food Research Institute)

Venue : Room 201

16:10-16:35

Current status and policy implications for fresh fishery products distribution in Korea

Heon-Dong Lee (Pukyong National University)

16:35-17:00

International standard technology and policy trends for global food traceability system

Daeyoung Kim (KAIST)

17:00-17:25

AI Transformation for sustainable foods

Jeongmin Lee (KAIST Innovation and Technology Management)

17:25-17:50

The development of sustainable fresh seafood distribution technology

Jung Eun Kim (Eunha fisheries)

>>> S9

Development of Sustainable Fresh Fishery Products Distribution Technology

Chaired by Kee Jai Park (Korea Food Research Institute)

>>> S9-1

Current status and policy implications for fresh fishery products distribution in Korea

Heon-Dong Lee
Pukyong National University

Food consumption through online non-face-to-face has increased rapidly, and as consumers seek convenience, the Home Meal Replacement(HMR) market is also growing significantly. Although public awareness about the hygiene and safety of seafood has increased significantly, the distribution of fresh fishery products has not changed much compared to the past. There is a limit to improving the freshness of fishery products due to the deterioration of fishing boats and fisheries port markets. A cold chain system for fishery products is not systematically established, and unsanitary handling practices exist at distribution sites. The most vulnerable problem in fresh fishery products distribution is that the distribution promotion function is weak. The lack of standardization of grades and packaging from the production stage of fishery products greatly hinders the enhancement of added value and efficiency in the subsequent distribution stages. In this presentation, I propose the following policy tasks for the development of fishery products distribution. First, floor auctions in the fisheries port markets should be eradicated. Second, in response to the growth of the online fresh logistics market, it is necessary to switch to a profit-generating fisheries port markets. Third, it is necessary to standardize the fish containers in accordance with the reality of distribution, and a recycling system must be prepared. Fourth, to reflect the recent changes in the seafood distribution trend, revision of the "Fishery Products Distribution Management and Support Act" is required. Lastly, policy support should be strengthened to expand the function of promoting the distribution of fishery products

>>> S9-2

International standard technology and policy trends for global food traceability system

Daeyoung Kim

Korea Advanced Institute of Science and Technology

In the global agricultural, livestock and fisheries food industry, interest in establishing a standardized traceability system to provide safe food, solve the problem of food waste, respond to import and export regulations, and improve corporate efficiency and brand value is growing. Overall, we present four topics: traceability-related policies and regulations in countries around the world, standard technology for implementing traceability system, global company trends, and policy proposals for domestic applications in Korea as follows.

Firstly, we review the policies and regulations for global food traceability from around the world, including "Smarter Food Safety Era" program of the FDA and the GDST (Global Dialogue on Seafood Traceability) program of WWF and IFT. Secondly, since the process of production, logistics, retail, and consumption of foods are elements of the global supply chain, the traceability system should be implemented according to international standards. We explore the identification system, data capture technology, data and service sharing technology of the GS1 international standard, which is the most widely advocated as core traceability standard. Thirdly, a number of global traceability platforms are using blockchain technology to ensure the reliability of traceability data. And for interoperability between blockchain platforms, the GS1 international standard is mostly adopted. We show the technologies and use cases of representative enterprise platforms such as IBM and SAP. Lastly, we present the current status of Korean agricultural, livestock and fishery food traceability system and propose a customized international standard application plan for linking with the global traceability system in near future.

>>> S9-3

AI transformation for sustainable foods

Jeongmin Lee
Korea Advanced Institute of Science and Technology

Artificial intelligence (AI) technology has recently accelerated the digital transformation in the food sector. AI is evolving beyond human cognitive functions to implement prediction, reasoning, and decision making. AI in the food industry has been making great progress in terms of food safety management and food quality management, and is bringing about drastic changes in the food distribution sector. This presentation introduces the latest AI technology trends, analyze applicability in the fisheries food sector, and explore R&D and sustainability of next-generation AI technologies in the fisheries distribution sector.

>>> S9-4

The development of sustainable fresh seafood distribution technology

Jung Eun Kim
Eunha fisheries

As a representative example of the situation facing Korean seafood in relation to the development of sustainable fresh seafood distribution technology, the working environment of Korean mackerel and Norwegian mackerel can be compared. Currently, Korean consumers' perception of Korean mackerel is mostly reminiscent us of public markets and traditional markets, whereas Norwegian mackerel reminds us of sanitary facilities and worksites. As such, when consumers want to purchase food, they want to purchase safe food with guaranteed freshness and quality, so as of November 2017, consumer preference for Norwegian mackerel was higher than that of domestic mackerel. In order to reflect such consumer satisfaction, the company proposes and manages five directions to realize the development of sustainable fresh seafood distribution technology. All of these directions are ultimately based on trust, to realize the sustainability of seafood with a healthy future based on trust at every stage, from object management to manufacturing processes, suppliers and consumers.

Session 10

Introduction of Product Use by Date and Managemental Strategies of Food Industry

Chaired by Jung-Beom Kim (Sunchon National University)

Venue : Room 202

16:10-16:35

Establishment of recommended use-by-date for each food to support business and response strategies of the food industry

Cheol soo Lee (Korea Advanced Food Research Institute)

16:35-17:00

Scientific safety factor for setting recommended use by date for foods

Sang-Do Ha (Chung-Ang University)

17:00-17:25

Strategies to spread consensus for establishment of use-by date labeling system

Sohyun baek (Korea National Council of Consumer Organizations)

17:25-17:50

Panel discussion

>>> S10

Introduction of Product Use by Date and Managemental Strategies of Food Industry

Chaired by Jung-Beom Kim (Sunchon National University)

>>> S10-1

Establishment of recommended use-by-date for each food to support business and response strategies of the food industry

Cheol Soo Lee

Korea Advanced Food Research Institute

With the revision of the Act on[Labeling and Advertising of Food], etc., from January 2023, the 'expiry date' labeling system will be changed to 'use-by-date'. The purpose of this regulation is to reduce food waste caused by expired products by indicating use-by-date instead of the 'expiry date' that is currently displayed on food, etc. and to improve the system with international trends. In this study, 50 types food(based on the Korea Food Standards Code) will be preferentially selected in the first year out of a total of 283 food types, and the recommended 'use-by-date' for each food will be presented through scientific experimental analysis. The results of this study are expected to be readily applicable to the establishment of the recommended 'use-by- date' for small and medium-sized food companies.

>>> S10-2

Scientific safety factor for setting recommended use by date for foods

Sang-Do Ha

Chung-Ang University

On November 5, 2021, the 'Enforcement Decree of the Act on the Labeling and Advertising of Foods, etc.' and a partial amendment to the Enforcement Rules, which require the labeling of the Use-by-date instead of the shelf-life, were announced. This amendment is to determine the matters delegated by the law and the matters necessary for its implementation as the law was amended on August 17th. The 'consumer labeling system' will be implemented from 2023 to change public awareness and prepare the industry. The shelf-life used in the past refers to the date it can be sold. You cannot sell products that have passed the shelf-life, but you can eat them at home for a longer period of time after purchase. But no one knows exactly how much past the shelf-life can be eaten. This is because each type of food is different, and it depends on the manufacturer, brand, and storage condition. In addition, the shelf-life can be set on average 30% longer than the Use-by-date, which is beneficial to both companies and consumers. Consumers are concerned about the safety of foods marked with an Use-by-date instead of shelf-life. Therefore, it would be better for manufacturers to set the initial consumption period conservatively with a sufficient margin of safety. Distributors must comply with distribution and storage conditions such as securing a cold chain and storage temperature. Consumers are also responsible for storage until consumption, so they should check the label and observe the storage conditions at home before consumption. The government should thoroughly monitor the market and provide institutional support at the beginning of the introduction of the system, and it would be good to suggest a way to change the set shelf-life to the Use-by-date for the time being until the introduction is stable, and to operate the recommended Use-by-date system for each item.

>>> S10-3

Strategies to spread consensus for establishment of use-by date labeling system

Sohyun Baek

Korea National Council of Consumer Organizations

Due to the amendment of the Act on Labeling and Advertising of Foods, the sell-by date label introduced in 1985 will be replaced with the use-by date label effective January 2023. The sell-by date is a period between a product's manufacturing date and the date that is allowed to be sold to consumers, while the use-by date refers to the period determined to be safe for consumption if the consumer complies with the storage instructions provided on a food label. According to the survey on the consumer awareness on the food expiration labeling by the Korea National Council of Consumer Organizations in May 2021, about 60% of the respondents answered that the use-by date is more appropriate for food expiration date indication. The highest number of respondents (68.7%) said that it would be convenient because of clear food expiration dates. Meanwhile, some people think that it is possible to reduce costs of unnecessary food waste (21.6%) and contribute to environmental protection (9.7%). This shows that the current sell-by label has not been playing a critical role in providing accurate information for consumers to evaluate if a food item is eatable. Food labeling information should contain explicit and useful content that enables consumers to make reasonable consumptions through right decisions. The newly adopted system pursues social benefits and values such as the reduction of food associated costs and waste for both families and businesses, environmental protection as well as international trends, yet it requires thorough preparation and committed efforts of the government and food industry to ensure that consumers fully benefit the from the system. Consumers have several questions and concerns: · the extended product longevity from the sell-by date period to meet the changed use-by date period · the articulate rationale for the extended period, and · reassuring food safety standards. It is expected that the introduction of the use-by date label will respond to some of these needs. Also, it will help consumers to obtain accurate information and have the new policy measure in place with the expiration date considering the nature of each food type based on scientific and consistent evidence. The food industry must set the expiration date with safe and reliable standards and have a secure storage system that reflects the characteristics of each food in distribution and consumption. Consumers should carefully check the storage instructions and lead a safe food consumption practices in life. The government should reorganize and closely manage the related laws and systems, and strive to educate consumers about the expiration date and increase awareness, thus allowing the expiration date labeling system can settle down as an effective scheme not only for the food industry but also for consumers

Session 11

Climate Change; Future and Current Researches on Mycotoxins for Food Safety

Chaired by Yong Eui Koo (National Institute of Food and Drug Safety Evaluation)

Venue : Room 203

16:10-16:35

Fungal occurrence in ginseng products from retail market

Jangnam Choi (National Institute of Agricultural Sciences)

16:35-17:00

Monitoring of trichothecene mycotoxins in food

Youngwoon Kang (Ministry of Food and Drug Safety)

17:00-17:25

Occurrence and risk assessment of major type B trichothecene and their modified form in Korea

Sang Yoo Lee (Chung-Ang University)

17:25-17:50

Where to go from here: Current status and ruture plan for research on safety management of mycotoxins

HeeSeok Lee (Chung-Ang University)

>>> S11

Climate Change; Future and Current Researches on Mycotoxins for Food Safety

Chaired by Yong Eui Koo (National Institute of Food and Drug Safety Evaluation)

>>> S11-1

Fungal occurrence in ginseng products from retail market in Korea

Jangnam Choi

National Institute of Agricultural Sciences

Ginseng is one of the important herbal medicinal resources. Ginseng is usually processed for the convenience of storage, transportation, and distribution, and its storability can be much improved through steaming or drying. However, ginseng and its products can be still contaminated with harmful fungi and mycotoxins. To investigate fungal occurrence in various ginseng products, we analyzed 22 fresh ginseng samples, 52 dried ginseng products (24 white ginseng, 26 red ginseng) and 18 ginseng sprout samples from retail market. In fresh ginseng, the average fungal incidence was 98.0%, and Fusarium spp. occurred with the highest incidence (21.2%). In dried ginseng products, fungi occurred in more than 46% of the total samples. Although the average fungal incidence was 1 log10 cfu/g or less, Penicillium polonicum, P. chrisogenum, Rhizopus microspores and Aspergillus chevalieri were dominant. In ginseng sprout, fungal incidence ranged from 113.3 to 174.1% with Penicillium spp. dominant in leaf and stem, and Fusarium spp. in root. PCR screening of mycotoxigenic species revealed that 2 isolates from fresh ginseng and 19 isolates from ginseng sprout were positive for respective biosynthetic genes (aflatoxin, ochratoxin A, patulin, nivalenol, citrinin). These results show that monitoring for fungal contamination and mycotoxins in ginseng is needed to ensure mycotoxicological safety of ginseng.

>>> S11-2

Monitoring of Trichothecene mycotoxins in food

Youngwoon Kang
Ministry of Food and Drug Safety

Mycotoxins are found at various food contaminated by fungi. Trichothecenes (TCT) is a mycotoxin produced mainly by fungi of the genus Fusarium. This mycotoxin is largely divided into type A toxin including T-2 toxin, HT-2 toxin and type B toxin including deoxynivalenol (DON), 3-acetyldeoxynivalenol (3-ADON), 15-acetyldeoxynivalenol (15-ADON). The aim of this study is to survey the contamination of these mycotoxins in food retailed in Korea. So, we developed the liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) method for determination of 5 mycotoxins of TCT in food. This method involved using uniformly labeled [13C] analogues of the target analytes as internal standard and extraction with 84% acetonitrile followed by purification with a solid-phase extraction cartridge. We analyzed the amounts of TCT in 108 items 533 food samples using developed method and will estimate the risk by intake food after monitoring over 1,000 food samples.

>>> S11-3

Occurrence and risk assessment of major type B trichothecene and their modified form in Korea

Sang Yoo Lee, So Young Woo, Fei Tian, Solyi Cho, Hyang Sook Chun
Chung-Ang University

Deoxynivalenol (DON) and nivalenol (NIV) are the major forms of the Type B trichothecene mycotoxin, one of the most frequently occurring mycotoxins worldwide. Their main modified forms, deoxynivalenol-3-β-D-glucoside (DON3G) and nivalenol-3-β-D-glucoside (NIV3G), can be hydrolyzed during digestion after ingestion. Therefore, it must be managed together with the parent toxin. In this study, the occurrence of DON, NIV and their glucoside conjugates in 500 cereals, beans and their processed products was investigated and risk assessment was conducted. The risk assessment of glucoside conjugates was performed by setting exposure scenarios according to absorption rates. Among 537 samples, DON, DON3G, NIV, and NIV3G were detected at mean concentrations of 99.4 μg/kg, 18.4 μg/kg, 75.4 μg/kg, and 50.1 μg/kg in 73 (14%), 40 (7%), 64 (12%) and 28 (5%) samples, respectively. The incidence of the glucoside conjugate was about 50% of that of the parent toxin, and the contamination level was up to 67%. The food with the highest level of contamination was job's tears, and DON, DON3G, NIV and NIV3G were detected at a maximum of 744.0 μg/kg, 22.4 μg/kg, 337.6 μg/kg, and 12.2 μg/kg, respectively. Based on the occurrence, the exposure calculated considering intake and body weight was 0.0195-0.3159 μg/kg b.w./day for the DON group (DON+DON3G), and 0.0179-0.3317 μg/kg b.w./day for the NIV group (NIV+NIV3G).

For the DON group, the exposure contributions for adults were highest for beer (39%) and barley (12%), but maize (29%) and barley (22%) had the highest exposure contributions for infants. For the NIV group, wheat flour (48%, 42%) and barley (20%, 25%) had the highest exposure contribution for both adults and infants. The calculated TDI% of DON group and NIV group based on average intake were 1.9-7.2% and 4.5-18.8%, respectively. Overall, the exposure level was at a safe level, but the TDI% of the NIV group was about twice that of the DON group. In Korea, there is no regulation limit for the NIV group, so a measure for safety management is required. In particular, TDI% of infants was higher than that of adults (maximum 95.2%), so it is necessary to manage Type B trichothecene mycotoxin for the safety of infants.

>>> S11-4

Where to go from here: Current status and future plan for research on safety management of mycotoxins

Seok-Hee Lee[1], Hee-Seok Lee[2]

[1]Dongguk University, [2]Chung-Ang University

A number of fungi can produce secondary metabolites, which are chemical hazards of increasing concern in food products because of the wide range of food types where they can be found. Food and feed contamination with secondary metabolites, which are produced by fungi, may be a serious concern for human and animal health because of their adverse effects. For example, the various mycotoxins such as aflatoxins, ochratoxins, and Fusarium hazardous secondary metabolites found in cereal grains, such as wheat, maize, and rice as well as other matrices. It is also detected in several herbal medicines. Due to that, various countries have regulated the mycotoxins through establishing the health-based guidance values, i.e. tolerable daily intake or tolerable weekly intake. Republic of Korea also have regulated several mycotoxins containing total aflatoxins, ochratoxin A, fumonisin, deoxynivalenol, and zearalenone in food and feed. Even if mycotoxins have been regulated, the tendency of contaminations by mycotoxins containing kinds of detecting mycotoxins, detecting frequency, and detecting level has been changed according to various environmental conditions. In this study, we have tried to analyze the tendency of research for safety management of mycotoxins with respect to detecting methods, occurrences, toxicity, and risk assessment. Furthermore, research roadmap for safety management of mycotoxins in Republic of Korea is established based on tendency analysis.

Session 12

Global Market Extension Strategy for Hanwoo (Korean Beef) and Status of Eco-friendly Biomaterials

Chaired by Sang Pil Hong (Korea Food Research Institute)

Venue : Room 204

16:10-16:35

Strategies and achievements to revitalize Hanwoo (Korean beef) exports

Seung-Je Lee (Jeonnam Bioindustry Foundation)

16:35-17:00

Introduction of eco-friendly EVO-based 9-layer vacuum shrink film

Sang Wook Ui (KC)

17:00-17:25

Solution using ICT wireless infrastructure technology for the problem of Cold Chain

Byung Bu Oh (Philcom)

17:25-17:50

Development of products using functional peptides from meat proteins

Jung-Bok Lee (Kyochon F&B Co., Ltd)

>>> S12

Global Market Extension Strategy for Hanwoo (Korean Beef) and Status of Eco-friendly Biomaterials

Chaired by Sang Pil Hong (Korea Food Research Institute)

>>> S12-1

Strategies and achievements to revitalize Hanwoo(Korean beef) exports

Seung-Je Lee

Jeonnam Bioindustry Foundation

The recent Russia-Ukraine crisis has led to an increase in domestic feed prices due to rising international oil prices and grain import prices. In particular, the increase in feed prices leads to an increase in the production cost of Korean beef farms, causing a problem of a decrease in the net income of farmers. In addition, it is urgent to explore the global export market for Korean beef as the competitiveness of the domestic Korean beef market is feared to weaken due to the zero beef import tariffs in 2026. Accordingly, the Korean Beef Export Research Project Group is proposing solutions along with deriving difficulties in each stage of Korean beef export to secure a stable export market for Korean beef. First, a 9-layer vacuum shrink film was developed to solve the drip and packing material loosening that occurs during the export and distribution process of Korean beef. The 9-layer vacuum shrink film is an optimized film for thermal adhesion and gas blocking using an eco-friendly EVOH resin, and the empirical results are derived that it is effective in reducing the extraction of Korean beef juice and maintaining long-term storage. Second, an ICT Data Logger capable of monitoring real-time temperature and humidity to track changes in the quality of Korean beef that occur during the distribution process was developed. As a result of the Data Logger analysis, it was confirmed that the quality of Korean beef changes due to the difference in the temperature inside the icebox, and various export demonstrations are currently underway to minimize the quality change in the Korean beef export distribution process.

Third, in order to increase the reliability of consumers in Korean beef exporting countries, QR code labels were applied to Korean beef for export. This technology has been developed so that overseas consumers can directly recognize the QR code on their mobile phones and check the history information of Korean beef. The QR Code label is expected to be used as a marketing strategy for Korean beef excellence and recipes using Korean beef by introducing it to processed foods using Korean beef as well as tracking the history of Korean beef. Fourth, several home meal (HMR) using non-preferred meat from Korean beef were developed. Currently, sirloin, tenderloin, and sirloin are exported as high-quality meat, but other non-preferred parts need to resolve the imbalance in supply and demand for non-preferred meat because consumption is low. Accordingly, it is seeking to diversify exports of Korean beef by developing hamburg steak and instant porridge products using non-preferred meat. These studies conducted by the Korean Beef Export Research Project Group are believed to contribute to stabilizing Korean beef farms and the domestic market and revitalizing Korean beef exports. Finally, it is expected that the core technologies developed by the Korean Beef Export Research Project will be applied not only to Korean beef but also to livestock products, helping to revitalize exports

This work was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture and Forestry(IPET) through Export Promotion Technology Development Program Program(or Project), funded by Ministry of Agriculture, Food and Rural Affairs(MAFRA). (grant number 618002-5)

>>> S12-2

Introduction of eco-friendly EVO-based 9-layer vacuum shrink film

Sang Wook Ui
KC Co., Ltd.

The Shrink film for meat processing is a large-scale market with a global market of $2 billion, and most of the products are supplied by global companies. Although it is supplied by two small companies in Korea. It has a supply capacity of less than 30% of domestic demand, so it is only used for packaging pork. In other words, in the case of beef, it is mostly dependent on imports. KC Co., Ltd. aims to compete with global companies by producing eco-friendly(EVOH) 9-layer film by introducing 3-layer simultaneous biaxial stretching technology for the first time in Korea. 9-layer film production is a new technology that has been developed in the world for less than 5 years. In particular, this technology is a process technology that has the advantages of the single bubble inflation method and tenter pry method, which are the existing film manufacturing methods. It's expected to create a new origin of EVOH vacuum shrink film technology for domestic meat processing. By developing a technology to control orientation and crystallization according to the stretching of polymers, even if the same plastic material is used as a raw material, it is advanced technology that improve the properties of the film. It has excellent competitiveness. By promoting continuous technological development of shrink film, functional packaging film, and high-functional industrial material film, it will be possible to contribute to export increase by securing overall mechanical properties and distribution safety of Korean beef shrink film.

This work was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture and Forestry(IPET) through Export Promotion Technology Development Program Program(or Project), funded by Ministry of Agriculture, Food and Rural Affairs(MAFRA). (grant number 618002-5)

>>> S12-3

Solution using ICT wireless infrastructure technology for the problem of Cold Chain

Byung Bu Oh

PHILCOM Co.,Ltd.

Cold-chain, also called cool-chain, refers to activities and equipment applied to maintain a constant low temperature range from product production to final delivery to consumers. It covers the entire process of manufacturing, processing, transportation and distribution of perishable and sensitive to temperature/humidity changes. In other words, Cold-Chain refers to a warehouse system that stores, packs, and distributes products such as refrigeration/freezing, and collectively refers to technology and management techniques that control temperature/humidity from production to consumption. The cold-chain market has established a cold-chain distribution system that delivers products that are very sensitive to temperature and humidity from packaging, transportation, handling, low-temperature storage, distribution, and final delivery. Building a Cold-Chain is an essential element in order to improve the quality of delivery. Cold-Chain consists of facilities and equipment that can maintain a set temperature range, materials such as insulation and refrigerant, and logistics equipment such as transport containers and refrigeration/freezing tower vehicles. Cold-Chain's tracking management function applies the technologies of the 4th industrial revolution, such as temperature/humidity monitoring devices, IoT, cloud, AI, and big data, to Cold-Chain. The global cold-chain market size is expected to reach about $500 billion by 2025. According to the International Cold Chain Association, the capacity of refrigerated logistics centers available per person in domestic cities is at a lower level than in advanced countries, and even recognition is limited to the food sector. Experts advise that demand should also be considered. The problem with Cold-Chain was that some Pfizer vaccines failed to control the temperature, which led to a complete defeat, and it is having difficulty maintaining the actual temperature due to the aging of the freezer/refrigeration warehouse. Also, temperature/humidity data is not standardized, and there is no standard communication protocol. Therefore, it is proposed to solve the problem of Cold-Chain using ICT wireless infrastructure technology. First, the temperature/humidity data is transmitted wirelessly, and the temperature/humidity status information in the distribution center and vehicle loading box is stably monitored in real-time, and the gateway and It solves the problem of Cold-Chain by using wireless infrastructure technology such as server.

This work was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture and Forestry(IPET) through Export Promotion Technology Development Program Program(or Project), funded by Ministry of Agriculture, Food and Rural Affairs(MAFRA). (grant number 618002-5)

>>> S12-4

Development of products using functional peptides from meat proteins

Jung-Bok Lee
Kyochon F&B CO., LTD

Recently, due to the development of medical technology and the improvement of human lifespan is extended, and aging is progressing rapidly with a decrease in the fertility rate. Proteins are macromolecules composed of basic units of amino acids and are considered to be the most important nutrient for humans. In particular, meat protein sources with excellent amino acid composition should be consumed to prevent muscle loss and immune function deterioration in growth and development and old age as essential components for muscle and immune body formation. Various peptides are known to be useful for physiological function and health benefit. Bioactive peptides are the general name for the short amino acid sequences, which could be produced from the hydrolysis of proteins including beef, pork, mutton, chicken, duck and various species of organisms. Before degradation of a protein, most of these peptides are latent without any biological effects, and are activated by the digestion or processing of foods, including fermentation and enzyme hydrolysis. Therefore, research and development of meat proteins and peptide materials are very important as interest in protein products has increased recently.

Session 13

Strategies in Building a Virtual Food Factory Based on Digital Twin

Chaired by Kwang-Hee Hong (IBOW Solution Co., Ltd.)

Venue : Room 201

10:20-10:45

Based on digital twinbuilding a smart virtual collaboration factory

Ji-yeon Kim (iBOW Solution Co., Ltd)

10:45-11:10

Long-term food freshness maintenance plan using organic acid of bacterial culture

Yongbin Eym (GK&C)

>>> S13

Strategies in Building a Virtual Food Factory Based on Digital Twin

Chaired by Kwang-Hee Hong (IBOW Solution Co., Ltd.)

>>> S13-1

Based on digital twinbuilding a smart virtual collaboration factory

Ji-yeon Kim
iBOWSOLUTION Co., Ltd

IBOWSOLUTION provides a digital twin-based virtual collaboration factory deployment solution through 3D CAD data and control signal interworking. Through this, it is possible to visualize the production process such as assembly and logistics flow of actual factories, thereby improving the efficiency of production facilities and workers.In addition, virtual verification prior to actual facility construction provides a preliminary insight into production line suitability and process efficiency. After establishing the facility, it is possible to standardize production assets (process/resource) through continuous data collection and systematic analysis through real-time control linkage. In addition, virtual 3D data can be used to perform physical verification and test operations such as process improvement, and accordingly, facility changes can reduce failure costs and start-up times. In addition, real-time control interworking of physical equipment through sensor information and 3D data interworking can build an integrated control monitoring system, and remotely control the control process and facility management of real equipment. In this way, you can build a data-driven digital twin-based virtual collaboration factory to build an efficient production management and verification system.

>>> S13-2

Long-term food freshness maintenance plan using organic acid of bacterial culture

Yongbin Eym
GK&C

Fruits and vegetables begin to wither as soon as they are harvested. In addition, most of the fruits and vegetables are temporarily stored under harsh conditions (unsuitable temperature and humidity) until they are harvested and delivered to customers. In particular, when sold by courier at the post office, most of the products are delivered to customers after 48 hours at room temperature. In order to compensate for this problem, it is desirable to spray the antioxidant diluted to an appropriate concentration just before harvest, spray it repeatedly immediately after harvest, and then package it and deliver it. It is known that the spraying effect of antioxidants on harvested fruits and vegetables suppresses pests(pathogenic bacteria, fungi & insect) and the organic acid(representative antioxidant) sprayed on the leaf surface makes it difficult to grow at a low pH, and brings repelling effects from pests. Therefore, what is important is how low cost can be supplied with antioxidants containing various organic acids. So, the bacterial culture medium was selected to secure inexpensive organic acid. After centrifuging the bacterial culture medium, separating only the supernatant, and diluting it to an appropriate concentration, it was tested that the long-term (at least one week) freshness of fruits and vegetables was significantly improved at a very low cost. could check.

Session 14

Understanding Sarcopenia as a Disease

Chaired by Choon Young Kim (Yeungnam University)

Venue : Room 202

10:20-10:45

Does sarcopenia accompanying progressive osteoarthritis of the knee joint affect patient-reported outcome measures following primary total knee arthroplasty?: A single-center study

Gi Beom Kim (Yeungnam University Medical Center)

10:45-11:10

Association of dietary mineral and vitamin intakes collected by 24-h recalls with sarcopenia in Korean elderly

Na-Hyung Kim (Yeungnam University)

11:10-11:35

Association of sarcopenia with osteopenia and osteoporosis in community-dwelling older Korean adults: A cross-sectional study

Do-Youn Lee (Yeungnam University)

11:35-12:00

Gender-specific differences in risk factors and prevalence for sarcopenia amongst community-dwelling young-old adults

Jongseok Hwang (Yeungnam University)

>>> S14

Understanding Sarcopenia as a Disease

Chaired by Choon Young Kim (Yeungnam University)

>>> S14-1

Does sarcopenia accompanying progressive osteoarthritis of the knee joint affect patient-reported outcome measures following primary total knee arthroplasty? : A single-center study

Gi Beom, Kim

Yeungnam University Medical Center

The purpose of this study was to 1) investigate the prevalence of sarcopenia in patients undergoing TKA for end-stage OA, and 2) investigate whether sarcopenia accompanying OA affects patients-reported outcome measures (PROMs) after TKA. In addition, we tried 3) to evaluate the factors affecting the outcome after TKA in patients with end-stage arthritis. From May 2020 to July 2021, a consecutive case series of 532 knees in 360 patients including 172 bilateral knees underwent primary TKA were screened. Sarcopenia was defined according to the criteria for the European Working Group on Sarcopenia in Older people 2 (EWGSOP 2) (appendicular SMI below 6.0kg/m2 in women and below 7.0kg/m2 in men). According to these criteria, enrolled patients were assigned to the group with sarcopenia (group S) and group without sarcopenia (group NS). All patients were regularly followed up at six weeks, and at six, and 12 months after index surgery. Patient-reported clinical evaluations were performed using the American Knee Society Score (AKSS) scale (knee score and function score), the Knee Injury and Osteoarthritis Outcome Score (KOOS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and ROM of the knee joint. Using the EWGSOP 2 definition, the prevalence of sarcopenia in women and men was 6.3% and 11.2%, respectively. Although group S showed significantly inferior PROMs during the 6-month follow-up, there was no statistically significant difference between the two groups at the 12-month follow-up. In multivariate analysis, sarcopenia (OR = 4.12; 95% CI = 2.07-7.09), age (OR = 2.15; 95% CI = 2.03-2.57), and BMI (OR = 1.17; 95% CI = 1.25-2.38) were associated with inferiority of PROMs. This study showed a higher prevalence of sarcopenia in men with progressive osteoarthritis of the knee joint. Up to 6 months after primary TKA, more inferior PROMs appeared in patients with sarcopenia, but there was no significant difference between the two groups from 12 months.

>>> S14-2

Association of dietary mineral and vitamin intakes collected by 24-h recalls with sarcopenia in Korean elderly

Na-Hyung Kim

Yeungnam University

Sarcopenia is characterized by loss of skeletal muscle mass, strength and power, and physical performance, and known as increasing prevalence according aging. In this study, we investigated the association between the intake of minerals and vitamins, one of diet-related factors, and handgrip strength as an indicator of sarcopenia in Korea elderly of aged 65 and over, using data from the Korean National Health and Nutrition Examination Survey Ⅷ-1 in 2019. Logistic regression analysis was performed to estimate the odd ratios (OR) and 95% confidential intervals (CI) of the associations between vitamin or mineral intakes and sarcopenia. In men, the intakes of calcium, phosphorus, iron, potassium, vitamin A, thiamine, riboflavin, and folate were associated with sarcopenia when unadjusted. In women, the intakes of calcium, phosphorus, iron, potassium, and riboflavin were associated with sarcopenia when unadjusted. When adjusted all covariates, it showed a significant association between potassium intake and handgrip strength in both groups. Conclusively, in this study, insufficient potassium intake was associated with low handgrip strength as an indicator of sarcopenia in the aged. A longitudinal studies on the intake of vitamins and minerals including potassium for prevention of sarcopenia need to be performed in future.

>>> S14-3

Association of sarcopenia with osteopenia and osteoporosis in community-dwelling older korean adults: a cross-sectional study

Do-Youn Lee
Yeungnam University

Sarcopenia and bone disorders, such as osteopenia and osteoporosis, are common musculoskeletal disorders in older adults. Therefore, this study aimed to establish the association between sarcopenia and bone disorders such as osteoporosis and osteopenia according to sex. We analyzed 3077 participants from the 2008~2011 Korean National Health and Nutrition Examination Survey aged 65 years or older. After adjusting for all covariates, such as physical examinations, exercise, and nutrient intake (model 4), the odds ratios for the association between sarcopenia and bone disorders were 2.051 (95% confidence interval [CI]: 1.498–2.808) in osteopenia and 2.258 (95% CI: 1.584~3.218) in osteoporosis. However, when sex was analyzed separately, the odds ratio was significantly different in men (osteopenia–2.068, 95% CI: 1.462–2.924; osteoporosis–3.247, 95% CI: 1.953–5.399), but not in women. Therefore, the results of this study show an association between sarcopenia and bone disorders in older Korean adults. Sarcopenia is significantly related to osteopenia and osteoporosis, especially in men, when stratified by sex.

>>> S14-4

Gender-specific differences in risk factors and prevalence for sarcopenia amongst community-dwelling young-old adults

Jongseok Hwang
Yeungnam University

Sarcopenia in the elderly is a serious global public health problem. Numerous sarcopenia studies classified their subjects into a single group, but health conditions and body composition vary according to age. This study examined the prevalence of sarcopenia according to gender and assessed the gender-specific risk factors in young-old adults. In this study, 2,697 participants in Korea aged from 65 to 74 years were analyzed from Korea National Health and Nutrition Examination Surveys. The prevalence of sarcopenia in males and females was 19.2% (CI 95%: 16.4-22.3) and 26.4% (23.7-29.4), respectively.The risk factors in men were age, body mass index (BMI), waist circumference (WC), skeletal muscle index (SMI), fasting glucose (FG), triglyceride, and systolic blood pressure (SBP). Their odd ratios were 1.447, 0.102, 1.494, 0.211, 0.877, 1.012, and 1.347. The risk factors in women were age, height, weight, BMI, WC, SMI, and fasting glucose with values of 1.489, 0.096, 0.079, 0.158, 0.042, and 1.071, respectively. The prevalence of sarcopenia was higher in females than in males. Overall, the clinical risk factors in males were age, height, BMI, WC, SMI, FG, triglyceride, and SBP. Age, height, weight, BMI, WC, SMI, and FG were the risk factors for women.

Session 15

Big Data Driven Smart Agriculture Methods and Strategies

Chaired by Seongjin Park (Jeonju University)

Venue : Room 203

10:20-10:45

Fourth industrial revolution and smart-farm

Jong-Won Lee (Korea National University of Agriculture and Fisheries)

10:45-11:10

Novel fruit packaging technology using biocompatible electrospun-mechanobio nanofiber

Chan Hee Park (Chonbuk National University)

11:10-11:35

Non-destructive technology trend using hyperspectral imaging for the food and agricultural plants

Munseob Lee (Electronics and Telecommunications Research Institute)

>>> S15

Big Data Driven Smart Agriculture Methods and Strategies

Chaired by Seongjin Park (Jeonju University)

>>> S15-1

Fourth industrial revolution and smart-farm

Jong-Won Lee
Korea National University of Agriculture and Fisheries

Agriculture has seen many revolutions, whether the domestication of animals and plants a few thousand years ago, the systematic use of crop rotations and other improvements in farming practice a few hundred years ago, or the "green revolution" with systematic breeding and the widespread use of man-made fertilizers and pesticides a few decades ago. Now, agriculture is undergoing a fourth industrial revolution triggered by the exponentially increasing use of information and communication technology in agriculture. Automation and robotic vehicles have been developed for farming purposes, such as mechanical weeding, application of fertilizer, or harvesting of fruits. The development of unmanned aerial vehicles with autonomous flight control, together with the development of lightweight and powerful hyperspectral snapshot cameras that can be used to calculate biomass development and fertilization status of crops, opens the field for sophisticated farm management advice. Moreover, decision-tree models are available now that allow farmers to differentiate between plant diseases based on optical information. Smart farming reduces the ecological footprint of farming. Minimized or site-specific application of inputs, such as fertilizers and pesticides, in precision agriculture systems will mitigate leaching problems as well as the emission of greenhouse gases. With current ICT, it is possible to create a sensor network allowing for almost continuous monitoring of the farm. Smart-farm can make agriculture more profitable for the farmer. Decreasing resource inputs will save the farmer money and labor, and increased reliability of spatially explicit data will reduce risks. Therefore, in this presentation, we would like to introduce domestic and overseas smart farm technologies.

>>> S15-2

Novel fruit packaging technology using biocompatible electrospun-mechanobio nanofiber

Chan Hee Park

Chonbuk National Universiry

We have studied the technique for efficient prolong the shelf-life of fruit. To prolong the shelf-life of fruit, one of the most important factor is the concentration of oxygen (O2) and carbon dioxide (CO2) produced by the fruits inside the packaging. Therefore, to create the right environment, it recommended creating pores which O2 and CO2 can be exchanged. We utilize electrospinning technique for easy electrohydrodynamic fabrication of nanofibers by electric force to fabricate nano-sized fibers with high porosity. Additionally, use of essential oil is very appropriate to reduce postharvest disease cause of their antibacterial and like-pesticide properties. In this study, we fabricated different structural packaging types using nanofibers and essential oil to compare the efficacy. After that, we observed the percentage of corruption is significantly reduced by using peach as a kind of fruits. These packaging techniques will overcome the limitation of fruits life with postharvest disease not only field of fruit packaging techniques.

>>> S15-3

Non-destructive technology trend using hyperspectral imaging for the food and agricultural plants

Munseob Lee, Sang Yun Kim
Electronics and Telecommunications Research Institute

Hyperspectral imaging technology is a technology for simultaneously acquiring and imaging spectral information and spatial information of an object, and it is possible to analyze a state, a composition, a feature, and a transformation. Hyperspectral technology enables inspection of the condition and quality of food by measuring the specificity of the spectral spectrum in a non-contact and non-destructive manner in the fields of food and agricultural plants. In this presentation, we will look at various known spectroscopic techniques and discuss the snapshot hyperspectral camera and line-scan-type hyperspectral technology developed by our research team. Through this, we will discuss performance factors such as FOV and measurement wavelength band suitable for food safety and quality classification. Finally, artificial intelligence technology (AI) with deep neural network for hyperspectral imaging will be discussed

Session 16

Emerging Technologies for Functional and Sustainable Food Packaging

Chaired by Soonjong Kwak (Korea Institute of Science and Technology)

Venue : Room 204

10:20-10:40

Flexible film materials for enhanced recycling of food packaging

Soonjong Kwak (Korea Institute of Science and Technology)

10:40-11:00

Development of deodorizing packaging materials and applied products to strengthen the export competitiveness of kimchi

SeungRan Yoo (World Institute of Kimchi)

11:00-11:20

Recyclable PP foam food containers

Eung Kee Lee (Chemico Advanced Materials Inc.)

11:20-11:40

High performance composite materials for food packaging application

Jun-Young Lee (Korea Institute of Industrial Technology)

11:40-12:00

Development of high barrier eco-friendly food packaging material for replacement of EVOH

Young Ju Choi (Everchemtech)

>>> S16

Emerging Technologies for Functional and Sustainable Food Packaging

Chaired by Soonjong Kwak (Korea Institute of Science and Technology)

>>> S16-1

Flexible film materials for enhanced recycling of food packaging

Soonjong Kwak

Korea Institute of Science and Technology

Plastic packaging materials account for more than 40% of waste plastics, which have become environmental issues such as marine plastic pollution and greenhouse gases. Therefore, plastic recycling is being promoted in an effort to reduce the amount of waste plastic, but it is not easy due to the nature of plastic packaging composed of many different materials. One of the characteristics that make the plastic packaging inevitably made of multiple materials is the gas barrier needed in plastic packaging. Oxidative deterioration is one of the main causes of food degradation. This process results from the generation of reactive oxygen species (ROS) and subsequent repeated reaction cycles between free radicals and oxygen. To increase the shelf-life of foods, it is essential to prevent the permeation of oxygen through the food packaging, which can be achieved through the use of oxygen barrier films. Polyolefins such as polyethylene (PE) and polypropylene (PP) employed as a mono-material (or UNI-material) packaging to promote recycling have poor oxygen barrier properties. As a result, in polyolefin-based barrier packaging films, the addition of an oxygen barrier layer, which has a chemical structure different from polyolefin, is unavoidable, but its usage may be minimized by utilizing a material that has higher barrier properties, thus increasing the recyclability of packaging. In this presentation, two high barrier technologies developed in KIST are introduced, which are advantageous to realize the polyolefin-based mono-material packages; polyketone-based high oxygen barrier material and aluminum oxide (AlOx) coated polyolefin barrier material.

>>> S16-2

Development of deodorizing packaging materials and applied products to strengthen the export competitiveness of kimchi

SeungRan Yoo

World Institute of Kimchi

This study aims to develop deodorizing packaging materials and applied products that can reduce odor caused during the export of kimchi. Kimchi odor evolved during its distribution may cause discomfort to foreigners who are not familiar with it, which may result in reduced marketability and economic losses. Sulfur compounds are known as the most significant volatiles that determine the overall Kimchi aroma due to their high odor activity values, thus, we aimed to remove volatile sulfur compounds using deodorizing packaging materials. To remove sulfur compounds, deodorizing materials were prepared by synthesizing silver ions, sodium bicarbonate, or zinc oxide on porous materials (activated carbon, zeolite, diatomite, and clay acid). Among the silver ion-synthesized porous materials, clay acid eliminates 97.39±0.45% of allyl methyl sulfide, 84.35±2.47% of dimethyl disulfide, 54.06 ±0.15% of allyl methyl disulfide, and 49.71±3.24% of diallyl disulfide (standard reagent concentration: 300 mM). Moreover, activated carbon impregnated with sodium bicarbonate eliminates 98.64±0.05% of allyl methyl sulfide, 95.21±0.45% of dimethyl disulfide, 57.76±5.20% of allyl methyl disulfide, and 56.55±2.44% of diallyl disulfide (standard reagent concentration: 300 mM). The zinc oxide-zeolite composite film eliminated more concentrations of allyl methyl sulfide, allyl methyl disulfide, and diallyl disulfide by 36.3±7.4, 7.8±0.1 and 3.7±0.4%, respectively, compared with those eliminated by general LDPE film. When the zinc oxide-zeolite composite film was used for kimchi packaging, the leakage of the aforementioned sulfides and disulfides was reduced. Additionally, TEM, SEM, FTIR, and TGA were employed to analyze the characteristics of the deodorizing materials and films. These deodorizing materials will be developed for kimchi packaging, such as liners, lids, or pouches, through foaming, packaging materialization, or multi-layer composite film manufacturing. The kimchi packaging thus developed are expected to enhance the competitiveness of kimchi export by improving its accessibility for consumers.

>>> S16-3

Recyclable PP foam food containers

Eung Kee Lee
Chemico Advanced Materials Inc.

Polystyrene (PS) foam which is usually called Styrofoam is being globally banned due to its environmental and health-related issues. However plastic food packaging industry is still looking for a good alternative to Styrofoam. Since Polypropylene (PP) is affordable, safe for food contact and recyclable, PP foam is considered as the most appropriate candidate to replace Styrofoam, but it is still very challenging to produce high quality PP foam for food containers. It is mainly because PP has much narrower foaming process window compared to PS. In fact, conventional PS foam extruders are not capable of producing PP foam properly. Chemico Advanced Materials Inc. commercialized low density PP foam sheet using advanced foam extrusion technology. It is expected that the low density PP foam will have numerous applications in food packaging industry. As PP foaming technology is further developed, eventually PP foam packaging will be able to replace not just Styrofoam but also solid PP and paper cup containers.

>>> S16-4

High performance composite materials for food packaging applications

Jun-Young Lee

Korea Institute of Industrial Technology

The food packaging technology has been considered to be a key research area to prevent the contamination and maintain the quality of products. The food packaging can have the desired properties using a variety method such as coating, compounding, laminating, etc. For this purpose, high performance materials have been developed and incorporated them into the food packages. The polymeric film with anti-viral materials would protect the foods from the biological contamination, preventing the food poisoning. Absorption of carbon dioxide inhibits the expansion of the fermented food packages. Furthermore, the expiration date of foods could be replaced with colorimetric signals of illustrations printed on the wrapping packaging. Therefore, it is expected that this work will open a new path for the development of high value-added food packaging materials with various functions and excellent performance.

>>> S16-5

Development of high barrier eco-friendly food packaging material for replacement of EVOH

Young Ju Choi
EVERCHEMTECH

High barrier materials, which are key to extending the shelf life and maintaining quality of food, rely on foreign imports from companies such as Kuraray, Toray, Toppan, and Dainipon in Japan. This is an absolutely disadvantageous structure in terms of supply and demand disruptions and price policies. This study aims to contribute to the establishment of domestic production and distribution market system by developing natural high-barrier food packaging materials with the same barrier properties to replace EVOH-based packaging materials imported from abroad. As plastic packaging materials have been subject to environmental problems, this study seeks to reduce resources and improve recycling by applying a thin film coating method that not only provides eco-friendliness of materials by implementing high barrier with natural product-based coating agents. In this study, physical properties evaluation, composition optimization, and performance improvement studies of each material were conducted through screening of various natural materials such as proteins, carbohydrates, and cellulose. Hydration reaction of protein and carbohydrate, were studied, and optimized composition was studied, and Oxygen transmission rate was observed according to the application of various substrates such as PET, OPP, etc. And the result was 1 um coating thickness was applied to PET 12um substrate to implement a performance of 1 cc/m2 · day or less. Studies on LDH(Layered Double Hydroxide) complexation and ionic crosslinking are underway to further improve performance. CMC (Carboxy methyl cellulose) confirmed oxygen barrier properties according to length change of hydrophobic chain through reforming, and a study is in progress to increase crystallinity through ion cross-linking. The natural high barrier material developed through this research aims to be applied not only to films but also to container types, and will conduct scale-up and line tests for mass production, select optimal process conditions, and manufacture prototypes.

OP-01

Quality characteristics of plant-based artificial muscle using complex polysaccharides of keppa-carrageenan and curdlan for 3D food printing

Jiyoon Kim[1]*, Kwang-Deog Moon[1,2]

[1]School of Food Science and Technology, Kyungpook National University
[2]Food and Bio-Industry Research Institute, Kyungpook National University

While consumption of meat analogue products is increasing, consumers are not satisfied because they are not familiar with them. This demand has increased the need for research on realistic artificial meat products. In this study, plant-based artificial muscles were manufactured in the form of muscle shape using 3D printers, and pre and post-processing characteristics of bovine tendon were compared. keppa-carrageenan (K) and curdlan (C) were mixed at a ratio of 1:1, 2:1, 3:1, and 4:1 heat-treated to prepare a complex gel after then mixed with tapioca starch to prepare samples in a total of four samples (K1C1, K2C1, K3C1, and K4C1). There was no significant difference in syneresis and moisture content of the complex gel before processing, but the gel strength and gumminess increased according to the C content. The 3D printing temperature condition was set by the temperature sweep test, and as the K content increased through the frequency sweep test, a property close to a solid was shown. After printing and cooking, K3C1 and K4C1 were similar in springiness and cohesiveness to CONT. In the evaluation of cooking loss and dimensional stability, K3C1 showed high stability. K3C1 samples were most suitable as artificial muscle fibers for 3D printing through evaluation of pre and post-processing. The possibility of manufacturing artificial muscles could be confirmed using 3D printers, and plant-based artificial muscles will be used as a technology that can solve problems such as the lack of texture of meat analogue and edible 3D cultured meat scaffold.

OP-02

곡물 안정화 처리에 의한 대두의 비린취 제거 및 식미 향상 효과

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대두는 동아시아를 원산지로 하는 콩과에 속하는 식용작물이다. 30-50%의 단백질을 함유하고 있어 다양한 요리에 사용되고 있으나 lipoxygenase(LOX)에 의해 발생 되는 비린 취는 가공 시 품질을 저하시키는 주요 요인으로 간주 되고 있다. 식품에 원적외선을 조사한 경우 영양소는 파괴되지 않으면서 에너지 효율이 높아지고 식품의 저장성과 보관 기간이 효과적으로 연장되는 것으로 알려져 있다. 따라서, 본 연구는 cold-hot 시스템 및 자외선 조사를 통한 곡물 안정화 처리공정(stabilization-drying process)이 생콩과 볶은콩의 비린취 및 식미에 주는 영향을 전자코와 전자혀를 이용한 비린취 패턴 조사, 비린취를 유발하는 lipoxygenase 및 TBARS 값 분석, 관능평가를 통해 비교해 보았다. 분석 결과에 따르면, 안정화 처리는 생콩 및 볶은콩의 LOX 저해율은 증가시키고 TBARS 값은 유의적으로 감소시켰다. 전자코의 분석 결과 지방취를 발생시키는 propenal/ethanol 성분의 감소가 확인됨에 따라 안정화 처리가 비린취 감소에 영향을 주었음이 확인되었다. 전문패널을 대상으로 한 관능평가의 경우, 안정화 처리한 생콩이 고소한 향, 단맛, 고소한 향미 부분에서 양의 상관관계를 보이며 전반적으로 높은 기호도를 보였다. 따라서, 곡물 안정화 처리가 대두의 비린취 제거 및 식미 향상에 기여하며 더 나아가 다른 통곡물의 고품질 및 고부가가치를 창출할 수 있는 가공법으로 활용될 것으로 기대된다.

OP-03

Comprehensive study on ambient loading of Chinese cabbage in corrugated fiberboard box with different ventilation design for shipping

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The ambient loading is an alternative cold chain method to the forced-air precooling (FAC) which causes the additional cost, labor, and time. However, it requires the ventilation design in the corrugated fiberboard box due to its vertical and lower airflow unlike the FAC. The three different edge-vent types of boxes were prepared and named as Vent 0, 2, and 3% according to its ventilation area. The ventilation efficiency of each box was analyzed by computational fluid dynamics (CFD) and complemented by the experimental validation test. In addition, the box compression strength (BCT) was determined by ASTM D642 and evaluated by the criteria from both Fibre Board Association (FBA) and ASTM D4169. Furthermore, the quality changes of Chinese cabbage were evaluated by weight loss, trimming loss, total soluble solution, pH, color, and firmness. Each box contains the six Chinese cabbages (15±1kg) which are wrapped with either clean newspaper or LLDPE film (10±1um) as the shipping business practices. Each Vent 0-3% was stacked in 7 layers and stored at 2±1oC, under 75±5% RH for 30days. From the results of both CFD and experimental validation, the core temperature of Chinese cabbage in Vent 2 and 3% showed the significantly faster decrease in the cooling rate than the one in Vent 0%, and there was no significant difference between them. Chinese cabbages wrapped with LLDPE film also showed better results in weight loss and firmness than those wrapped with newspaper.

OP-04

Cyclodextran, cyclodextrin의 computational modeling을 통한 구조학적 분석 및 물리적, 소화적 특성 비교

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Cycloisomaltooligosaccharide(CI, alternatively cyclodextran)는 포도당이 α-1,6 결합의 환상 구조로 이루어진 올리고당으로 수용액에서 α-1,4 결합의 환상 구조로 구성된 cyclodextrin(CD)보다 높은 수용성을 가진다고 알려져 있었다. 이는 CD의 α-1,4 구조와 CI의 α-1,6 결합의 차이로 인해 분자 내경이 더 크고 결합의 융통성으로 인해 포집능이 뛰어난 것으로 확인되었다. 그러나 CI의 분자 구조에 따른 내 · 외경의 크기에 대한 연구는 미비한 실정이고 또한 물리적 및 소화적 특성에 대한 연구는 진행되어있지 않았다. 그래서 computational modeling을 통한 CI, CD의 구조 특성 및 물리적, 소화적 특성을 비교하였다. Computational modeling을 통해 CI, CD 구조를 3D 최적화를 하였고, 구조 특성을 비교한 결과 CI의 내경이 CD에 비해 큰 것을 확인할 수 있었다. 그러나 CI, CD의 물리적 특성 중 표면장력 및 log P 값, FT-IR, X-ray diffraction은 큰 차이를 보이지 않았다. 소화적 특성의 경우 rat intestinal powder를 이용하여 포도당 생성량을 비교하였는데, CD의 경우 시간이 증가함에 따라 전부 분해가 되는 것을 확인하였으나, CI는 시간이 증가하여도 포도당의 분해량이 2%이하로 분해되는 것을 보아 장내에서 분해가 되지 않는 것을 알 수 있었다. 그래서 *in vitro* 소화 모델을 이용하여 CI, CD의 분해량을 측정한 결과 초기에 두 가지 물질 모두 분해 되지 않았으나, 펩신 처리 시부터 CD의 분해량이 증가하였고 장내 효소 처리 시에는 급격하게 분해되는 것을 확인할 수 있었다. 이는 CI가 장내로 물질을 전달하는데 CD에 비해 효과적인 포집체로 사용할 수 있을 것으로 보였다.

OP-05

Application of Cold-stable and Lytic ST phage for Simultaneous Control of *s. typhimurium* and Its Biofilm Formed on Cantaloupe and Polypropylene Surface

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This study aimed to isolate and characterize *Salmonella Typhimurium* (ST) phage for simultaneous control of ST and its biofilm. ST phage, presenting a halo zone, was isolated and purified from a slaughter washing water and its morphology was observed by TEM for viral classification. The temperature stability of the phage was investigated by exposure to various temperature ranges. The bactericidal effect of phage was determined by measuring bacterial number after phage treatment at various MOI of 1.0, 10, 100, and 1,000. Its antibiofilm efficacy was genetically analyzed by confirming the presence of biofilm-degrading enzymes. After forming ST biofilm on polypropylene (PP) and cantaloupe at 4°C, antibiofilm efficacy of phage was evaluated and compared based on biofilm population and its topology using SEM. ST phage was stable in wide temperatures (-20~60°C) and its best bactericidal effect was maintained up to 6 h at MOI of 100. ST phage was belonged to the Ackermannviridae family with three biofilm-degrading depolymerases including endorhamnosidase and glycosidase, and endolysin. In addition, phage treatment at 4°C reduced each biofilm on PP and cantaloupe by ~5.1 log CFU/cm^2 and ~4.5 log CFU/cm^2, respectively. It is consistent with SEM image, exhibiting increased degradation of biofilm depending on increased incubation time. Thus, our cold-stable phage was proposed as a sufficient and promising biocontrol agent to allow effective simultaneous control of ST and its biofilm on both food and food-contact surface at cold temperature.

OP-06

Production of shinorine from lignocellulosic biomass by metabolically engineered *Saccharomyces cerevisiae*

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Mycosporine-like amino acids (MAAs) have been used in cosmetics and pharmaceuticals due to its properties of UV protection, antioxidant and wound treatment. Commercially available MAAs has been produced by extraction from its natural producer, red algae *Porphyra umbilicalis*, but the process suffers from low extraction yield and complex steps. In this context, the biological production of MAAs using microorganisms may be an attractive alternative for sustainable and economical MAAs production. To achieve this goal, MAAs production by *Saccharomyces cerevisiae* known as generally recognized as safe (GRAS) was developed in this study. Since native *S. cerevisiae* cannot produce MAAs, genes involved in MAAs biosynthetic pathway from *Actinosynnema mirum* were introduced into *S. cerevisiae* for heterologous MAAs production. To facilitate pentose phosphate pathway from xylose, xylose assimilating pathway derived from *Scheffersomyces stipitis* was adopted in the engineered *S. cerevisiae*. Additionally, accumulation of sedoheptulose 7-phosphate (S7P) was attempted by deleting the TAL1 gene encoding transaldolase in pentose phosphate pathway to increase carbon flux towards the MAAs biosynthetic pathway. The resulting strain (DXdT-M) produced 73.1 mg/L of shinorine with 2.8 mg/L-h of productivity. Also, the DXdT-M strain was able to produce 54 mg/L of shinorine from lignocellulosic hydrolysate, suggesting it might be applied to eco-friendly and economical production of shinorine. By glucose-limited fed-batch fermentation, the DXdT-M strain produced 751 mg/L of shinorine with 11 mg/L-h of productivity. These results suggest that shinorine production by *S. cerevisiae* might be a promising process for sustainable production and industrial applications of MAAs production.

OP-07

Whole cell-based biosensor to detect heavy metals in foods

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The heavy-metal pollution in foods is one of the important issues with respect to food safety because it causes many pathologies from neurodegenerative diseases, cancers, and metabolic disorders. To detect heavy metals in the foods, expensive equipments and experts are required. To solve this problem, we constructed whole cell-based biosensors for detection of heavy metals, especially the determination of arsenic and mercury in seaweed. Two different whole cell biosensors consist of three parts: reporter genes (gfp), heavy metal inducible promoter (ParsR, PmerT), and its regulatory protein gene (arsR, merR). The sensing mechanism relies on the selective recognition from the bacterium of given metals and producing the green fluorescent protein (gfp). The constructed biosensors were able to rapid and high-sensitively detect arsenic and mercury with a LOD of 1.5 ppb and 0.5 ppb, respectively. These biosensors were applied to detect arsenic and mercury in seaweed. These results pave the way for advanced sensing strategies suitable for the food safety monitoring.

OP-08

Changes of metabolite composition in short-term high CO_2-treated 'Seolhyang' strawberry (Fragaria × ananassa) fruit during cold storage

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'Seolhyang' strawberry is often harvested before it is fully ripened and treated with CO2 to extend shelf-life. Here, we investigated the effect of a short-term high CO2 treatment on the non-volatile and volatile metabolite changes in 'Seolhyang' strawberries in two ripening stages (i.e., half-red and bright-red) during cold storage using ultra high performance liquid chromatography-quadrupole time-of-flight and headspace solid-phase microextraction with gas chromatography-mass spectrometry, respectively. CO2-treated strawberries exhibited lower (although not significantly) decay rates than untreated strawberry samples. High CO2-treated half-red and bright-red strawberries exhibited firmness, color, and non-volatile metabolite profiles similar to those of their controls at the final storage time. Especially, the bright-red strawberries contained higher anthocyanin levels than the half-red strawberries, regardless of the CO2 treatment during storage. In case of volatiles, storage increased volatile compound levels and total volatiles of the CO2 treated strawberries were lower than those of untreated strawberries during storage. Volatile composition changes of strawberry depending on CO2 treatment and maturity will be presented.

OP-09

Development and validation of ultra-fast PCR method to differentiate between *Pleuronichthys cornutus* and *Pleuronectes yokohamae*

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In this study, ultra-fast polymerase chain reaction (Ultra-fast PCR) method was developed and validated to distinguish *Pleuronichthys cornutus (P. cornutus)* and *Pleuronectes yokohamae (P. yokohamae)* which are difficult to be distinguished morphologically. Species-specific primers were designed for the cytochrome b (CYTB) gene in mitochondrial DNA. The positive Ct value of *P. cornutus* was less than 22 cycles and the positive Ct value of *P. yokohamae* was less than 23 cycles. The species-specific primers designed in this study for *P. cornutus* and *P. yokohamae* were selectively amplified by *P. cornutus* and *P. yokohamae* DNA, respectively. The sensitivity of *P. cornutus* and *P. yokohamae* primers were 1 ng/μL. The standard curve of *P. cornutus* showed a linearity of 0.99, a PCR efficiency of 100% and a slope of -3.3. The standard curve of *P. yokohamae* showed a linearity of 0.99%, a PCR efficiency of 94% and a slope of -3.5. The quantitative limit of *P. cornutus* and *P. yokohamae* were 0.7 ng/μL and 0.9 ng/μL, respectively. As a result of the quantitative test, it was confirmed that the "Guidelines on standard procedures for preparing analysis method such as food" proposed by the Ministry of Food and Drug Safety were met. Ultra-fast PCR method developed and validated in this study for discrimination of *P. cornutus* and *P. yokohamae* has advantages in that it has excellent thermal conductivity and is convenient to carry, enabling rapid discrimination and field application. Therefore, this method is expected to be useful for the control of forgery and alteration of raw materials in seafood.

OP-10

Quality characteristics and antioxidant activity of traditional Korean soy sauce based on the proportion of onion juice

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This study was conducted to improve the quality and functionality of Korean soy sauce using onion juice. The titratable acidity of the soy sauce was the highest at 2.90% in the sample containing 100% onion juice at the time of completion of fermentation. The salt (NaCl) content was the highest without the addition of onion juice and was low in the samples to which onion juice was added. The protein content ranged from 11.09 to 12.50%. The results of the sensory evaluation revealed that the soy sauce sample containing 70% onion juice showed the highest preference at 5.0-5.8 levels in terms of sweetness, salty taste, delicate flavor, and overall preference. Quercetin content was not detected in the soy sauce without the addition of onion juice. This content stood at 1.73 mg/100 g in soy sauce with 70% onion juice added, and 1.68 mg/100 g in soy sauce with 100% addition of onion juice. The content of total polyphenols and total flavonoids increased as the amount of onion juice added increased. Antioxidant activity also increased according to the amount of onion juice added.

OP-11

Development of T*enebrio molitor* larvae oil-based oleogels structuring with beeswax and GMS: its application as a solid fat replacer in CAKES

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Edible insects are attracting attention as promising alternative foods due to containing high protein content and various micronutrients and having environmental benefits such as low carbon consumption and high feed conversion efficiency. *Tenebrio molitor* larvae (TM), one of the approved edible insects in Korea, contain more than 30% fat composed of 70% unsaturated fatty acids. Despite such an excellent lipid source, most of the research on TM is focused on protein, and there are few studies on the utilization of their oil in food. Therefore, this study solidified TM oil through beeswax (BW) and glycerol monostearate (GMS) by applying oleogelation technology. The oleogels with TM oil were used as a solid fat replacer in the bakery food model and their structural, rheological, and sensory properties were investigated. The oleogel samples were named TBO5%, TBGO5%, TBO10%, and TBGO10%, respectively, depending on the concentrations and types of oleogelators (BW and GMS). In the results of FTIR, there was no significant difference between TM oil and the oleogel samples, showing that TM oil was solidified without changing the chemical composition. The highest firmness, oil binding capacity, and viscoelasticity of oleogel were observed in TBGO10%. These results showed that the interaction between BW and GMS reinforced the structure of oleogel. In the DSC results, TBGO5% had the lowest freezing point and TBGO10% had the highest melting point. The TBGO10% was substituted with shortening at different levels. As the replacement ratio increased, the specific gravity of the batter and the hardness of the cake increased but the viscoelasticity of the batter and the volume index of the cake showed the opposite trend. In the results of micro-CT, the higher total porosity and the larger pores size was observed with increasing the replacement ratio. As a result of sensory evaluation, cakes replaced with TGBO10% were generally superior to those made with shortening, and in particular, cakes replaced with TGBO 10% showed the best sensory results.

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OP-12

Evaluation of the characteristics of Citrus hybrid Kanpei extracts through fermentation of lactic acid bacteria.

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Citrus hybrid Kanpei (CHK) is one of the subtropical citrus fruits cultivated in Korea due to recent climate change. Because the cultivation environment of domestic crops has changed, it is necessary to develop processed foods technology to increase the application of various subtropical crops. Lactic acid bacteria fermentation is a green processing technology that can increase the efficacy of various foods and beverages by producing nutrients and functional ingredients. In this study, CHK was fermented by types of lactic acid starters (YFH, ABY, YCX, YC), and their quality was investigated. As a result, the pH decreased with increasing fermentation time and the titratable acidity was observed to have opposite trends. On the number of lactic acid bacteria, all samples showed above 7.60 log CFU/mL after fermentation and YC showed the highest cell counts of 9.40 log CFU/mL after 24h. Antioxidant activities (DPPH, ABTS) and the total polyphenol and flavonoid contents were increased after fermentation and the highest values were shown in the YXC sample. The content of organic acid was increased in all samples, YFH had the highest (15.52 mg/mL) content. And acetic acid, which was not detected in CHK, was detected in the range of 1.77-3.92 mg/mL after fermentation, and lactic acid content was also significantly increased. A probiotic beverage was developed using CHK extracts through this lactic acid fermentation, and the preference for sensory properties was highest in YXC and YC. In this study, it can be concluded that CHK extracts through lactic acid fermentation positively affect on the production of probiotic beverages.

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OP-13

Characterization of biodegradable materials using microfibrillated cellulose derived from food Peels and poly lactic acid

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The rapid growth of the bioplastic market in the plastics industry and the research trends for sustainable economics are attracting great attention. In this study, cellulose materials extracted from fruits/vegetable peels were produced and integrated into poly lactic acid (PLA), a representative biodegradable plastic. Microfibrillated celluloses (MFCs) were obtained after chemical treatment with 1% NaOH and blending at over 30000 rpm for 80 min using grapefruit, coffee silver skin, sweet pumpkin, etc.. Then, one phr of MFCs was compounded with PLA pellets at 180℃ for 10 min. As a result, the composite films showed comparable mechanical properties to the neat PLA film. The storage modulus of all the composite PLA films showed slightly higher value like 7-8 MPa at above 48℃, in comparison with the neat PLA film showing 6 MPa. The glass transition temperature of each composite film also increased at 58°C (SS MFCs/PLA), 61°C (GF MFCs/PLA) and 57°C (SP MFCs/PLA). In conclusion, The MFCs derived from food peels can help to improve the physical properties of PLA. Furthermore, it can be beneficial to a sustainable economy by actively utilizing food by-products.

OP-14

Potential anti-Biofilm activity of potassium sorbate and glucose oxidase singly and combined against *E. coli* Biofilm on biotic (beef, shrimp) and abiotic (PET, rubber) surfaces

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E. coli strains can cause symptoms like diarrhea, abdominal pain, convulsions which can lead to kidney failure. glucose oxidase is an enzyme that considered a kind of antibiotic because hydrogen peroxide is generated by the reaction. potassium sorbate is registered as safe (GRAS) and is widely used as an antibacterial agent. The purpose of this study was to investigate the antibiofilm activity of potassium sorbate and glucose oxidase singly and in combined. for this purpose, we allowed *E. coli* to develop biofilm on biotic (Beef, Shrimp) and abiotic (PET, Rubber) surfaces and treated with different concentrations of potassium sorbate and glucose oxidase. The single treatment of potassium sorbate and glucose oxidase reduced approximately 2.9, 3.2 log CFU/g and 2.3, 2.5 log CFU/g *E. coli* biofilm at 4×MIC from beef and shrimp respectively. In other case, 2.6, 2.5 log CFU/cm^2 and 2.3, 2.2 log CFU/cm^2 reduced at 4×MIC PET and rubber respectively. In combination treatment the reduction rate was approximately 3.5 and 4.0 log CFU/g and also 3.0 and 3.10 log CFU/cm^2 *E. coli*biofilm at 4×MIC from beef, shrimp, PET, and rubber respectively. Therefore, this study confirmed that the combination treatment of glucose oxidase and potassium sorbate was effective in reducing *E. coli* biofilms and increase the food safety. The reduction effect of the combined treatment of potassium sorbate and glucose oxidase against the biofilms of *E. coli* was also visually confirmed by confocal laser scanning microscopy (CLSM) and field emission scanning electron microscopy (FE-SEM). Therefore, this study confirmed that the combination treatment of potassium sorbate and glucose oxidase was effective in reducing *E. coli* biofilms and increase the food safety.

OP-15

Effect of different molecular weight of polyethylene glycol on the moisture-absorbing ability of polypropylene/polyethylene glycol/Molecular sieve composite sheets

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As a moisture absorbent agent, the molecular sieve (MS) was incorporated into the polypropylene (PP)-polyethylene glycol (PEG) composite using the melt-blending method. The PP (30 wt.%), and PEG (10 wt.%), MS (60 wt.%) were first compounded using a twin-screw extruder, followed by the injection molding of composite into a sheet-formed article. To evaluate the moisture absorption ability of the system, PEG in the six different molecular weights PEG (4000 to 35000) was introduced to the composite. In this study, these samples were characterized by water absorption test, Contact angle, FT-IR, XRD, TGA, and SEM for their hydrophilicity, structural identification, thermal behavior, and morphology respectively. Consequently, composite with PEG 8000 showed the highest moisture absorption ability among them. The SEM images displayed the well-distribution of MS in the PEG and the channeling structure derived from PEG and MS in the matrix of PP. The PEG/MS channeling structure was intended to absorb and maintain the moisture in the matrix of the sheet. Accordingly, the channeling structure was enhanced the diffusion of moisture in the matrix of PP, through which the combination of PEG/MS can hold the moisture before absorbing by the packaged items such as pharmaceutical products.

OP-16

Studies on biological properties of two phages to control *Pectobacterium carotovorum* subsp. carotovorum

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Pectobacterium carotovorum subsp. carotovorum (PCC) is one of the major pathogen decaying fresh produce in field, transport, and storage. PCC enters through natural openings or wounds and rapidly spreads into the main stems causing the extensive maceration within a few days. The purpose of this study was to isolate and characterize PCC-specific phages for controlling PCC in fresh produce. Phage isolation was performed by incubating PCC in LB broth containing each fresh produce and its soil collected in agricultural environment. Morphology of isolated phages was observed using TEM. Their host range and efficiency of plating (EOP) were determined against 12 PCC and 21 non-PCC including food spoilage and foodborne pathogen. To assess the bactericidal activity of phages, exponentially growing PCC was infected each phage at various MOIs (0.01-100) and the viable bacterial concentration was monitored using LB agar plate count method. Stability of phages was determined by measuring phage titer after exposure to various pHs (1-12) and temperatures (-80-70°C) for 1 h. Two lytic phages (PCC1 phage and PCC2 phage) were isolated from tomato soil belonging to the Myophage and Siphophage, respectively. Two phages infects specifically six out of twelve PCC among all tested strains with slightly different EOP values. PCC1 phage could efficiently inhibited the host PCC growth and superior to maintain the inhibition time more than PCC2 phage. Both phages exhibited excellent stability at wide ranges of pHs (3-11) and temperatures (-80-50°C). This study demonstrated the potential of these phages for candidates to control PCC in fresh produce.

OP-17

Synergistic action of UV-C assisted postbiotic (J.27) to eradicate Salmonella biofilm in poultry process

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The risk of salmonellosis is getting increased in poultry consumption. Accordingly, pathogenic biofilms created in food process are threatening to human lives. Postbiotic (metabolic by-products) from lactic acid bacteria (LAB), produced by kimchi-derived *Leuconostoc mesenteroides* J.27 isolate, was investigated as biocidal agents and was analyzed to reveal its antimicobial potential against pathogenic bacteria (Salmonella spp.). The purpose of this study was to investigate the synergistic action of UV-C assisted postbiotic (J.27) against *Salmonella Typhimurium* ATCC 19585 and Salmonella Thompson wild #6817 biofilm formed on food contact surface (stainless steel [SS], silicone rubber [SR]) and poultry-related food (chicken tenderloin, egg shell). The biofilm on the surface and within food was significantly reduced($P < 0.05$) by combination treatment of J.27 with UV-C. Combination treatment of J.27(1, 2, and 4MIC) with UV-C(1, 3, and 5min) reduced 1.02-6.37 log CFU/cm^2 of *S. Typhimurium* biofilms and 1.65-6.38 log CFU/cm^2 of *S. Thompson* biofilms on food contact surfaces. On food surfaces, J.27 with UV-C treatment reduced *S. Typhimurium* and *S. Thompson* biofilms on chicken tenderloin by 0.65-1.88, 0.39-1.52 log CFU/g, respectively and egg shell by 1.37-4.29, 1.20-3.66 log CFU/g, respectively. In the case of food contact surfaces, the combination treatment of J.27 with UV-C showed a similar antibiofilm effect in both Salmonella strains and both surfaces. In food surfaces, the antibiofilm effect of the combination treatment was investigated to work more than twice in egg shell than in chicken tenderloin. Additionally, reduction of the biofilm on food contact surfaces and food was visualized through field emission scanning electron microscopy (FESEM). These results indicated that the synergistic treatment of UV-C assisted J.27 could be used as a promising alternative strategy to control Salmonella contamination as well as Salmonella biofilm formation in poultry industry.

OP-18

Optimization of protease production from bacillus sp. using response surface methodology

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Proteases are enzymes with a wide range of applications in pharmaceuticals, detergents and food processing industries. In particular, microbial proteases can be utilized in various industries with the most diverse biochemical properties. The purpose of this study was to optimize protease production media using cheap carbon and non-animal nitrogen sources. Firstly, five strains were selected with high proteolytic activity among fifty Bacillus sp. The selected strains were determined that protease activity was affected by various carbon and nitrogen sources, and at different incubation times. Two strains with high protease activity were identified: *Bacillus amyloliquefaciens* SRCM 102139, *Bacillus subtilis* SRCM 104999. SRCM 102139 strain and SRCM 104999 strain had the highest protease activity in 0.8% glucose and 0.3% yeast extract from 8~14h, and in 0.8% starch and 0.1% soypeptone from 20~24h, respectively. Interestingly, SRCM 102139 strain showed unusual bacterial growth. The production of protease for SRCM 102139 strain was optimized by the Central Composite Design (CCD) under response surface methodology. Optimal conditions were calculated that 0.5% glucose as a carbon source and 0.347% yeast extract as a nitrogen source and pH condition was 6, and then predicted value of protease activity was 0.929 unit/mL. The experimental value of protease activity in optimal condition 0.926 unit/mL. The enzymatic activity of the industrial protease (FoodPro® Alkaline Protease) was 1.203 unit/mL, which was 24% higher than that of the crude protease from SRCM 102139 strain. However, the activity of the protease from SRCM 102139 strain might be significantly increased compared to that of industrial enzymes through further purification process.

OP-19

Physicochemical properties and consumer preference of extruded snack enriched with fermented wheat bran for senior friendly food

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The purpose of this study was to investigate the physicochemical properties and consumer preference of extruded snacks added with fermented wheat bran for senior friendly food. Brown rice extruded snacks with different additional levels (0, 2.5, 5, 10, 15%) of solid-state fermented wheat bran inoculated with *Lactobacillus acidophilus* were prepared and their physicochemical and textural characteristics, total phenolic (TPC) and flavonoid contents (TFC), 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, trolox equivalent antioxidant capacity (TEAC) as well as amino acids composition were determined. The higher the addition of fermented wheat bran resulted the higher the TPC and TFC values and the greater the antioxidant properties. Also, the level of hardness in snack samples increased with the incorporation of fermented wheat bran, ranging from 60,345 to 84,310 (N/m2). Snacks with 15% fermented wheat bran exhibited the highest amount of branched chain amino acids (BCAAs): isoleucine (0.53 mg/100 g), leucine (0.67 mg/100 g), and valine (1.37 mg/100 g). Elderly consumers' overall acceptance showed the level higher than 6 for the snacks enriched with up to 10% fermented wheat bran. These results confirmed that the snack formulation with the addition of fermented wheat bran can improve functional food and textural properties without producing any detrimental effects to consumers' acceptability.

OP-20

Physicochemical characteristics and biological activities of collagen hydrolysate fractions extracted from alaska pollock (Theragra chalcogramma) skin using enzyme and ultrasound-assisted extraction

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This study aimed to explore the physicochemical and biological properties of collagen hydrolysates (CH) extracted through different extraction methods: control (C), ultrasound-assisted extract (UAE), enzyme-assisted extract (EAE), and enzyme-ultrasound-assisted extract (EAE+UAE). The CH was fractionated on molecular weights of ≤ 3, 3-10, 10-30, and ≥ 30 kDa, and the characteristcis and biological activities of each fraction were compared with crude collagen hydrolysate. The CH extracted by EAE+UAE showed the highest yield. FTIR revealed the presence of amide Ⅰ, Ⅱ, Ⅲ, and A, B bands in CH samples, indicating a typical collagen structure. EAE and EAE+UAE were not detected on SDS-PAGE, and the SEM results described a fragmented structure in samples with enzyme treatment. Regarding biological properties, EAE and EAE+UAE with molecular weight of ≥ 30 kDa exhibited the scavenged DPPH radicals of about 50%, and EAE+UAE with AGS and KATO Ⅲ cancer cells with up-regulation of p53 and caspase 3 genes, and down-regulation of mTOR, ERK, c-Rel, Bcl-xL and Bcl2 genes. According to the results of peptide sequencing, SGPSGPA and GPAGPS were most prevalent peptide sequences which contributed to antioxidant and anticancer properties of EAE+UAE with molecular weight of ≥ 30 kDa.

OP-21

Synergistic effects of combination treatment using bacteriophage and essential oils to control salmonella enteritidis

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A bacteriophage (BP) is a type of virus that infects specific host bacteria. Essential oils (EOs) are natural products that could be used to control food spoilage and foodborne pathogenic bacteria. Salmonella Enteritidis is one of the most common pathogen that causes salmonellosis in human by intaking poultry product or migrating from food contact materials (FCMs). This study was aimed to evaluate efficacy of *S. Enteritidis* reduction by using BP and EOs on FCMs (stainless steel [SS] and polypropylene [PP]) and quail's egg. Two EOs (thymol [Thy] and geraniol [Ger]) and BP CAU-SEP-3 were treated in experiment. After attachment of bacteria on FCMs and quail's egg, minimal inhibitory concentration (MIC) level of Thy, Ger and multiplicity-of-infection (MOI) 100 of BP CAU-SEP-3 were treated. After 6 h treatment on FCMs with BP, BP+Thy, BP+Ger, BP+Thy+Ger, biofilm reduced by 2.85, 3.43, 3.18, 3.75 log CFU/cm^2 on SS, and 1.67, 1.34, 1.67, 2.11 log CFU/cm^2 on PP, respectively. On quails egg at 25℃, *S. Enteritidis* was reduced by 2.03, 2.55, 2.45, 2.92 log CFU/egg in treatment of BP, BP+Thy, BP+Ger, and BP+Thy+Ger, respectively. At 4℃, *S. Enteritidis* was reduced by 1.01, 1.06, 1.13, 1.33 log CFU/egg in BP, BP+Thy, BP+ Ger, and BP+Thy+Ger treatment, respectively. Also, 2D and 3D images of *S. Enteritidis* biofilm were visualized by confocal laser scanning microscope. These results demonstrate that combination treatment of BP and EOs show synergistic effect to reduce *S. Enteritidis* on FCMs and quail's egg, moreover, they can be utilized as an eco-friendly antimicrobial agents.

OP-22

Antioxidant Activity of Milkfish (chanoschanossp) protein hydrolysed by crown flower plants protease

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Fish protein hydrolysates are potential as a natural antioxidant. In this study, milkfish was evaluated as raw material for obtaining fish protein hydrolysates showing antioxidant activity. This study aimed to know the antioxidative properties of milkfish protein hydrolyzed by crown flower plant enzymes and to evaluate the effective combination of enzyme concentration and the length of hydrolysis. Milkfish protein hydrolysates were prepared by various enzyme concentrations consisting of 4%, 5%, 6%, and different hydrolysis lengths of 2, 4, and 6h. The analysis conducted on milkfish protein hydrolysates includes protein content, degree of hydrolysis, amino acid composition, molecular weight, mineral content, antioxidant activity by 2,2-diphenyl-1-picrylhydrazyl (DPPH) and reducing power methods. The results of this study indicate that the highest protein content, and degree of hydrolysis, respectively, were 65.69% and 86.33%, which were obtained by using 4% (39 unit) crown flower plants enzyme with a hydrolysis length of 2h. The hydrolysates had 15 amino acids, and the highest three of them were glutamic acid (12.05%), aspartic acid (7.30%), and lysine (6.89%). The molecular weight test results stated that the sample with the highest protein content scored 10.40 kDa and 43.71 kDa. Potassium (K) was the highest mineral content (13.327 ppm) obtained from hydrolysis. Moreover, the antioxidant activity test results showed that 33.25% was the highest % of radical scavenging activity (RSA) value with the half maximal inhibitory concentration (IC_{50}) about 1741.66 ppm and the reducing power absorbance value of 0.365 was obtained in combination treatment of 4% enzyme and hydrolyzed for 2h.

OP-23

Anti-melanogenesis effects of *Piper betle* leaves extract via MAPKs/CREB/MITF pathway and induction of autophagy in MNT-1 cells

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Skin-pigmentation is mainly caused by hyperactivation of melanocytes in epidermis and thereby overproduced melanin. *Piper betle* leaves (PBL) is a edible and popular medicinal plant to treat various health conditions in Asia countries. In this study, the anti-melanogenic effect of PBL and its molecular mechanism was first discovered. PBL showed a remarkable activity against mushroom tyrosinase with IC_{50} values of 7.65±0.28 ㎍/mL, which is 8-folds stronger than arbutin, a widely used whitening agent. L-DOPA zymography and melanin content assay revealed that PBL also attenuated the intracellular tyrosinase activity and melanin synthesis in MNT-1 cells. The phosphorylation of CREB was significantly surpressed by PBL, resulting in the down-regulation of MITF, tyrosinase, TYRP-1 and TYRP-2 protein expression. In addition, PBL stimulated the phosphorylation of MAPKs (ERK1/2, JNK and p38). Finally, PBL can contribute to preventing cellular aging due to failure to maintain protein homeostasis. PBL stimulated both proteasomal and lysosomal dradation of melanogenic proteins. Futhermore, autophagy inducing ability of PBL was evaluated. PBL dose-dependently incresed the expression of Beclin1, ATG5 and LC3-Ⅱ, but that of p62, a degradation marker, was decreased. In particular, by monitoring the turnover of LC3 used as a autophagosomal marker, we disclosed PBL can control dynamic process of autophagy. In addition, the reduced melanin content was recovered by autophagy inhibitor treatment, which proved that PBL is involved in skin depigmentation. Given the above, *Piper betle* leaves are expected to contribute the win-win development of cosmeceutical and high-value-added food industry.

C-01

Isolation and identification of microorganism contaminated in packaged tofu

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This study isolated and identified microorganisms contaminated in 6 packaged tofu (3 tofu with HACCP-certified and 3 tofu with non-HACCP) to compare the safety condition. The tofu stored at 25±1℃ for 24h and then microbiological contamination was analyzed. The contamination level of total aerobic bacteria and coliform bacteria were tested according to Korea food code and the isolates were identified by DNA sequence analysis. Coliform bacteria was not detected in HACCP and non-HACCP, but total aerobic bacteria was detected significantly higher in non-HACCP tofu. As a result of this study, *Paenibacillus polymyxa*, *Bacillus toyonensis*, *Lysinibacillus fusiformis*, and *Bacillus cereus* were detected in packaged tofu. *Bacillus cereus*, a food poisoning bacteria, was detected in HACCP-certified tofu, so it was necessary to reconfirm the effectiveness of the HACCP process such as the cleaning process of soybeans.

C-02

상수리나무 도토리와 가시나무 도토리의 이화학적 특성 비교

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가시나무의 열매인 도토리는 식용으로 가능하지만 현 시장에서 쓰이는 도토리의 주종은 상수리나무에서 비롯된 종이 대부분이며, 가시나무 도토리 성분에 대한 date base는 매우 미흡한 실정이다. 따라서 본 연구에서는 대중화가 이루어 지지 못한 가시나무 도토리의 이화학적 특성을 상수리나무 도토리와 비교하여 가시나무 도토리의 활용성 증대와 다양한 도토리종의 대중화에 이바지 하려고 하였다. 일반 성분 조성을 비교한 결과 수분, 조회분, 조지방, 조단백질, 조섬유 함량 모두 가시나무 도토리가 더 높게 나타났다. 환원당의 함량은 가시나무 도토리가 상수리나무 도토리보다 높은 것을 확인했고, 유리당의 경우 glucose 성분만 검출 되었으며, 그 양은 상수리나무 도토리가 1,5190.08 mg/100 g으로 높게 나타났다. Total polyphenol 함량과 total flavonoid 함량은 가시나무 도토리가 약 1.5배 이상 높은 함량을 보였고, ABTS 라디컬 소거능과 DPPH 자유라디칼 소거능도 가시나무 도토리가 활성이 높게 나타났다.

C-03

홍시분말과 발효유를 활용한 곤약 젤리의 품질 특성 비교

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홍시는 조직이 무르고 당 함량이 높아 저장성이 낮고 가공으로의 활용이 제한적이다. 본 연구는 홍시의 이용성 확대 및 가공품의 다양화를 도모하고자 홍시를 동결건조하였으며, 홍시분말 첨가량(1%, 3%, 5%)에 따른 발효유 곤약젤리 제조를 위한 품질 특성을 평가하였다. 발효유의 pH, 적정산도, 유산균수는 제조규격에 적합하였다. 홍시분말 첨가량에 따른 발효유 곤약젤리의 pH, 적정산도, 당도는 홍시분말 첨가량이 증가할수록 높은 값을 나타냈다. 색도의 경우 L 값은 홍시분말 첨가량이 증가할수록 낮아지고 반대로 a, b 값의 경우 홍시분말 첨가량이 증가할수록 높아졌다. texture는 경도, 응집성, 검성, MaxG1 항목에서 5% 첨가 시료구가 가장 높은 것으로 나타났다. 관능평가는 7점 척도법으로 평가하였으며 맛의 경우 5% 첨가 시료구가 4.71로 가장 높은 값을 보였고, 향미와 조직감 및 전체적인 기호도 항목에서 4.9점으로 3% 첨가 시료구가 가장 높았다. 본 연구 결과 홍시분말첨가량에 따른 발효유 곤약젤리 제조 시 홍시분말 첨가량은 3%가 적합한 것으로 판단된다.

C-04

율무미강 잔사발효추출물 및 그 분획물의 멜라닌 생합성 저해 활성 평가

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율무는 항산화, 항염증 및 혈당 강하 효과 등을 나타내는 유용한 생리활성 물질을 함유하고 있는 것으로 잘 알려져 있으며, 특히 아시아에서 전통적인 약용 식물로 널리 이용되어 왔다. 이뿐만 아니라, 최근에는 미강 추출물 또한 다양한 생리활성이 보고되고 있기 때문에 활용도가 증가되고 있다. 본 연구에서는 율무미강 추출 후 별도의 용도 없이 폐기되는 잔사의 활용성 및 기능성을 높이고자, 주정 추출 후 남아있는 율무미강 부산물(잔사)에 1% 유산균을 접종한 뒤, 주정 추출하여 잔사발효추출물을 얻었다. 멜라닌 생성 억제에 대한 율무미강의 효능은 현재까지 밝혀진 바가 없으므로 멜라닌 생성 억제 효과를 분석한 결과, α-MSH를 처리한 군에 비해 세포 내 멜라닌 함량이 감소하였고 이러한 율무미강 잔사발효추출물의 효과는 세포 내 tyrosinase 활성 감소를 통해 나타나는 것으로 확인되었다. 이러한 결과를 바탕으로 율무미강 잔사발효추출물을 butanol, ethyl acetate, hexane 및 water로 분획하고, 이들의 항산화 활성 및 멜라닌 생성 억제 효과를 평가하였다. 그 결과, 모든 분획물에서 항산화 활성이 증가하였고, α-MSH로 유도된 B16F10 세포에서 세포독성 없이 멜라닌 함량이 억제되는 것으로 나타났다. 특히 네 가지 분획물 중 butanol 분획물은 다른 분획물들과는 달리 낮은 농도(5, 15 ppm)에서도 강력한 멜라닌 생성 억제 활성을 보였다. Butanol 분획물의 멜라닌 생합성 저해 효과를 추가로 분석하기 위하여 B16F10 세포 내에서 tyrosinase 활성을 측정한 결과, butanol 분획물에 의해 세포 내 tyrosinase 활성이 감소되는 것으로 나타났다. 이와 같은 결과로부터 율무미강 잔사발효추출물 butanol 분획물은 tyrosinase 억제 활성에 의해서 멜라닌 생합성 억제 효과가 나타나는 것으로 사료된다. 본 연구 결과는 율무미강의 주정 추출 후 폐기되는 부산물로부터 얻은 발효추출물의 항산화 활성 및 멜라닌 함량 감소 효과를 기반으로 피부 미백과 색소 침착에 유익한 영향을 주는 화장품 개발이 가능함을 제시하면서, 율무미강 추출 후 폐기되는 자원의 활용성을 높일 수 있음을 시사한다.

C-05

양배추 첨가에 따른 콤부차의 품질특성 연구

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최근 COVID-19 팬데믹 발생으로 인해 면역력 강화에 대한 관심이 급증하고 있다. 콤부차(kombucha)는 SCOBY (Symbiotic Culture of Bacteria and Yeast)라고 하는 효모, 유산균, 초산균의 미생물 군집에 의해 발효된 발효 음료로서 장 건강 및 신체 면역 체계 증진에 뛰어난 프로바이오틱스가 풍부하다고 알려져있다. 또한 양배추에는 항균 활성 및 항산화 활성과 같은 면역력을 향상 시킬 뿐만 아니라 위 건강에 도움을 주는 Vitamin U로 알려진 *S-methylmethionine*가 풍부하게 존재한다. 본 연구에서는 면역 증진이 강화된 콤부차를 개발하기 위하여 양배추를 첨가한 콤부차 발효를 수행하였다. 구체적으로, FTIR법을 이용하여 SCOBY의 물리적 특성을 확인하였고, 미생물의 생균 수 및 콤부차 발효 결과, 위 건강 개선 효과, 항균 활성 등을 확인하였다. 그 결과, SCOBY의 첨가는 콤부차 발효 능력을 강화시켰으며, 양배추 첨가량에 따라 미생물 생균 능력 및 발효 효과가 향상되었다. 또한, 위 건강 개선 효과를 측정하기 위해 alpha-amylase와 invertase 활성을 측정한 결과 기존 콤부차와 비교하여 유의적인 차이를 보였으며, 식중독 병원균에 대한 항균 활성 분석에서 특정 병원균의 유의적인 감소를 관찰할 수 있었다. 마지막으로, 콤부차 발효액에 *Komagataeibacter rhaeticus (Gluconacetobacter rhaeticus)*가 약 75.1%로 우점하고 있었으며, 이 외 *Loriellopsis cavernicola* (8.6%), *Lactobacillus johnsonii* (1.9%), *Escherichia fergusonii* (1.6%), *Rubrivivax gelatinosus* (0.8%), *Bacteroides stercoris* (0.5%) 등의 박테리아성 미생물이 존재하는 것을 16S rRNA sequencing을 이용한 메타지놈 분석으로 확인하였다. 따라서, 양배추를 첨가한 콤부차는 POST COVID-19 시대에서 면역력 향상과 더불어 위 건강에 도움을 줄 수 있을 것이다.

C-06

팜유 대체 식물성 지방 스프레드 제조

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팜유는 정제공정에서 glycidyl esters와 3-monochloropropane-1,2-diol(3-MCPD) ester의 생성량이 증대되고, 생산과정에서의 환경오염 등의 문제점이 대두됨에 따라, cocoa butter(0~60%), shea butter(10~40%)와 extra virgin olive oil (50~60%)을 혼합하여 팜유 대체 블렌드 (palm oil equivalent blend, PEB) 8종을 제조하고 commercial soft margarine(CSM)과 물리적 특성을 비교하였다. PEBs의 melting point(MP)는 22.0 ~ 27.0℃의 구간이고, CSM은 25.0℃이었다. Solid fat content(SFC) 분석 결과, PEBs의 SFC는 extra virgin olive oil의 함량이 낮을수록, cocoa butter과 shea butter의 함량이 높을수록 SFC가 높은 경향을 보였다. CSM 추출지방과 PEBs는 10~20℃의 구간에서 급속히 융해되었다. PEBs의 SFC는 10℃에서 35~75%, 15℃에서 32~71%, 20℃에서 18~33%이고, 반면 CSM 추출지방은 10℃에서 18%, 15℃에서 14%, 20℃에서 10%으로, PEBs보다 모든 온도에서 낮은 SFC를 나타내었다. 지방 스프레드 섭취 온도인 20℃에서의 SFC 비교 시, CSM 추출지방(10%)과 PEB-1(12%)과 PEB-8(13%)가 유사한 SFC를 보였다. PEB-8을 함유한 식물성 지방 스프레드를 제조한 후 CSM의 texture를 비교한 결과, 지방 스프레드의 firmness, spreadability, cohesiveness, adhesiveness는 CSM 보다 높았으며, 스프레드 제조 시 PEB-8 함량 비율이 높을수록 firmness, spreadability, adhesiveness는 증가하고, cohesiveness는 낮아지는 경향을 보였다. 본 연구에서는 고체지인 cocoa butter와 shea butter과 액체유인 extra virgin olive oil의 혼합 비율이 다양한 팜유 대체 식물성 지방 스프레드의 제조가 가능함을 확인하였다.

C-07

인공지능 발효기기 연구 및 발효식품 개발

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발효 장치는 열을 이용하여 내부의 물품에서 발효가 수행되도록 하는 장치이다. 이를 위해, 발효 장치는, 내부 온도를 조절하기 위한 내부 온도 조절 장치를 이용한다. 선행 문헌에 의하면 발효 장치는 압력 센서와 가스 취출 밸브를 이용하는데, 설정한 시간 동안 압력 감지 값에 의한 가스 취출 밸브의 오픈 횟수가 설정 횟수 미만이면, 발효 완료 시점을 판단하므로 실제 발효 완료 시점이 정확하지 않다. 게다가 발효 종료 이후 살균 및 냉각과 같은 후처리가 필요하며, 4차 혁명에 근간이 되는 데이터 취득이 이뤄지지 않고 있다. 따라서 해당 연구에서는 에어락과 카메라를 이용하여 정확하고 간편하게 발효 동작을 수행하며, 인공지능의 기법을 이용하여 발효 종료 시 자동으로 후처리를 진행하는 발효 장치를 연구 기획하였다. 본 연구는 센서를 통해 얻어진 데이터는 실시간으로 클라우드에 저장되어 발효와 관련 데이터 취득을 가능하게 하며, 발효 장치에는 온도 센서, 온도 조절 장치(열전소자, 압축기), 컨트롤러, 가스 센서, 도어 센서, 카메라, 에어락, 조명 장치, 디스플레이, 통신 장치, 전력 공급 장치, 배터리, 메모리로 구성되었으며 컨트롤러는 온도 조절 장치를 제어해 발효조가 일정 온도를 유지할 수 있도록 하고, 연결된 에어락을 통해 기포 발생 유무와 기포 증감 여부를 실시간 카메라 영상으로 데이터를 취득해 이에 따른 온도를 2단계의 히스테리시스로 제어하여 발효 종료 시 살균 및 냉각하도록 프로그래밍되었다. 본 연구의 결과물을 이용하여 전통주의 한 종류인 이화주 및 쌀요거트, 발효액종 등 다양한 발효 식품을 제조해 보았고, 물품의 종류, 양, 제형에 관계없이 최적의 발효 온도에 대응하여 자동으로 발효 동작을 수행한 것을 확인하였으며, 발효 제품의 온습도, CO^2 및 알코올 농도의 데이터를 취득할 수 있었다. 취득한 데이터를 기반으로 머신러닝을 통해 학습시켜 발효 조작할 때에 다양한 발효 결과를 예측하고 발효 조건을 제시하는 인공지능(AI) 발효기로 확장 가능하게 하였다.

C-08

Evaluation of physicochemical properties of dried brewer's spent grain as an edible Ink for 3D food printing

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Nowadays, 3D food printing is drawing attention as a representative technology of the 3rd Industrial Revolution in the food sector. Several researches are conducted to produce desirable 3D food printing materials including waste materials from food processing industry. This can be categorized as "Food Upcycling" as it may address the increasing environmental problems and produce a high-quality and nutritious food. Brewer's spent grain is a waste material from beer processing and has excellent functional properties. In this study, brewer's spent grain was incorporated in 3D printed cheesecake. The suitability of cheesecake as an edible ink for 3D food printing and its physical, functional and antioxidant properties were evaluated. There were 4 types of cheesecake prepared based on the particle size of the Brewer's spent grain: large (>425㎛), medium (250~425㎛), small (150~250㎛) and fine (>150 ㎛). However, due to the rough texture and irregular array of particles, the 3D food printer was not able to print the cheesecake with medium and large particle size. In terms of printability, the cheesecake with fine particle size was the most complete, while for robustness, cheesecake with small particle size was the most robust. This can be attributed due to the moisture content of the small and fine particle size which are both suitable as a 3D food printing material. As regards to the color value, bigger particle size had higher brightness and low redness, hence yellowness was not affected. Also, higher antioxidant properties was observed in Brewer's spent grain. Overall, this study infers that cheesecake added with 5% Brewer's spent grain with fine particle size seems to be a suitable functional edible ink for 3D food printing. Furthermore, Brewer's spent grain can be used as a basic material for developing 3D food materials in the future.

C-09

Inhibitory effects of qrtichoke extracts on helicobacter pylori growth and qnti-proliferation qctivity of human gastric cancer cell

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This study aimed to explore the effect of artickhoke extracts on the inhibitory activity of Helicobacter pylori and human originated gastric cancer cells (AGS and Kato III). Artichoke powder from Spain, China, and commercial brand (Orpuri) were extracted by distilled water and their total phenolic (TPC) and flavonoid (TFC) contents, antioxidant capacities; 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, trolox equivalent antioxidant capacity (TEAC), ferric reducing antioxidant power(FRAP), anti-inflammatory, and α-amylase activities were determined. The highest level of TPC and TFC were found in artichoke extracts from Spain, followed by extracts from Orpuri and China. Extracts from Spain and Orpuri showed a similar trend of anitoxidant activity while those from China exhibiting no antioxidant activity. The higher inhibition effects on cell proliferation of gastric cancer cells (AGS and KATO III) were observed in extracts from Spain and Orpuri compared to extract from China. Also, these two samples showed a more than 50% reduced inflammatory activity at 0.5 mg/mL while sample from China displaying 30% at 1.5 mg/mL. However, extract from China showed the slightly higher inhibitroy on growth of H.pylori than other samples. These results clearly revealed that artichoke extracts from Spain and Orpuri provide the higher levels of TPC, TFC, antioxidant capacities, anti-inflammatory activity as well as anticancer properties.

▷▷▷ UCC 영상공모전 참가자 및 발표순서

순서	제 목	팀 명	팀 원	소 속
1	**소비기한 알림이**	위생 금쪽이	**남주희, 이주현**	순천대학교
2	**맞춤영양은 못참아**	우아한 자매들	**남가연, 정유리, 송민채**	경상국립대학교
3	**미래 식량! 식용 곤충 넌 도대체 뭐야?**	레이디벅스	**황지수, 강윤경, 강민주, 이은채**	영남대학교
4	**소비기한 그것이 알고싶다**	창식이	**전보영, 박세원, 김현섭, 김의진**	창원대학교
5	**UP-폐기물을 Upgrade, 새로운 가치로 Produce**	식품영상학과	**추수정, 이희정, 박나현, 이가원**	창원대학교

포스터 발표 논문 목록

○ **PART Ⅰ.** 저장/포장/유통

○ **PART Ⅱ.** 가공/품질

○ **PART Ⅲ.** 화학/분석

○ **PART Ⅳ.** 미생물/발효/안전성

○ **PART Ⅴ.** 생리활성/영양/기능성

▷▷▷ 포스터발표 논문 목록

PART I . 저장/포장/유통

P1-1

Changes in freshness of 'Ilpum' rice by different storage conditions and periods

Jeehwa Hong*, Eunsoo Park, Gwanghee Lee, Sunghie Hong
Experiment Research Institute, National Agricultural Products Quality Management Service

P1-2

Antimicrobial activity of chitosan-based ternary blend edible film incorporated with Duchesnea indica extract for strawberry application

Hye Jo Choi[1,2]*, Hyun Joo Chang[1], Nari Lee[1], Sung Wook Choi[1]
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[2]Department of Food Science and Technology, Jeonbuk National University

P1-3

오리혈액의 건조방법에 따른 겔의 이화학적 및 기능적 특성 연구

김재익[1,2]*, 김태경[1], 차지윤[1], 구수경[1], 정사무엘[2], 최윤상[1]
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P1-4

파프리카 저장 온도와 소포장방법에 따른 선도 유지 연구

강창수[1], 김미령[2], 이정수[3]*
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P1-5

수확후 1-MCP처리가 단감 과일의 저장 중 품질변화에 미치는 영향

이선미[1]*, 안광환[1], 김은경[1], 윤혜숙[1], 최성진[1]
[1]경상남도농업기술원단감연구소

P1-6

Quality analysis by treatment for improvement of glutinous corn storage

Ji Seon Park*, Jin Kwan Ham, Eun Ha Chang, Jae Geel Lim
Jeung Ae Yoon, KyeHyun Lim, Hyang Kwon, Sun Young Kim, Kyung Ah Jang

P1-7

Edible insect extracted hydrolyzed protein: Effects on structure and functional properties

Tae Kyung Kim[1], Yea Ji Kim[1], Yoo Jung Choi[1], Jae Hoon Lee[1], Hae Won Jang[2], Samooel Jung[3], Yun Sang Choi[1]*
[1]Korea Food Research Institute, [2]Sungshin Women's University, [3]Chungnam Nation University

P1-8

Quality characteristics of salted kimchi cabbage according to leaf density

Sung Jin Park[1*], Min Jung Lee[1], Hae Il Yang[1], Ju Young Lim[1], Mi Ai Lee[1], Sung Hee Park[1]
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P1-9

DBD 플라즈마 활성종을 활용한 양파 부패율 저감에 대한 연구

윤정우[1*], 전형원[1], 엄상흠[1], 유승민[1]
[1]*한국핵융합에너지연구원 플라즈마기술연구소*

P1-10

제조공정 및 포장이미지를 이용한 식품의 동일성 판단 기법

김영덕*, 곽동훈, 박준우
대구경북과학기술원 ICT연구본부

P1-11

Selection of quality indicators and prediction of shelf-life of the meal-kit type chicken steak

Eun Jin Lee[1*], Jae Hee Park[1], Jeong-Eon Lee[2], Yong Jun Cha[2], Hye Kyung Moon[1,2]
[1]*Department of Interdisciplinary Program in Senior Human Ecology(Food and Nutrition), Changwon National University,*
[2]*Department of Food and Nutrition, Changwon National University*

P1-12

산지유통센터(APC)의 경영리스크 평가와 스마트 정보화에 관한 연구[1)]

이소진*
지역농업네트워크 협동조합

P1-13

하절기 파프리카 운송중 온습도 모니터링 및 MA 포장에 따른 선도유지 효과

장민선*, 권헌중, 이지현, 최미희, 양해조, 박부희
국립원예특작과학원 저장유통과

P1-14

The quality characteristics of low salt Aralia elata Jangachi using soybean suauce

Eun Hye Ryu, Sung Woong Gim, Ji Wung Kwon*
Berry and Biofood Research Institute

P1-15

Self-venting bio-degradable blend films for microwave packaging applications

Wooseok Song*, Hojun Shin, Junseok Lee, jongchul Seo
Department of packaging, Yonsei University

P1-16

영상 처리를 활용한 식품 이미지 데이터 증강 기법

박준우[1*], 곽동훈[1], 조형국[2], 김영덕[1]
[1]대구경북과학기술원 ICT연구본부, [2]경운대학교 소프트웨어학부

P1-17

Synthesis of antibacterial calcium oxide nanoparticles prepared from eggshell wastes

Won Heo*, Kitae Park, Seungjong Han, Jongchul Seo
Department of Packaging, Yonsei University

P1-18

Quality change and evaluation in cold storage of fresh-cut fruits purchased from online and offline markets

Rye Gyeong Park[1], Ju Hong Kang[1], Ji Hyeon Lee[1], Ji Eun Lee[1], Won Ho Jeong[1], Jae Won Lee[1], Sung Ju Cho[2], Il Kwon Bae[3], and Jae Hak Sohn[1,2*]
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[2]*Seafood Research Center, IACF, Silla University,*
[3]*Department of Companion Animals, Silla University*

P1-19

A study on the correlation between freshness factors of white rice

Hoon Kim[1], Hong Sik Kim[1], Ah-Na Kim[1], Oui Woung Kim[1], Jae Woong Han[2], Ho Rim Jang[1*]
[1]*Research Group of Safety Distribution, Korea Food Research Institute,*
[2]*Department of SmartFarm Engineering, Kongju National University*

P1-20

폴리케톤 기반 고차단성 다층필름의 식품 저장 연장효과

김효진*, 김상섭, 정문철, 조영진
한국식품연구원

P1-21

Effects of packaging methods on freeze-thawing characteristics of passion fruit

Hyun Jeong Shim*, Hyeon Bin Oh, Hyun Wook Jang, Yong Sik Cho
Fermented & Processed Food Science Division, Department of Agrofood Resources. National institute of Agricultural Science

P1-22

Quality change and evaluation in cold storage of fresh-cut vegetables purchased from online and offline markets

Ji Eun Lee[1], Sung Ju Cho[2], Ju Hong Kang[1], Ji Hyeon Lee[1], Rye Gyeong Park[1], Won Ho Jeong[1], Jae Won Lee[1], Il Kwon Bae[3], and Jae Hak Sohn[1,2*]

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P1-23

Use of cellulose nanofibers (CNF) with a red radish color extract as a pH indicator packaging

Yeon Ju Lee*, Jun Ho Heo, Young Hoon Jung

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P1-24

Hot water treatment reduces peel browning of oriental melon by modulating cutin metabolism

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P1-25

전처리 농산물의 소비 행태 및 유통 제품의 미생물 오염도 모니터링

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국립농업과학원 농산물안전성부 유해생물과

P1-26

Biorefinery application of rice husks and valorization of each process by-products

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P1-27

Analysis of packaging used for dried processed fruit/vegetable products in Korea

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P1-28

Application of word2Vec algorithm to determine “the same imported food product from the same company” guidelines

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P1-29

Effect on quality factors during the distribution of stored 'Fuji' apples at room temperature

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P1-30

Effect of cultivation area and cold storage period on the quality of 'Fuji' Apples

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P1-31

도라지 플러그 묘 온실 육묘 시 상토조성에 따른 생육 비교

김윤숙*, 이상은, 조용남, 김태원, 허재영, 이흥수
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P1-32

Comparison of flavor and marketability by fresh-cut fruits combination

Min Sun Chang*, Hun Joong Kweon, Ji Hyun Lee, Mi Hee Choi, Haejo Yang, Bu Hee Park
Postharvest Technology Division, National Institute of Horticultural and Herbal Science, RDA

PART II . 가공/품질

P2-1

IRG 품온 상승 억제 및 예건용 시험장치 성능 시험

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P2-2

동결건조 간편식품의 재수화 분산안정성 증진을 위한 전분류 열처리 호화과정 중 균질처리 조건검토

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P2-3

Effects of plant cell wall-degrading enzyme treatment and yeast fermentation on the antibacterial and antioxidant activities of green tea extract

Min Jeong Jung[1], Jong-Woong Nam[1], Ah Ram Han[1],
Byoung Mok Kim[1], In Hak Jeong[2], Joon Young Jun[1]*
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P2-4

The rheological and thermal properties of organogel containing Tenebrio molitor (mealworm) oil for developing solid fat replacer in meat patty

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P2-5

The structural, rheological, and thermal properties of oleogels with insect oil: Beeswax and glycerol monostearate interactions towards Tenebrio molitor larvae oil

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P2-6

Functional, microbial and sensorial properties of probiotic banana juice fermented by lactic acid bacteria

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P2-7

The effect of xanthan addition on the quality of fish cracker

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P2-8

Characteristics of fermented pineapple extracts according to the types of lactic acid bacteria

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P2-9

찹쌀가루를 이용한 농산물 건조 부각의 제조 및 품질 특성

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P2-10

딥러닝 이미지 분석 방법을 이용한 홍삼 등급판별

김민현[1*], 김지윤[1], 김정수[1], 박상혁[1], 김지혜[1], 김인선[1], 남인주[1], 문광덕[1,2]
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P2-11

Optimization of ultrasound-assisted protease degradation treatment on the extraction of rice bran protein

Sanghyeok Park[1*], Jiyoon Kim[1], Jungsoo Kim[1], Minhyun Kim[1],
Jihye Kim[1], Insun Kim[1], Inju Nam[1], Kwang Deog Moon[1,2]
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P2-12

Effect of ultrasound on stability and quality of plant-based rice milk

Sanghyeok Park[1*], Jiyoon Kim[1], Jungsoo Kim[1], Minhyun Kim[1],
Jihye Kim[1], Insun Kim[1], Inju Nam[1], Kwang-Deog Moon[1,2]
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P2-13

Quality characteristics and comparison of microbial community in traditional doenjang by aging period in gangwon province

Jae Geel Lim*, Ji-Seon Park, Jin Kwan Ham, Eun Ha Chang, Eun Kyung Yeom,
Yoon Ji Goh, Yun Mi Ko, Seo Hyun Yoon
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P2-14

Components of spirits according to various distillation methods

Je Young Shin*, Han Seok Choi
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P2-15

Study for silkworm larva movement monitoring using image processing

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P2-16

석류 농축액을 활용한 음료 베이스 개발

이동훈[1]*, 이채미[1], 최유리[1], 이채윤[1], 조형우[1], 임예원[1], 김은혜[1], 정재희[1], 김수환[2], 허창기[1,2]
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P2-17

복숭아 퓨레 첨가량에 따른 복숭아 식혜의 품질 특성

정경미*, 김대홍, 이지윤, 서은철, 전준영, 오현주
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P2-18

Physicochemical properties and antioxidant activity of Hovenia dulcis fruit vinegar

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P2-19

Changes of physicochemical properties during lactic acid fermentation of kiwi (Actinidia deliciosa)

Hwi Gon Kim[1]*, Wool Lim Park[1], Hye Ji Min[1], Ji An Heo[1], Yeong Seon Won[2] and Kwon Il Seo[1]
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P2-20

Optimization of manufacturing conditions for song-hwa mushroom sausage using response surface methodology

Jin Ha Sim[1]*, Seungmin Moon[1], Changheon Lee[1], Jin Hyeon Kim[1],
Eunsong Cha[1], Gyeongtae Jeong[2], Gawon Lee[2], and Daeung Yu[1,2]
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P2-21

α-amylase처리가 마젤리 조직감에 미치는 영향

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P2-22

매실 절임가공 기계화를 위한 과육 및 설탕 계량 시스템 개발 및 성능 평가

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P2-23

섬쑥부쟁이 데침시 칼슘처리에 따른 이화학적 품질특성

윤성란[1*], 류정아[1], 장길수[1], 김선화[2], 정용진[2], 권중호[2]
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P2-24

매실 씨제거 및 과육절단 시스템 성능 평가

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P2-25

국내 다소비 두류의 조리 전후에 따른 비타민 B2 함량 비교

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P2-26

국내 다소비 곡류 가공품의 비타민 B2 함량 비교

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경상북도농업기술원

P2-27

클로로겐산 함량증진 효소추출 사과 차음료 생산 공정 개발

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P2-28

국내 귀리 스낵처리에 따른 팽화귀리의 품질특성 변화

송영은*, 신소희, 한현아, 이송이, 최소라, 송은주
전라북도농업기술원

P2-29

데침 조건과 가염 조건에 의한 울릉도산 섬쑥부쟁이, 큰미역취, 물엉겅퀴의 색도 변화

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P2-30

A Comparative Analysis of Physiochemical Properties of Plant-based Alternative Meat with different Fat Content

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P2-31

Radical scavenging activity and quality characteristics of domestic malts made with oats

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P2-32

Quality characteristics comparison of domestic malt made with two-row barley and foreign malts

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P2-33

Platform for farmstead dairy processing and the quality characteristics of the dairy products

Sujatha Kandasamy*, Jayeon Yoo, Han Byul Kang, Hyoun Wook Kim, Hyung Ho Bae, Jun Sang Ham
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P2-34

영상처리기법을 이용한 불량누에고치 판별 분석 연구

유현채[1*], 김기영[1], 이아영[1], 김성완[2]
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P2-35

울릉도 섬쑥부쟁이의 건조 방법에 따른 품질 특성 비교

김선화[1], 윤성란[2], 권중호[1], 정용진[1*]
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P2-36

RGB 영상 정보 분석을 통한 바나나의 숙도 및 저온 장해 예측

이다움*, 이상봉, 김효진, 김상섭, 박기재, 최정희, 임정호
한국식품연구원

P2-37

Physicochemical characteristic and sensory evaluation of kimchi containing heat-treated garlic

Eun Hae Kim*, Mi Ai Lee, Yun Jeong Choi, Young Bae Chung, Hye Young Seo , Sung Hee Park
World Institute of Kimchi

P2-38

Manufacturing and sensory evaluation of whole wheat added kimchi

Eun Hae Kim*, Min jung Lee, Sung Jin Park, Ji Hee Yang, Sung Gi Min, Sung Hee Park
World Institute of Kimchi

P2-39

Effect of silkworm powder on viscoelastic and structural properties of corn starch based 3D food printing ink

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P2-40

조미 소재 활용을 위한 마늘 페이스트 제조 및 품질특성

지수현*, 이유석, 이선경, 김표현, 신정엽, 마경철, 이진우
전남농업기술원 친환경농업연구소

P2-41

Comparative physiochemical characteristics between Kimchi and Mukeunji collected from the southern regions of Korea

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P2-42

갓 가공품 개발을 위한 데침 처리별 품질특성

지수현*, 이유석, 이선경, 김표현, 이은실, 마경철, 이진우
전남농업기술원 친환경농업연구소

P2-43

고려엉겅퀴 우수품종 육성을 위한 집단별 특성조사 및 관능평가 연구

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강원도농업기술원 산채연구소

P2-44

Evaluation of quality characteristics of kimchi seasoning products

Ye sol Kim*, Young Bae Chung, Seo yeong Chon, Sung Hee Park, Sung gi Min, and Hye Young Seo
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P2-45

냉동저장 온도 및 기간에 따른 데친 유채의 품질특성 변화

김표현*, 이유석, 이선경, 지수현, 이세라, 마경철, 이진우
전라남도농업기술원 친환경농업연구소

P2-46

김치유산균 이용 갈색거저리 유충 분말 첨가 쌀 요구르트 특성

김봉신*, 김현영, 박여옥, 하기정, 최재혁
경상남도농업기술원

P2-47

Development of a manufacturing method for Cudrania tricuspidata tea with increased antioxidant activity

Dong Ho Kim*, Jeong Been Park, So Young Yang
Icheon-si Agricultural Technology Center, Department of Research and Development

P2-48

해동방법을 달리한 냉동 데친 유채의 품질특성 변화

김표현*, 이유석, 이선경, 지수현, 마경철, 이진우
전라남도농업기술원 친환경농업연구소

P2-49

발효위치에 따른 전통된장 발효 전·후 품질특성 및 미생물군집 비교

이선경, 이유석, 지수현, 김표현, 강혜원, 임재길[2], 마경철[1], 이진우[1]
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P2-50

진도 강황 추출조건에 따른 커큐민 함량 및 수율 비교

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P2-51

강황 소재 첨가량에 따른 강황 발효유 품질 및 관능적 특성

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P2-52

여주 쓴맛 개선을 위한 전처리 및 유산균 발효조건

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전라남도농업기술원 친환경농업연구소

P2-53

강원 더덕의 식품학적 성분· 향기성분 및 가공적성 탐색

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P2-54

홍화순 수확시기별 기능성성분 함량 및 홍화순 침출차 품질특성

이유석*, 이선경, 지수현, 김표현, 이예향, 마경철, 이진우
전라남도농업기술원 친환경농업연구소

P2-55

수분 및 갈변 감소조건별 양파 열풍건조분말의 이화학적특성 비교

이선경*, 이유석, 지수현, 김표현, 김주현, 윤영애, 마경철, 이진우
전라남도농업기술원 친환경농업연구소

P2-56

양파 건조분말 종류별 품질 및 흡습특성 비교

이선경*, 이유석, 지수현, 김표현, 김주현, 마경철, 이진우
전라남도농업기술원 친환경농업연구소

P2-57

Physicochemical characteristics of gluten-free vegan scones made of different rice flours

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P2-58

Quality characteristics of wheat according to drying temperature and drying time

Hoon Kim[1], Hong Sik Kim[1], Ah Na Kim[1], Ho Rim Jang[1], Oui Woung Kim[1], Jae Woong Han[2], Su Hyeon Park[1*]

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P2-59

Evaluation of protein digestibility by the cooking method of chicken breast using in vitro digestion model

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P2-60

Chemical properties to determine the freshness of chub mackerel (Scomber japonicus) at a fishery products auction house in communal fish market

Eun Song Kim[1*], Ju Won Ryu[1], Hyo Bin Kim[1], Hye Min Jang[1], Jin Seok Kim[1], Ju Chan Kim[1], Se Eun Lee[1], Su Jeong Lee[2], Dong Hui Kim[1], Kyung Tae Kim[1], Eun Woo Lee[2], Sung Hwan Eom[1]

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P2-61

Characteristics of gluten-free muffin made by thermally treated rice flour/protein composite

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P2-62

3D printing of cellulose microfibrils with locust bean gum

Juhyun Min*, Yeon Ju Lee, Mariam Omowunmi Aminu and Young Hoon Jung

School of Food Science and Biotechnology, Kyungpook National University

P2-63

Study on the manufacturing method of soymilk using gyeonggi kidney beans (Jagang, Heukgang, Yuldu, Sinseondu)

Jeong Been Park*, Dong Ho Kim, Moon Hyung Son

Icheon-si Agricultural Technology Center, Department of Research and Development

P2-64

비건 스프레드의 제조 및 물리적 특성 평가

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대구대학교 식품영양학과

P2-65

추출조건별 물리·화학적 특성 및 항산화 활성을 통한 잇바디 돌김 유래 기능성 다당류의 최적 추출조건 확립

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P2-66

Thawing quality characteristics of frozen pork according to the vacuum of a 100 L scale tumbler

Won Ho Hong*, Jiyeon Chun
Department of Food Science and Technology, Sunchon National University

P2-67

Kinetic modeling of dieckol extraction from Ecklonia cava by itrasound-assisted extraction: Comparison of extraction solvents

Gwang-Deok Park[1*], Jong-Jin Park[1,2], Ibukunoluwa Fola Olawuyi[1],
Ha Seong Cho[1], Yoo Jin Na[1], Won Young Lee[1,3]
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P2-68

Quality characteristics of eggless muffins prepared using alternative egg solutions containing super mealworm protein isolate and carrageenan

조하성[1*], bukunoluwa Fola Olawuyi[1], 박종진[1,2], 박광덕[1], 나유진[1], 이원영[1,3]
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P2-69

Tailored extraction of okra pectin as a clean-label emulsifier

Ibukunoluwa Fola Olawuyi[1*], Jong Jin Park[1,2], Gwang Deok Park[1],
Ha-Seong Cho[1], Yoo-Jin Na[1], Won Young Lee[1,3]
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P2-70

Protein enrichment of gluten-free pancakes with corn flour using edible insect protein isolate

Lena Chiamaka Okonkwo[1*], Jong Jin Park[1,2],
Ibukunoluwa Fola Olawuyi[1], Won Young Lee[1,3]
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P2-71

천마를 이용한 어린이용 건강음료의 품질 특성 및 항산화 활성

박소희[1], 문혜경[2], 이수원[1], 김종국[1*]
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P2-72

Quality properties and food materials development of Mycoleptodonoides aitchisonii

Seung Bin Im[1*], Kyung-Je Kim[1], Seong Woo Jin[1], Young Woo Koh[1], Neul i Ha[1], Hee Kyung Jeong[1], Kyeong Won Yun[2], Kyoung Sun Seo[1*]
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P2-43

Physical properties by different parts and heat treatments for standardization of the quality of production Lentinula edodes with smart farm application

Young Woo Koh[1], Neul I Ha[1], Kyung Je Kim[1], Seong Woo Jin[1], Seung Bin Im[1], Hee Kyung Jeong[1], Kyeong Won Yun[2], Kyoung Sun Seo[1*]
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P2-74

Effect of enzymatic hydrolysis by crown flower plants and papain protease on characteristics and antioxidant activities of milkfish (chanos chanos Sp) protein.

Lilik Krisna Mukti[1], Hey Kyung Moon[2], Jong Kuk Kim[1], Woo Won Kang[1], Maryanto[3], Ardiyan Dwi M[3], Andrew Setiawan R[3], Asrul Bahar[4], Yuli Witono[3*]
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PARTIII. 화학/분석

P3-1

영지버섯으로 고체발효시킨 꾸지뽕나무 잔가지 (Twig)에서 생물전환 생성물들의 분리 및 구조동정

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P3-2

꾸지뽕나무 잔가지 (twig)에서 Parishin 유도체의 분리동정 및 천마와 Parishin 유도체의 함량 비교

김종국[1*], 김대운[1,2], 송영은[3], 김영회[1], 김명곤[1]
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P3-3

대파 건조 조건에 따른 thiamethoxam의 잔류량 변화

조미현[1*], 박민수[1], 배수빈[1], 김명헌[1], 김현준[1], 안소은[1], 김서홍[2], 임무혁[1]
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P3-4

방사무늬김(Pyropia yezoensis)과 잇바디돌김(Pyropia dentata)의 성분학적 특성 비교

송시훈[1*], 최진혁[1], 김형균[2], 정재천[2], 조정용[1]
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P3-5

Hazard substance analysis by polycyclic aromatic hydrocarbons (PAHs) study

Jung-A Lee*, Hong-Jo Park, Hyun-Seo Lee, Je-Eon Kim, Se-Yun Choi,
Su-Been Kim, Ki-Yun Kim, Joon-Goo Lee
Dong-A University Department of Food Biotechnology

P3-6

국내 농식품자원에서의 인지질의 정성 및 정량분석

장현준*, 김호창, 이정희
대구대학교 식품영양학과

P3-7

DComparison of two extraction methods (solvent and enzyme hydrolysis) on vitamin K (phylloquinone and menaquinone) analysis in 6 kinds of seafood products

Yu Jeong Gwak[1*], Jeong Kim[1], Su Jin Park1, Jiyeon Chun[1]
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P3-8

Detection of glucose, lactic acid, and urea using SWCNT based biosensor

Dong Sup Kim[1], Chan Yeop Jung[2], Yun Won Jang[2], Yoona Shin[2] Jun-Hyun Oh[2], Jingyoung Lee[1*]
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[2]*Department of Plant and Food Sciences, Sangmyung University*

P3-9

유색마 유전자원의 이화학적 특성 분석

최소영[1*], 전수경[1], 임경란[1], 조신혁[1], 문광덕[2]
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P3-10

Determination of viamin B1 and B3 contained in meats and processed meats

Song Yee Lee*, So Ra Choi, Eun Ju Song, Eun Ju Kim, Hyun Ah Han
Jeollabuk-do Agricultural Research and Extension Services

P3-11

Development of prediction model for capsaicinoid content of korean red-pepper powder with vrious cultivars by near-infrared spectroscopy

Seong Youl Lee*, Yun Jeong Choi, Ji Hee Yang, Young Bae Chung, Sung Gi Min
World Institute of Kimchi

P3-12

유통 콜라겐 제품 중 중금속 함량 모니터링

김지은*, 김범호, 김경아, 김대환, 최영주, 강효정, 민지현, 이명진, 오조교
경기도보건환경연구원 보건연구기획팀

P3-13

시중 유통 음료의 알루미늄 섭취 위해평가

최영주*, 김범호, 김경아, 김대환, 김지은, 강효정, 민지현, 이명진
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P3-14

DNA barcode 정보를 이용한 수산물 원재료 진위 판별에 관한 연구

김대환*, 김범호, 김경아, 김지은, 최영주, 강효정, 민지현, 이명진, 오조교
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P3-15

곡류 및 그 가공식품의 무기비소 오염도 실태 조사

백은진*, 김명길, 김현주, 성진희, 이유진, 곽신혜, 이명진, 오조교
경기도보건환경연구원 식품분석팀

P3-16

국내 농특산자원의 원료 및 가공방법에 따른 비오틴(biotin) 성분 특성

양영택*, 이정민, 문경희, 김유경, 송정흡
제주특별자치도농업기술원

P3-17

제주지역 밭 토양 중 잔류농약 모니터링

양영택*, 이정민, 김유경, 강호준, 송정흡
제주특별자치도농업기술원

P3-18

Physicochemical characteristics of yellow ball, a new citrus variety

Seongman Jeong[1*], Dong Shin Kim[2], Seong Ho Jo[1], Sun Lee[1], Sang Suk Kim[3], Hyun Jin Kim[1,2]
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[2]Institute of Animal Medicine, Gyeongsang National University,
[3]Citrus Research Institute, Rural Development Administration

P3-19

Determination of cyanogenic glycosides in home-made maesil-cheong from korea by LC-MS/MS

Hyunjun Lee[1], Inhwan Kim[1], Kwang Won Lee[2], Hyun Seok Kim[3], Jihyun Lee
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[2]Department of Biotechnology, Korea University,
[3]Department of Food Science and Biotechnology, Kyonggi University

P3-20

Comparison of nutrient compounds of processed products using truffle

Neul I Ha[1*], Kyung Je Kim[1], Seong Woo Jin[1], Young Woo Koh[1], Seung Bin Im[1],
Hee-Kyung Jeong[1], Kyeong Won Yun[2], Kyoung Sun Seo[1*]
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PARTⅣ. 미생물/발효/안전성

P4-1

Fermentative and functional properties of non-Saccharomyces cerevisiae isolated from traditional yeast

Woo Soo Jeong* A-ra Kim, So Young Kim, Soo Hwan Yeo
Fermented And Processed Food Science Division, Department of Agrofood Resource, NIAS, RDA

P4-2

소규모 새싹보리 분말류 가공업체용 디지털 해썹 관리시스템

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P4-3

백합추출발효분말을 이용한 곡류효소의 제조

김승태*, 이상엽, 박세진, 이원종, 김성훈
보타노스

P4-4

Analysis of metagenome and sensory characteristics from korea traditional vinegars

Haram Kong*, Sun Hee Kim, Joo Yeon Kim, Woo Soo Jeong, So Young Kim, Soo Hwan Yeo†
Fermented and Processed Food Science Division, Department of Agrofood Resources, NIAS, RDA, Wanju, 55365, Korea

P4-5

Quality characteristic of fermented vinegar using Maclura tricuspidata fruits and identified of ingredients by UPLC/QTOF-MS

Dae Woon Kim[1,2]*, Soo Chang Na[2], Ha Bin Kim[2], Young Hoi Kim[1], Myung-Kon Kim[1], Tae-Young Kim[2]
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P4-6

Microbial characterization of useful fungi Isolated from commercial nuruk

Su Jeong Lee*, So Young Kim, Soo Hwan Yeo, Woo Soo Jeong
Fermented and Processed Food Science Division, Department of Agrofood Resource, NIAS, RDA

P4-7

Hygienic effect of MA (modified atmosphere) film on ginseng sprout packaging

Jinju Park[1*], Jangnam Choi[1], Jihyun Lee[2], Sosoo Kim[1], Seulgi Baek[1],
Jayeong Jang[1], Jeomsoon Kim[1], Theresa Lee[1]
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[2]*Postharvest Technology Division, National Institute of Horticultural and Herbal Science*

P4-8

Effect of sterilization conditions on microbial reduction in cleaning tools

Ji Yu Im*, Chae Young Kim, Do Gyung Oh, Chan Yeong Kim, Jung Beom Kim
Department of Food Science and Technology, Sunchon National University

P4-9

Functional characteristics of acetic acid bacteria isolated from farm-made fermented vinegar

Sun Hee Kim*, Joo Yeon Kim, Woo Soo Jeong, So Young Kim, Soo Hwan Yeo
Fermented and Processed Food Science Division, Department of Agrofood Resources, NIAS, RDA

P4-10

양파착즙액 발효물 첨가에 따른 한식간장의 품질특성 및 항산화활성

이채미[1*], 최유리[1], 이동훈[1], 이채윤[1], 정재희[1], 김수환[2], 허창기[1,2]
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P4-11

Fermentation of onion extract by lactic acid bacteria enhances its physicochemical properties

Chae Mi Lee[1], Yu ri Choi[1], Dong Hun Lee[1], Chae Yun Lee[1], Hyeong Woo Jo[1],
Won Hee Lee[1], Jae Hee Jeong[1], Su Hwan Kim[2], Chang Ki Huh[1,2*]
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P4-12

Comparison of the quality characteristics by part of sprouted garlic

Yu ri Choi[1], Chae Mi Lee[1], Dong Hun Lee[1], Chae Yun Lee[1], Hyeong Woo Jo[1],
Jae il An[1], Jae Hee Jeong[1], Su Hwan Kim[2], Chang Ki Huh[1,2*]
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P4-13

유청을 활용하여 바이오 에탄올 생산 기술 개발

최유리[1*], 이채미[1], 이동훈[1], 이채윤[1], 조형우[1], 안재일[1], 정재희[1], 김수환[2], 허창기[1,2*]
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P4-14

Microbial isolation step 1 for the development of kombucha scoby

Dong Hun Lee[1], Chae Mi Lee[1], Yu Ri Choi[1], Chae Yun Lee[1], Hyeong Woo Jo[1], Eun Hye Kim[1], Jae Hee Jeong[1], Su Hwan Kim[2], Chang Ki Huh[1,2*]
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[2]*Research Institute of Food Industry, Sunchon National University*

P4-15

Comparison of the antioxidant activity according to ethanol extraction concentration of omija

Chae Yun Lee[1], Chae Mi Lee[1], Dong Hun Lee[1], Yu Ri Choi[1], Hyeong Woo Jo[1], Ye Won Lim[1], Jae Hee Jeong[1], Su Hwan Kim[2], Chang Ki Huh[1,2*]
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P4-16

브로콜리 및 아스파라거스에 대한 각국의 잔류농약 모니터링

박민수[1*], 김서홍[2], 배수빈[1], 조미현[1], 김명헌[1], 김현준[1], 안소은[1], 임무혁[1]
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P4-17

UV-C 조사 선량에 따른 신선편이(fresh-cut) 수박의 품질특성

한현아[1*], 송은주[1], 김은주[1], 이송이[1], 조승현[1]
[1]*전라북도농업기술원*

P4-18

Characteristics and shelf-life of Oryza sativa L. using stabilization-drying process

Eunsu Song[1*], Hyeeun Gwon[1], Jaeyoung Choi[1], Jiyeon Chun[2], Jinah Hwang[1]
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P4-19

곤드레가 포함된 양념을 첨가한 김치의 품질특성

권동진, 오지연*, 강윤한
강릉원주대학교 생명과학대학 식품가공유통학과

P4-20

Physical properties of soybean meal protein isolates prepared from defatted soybean meal

Boyeon Park[1,2*], Sejin Kim[1], Jaehyun Ahn[1], Heekyung Han[1], Jinyi Kang[1], Boyeon Park[1,2]
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P4-21

Analysis and comparison of microbiome in three types of laver (raw laver, dried laver and seasoned/roasted laver)

Young Hoon Kim*, Min A Lee, Hee Won Yoon, Jeong Pyo Kang and Hyun Joong Kim,
Department of Food Engineering, Mokpo National University, Muan, South Korea,

P4-22

Morphological and physiological charateristics of UV-C irradiated bacteria in drinking water using a water purifier

Min A Lee[1]*, Hee Won Yoon[1], Ja Bin Kim[1], Chang Joo Lee[2], Hyun Joong Kim[1]
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P4-23

Combinatorial effect of slightly acidic electrolyzed water and sodium benzoate against multi-species oral cariogenic biofilm

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P4-24

Unveiling the potentials of bioactive oligosaccharide1-kestose (GF2) from Musa paradisiaca Linn peel with an anxiolytic effect based on gut microbiota modulation in stressed mice model

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P4-25

Adherence inhibition of shiga toxin producing (STEC) Escherichia coli by non-digestible oligosaccharides derived from Saccharomyces boulardii in Caenorhabditis elegans gut model

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P4-26

Antimicrobial efficacy of slightly acidic electrolyzed water combined with bay leaf (Laurus nobilis L.) essential oil against cariogenic Candida albicans, Streptococcus mutans biofilms

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P4-27

The use of commercial wine yeast Saccharomyces cerevisiae EC1118 for cassava ethanol production at high solids loading by separate hydrolysis & fermentation and simultaneous saccharification & fermentation

Nithnilanch Phachanseesoulath[1,2], Sejin Geum[2]*, Imkyu Han[2], Yeongmin Kim[2], Sonmi Kim[2], Eunseol Kim[2], Jeongwoo Byun[2], Soo Rin Kim[2,3]

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P4-28

Quality evaluation of fresh-cut vegetables and fruits purchased from online and offline markets

Sung Ju Cho[2], Ju Hong Kang[1], Ji Hyeon Lee[1], Ji Eun Lee[1], Rye Gyeong Park[1], Won Ho Jeong[1], Jae Won Lee[1], Il Kwon Bae[3], Jae Hak Sohn[12*]

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P4-29

Method validation for quantitative analyzing aflatoxin productivity in Aspergilllus sp. isolated from traditional soybean paste.

Seongeui Yoo*, JiEon Park, SeoYeon Kwak, Seung Yeon Baek, Woosoo Jeong, Soo Hwan Yeo, So-Young Kim

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P4-30

Immune-modulating effect of Leuconostoc mesenteroides K2-4 isolated from radish kimchi

SeoYeon Kwak*, JiEon Park, Seongui Yoo, Seung Yeon Baek, Myeong Hui Han, Woosoo Jeong, SooHwan Yeo, SoYoung Kim

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P4-31

Rapid and economical fermentation of shiitake-soy sauce using the cap of Lentinus edodes, medicinal herbs and meju powder

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P4-32

Safety evaluation of Leuconostoc mesenteroides K2-1 isolated from the Korean radish watery kimchi, Dongchimi

JiEon Park*, SeoYeon Kwak, Seongeui Yoo, Seung Yeon Baek, Myeong Hui Han, Woosoo Jeong, SooHwan Yeo, SoYong Kim
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P4-33

Anti-inflammatory effects of heat-killed lactic acid bacteria in LPS-stimulated RAW 264.7 cell

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P4-34

Anti-stress effects of potential probiotic lactococcus lactis subsp. cremoris against corticosterone-induced apoptosis in PC12 cells

Yu Jin Choi*, Seok Geun Jeong
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P4-35

Stability and antibiofilm efficiency of slightly acidic electrolyzed water against mixed-species of Listeria monocytogenes and Staphylococcus aureus

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P4-36

Diversity and mycotoxin production of fungi isolated from Meju

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P4-37

From food to gut: A novel luminescent tagging system to track lactic acid bacteria

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P4-38

The change of color and pH value of skate muscle during fermentation at different fermentation conditions

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P4-39

Changes in intestinal microbiota according to consumption of cheonggukjang in an IBD animal model

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Hee Jong Yang1, Do Youn Jeong[1*]

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P4-40

Enhanced phytoremediation and biosorption of cationic methylene blue (Acid Blue 93) dye by Acidomyces acidophilus ATCC 26774

Jinwon Kim*, Myeong Seon Ryu, Hee-Jong Yang, Gwangsu Ha, Su Ji Jeong,
Su Jin Shin, Ho Jin Jeong, Soo Young Lee, Do Youn Jeong*

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P4-41

Quality characteristics and antmicrobial activity of black raspberry vinegars fermented by various acetic acid bacteria

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P4-42

Screening of antagonistic bacteria having plant growth-promoting abilities and antifungal activity against phytopathogenic fungi

Ji Won Seo, Su Ji Jeong, Jinwon Kim, Myeong Seon Ryu, Se Won Park,
Hee Jong Yang, Do Youn Jeong*

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P4-43

Assessment of potential probiotic properties of lactic acid bacteria isolated from kimchi

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P4-44

Microbial diversity of representative traditional soy sauce, Ganjang in different regions of korea

Su Ji Jeong, Gwangsu Ha, Myeong Seon Ryu, JinWon Kim, Su Jin Shin,
Hee Jong Yang, and Do-Youn Jeong*
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P4-45

Effect of xylan from barley (Hordeum vulgare) husk for prebiotic and antibacterial efficacy against multi-drug resistance Staphylococcus aureus

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Xiuqin Chen, Pianpian Yan, Deog Hwan Oh
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P4-46

Microorganisms inactivation strategy after steaming process of rice cakes manufacturing for a small rice cake processing company

Jun Ha Park[1]*, Sang Hyeok Park[1], Sangha Han[1], Kye Hwan Byun[1], Song yi Choi[2], Sang Do Ha[1]
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P4-47

Occurrence of mycotoxigenic fungi and mycotoxins in peanuts during storage

Jung Hye Choi*, Ju Young Nah, Mi Jeong Lee, Su Bin Lim, Theresa Lee,
Ja Yeong Jang and Jeomsoon Kim
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P4-48

Lactobacillus plantarum GS100에서 유래한 2종의 β-glucosidase를 이용한 Rubusoside 생산

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P4-49

Comparative study on quality characteristics and antioxidant activity of Glycyrrhiza glabra fermented with A. awamori and A. luchuensis

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P4-50

대체감미료를 이용한 저칼로리 콤부차 제조 및 특성

장다은[1*], 이하늘[2], 홍성진[1], 정아영[3], 김영민[2]
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P4-51

Synthesis of TtCITase-C derived glucosyl products from disaccharides by a CITase from Thermoanaerobacter thermocopriae

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P4-52

Isolation and identification of nitrite producing lactic acid bacteria from fermented foods

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P4-53

Isolation and characterization of Escherichia coli-specific bacteriophage for eco-friendly biocontrol agent

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P4-54

Manufacturing air-blast dried lactic acid bacteria starter for Makgeolli brewing

Chan Woo Kim[1*], Jun Su Choi[1], Kyu Taek Choi[1], Sae Byuk Lee[1,2]. Heui Dong Park[1,2]
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P4-55

A comparative study of disinfectants against Salmonella Typhimurium on chicken skin and food-contact surfaces

Shamsun Nahar, Ah Jin Cho*, Eun Her, A.G.M.Sofi Uddin Mahamud, Sang Do Ha
Department of Food Science and Technology, Chung-Ang University,

P4-56

Manifolds of flavourzyme on biofilm formation, quorum sensing, and virulence gene expression of Pseudomonas aeruginosa

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P4-57

농·수·축산물 원재료 중 천연유래 보존료(프로피온산, 안식향산, 소브산)의 검출 및 인정 현황 분석

최민우*, 한상하, 김덕현, 박준하, 현석우, 손정원, 하상도*
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P4-58

Characterization and genomic analysis of a lytic phage as a biocontrol strategy against Pectobacterium carotovorum subsp. carotovorum

Ye Rim Park*, Su Hyeon Kim, Hyeju Jung, Mi Kyung Park
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P4-59

Phycocyanin production and antioxidant activity of the heterotrophically cultivated Galdieria sulphuraria 074G

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P4-60

An in-vitro assessment of the cholesterol-lowering efficacy of potential probiotic Lactobacillus rhamnosus - Isolated from ginseng sprouts

Enam Ahmed[1,2*], Dongha Park[1,2], Ji eun Lee[1,2], Seokmin Kim[3], Selin Jung[3], Bokyung Lee[1,2]
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[3]*Department of Food Science and Nutrition, Dong-A University*

P4-61

Change in pysicochemical and sensory quality of moromi fermented with different Aspergillus oryzae strains

Ji hyun An[1*], Quynh An Nguyen[1], Dong Shin Kim[2], Saoraya Chanmuang[3], Seung Wha Jo[4], Hyun-Jin Kim[1,2,3]
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P4-62

Manufacture of fermented Lentinula edodes by phytolactic acid bacteria

Hee Gyeong Jeong[1*], Kyung Je Kim[1], Seong Woo Jin[1], Young Woo Koh[1],
Seung Bin Im1, Neul i Ha[1], Kyeong Won Yun[2], Kyoung Sun Seo[1*]
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P4-63

Evaluation of anti-microbial and anti-inflammatory activities of isolated lactic acid bacteria from agricultural crops on potential vaginal dysbiosis improvement

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P4-64

Evaluation of antioxidant and nitrite scavenging activity using lactic acid bacteria metabolites isolated from ginseng sprout

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P4-65

Evaluation of preventing inflammatory bowel disease and dysbiosis of gut microbiota with probiotics in DSS-induced colitis mouse model

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P4-66

Isolation and characteristics of P. nalgiovense SJ02 obtained from korean mudflat for fermented sausage

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PART V . 생리활성 / 영양 / 기능성

P5-1

Enzymatic preparation and antioxidant activities of protein hydrolysates from tuna by-products

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P5-2

A systems biological approach to understanding the mechanisms underlying the therapeutic potential of mugwort and ginger supplements

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P5-3

Folic acid and vitamin c content of korea's food according to processing pethod

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P5-4

Antioxidant activity and anti-Inflammatory on caco-2 cell line effects of ethanol extract from Cheonggukjanghwan with blueberry and aronia fermented

Byung-Min Oh[1]*, Kyung Eun Moon[1], Ji Heon On[1], Hyeon Hwa Oh[1],
Young Soo Kim[1], Geun Seoup Song[1]
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P5-5

Effect of beneficial bacteria and hazardous substances on the functionality of traditional soy sauce

Sowon Jang[1]*, Hye-Soo Jung[1], Hee-Jin Kim[1], Ju-Eun Kang[1], Ra-Yeon Kim[1], Geun-Seoup Song[1]
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P5-6

Antioxidant activity and anti-inflammatory effect of ethanol extract from deonjang stock with perilla frutescens leaf

Kyung Eun Moon*, Byung Min Oh, So Hyun Park, Joon Gon Kim,
Hyeon Hwa Oh, Geun Seoup Song, Young Soo Kim
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P5-7

Analysis of antioxidant activity of functional enhanced silkworm

Jong Woo Park*, Chang Hoon Lee
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P5-8

Nutritional compositions in roots, twigs, leaves, fruit pulp, and seeds from pawpaw (Asimina triloba [L.] Dunal) grown in korea

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[2]*Department of Microbiology and Molecular Biology, Chungnam National University,*
[3]*Department of Food and Nutrition, Dong-eui University*

P5-9

Anti-inflammatory effects of Marclura tricuspidata twig sawdust extract fermented with Ganoderma lucidum mycelium in 3T3-L1 adipocyte

Se Eun Park*, Hyo Jeong Lee, Jun Hui Choi, Ki Man Kim, Seung Kim
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P5-10

Anti-oxidant and anti-inflammatory activities of Mesembryanthemum crystallinum extract

Se Eun Park*, Jun Hui Choi, Ki Man Kim, Seung Kim, Hyo Jeong Lee
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P5-11

Effects of Allium ampeloprasum extract on testosterone synthesis in TM3 Leydig cells

Se-Eun Park*, Hyo-Jeong Lee, Jun-Hui Choi, Ki-Man Kim, Seung Kim
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P5-12

Antioxidant, anti-fibrin clotting, and anti-coagulant effect of Maclura tricuspidata (Carr.) bur extracts fermented using several forest mushrooms

Jun-Hui Choi*, Se-Eun Park, Ki-Man Kim, Hyo-Jeong Lee, Seung Kim
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P5-13

Intestinal immune-modulating activities of oak Lentinus edodes fermented using Lactobacillus acidophilus JMIL-001, Pediococcus pentosaceus JMIL-002, Lactobacillus fermentum JMIL-003, and Lactobacillus plantarum ICFPL-001

Jun-Hui Choi*, Se-Eun Park, Hyo-Jeong Lee, Seung Kim, Ki-Man Kim
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P5-14

에탄올 농도별 커피 추출물의 기능성 탐색

유화영[1*], 김현왕[1], 전현일[1], 조승화[2], 송근섭[1]
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P5-15

Phytochemical profile of Xanthium Strumarium L. fruit extract and its antioxidant and anti-inflammatory activities

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P5-16

Antioxidant and anti-aging activity of Ge-Geol radish water extracts

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P5-17

Physiological activity of Nelumbo nucifera byproducts mixed extract

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P5-18

Physiological activities of hot water extract from Phragmites communis rhizoma as a functional materials

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P5-19

A study on the physiological activity of smilacis rhizoma extracts

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P5-20

Cibotii rhizoma extract attenuates dexamethasone-induced muscle atrophy by regulating the protein turnover in C2C12 cells

Joo Yeon Lee*, Choon Young Kim
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P5-21

Ameliorative effects of fermented garlic on autoimmune neurodegenerative disease in cuprizone-induced rat model of multiple sclerosis

Sangar Madhuri, Neeracha Sangpreecha, Doyoung Song, Yang-Kyun Park, Seong Gook Kang, Kyung Sik Ham*

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P5-22

Effects of fermented onion on gut health in d-galactose-induced aging rats

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P5-23

Antitussive, expectorant activities and anti-inflammatory effects of Dendropanax morbifera leaf extract

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P5-24

Antiobesity and hepatoprotective effects of protein hydrolysates from Protaetia brevitarsis in high-Fat diet-Induced obese mice

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P5-25

In vivo protective effects of lentil (Lens culinaris) extract against oxidative stress-Induced hepatotoxicity

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P5-26

Changes in antioxidant activities according to laver heat processing

Won Kim*, Seal Lee, Yeon Ju Lee, Hyo Jeong Kang, Jin Yeong Kim, Ki Bok Yoon, Ho Cheol Yang, Yang Jun An, Du Yeong Jeon

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P5-27

구기자, 산수유, 야관문, 엉겅퀴 및 어성초의 항산화활성 및 항혈전활성

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P5-28

Antioxidant capacity and transcriptome responses of lactic acid bacteria isolated from kimchi

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P5-29

A study on the phytoestrogenic effect of black raspberry (Rubus occidentalis) extract

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P5-30

A study on nutritional value of traditional salt-fermented fish sauces as a natural seasoning

Min ji Kim*, Mee sook Kang, Jong sin Kim, Sug chun Lim, Ji yeon Kang,
Hyeon-jeong Choi, So-yeon Kim, Ha-eun Lee
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P5-31

4종 홍잠의 항산화 및 항혈전 활성

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P5-32

Quality characteristics and antioxidants properties of persimmon (Diospyros kaki Thunb.) leaf tea

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P5-33

Screening of plants extracts from gyeongbuk area for antibacterial and anti-inflammatory activity

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P5-34

Evaluation of quality properties of plant-based protein material

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P5-35

Regulation of blood glucose homeostasis by procyanidin A2 : in silico, in vitro and in vivo analysis

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P5-36

Optimization of the extract conditions of Acacia species by response surface methodology and assessment of anti-oxidant potential

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P5-37

5종 약선 추출물의 항산화 및 항당뇨 활성 비교

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P5-38

Antioxidant activity of Dioscoreae rhizoma(Sanyak) fermented with Aspergillus awamori and quality characteristics germinated black rice porridge

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P5-39

Metabolites profiling of ripe ajwa date pulp (Phoenix dactylifera L.) using response surface methodology and artificial neuronal network models

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P5-40

Optimization of extraction conditions of Portulaca oleracea L. extract using RSM, ANN and characterization of bioactive compounds by high-resolution mass spectroscopy

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P5-41

γ-mangostin attenuates UVB-Induced photoaging in HaCaT cells through the inhibition of MAPK / AP-1 / MMP-1 Signaling

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P5-42

In silico approach to functional ingredients: autophagy-enhancing melanogenesis inhibition through the combination of flavonoids

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P5-43

Physicochemical characteristics of Spirulina platensis

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P5-44

Anti-inflammatory and wound healing effects of analgesic potential using in vivo oral ulcer model of CBG (Cannabigerol)

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P5-45

기린초 에탄올 추출물의 기능성에 관한 연구

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P5-46

Nutritional and functional characteristics of three varieies of Korean cabbage (Brassica rapa. L): korean cabbage (KC), red korean c(RKC) and golden korean cabbage (GKC)

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P5-47

Effect of enzymatic hydrolysis by crown flower plants on characteristics and antioxidant activity of milkfish protein

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P5-48

Effect of fermented Platycodon grandiflorus extract by lactic acid bacteria on liver protection

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P5-49

Ultrasonic pretreatment and enzymatic hydrolysis conditions for preparation of cricket protein hydrolysate

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P5-50

Nutritional compositions of shellfish in the Islands of jeollanam-do

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▷▷▷ 저자색인

A

AA,G,M,Sofi Uddin Mahamud P4-55
A,G,M,Sofi Uddin Mahamud P4-56
Ah Hyun Kim P5-50
ae Hak Sohn P1-18
Ah Jin Cho P4-55
Ah Jin Cho P4-56
Ah Na Kim P1-19
Ah Na Kim P2-58
Ah Ram Han P2-3
Ahsan Javed P5-39
Ahsan Javed P5-40
A hyeon Kim P2-57
A Hyeon Kim P4-38
Andrew Setiawan R P2-74
Andrew Setiawan R P5-47
Ara Jo P5-23
A ra Kim P4-1
ARa Shin P4-38
Ardiyan Dwi M P2-74
Ardiyan Dwi M P5-47
Asrul Baha P2-74
Asrul Baha rP5-47
AYoung Lee P5-34

B

Bokyung Lee P4-60
Bokyung Lee P4-63
Bokyung Lee P4-64
Bokyung Lee P4-65
Bo-Ram Park P4-49
Bo-Ram Park P4-51
Bo-Ram Park P5-38
Bo-Rim Song P5-36
Boyeon Park P4-20
Boyeon Park P4-20
Bu Hee Park P1-32
bukunoluwa Fola Olawuyi P2-68
Byeong Jun Ji P4-52
Byoung Mok Kim P2-3
Byung Min Oh P5-4
Byung Min Oh P5-6

C

Chae Mi Lee P4-14
Chae Mi Lee P4-15
Chae Rin Park P4-23
Chae Rin Park P4-45
Chae Wan Baek P1-27
Chae Young Jung P2-7
Chae Yun Lee P4-14
Chae Yun Lee P4-15
Chae Mi Lee P4-12
Chae Mi Lee P4-11
Chaerin Park P4-24
Chaerin Park P4-25
Chae Rin Park P4-26
Chae Yeon Han P2-30
Chae Young Kim P4-8
Chae Yun Lee P4-11
Chae Yun Lee P4-12
Chan Yeop Jung P3-8
Chang Hoon Lee P5-7
Chang Ki Huh P4-14
Chang Ki Huh P4-15
Chang Heon Lee P2-20
Chang Hwan Jeon P5-24
Chang Hwan Park P5-16
Chang Joo Lee P4-22
Chang Ki Huh P4-11
Chang Ki Huh P4-12
Chang Woo Kim P5-36
Chang Woo Kim P5-41
Chan Kyu Park P5-33
Chan Soon Park P4-49
Chan Soon Park P5-38
Chan Woo Kim P4-54
Chan Yeong Kim P4-8
Cho Een Kim P5-23
Choon Young Kim P5-20
Choon Young Kim P5-32
Chulyung Choi P5-23

D

Du-Yeong Jeon P5-26
Du-Yeong Jeon P5-50
Daeung Yu P2-20
Dae-Woon Kim P4-5
Daun Kim P5-28
Deog Hwan Oh P4-23
Deog Hwan Oh P4-24
Deog Hwan Oh P4-25
Deog Hwan Oh P4-35
Deog Hwan Oh P4-45
Deog-Hwan Oh P4-26
Deok-Gyeong Kang P4-31
Do Young Kim P2-6
Doan Thi Thanh Huyen P4-51
Do Gyung Oh P4-8
Dong Ho Kim P2-47
Dong Ho Kim P2-63
Dong Hun Lee P4-14
Dong Hun Lee P4-15
Dong Jin Moon P5-34
Dong Sup Kim P3-8
Dong Chang Kim P5-44
Dong Ha Park P4-60
Dong Ha Park P4-63
Dong Ha Park P4-64
Dong Ha Park P4-65
Dong Ho Seo P4-52
Dong Hui Kim P2-60
Dong Hun Lee P4-11
Dong Hun Lee P4-12
Dong Shin Kim P3-18
Dong Shin Kim P4-61
Doo Yung Jeon P5-50
Do Youn Jeong P2-41
Do Youn Jeong P4-39
Do Youn Jeong P4-40
Do Youn Jeong P4-42
Do Youn Jeong P4-43
Do Youn Jeong P4-44
Do Youn Song P5-21
Do Youn Song P5-22
Du Yun Jeong P2-61

E

Eun Hee Kim P5-50
Enam Ahmed P4-60
Enam Ahmed P4-64
Eun Ha Chang P1-6
Eun Hae Kim P2-37
Eun Hae Kim P2-38
Eun Her P4-55
Eun Her P4-56
Eun Hye Kim P4-14
Eun Hye Ryu P1-14
Eun Hye Ryu P4-41
Eun Ha Chang P2-13
Eun- Hye Kim P5-33
Eun Ji Kim P4-23
Eun Ji Kim P4-24
Eun Ji Kim P4-25
Eun Ji Kim P4-26
Eun Ji Kim P4-45
Eun Jin Lee P1-11
Eun Ju Cho P5-34
Eun Ju Kim P3-10
Eun Ju Song P3-10
Eun Kyung Kim P2-39
Eun Seol Kim P4-27
Eun Song Cha P2-20
Eun Song Kim P2-60
Eun Soo Park p1-1
Eunsu Song P4-18
Eunsu Song P5-15
Eun Woo Lee P2-60

F

Fanar Alshammari P5-39
Fanar Alshammari P5-40

G

Ga Eun Park P5-17
Ga Won Lee P2-20
Geun Ho Choi P4-52
Geun Seoup Song P5-4
Geun Seoup Song P5-5
Geun Seoup Song P5-6
Go Eun Choi P1-26
Gwang Deok Park P2-67
Gwang Deok Park P2-69
Gwang Hee Lee p1-1
Gwang Su Ha P4-39
Gwang Su Ha P4-40
Gwang Su Ha P4-44
Gyeong Tae Jeong P2-20
Gyu Hyeon Park P5-1
Gyung Ran Do P1-24
Gyu Ok Lee P5-23

H

Ho Cheol Yang P5-26
Hyo Jeong Kang P5-26
Hwan Sik Na P5-50
Ha Bin Kim P4-5
Hae Won Jang P1-7
Hae Won Song P2-4
Hae Il Yang P1-8
Haejo Yang P1-32
Ha eun Lee P5-30

Han Byul Kang P2-33
Han Seok Choi P2-14
Haram Kong P4-4
Ha Seong Cho P2-67
Ha Seong Cho P2-69
Hee Gun Yang P4-43
Hee Gyeong Jeong P5-48
Hee Gyeong Jeong P4-62
Hee Jin Kim P5-5
Hee Jong Yang P2-41
Hee Jong Yang P4-39
Hee Jong Yang P4-40
Hee Jong Yang P4-42
Hee Jong Yang P4-43
Hee Jong Yang P4-44
Hee kyung Han P4-20
Hee Kyung Jeong P2-72
Hee Kyung Jeong P2-73
Hee Kyung Jeong P3-20
Hee Won Lee P4-49
Hee Won Lee P5-38
Hee Won Yoon P4-21
Hee Won Yoon P4-22
Heui Dong Park P4-54
Hey Kyung Moon P2-74
Hey Kyung Moon P5-47
Hey Ran Choi P5-29
Ho Jin Jeong P4-43
Ho Rim Jang P1-19
Ho Rim Jang P2-58
Hoi Man Park P2-15
Ho Jin Jeong P4-40
Ho Jun Shin P1-15
Hong Sik Kim P1-19
Hong Sik Kim P2-58
Hong Jo Park P3-5
Hoon Kim P1-19
Hoon Kim P2-58
Ho Yong Sohn P4-31
Hun Joong Kweon P1-32
Hwan Seok Jeong P5-33
Hwi gon Kim P2-18
Hwi Gon Kim P2-19
Hyang Kwon P1-6
Hyang Lan Eum P1-30
Hyang Lan Eum P1-29
Hye Jee Kang P1-26
Hyeeun Gwon P4-18
Hye Jeong Kim P5-34
Hye Ji Min P2-18
Hye Ji Min P2-19
Hye Jin Park P2-57
Hye Jo Choi P1-2
Hye Ju Jung P4-58
Hye Kyung Moon P1-11
Hye Lim Jang P5-8
Hye Min Jang P2-60
Hyeon Bin Oh P1-21
Hyeon Hwa Oh P5-4
Hyeon Hwa Oh P5-6
Hyeon Woo Moon P1-24
Hyeong Woo Jo P4-14
Hyeong Woo Jo P4-15
Hyeong Woo Jo P4-11
Hyeong Woo Jo P4-12
Hyeon Jeong Choi P5-30
Hyeon Ji Yoon P5-25
Hye Soo Jung P5-5
Hye youn Kim P5-23
Hye Young Seo P2-37
Hye Young Seo P2-44
Hyo Bin Kim P2-60
Hyo Jeong Lee P5-10
Hyo Jeong Lee P5-11
Hyo Jeong Lee P5-12
Hyo Jeong Lee P5-13
Hyo Jeong Lee P5-9
Hyo Seon Lee P5-24
Hyoun Ji Park P5-2
Hyoun Wook Kim P2-33
Hyun Jeong Shim P1-21
Hyun Jin Jeong P2-8
Hyun Soo Chun P4-52
Hyun Wook Jang P1-21
Hyun Ah Han P3-10
Hyung Ho Bae P2-33
Hyun Jin Kim P3-18
Hyun Jin Kim P4-61
Hyun Joo Chang P1-2
Hyun Joong Kim P4-21
Hyun Joong Kim P4-22
Hyun Jun Lee P3-19
Hyun Seo Lee P3-5
Hyun Seok Kim P3-19

I

Ibukunoluwa Fola Olawuyi P2-67
Ibukunoluwa Fola Olawuyi P2-69
Ibukunoluwa Fola Olawuyi P2-70
Il Kwon Bae P1-18
Il Kwon Bae P1-22
Il Kwon Bae P4-28
Imkung Oh P2-6
Imkyu Han P4-27
Im kyung Oh P2-4
Im kyung Oh P2-5
Im kyung Oh P2-7
Im kyung Oh P2-8
In Young Choi P4-37
In Hak Jeong P2-3
In hwan Kim P3-19
In Ju Nam P2-11
In Ju Nam P2-12
In Sun Kim P2-11
In Sun Kim P2-12

J

Jin Yeong Kim P5-26
Ja Yeong Jang P4-36
Ja Yeong Jang P4-47
Ja Bin Kim P4-22
Jae Geel Lim P1-6
Jae Hak Sohn P1-22
Jae Hak Sohn P4-28
Jae Hee Jeong P4-14
Jae Hee Jeong P4-15
Jae Hoon Lee P1-7
Jae Won Lee P1-18
Jae Won Lee P1-22
Jae Won Lee P4-28
Jae Geel Lim P2-13
Jae Hee Jeong P4-11
Jae Hee Jeong P4-12
Jae Hee Park P1-11
Jae Hoon Jeong P4-31
Jae Hyun Ahn P4-20
Jae Il An P4-12
Jae In choe P4-53
Jae Min Seo P5-49
Jae Woong Han P1-19
Jae Woong Ha P2-58n
Jae Yong Kim P5-23
Jae Young Choi P4-18
Jan Peter van Pijkeren P4-37
Jan Gnam Choi P4-7
Ja Won Shin P5-23
Ja Yeon Yoo P2-33
Ja Yeong Jang P4-7
Je Young Shin P2-14
Jee Hwa Hong P1-1
Jee Hwan Oh P4-37
Je Eon Kim P3-5
Jeom Coon Kim P4-47
Jeom Voon Kim P4-7
Jeong Been Park P2-47
Jeong Been Park P2-63
Jeong Kim P3-7
Jeong Kim P5-43
Jeong Lee P5-3
Jeong Eon Lee P1-11
Jeong Ho Kim P2-18
Jeong Min Lee P5-1
Jeong Pyo Kang P4-21
Jeong Woo Byun P4-27
Jeoom Sun Kim P4-36
Jeung Ae Yoon P1-6
Jeung Hee An P2-31
Jeung Hee An P2-32
Jeung Hee Lee P5-34
Ji Eun Lee P1-18
Ji Eun Lee P1-22
Ji Eun Lee P4-28
Ji Heon On P5-4
Ji Hyeon Lee P4-28
Ji Hyeon Lee P1-18
Ji Hyeon Lee P1-22
Ji Hyun Lee P1-32
Ji won Choi P1-30
Ji won Choi P1-29
Ji won Seo P4-39
Ji Wung Kwon P1-14
Ji Wung Kwon P4-41
Ji Yeon Kim P5-2
Ji Yoon Chang P5-28
Ji An Heo P2-18
Ji An Heo P2-19
J iEon Park P4-29
Ji Eon Park P4-30
Ji Eon Park P4-32
Ji Eun Lee P4-60
Ji Eun Lee P4-63
Ji Eun Lee P4-64
Ji Eun Lee P4-65
Ji Eun Park P4-36
Ji Hee Yang P2-38
Ji Hee Yang P3-11
Ji Hye Kim P2-11
Ji Hye Kim P2-12
Ji Hyun An P4-61
Ji Hyun Lee P1-30

Ji Hyun Lee P1-29
Ji Hyun Lee P3-19
Ji Hyun Lee P4-7
Ji Hyun Park P5-25
Jin Ha Sim P2-20
Jin Hyeon Kim P2-20
Jin Young Kim P5-23
Jin Ah Hwang P4-18
Jin Ah Hwang P5-15
Jin Gyoung Lee P3-8
Jin Ju Park P4-7
Jin Ju Park P5-3
Jin Kwan Ham P1-6
Jin Kwan Ham P2-13
Jin Seok Kim P2-60
Jin Sik Nam P5-8
Jin Won Kim P4-40
Jin Won Kim P4-42
Jin Won Kim P4-44
Jin Yi Kang P4-20
Ji Seon Park P1-6
Ji Seon Park P2-13
Ji Seon Yoo P2-59
Ji Won Seo P4-42
Ji Yeon Chun P2-66
Ji Yeon Chun P3-7
Ji Yeon Chun P4-18
Ji Yeon Chun P5-15
Ji Yeon Chun P5-43
Ji Yeon Chun P5-46
Jiveon Kang P5-30
Ji Yong Kim P4-53
Ji Yoon Kim P2-11
Ji Yoon Kim P2-12
Ji Yu Im P4-8
Jong Hwa An P5-32
Jong Kuk Kim P2-74
Jong Kuk Kim P5-47
Jong Woo Park P5-7
Jong Bang Eun P2-57
Jong Bang Eun P4-38
jong Chul Seo P1-15
Jong Chul Seo P1-17
Jong Jin Choi P5-18
Jong Jin Park P2-67
Jong Jin Park P2-69
Jong Jin Park P2-70
Jong Kug Lee P5-3
Jong Sin Kim P5-30
Jong Woong Nam P2-3
Joon Gon Kim P5-6
Joon Goo Lee P3-5
Joon Young Jun P2-3
Joo Yeon Kim P4-4
Joo Yeon Kim P4-9
Joo Yeon Lee P5-20
Ju Hong Kang P1-18
Ju Hong Kang P1-22
Ju Hong Kang P4-28
Ju Young Lim P1-8
Ju Chan Kim P2-60
Ju Eun Kang P5-5
Juh Yun Min P2-62
Jun Ho Heo P1-23
Jung A Lee P3-5
Jung Beom Kim P4-8
Jung Hye Choi P4-47
Jung Soo Kim P2-11
Jung Soo Kim P2-12
Jun Ha Park P4-46
Jun Hui Choi P5-10
Jun Hui Choi P5-11
Jun Hui Choi P5-12
Jun Hui Choi P5-13
Jun Hui Choi P5-9
Jun Hwa Shin P5-36
Jun Hyun Oh P1-28
Jun Hyun Oh P3-8
Jun Hyun Oh P4-59
Jun Sang Ham P2-33
Jun Seok Lee P1-15
Jun Su Choi P4-54
Ju Won Ryu P2-60
Ju Yeon Lee P2-59
Ju Young Nah P4-47

K

Ki Bok Yoon P5-26
Kang Mo Ku P1-24
Ki Man Kim P5-10
Ki Man Kim P5-11
Ki Man Kim P5-12
Ki Man Kim P5-13
Ki Man Kim P5-9
Ki Tae Park P1-17
Ki Yun Kim P3-5
Kwang Deog Moon P2-11
Kwang Deog Moon P2-12
Kwang Won Lee P3-19
Kwon Il Seo P2-18
Kwon Il Seo P2-19
Kye Hwan Byun P4-46
Kye Hyun Lim P1-6
Kyeong Jin Kim P5-2
Kyeong Won Yun P2-73
Kyeong Won Yun P2-72
Kyeong Won Yun P3-20
Kyeong Won Yun P4-62
Kyeong Won Yun P5-48
Kyoung Sun Seo P2-72
Kyoung Sun Seo P2-73
Kyoung Sun Seo P3-20
Kyoung Sun Seo P4-62
Kyoung hee Jo P4-23
Kyoung hee Jo P4-24
Kyoung hee Jo P4-25
Kyoung hee Jo P4-26
Kyoung hee Jo P4-35
Kyoung hee Jo P4-45
Kyoung Sun Seo P5-48
Kyung Ah Jang P1-6
Kyung Eun Moon P5-4
Kyung Eun Moon P5-6
Kyung Tae Kim P2-60
Kyung Young Yoon P5-49
Kyung Je Kim P2-72
Kyung Je Kim P2-73
Kyung Je Kim P3-20
Kyung Je Kim P4-62
Kyung Je Kim P5-48
Kyung Sik Ham P5-21
Kyung Sik Ham P5-22
Kyu Taek Cho iP4-54

L

Lena Chiamaka konkwo P2-70
Lilik Krisna Mukti P2-74
Lilik Krisna Mukti P5-47

M

Mariam Omowunmi Aminu P2-62
Maryanto P2-74
Maryanto P5-47
Md badrul Alam P5-35
Md Badrul Alam P5-36
Md Badrul Alam P5-39
Md Badrul Alam P5-40
Md Badrul Alam P5-41
Md Badrul Alam P5-42
Md Badrul Alam P5-44
Mee Sook Kang P5-30
Me Hea Park P1-24
Meiqi Fan P2-39
Mi Dan Kang P1-26
Mi Jeong Lee P4-36
Mi Ai Lee P2-37
Mi Ai Lee P1-8
Mi Hee Choi P1-32
Mi Jeong Lee P4-47
Mi Kyung Park P1-28
Mi Kyung Park P4-53
Mi Kyung Park P4-58
Min Jung Lee P1-8
Min jung Lee P2-38
Min A Lee P4-21
Min A Lee P4-22
Min Hyun Kim P2-11
Min Hyun Kim P2-12
Min Jeong Jung P2-3
Min Jeoung Pyo P2-30
Min Ji Kang P2-59
Min Ji Kim P5-30
Min Jung Jang P5-18
Min Jung Jang P5-19
Min Kyoung Kang P2-59
Min Kyoung Kang P4-66
Min Sun Chang P1-30
Min Sun Chang P1-29
Min Sun Chang P1-32
Mo Eun Lee P5-28
Moon Hyung Son P2-63
Myeong Seon Ryu P4-39
Myeong Seon Ryu P4-42
Myeong Seon Ryu P4-44
Myeong Hui Han P4-30
Myeong Hui Han P4-32
Myeong Seon Ryu P4-40
Myung Kon Kim P4-5

N

Nam Woo Kim P5-16
Nam Woo Kim P5-18
Nari Lee P1-2
Na young Lim P5-1
Neeracha Sangpreecha P5-21
Neeracha Sangpreecha P5-22

Neul I Ha P5-48
Neul I Ha P2-72
Neul I Ha P2-73
Neul I Ha P3-20
Neul I Ha P4-62
Nishala Erandi Wedamulla P2-39
Nithnilanch Phachanseesoulath P4-27

O

ROui Woung Kim P1-19
Oui Woung Kim P2-58

P

Pianian Yan P4-23
Pianpian Yan P4-35
Pianpian Yan P4-45
Pue Hee Park P1-30
Pue Hee Park P1-29

Q

Quynh An Nguyen P4-61

R

Ramacahndran Chelliah P4-26
Ramacahndran Chelliah P4-24
Ramacahndran Chelliah P4-25
Ramacahndran Chelliah P4-35
Ramacahndran Chelliah P4-45
Ra Yeon Kim P5-5
Rea Mae Templonuevo P5-46
Rye Gyeong Park P1-18
Rye Gyeong Park P1-22
Rye Gyeong Park P4-28

S

Seal Lee P5-26
Seal Lee P5-50
S. Park P5-50
Sae Byuk Lee P4-54
Samooel Jung P1-7
Sangar Madhuri P5-21
Sangar Madhuri P5-22
Sang Do Ha P4-46
Sang Do Ha P4-55
Sang Do Ha P4-56
Sang Ha Han P4-46
Sang Han Lee P5-35
Sang Han Lee P5-36
Sang Han Lee P5-39
Sang Han Lee P5-40
Sang Han Lee P5-41
Sang Han Lee P5-42
Sang Han Lee P5-44
Sang Hyeok Park P2-11
Sang Hyeok Park P2-12
Sang Hyeok Park P4-46
Sang Nam Oh P2-59
Sang Nam Oh P4-66
Sang Soon Kim P1-28
Sang Suk Kim P3-18
Saoraya Chanmuang P4-61
Se Won Park P4-42
Se Won Park P4-43
Se Eun Lee P2-60
Se Eun Park P5-10
Se Eun Park P5-11
Se Eun Park P5-12
Se Eun Park P5-13
Se Eun Park P5-9
Se Jin Geum P4-27
Se Jin Kim P4-20
Selin Jung P4-60
Selin Jung P4-63
Selin Jung P4-64
Selin Jung P4-65
Seok Geun Jeong P4-34
Seok Min Kim P4-60
Seok Min Kim P4-64
Seok Min Kim P4-65
Seong Youl Lee P3-11
Seongeui Yoo P4-29
Seongeui Yoo P4-32
Seong Gook Kang P5-21
Seong Ho Jo P3-18
Seong Hyun Choi P2-57
Seong Jin Hong P4-51
Seong Man Jeong P3-18
Seongui Yoo P4-30
Seong Woo Jin P2-72
Seong Woo Jin P2-73
Seong Woo Jin P3-20
Seong Woo Jin P4-62
Seong Woo Jin P5-48
Seoug Gook Kang P5-22
Seo Yeon Kwak P4-29
Seo Yeon Kwak P4-30
Seo Yeon Kwak P4-32
Seo yeong Chon P2-44
Seul Gi Baek P4-7
Seul Ki Park P4-49
Seul Ki Par kP5-38
Seun Ah Yang P5-33
Seung Bin Im P4-33
Seung Kim P5-10
Seung Kim P5-11
Seung Kim P5-12
Seung Kim P5-13
Seung Kim P5-9
Seung Wha Jo P4-61
Seung Bae Park P5-48
Seung Bin Im P2-72
Seung Bin Im P2-73
Seung Bin Im P3-20
Seung Bin Im P4-62
Seung Bin Im P5-48
Seung Hyun Sim P2-31
Seung Hyun Sim P2-32
Seung Jong Han P1-17
Seung Min Moon P2-20
Seung Yeon Baek P4-29
Seung Yeon Baek P4-30
Seung Yeon Baek P4-32
Se Yun Choi P3-5
Sham Sun Nahar P4-55
Sham Sun Nahar P4-56
Shin Young Park P4-49
Shin Young Park P5-38
Si Hyeong Lee P5-49
Siva Kumar Malka P1-24
So Hyun Park P5-6
So Min Jo P5-2
So Young Kim P4-9
So Young Yang P2-47
So Hui Jeong P2-5
So Hui Park P4-53
Song Yee Lee P3-10
Song yi Choi P4-46
Son Mi Kim P4-27
Soo Rin Kim P4-27
Soo Chang Na P4-5
Soo Hwan Yeo P4-1
Soo Hwan Yeo P4-29
Soo Hwan Yeo P4-30
Soo Hwan Yeo P4-32
Soo Hwan Yeo P4-4
Soo Hwan Yeo P4-6
Soo Hwan Yeo P4-9
Sook Park P5-50
Soo Yeon Lim P1-30
Soo Yeon Lim P1-29
Soo Young Lee P2-41
Soo Young Lee P4-40
So Ra Choi P3-10
So Soo Kim P4-7
So Won Jang P5-5
So Yeon Kim P5-30
So Yong Kim P4-32
So Young Kim P4-1
So Young Kim P4-29
So Young Kim P4-30
So Young Kim P4-36
So Young Kim P4-4
So Young Kim P4-6
Su Hwan Kim P4-14
Su Hwan Kim P4-15
Su Hyeon Park P2-58
Su Jeong Lee P4-6
Su Ji Jeong P4-39
Su Jung Lee P5-29
Su Been Kim P3-5
Su Bin Lim P4-36
Su Bin Lim P4-47
Sug Chun Lim P5-30
Su Hui Bang P2-57
Su Hwan Kim P4-11
Su Hwan Kim P4-12
Su hyeon Kim P4-53
Su Hyeon Kim P4-58
Sujatha Kandasamy P2-33
Su Jeong Lee P2-59
Su Jeong Lee P2-60
Su Jeong Lee P4-66
Su Jeong Seo P5-16
Su Jeong Seo P5-17
Su Jeong Seo P5-19
Su Ji Jeong P4-40
Su Ji Jeong P4-42
Su Ji Jeong P4-44
Su Jin Oh P5-36
Su Jin Park P3-7
Su Jin Shin P4-40
Su Jin Shin P4-44
Sun Hee Kim P4-4
Sun Hee Kim P4-9
Sun Lee P3-18

Sun Ung Jeong P4-52
Sun Young Kim P1-6
Sung Gi Min P2-38
Sung Gi Min P3-11
Sung Hee Park P1-8
Sung Hee Park P2-37
Sung Hee Park P2-38
Sung Jin Park P1-8
Sung Jin Park P2-38
Sung Ju Cho P1-18
Sung Ju Cho P1-22
Sung Ju Cho P4-28
Sung Kyu Yoon P5-35
Sung Woong Gim P1-14
Sung Woong Gim P4-41
Sung Gi Min P2-44
Sung Gil Choi P2-30
Sung Hee Park P2-44
Sung Hie Hong P1-1
Sung Hwan Eom P2-60
Sung Hwan Kim P5-39
Sung Hwan Kim P5-40
Sung Hyen Lee P4-49
Sung Hyen Lee P5-38
Sung Kyu Yoon P5-36
Sung Wook Choi P1-2
Syng Ook Lee P5-1
Syng Ook Lee P5-24
Syng Ook Lee P5-25

T

Tae Ho Ryu P5-29
Tae Gyung Sung P5-16
Tae Gyung Sung P5-17
Tae Kyung Kim P1-7
Tae Yeon Kim P2-57
Tae Young Kim P4-5
Theresa Lee P4-36
Theresa Lee P4-47
Theresa Lee P4-7

W

Won Kim P5-26
Won Heo P1-17
Won Ho Jeong P1-18
Won Ho Jeong P1-22
Won Ho Jeong P4-28
Won Young Lee P2-67
Won Young Lee P2-69
Won Young Lee P2-70
Won Hee Lee P4-11
Won Ho Hong P2-66
Won Ho Hong P5-46
Woo Soo Jeong P4-1
Woo Soo Jeong P4-4
Woo Soo Jeong P4-6
Woo Soo Jeong P4-9
Woo Won Kang P2-74
Woo Won Kang P5-47
Wool Lim Park P2-18
Wool Lim Park P2-19
Wook Hyeon Seo P5-50
Woo Seok Song P1-15
Woo Soo Jeong P4-29
Woo Soo Jeong P4-30
Woo Soo Jeong P4-32

X

Xiquen Chen P4-26
Xiuqin Chen P4-23
Xiuqin Chen P4-35
Xiuqin Chen P4-45

Y

Yang Jun An P5-26
Yang Jun An P5-50
Yeon Ju Lee P5-26
Yeon Kyoung Kim P5-50
Yan pianpian P4-26
Yang Kyun Park P5-21
Yang Suk Lee P5-17
Yang Suk Lee P5-18
Yang Suk Lee P5-19
Ye Won Lim P4-15
Yea Ji Kim P1-7
Yeo Eun Yun P1-24
Yeon Ju Lee P1-23
Yeon Ju Lee P2-62
Yeong Ji Yun P2-57
Yeong Min Kim P4-27
Yeong Seon Won P2-19
Ye Rim Park P4-58
Ye Sol Kim P2-44
Ye Won Joung P2-31
Ye Won Joung P2-32
Yong Dae Kim P5-2
Yong Sik Cho P1-21
Yong Sik Cho P1-27
Yong Jun Cha P1-11
Yoo Jin Na P2-67
Yoo Jin Na P2-69
Yoo Jung Choi P1-7
Yoo Na Shin P3-8
Yoon Jeong Cho P5-3
Young Bae Chung P2-37
Young Bae Chung P3-11
Young Ha Rhee P5-8
Young Hoon Jung P1-23
Young Hoon Jung P1-26
Young Hoon Jung P2-62
Young Woo Koh P4-33
Young Bae Chung P2-44
Young Bin Yeo P5-36
Young Duk Kim P1-28
Young Hoi Kim P4-5
Young Hoon Kim P4-21
Young Jin Choi P2-39
Young Jun Joen P5-42
Young June Kim P1-28
Young June kim P4-59
Young Min Kim P4-51
Young-Soo Kim P5-4
Young Soo Kim P5-6
Young Soon Bang P5-19
Young Woo Koh P2-72
Young Woo Koh P2-73
Young Woo Koh P3-20
Young Woo Koh P4-62
Young Woo Koh P5-48
Young Wook Seo P2-15
Yu Jin Choi P4-34
Yu Jin Choi P4-33
Yu Jin Choi P5-48
Yu Ri Choi P4-14
Yu Ri Choi P4-15
Yu Ri Lee P5-2
Yue Zhao P5-46
Yu Jeong Gwak P3-7
Yu Jeong Lee P5-33
Yuli Witono P2-74
Yuli Witono P5-47
Yun Won Jang P3-8
Yun Jeong Choi P2-37
Yun Jeong Choi P3-11
Yun Jeong Noh P2-41
Yun Jin Lee P4-31
Yun Ju So P5-33
Yun Sang Choi P1-7
Yu Ri Choi P4-11
Yu Ri Choi P4-12
Yu Rim Lee P2-31
Yu Sen Gwan P5-46

ㄱ

강덕경 P5-27
강덕경 P5-31
강윤한 P2-9
강윤한 P4-19
강창수 P1-4
강혜원 P2-49
강호준 P3-17
강효정 P3-12
강효정 P3-13
강효정 P3-14
곽동훈 P1-10
곽동훈 P1-16
곽신혜 P3-15
구수경 P1-3
권동진 P4-19
권중호 P2-23
권중호 P2-35
권헌중 P1-13
김경아 P3-12
김경아 P3-13
김경아 P3-14
김기영 P2-1
김기영 P2-34
김기영 P4-2
김대운 P3-1
김대운 P3-2
김대진 P2-43
김대홍 P2-17
김대환 P3-12
김대환 P3-13
김대환 P3-14
김덕현 P4-57
김명곤 P3-1
김명곤 P3-2
김명길 P3-15
김명헌 P3-3
김명헌 P4-16
김미경 P1-4
김민우 P5-45
김민현 P2-10
김민희 P2-29
김밝금 P2-1

김밝금 P4-2
김범호 P3-12
김범호 P3-13
김범호 P3-14
김병목 P2-2
김봉신 P2-46
김상섭 P1-20
김상섭 P2-36
김서홍 P3-3
김서홍 P4-16
김선화 P2-23
김선화 P2-35
김성완 P2-34
김성훈 P4-3
김세리 P1-25
김세원 P2-43
김세원 P2-53
김수환 P2-16
김수환 P4-10
김수환 P4-13
김승태 P4-3
김영덕 P1-10
김영덕 P1-16
김영민 P2-29
김영민 P2-65
김영민 P4-48
김영민 P4-50
김영회 P3-1
김영회 P3-2
김유경 P3-16
김유경 P3-17
김윤숙 P1-31
김은경 P1-5
김은아 P2-27
김은주 P4-17
김은혜 P2-16
김인선 P2-10
김재익 P1-3
김정수 P2-10
김종국 P2-71
김종국 P3-1
김종국 P3-2
김종식 P5-27
김주현 P2-55
김주현 P2-56
김지민 P5-27
김지민 P5-31
김지윤 P2-10
김지은 P3-12
김지은 P3-13
김지은 P3-14
김지혜 P2-10
김태경 P1-3
김태원 P1-31
김표현 P2-40
김표현 P2-42
김표현 P2-45
김표현 P2-48
김표현 P2-49
김표현 P2-50
김표현 P2-51
김표현 P2-52
김표현 P2-54
김표현 P2-55
김표현 P2-56
김현영 P2-46
김현왕 P5-14
김현주 P2-52
김현주 P3-15
김현준 P3-3
김현준 P4-16
김형균 P3-4
김호창 P3-6
김효진 P1-20
김효진 P2-36

ㄴ

나유진 P2-68
남인주 P2-10
남종웅 P2-2

ㄹ

류정아 P2-23
류정아 P2-25
류정아 P2-26

ㅁ

마경철 P2-40
마경철 P2-42
마경철 P2-45
마경철 P2-48
마경철 P2-49
마경철 P2-50
마경철 P2-51
마경철 P2-52
마경철 P2-54
마경철 P2-55
마경철 P2-56
문경희 P3-16
문광덕 P2-10
문광덕 P2-21
문광덕 P3-9
문우석 P2-51
문윤기 P2-43
문윤기 P2-53
문혜경 P2-71
민경태 P2-9
민지현 P3-12
민지현 P3-13
민지현 P3-14

ㅂ

박광덕 P2-68
박기덕 P2-43
박기덕 P2-53
박기재 P2-36
박기진 P2-43
박기진 P2-53
박민수 P3-3
박민수 P4-16
박보람 P5-37
박부희 P1-13
박상혁 P2-10
박세진 P4-3
박소희 P2-71
박슬기 P5-37
박신영 P5-37
박여옥 P2-46
박종률 P2-22
박종률 P2-24
박종진 P2-68
박준우 P1-10
박준우 P1-16
박준하 P4-57
박지혜 P5-45
박찬순 P5-37
박회만 P2-22
박회만 P2-24
배수빈 P3-3
배수빈 P4-16
백은진 P3-15

ㅅ

서영욱 P2-22
서영욱 P2-24
서은철 P2-17
성진희 P3-15
손정원 P4-57
손호용 P5-27
손호용 P5-31
송근섭 P5-14
송시훈 P3-4
송영은 P2-28
송영은 P3-2
송은주 P2-28
송은주 P4-17
송정흡 P3-16
송정흡 P3-17
신동근 P2-43
신소희 P2-28
신승렬 P5-45
신정엽 P2-40
신혜승 P2-27
신화균 P2-27

ㅇ

안광환 P1-5
안소은 P3-3
안소은 P4-16
안재일 P4-13
안현아 P2-64
안혜수 P4-48
양영택 P3-16
양영택 P3-17
양해조 P1-13
엄상흠 P1-9
오조교 P3-12
오조교 P3-14
오조교 P3-15
오지연 P4-19
오현주 P2-17
위지향 P2-50
위지향 P2-51
유승민 P1-9
유현채 P2-34
유화영 P5-14
윤성란 P2-23
윤성란 P2-25
윤성란 P2-26
윤성란 P2-35
윤영애 P2-55
윤정우 P1-9
윤혜숙 P1-5
이남길 P2-43
이남길 P2-53
이다움 P2-36

이동훈 P2-16
이동훈 P4-10
이동훈 P4-13
이만효 P5-27
이명진 P3-12
이명진 P3-13
이명진 P3-14
이명진 P3-15
이상봉 P2-36
이상엽 P4-3
이상은 P1-31
이선경 P2-45
이선경 P2-56
이선경 P2-40
이선경 P2-42
이선경 P2-48
이선경 P2-49
이선경 P2-50
이선경 P2-51
이선경 P2-52
이선경 P2-54
이선경 P2-55
이선미 P1-5
이성우 P2-21
이성현 P5-37
이세라 P2-45
이소진 P1-12
이송이 P2-28
이송이 P4-17
이수빈 P1-25
이수원 P2-71
이아영 P2-34
이아영 P4-2
이예향 P2-54
이원영 P2-68
이원종 P4-3
이유석 P2-42
이유석 P2-40
이유석 P2-45
이유석 P2-48
이유석 P2-49
이유석 P2-50
이유석 P2-51
이유석 P2-52
이유석 P2-54
이유석 P2-55
이유석 P2-56
이유진 P3-15
이윤진 P5-27
이윤진 P5-31
이은실 P2-42
이정민 P3-16
이정민 P3-17
이정수 P1-4
이정희 P2-64
이정희 P3-6
이지윤 P2-17
이지현 P1-13
이진우 P2-40
이진우 P2-42
이진우 P2-45
이진우 P2-48
이진우 P2-49
이진우 P2-50
이진우 P2-51
이진우 P2-52
이진우 P2-54
이진우 P2-55
이진우 P2-56
이채미 P2-16
이채미 P4-10
이채미 P4-13
이채윤 P2-16
이채윤 P4-10
이채윤 P4-13
이하늘 P2-65
이하늘 P4-50
이효영 P2-43
이효영 P2-53
이홍수 P1-31
이희원 P5-37
임경란 P2-21
임경란 P3-9
임무혁 P3-3
임무혁 P4-16
임예원 P2-16
임재길 P2-49
임재길 P2-53
임정호 P2-36
임지현 P5-45
임현정 P2-65

ㅈ

장길수 P2-23
장길수 P2-25
장길수 P2-26
장다은 P4-50
장민선 P1-13
장요셉 P2-9
장현준 P3-6
전수경 P2-21
전수경 P3-9
전준영 P2-17
전준영 P2-2
전현일 P5-14
전형원 P1-9
정경미 P2-17
정문철 P1-20
정민정 P2-2
정보미 P2-22
정보미 P2-24
정사무엘 P1-3
정아영 P4-50
정용진 P2-23
정용진 P2-35
정유정 P2-29
정재천 P3-4
정재희 P2-16
정재희 P4-10
정재희 P4-13
조미현 P3-3
조미현 P4-16
조승현 P4-17
조승화 P5-14
조신혁 P2-21
조신혁 P3-9
조영진 P1-20
조용남 P1-31
조정용 P2-65
조정용 P3-4
조하성 P2-68
조한라 P2-50
조한라 P2-51
조형국 P1-16
조형우 P2-16
조형우 P4-13
지수현 P2-42
지수현 P2-40
지수현 P2-45
지수현 P2-48
지수현 P2-49
지수현 P2-50
지수현 P2-51
지수현 P2-52
지수현 P2-54
지수현 P2-55
지수현 P2-56

ㅊ

차지윤 P1-3
채효빈 P1-25
최덕영 P2-29
최미희 P1-13
최민우 P4-57
최성진 P1-5
최소라 P2-28
최소영 P2-21
최소영 P3-9
최송이 P1-25
최영주 P3-12
최영주 P3-13
최영주 P3-14
최유리 P2-16
최유리 P4-10
최유리 P4-13
최윤상 P1-3
최재혁 P2-46
최재호 P2-27
최정희 P2-36
최진혁 P3-4

ㅎ

하기정 P2-46
하상도 P4-57
하주연 P2-9
한상하 P4-57
한신규 P5-45
한아람 P2-2
한현아 P2-28
한현아 P4-17
허재영 P1-31
허창기 P2-16
허창기 P4-10
허창기 P4-13
현석우 P4-57
현정은 P1-25
홍다현 P2-9
홍성진 P4-48
홍성진 P4-50
홍주연 P5-45
황인준 P1-25

업 체 명	(재)환동해산업연구원		
대표자 성명	전 강 원		
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이 메 일	yujin429@mire.re.kr		
주 소	경북 울진군 죽변면 해양과학길 22		
주 요 기 술 및 취 급 품 목	환동해산업연구원은 해양산업기술 지식기반 확충으로 정부정책에 선제적이고 능동적으로 대응하여 해양 R&D 특성화 및 원천기술과 고부가가치 신물질 소재 및 융합기술개발로 경쟁력을 확보하여 해양산업기업 투자유치, 일자리 창출, 해양산업분야 인재육성 및 기술이전을 통한 기업 산업화 지원에 적극 노력해 나가고 있다. 환동해산업연구원은 최첨단 시설 및 장비와 우수한 연구 인력 등을 갖추고 있으며, 연구개발, 기업지원, 해양교육, 해양역사 및 문화육성활동으로 해양산업의 고부가가치 창출에 전력하고 있다. • 해양생물을 이용한 신물질 및 해양유래 소재개발 • 해양산업 전문교육을 통한 인재 양성 • 생물자원 이용 융복합화를 통한 산업경쟁력 강화 • 기업의 자생적 경쟁력 강화 지원 확대 • 대외 협력기반 확충 및 연구원 운영 내실화 • 지역산업단지 기업투자유치, 일자리 창출 • 지역전략산업 클러스터 구축, 글로벌 수준의 기업지원 인프라 및 종합 서비스 체계 구축 • 지역향토자원의 고부가가치 및 융복합산업화, 지역경제 활성화 및 일자리 창출 극대화 • 효율적인 경영시스템 운영 및 연구원 업무역량 강화로 신뢰받는 연구원으로 자리매김		

<table>
<tr><td>업 체 명</td><td colspan="3">(재)경북바이오산업연구원</td></tr>
<tr><td>대표자 성명</td><td colspan="3">한 진 관</td></tr>
<tr><td>전 화 번 호</td><td>054-850-6930</td><td>팩스번호</td><td>054-850-6993</td></tr>
<tr><td>홈 페 이 지</td><td colspan="3">www.gib.re.kr</td></tr>
<tr><td>이 메 일</td><td colspan="3">microbiol@gib.re.kr</td></tr>
<tr><td>주 소</td><td colspan="3">경북 안동시 풍산읍 산업단지 2길 5</td></tr>
<tr><td>주 요 기 술
및
취 급 품 목</td><td colspan="3">
주요기술
1. R&D 지원/협업
<table>
<tr><th>구분</th><th>대상분야</th><th>주요실적</th><th>담당</th></tr>
<tr><td>백신생산용</td><td>· 항원 백신 연구개발
· mRNA 백신 개발
· 백신 전달체 연구개발</td><td>· 재조합 항원 단백질-히알루론산 접합체 백신 개발(추진 중)
· 구조기반mRNA백신개발 플랫폼 구축(추진 중)</td><td>연구기획팀
(850-6811)</td></tr>
<tr><td></td><td>· 바이러스 감염병 백신 개발
· 백신 생산-분리-정제공정 개발
· 백신 유효성 및 안전성 평가
· 백신생산용 세포주 개발
· 신규사업 발굴 및 기획</td><td>· 세포배양방식 A형간염백신 개발
· SFTS/HFRS 백신 후보주 개발
· 바이럴벡터백신 생산-정제공정 기업지원 및 기술이전
· mRNA백신생산 및 유효성 평가 최적화 (추진 중)</td><td>기술개발팀
(850-6844)</td></tr>
<tr><td>천 연 물
(식품등)</td><td>· 천연자원 활용 식의약 소재개발
· 농산물 유용소재 자원화 연구개발</td><td>· 천연물 및 농산물 활용 제품개발
· 천연자원 소재 활성 측정 시스템 구축(추진중)</td><td>바이오연구센터
(850-6930)</td></tr>
<tr><td></td><td>· 헴프 유효성분 라이브러리 구축 및 기능성 연구
· 헴프 유효성분의 미생물 생물막 저해 연구
· 헴프 분자육종 및 조직배양 연구</td><td>· 경북 산업용 헴프 규제자유특구 기획
· 산업식품용 헴프 클러스터 조성 기본계획 수립 조사용역(수행 중)
· Hemp 제품화를 위한 성분 효능 및 기능성 평가 연구용역
· 생강 기능성 소재개발 및 명품화사업 타당성 조사용역</td><td>대마산업지원단
(850-6935)</td></tr>
<tr><td>식품공정</td><td>· GMP, HACCP 운영 총괄
· 일반식품 산업화 공정개발
· 일반식품 제형화 및 제품화</td><td>· 대량소비형 식용곤충 소재화개발
· 오가피 · 생강 유산균 발효 및 농축 제품 개발(진행중)
· 오미자를 이용한 분말스틱 개발(우리가치허니-완료)
· 김치시즈닝 개발 및 제품생산</td><td>공정개발팀
(850-6821))</td></tr>
</table>
2. 비R&D 지원사업
3. 식품분야 시험, 검사
4. OEM제품생산
5. 창업보육

취급품목(제공서비스)
1. R&D지원 : 백신생산 연구, 천연물 연구, 식품공정
2. 비R&D지원 : 규제자유특구사업, 경북푸드-테크 구축사업, 인력양성패키지, 대경혁신인재양성사업 등
3. 식품분야 시험,검사 : 자가품질위탁검사, 일반의뢰분석, 영양성분분석
4. OEM제품생산 : 장비 사용 및 단순위탁, OEM의뢰
5. 창업보육 : 입주기업 관리, 기업지원사업 발굴 및 수주 지원, 기술개발 관리
</td></tr>
</table>

업 체 명	(재)전남바이오산업진흥원 천연자원연구센터		
대표자 성명	이 학 원		
전 화 번 호	061-860-2600	팩스번호	061-864-7105
홈 페 이 지	http://www.jbf.kr		
이 메 일	jykim761217@jbf.kr		
주 소	전남 장흥군 안양면 우드랜드길 288 (재)전남바이오산업진흥원 천연자원연구센터		
주 요 기 술 및 취 급 품 목	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·중견기업에 이전하고 원할한 원재료 수급을 위해 농가와 계약재배를 함으로써 기술의 제품화와 농가수익 증대의 선순환 생태계를 구축하고 있습니다. 또한 입주기업제도 및 창업보육센터의 운영을 통해 벤처기업의 창업 및 보육을 활성화 시키고 산업체를 위한 현장인력양성과 마케팅 지원등 다각적인 기업지원 활동을 수행하고 있습니다.		

업 체 명	경상북도농업기술원 감수출농업기술지원단		
대표자 성명	김 종 국		
전 화 번 호	054-530-1305	팩스번호	054-530-1309
홈 페 이 지			
이 메 일	kjk@knu.ac.kr		
주 소	경북 상주시 경상대로 2559 경북대학교 상주캠퍼스 식품외식산업학과		
주 요 기 술 및 취 급 품 목	◆ 사업명 : 경북 감의 수출 확대 및 부가가치 향상을 위한 현장애로 기술지원 ◆ 추진배경(필요성) ▫ 경북지역 떫은 감 생산량은 111,495톤(51%), 생산액은 1,030억원(47%)으로 주요 소득 작목이나 과잉 생산으로 가공기술로 곶감 상품화를 통한 수출 주도로 농가 소득 안정이 필요함 ▫ 곶감 생산량은 연간 15,203톤, 생산액은 2,024억 원을 나타내고 있음 ▫ 떫은 감 수출량은 해마다 증가하는 추세이나, 곶감의 유통 특성상 콜드체인을 통한 현지 유통과 유통 이력 및 수출 후 사후 관리를 통한 품질 유지가 곶감 수출 경쟁력의 핵심 요인 ▫ 떫은 감 재배기술과 가공품 개발 및 마케팅 · 수출까지 전 단계에 걸쳐 현장에서 필요한 기술개발 및 컨설팅 지원이 필요함 ▫ 지역특화 작물의 부가가치 증대와 농가의 안정적 소득증대를 위하여 연구직, 대학교수, 곶감 가공 전문가, 공무원 등으로 산학 ◆ 사업추진 목표 ▫ 감(곶감) 수출 활성화 및 부가가치 증대 • 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(곶감) 수출 작목반 육성 ▫ 고품질 원료 감 생산지원 시스템 구축 • 수입국 기호도에 맞는 재배생산 시스쳄 확보 • 수출용 고품질 감 생산 기술 개발 • 수출용 감 생산을 위한 수출대상국의 농약잔류허용기준(MRL) 및 농약에 대한 안전관리 허용물질(PLS) 작성 후 농가 보급 • Global GAP 인증을 위한 기준안 마련 및 추진 ▫ 가공 및 산업화 지원 • 수출용 고품질 곶감 및 다양한 감 가공제품 기술 개발 • 유황대체 처리를 통한 위생적이고 안전한 고품질 곶감 및 감말랭이 생산 기술 개발 • 포장재, 저장유통기술 개발 및 소비자 신뢰 확보를 위한 인증제도 구축		

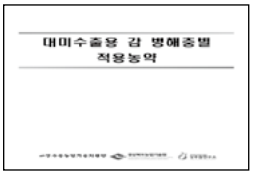
주 요 기 술 및 취 급 품 목

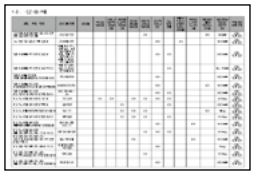
◆ 우수성과 및 애로사항 해결

▫ 감과수농가 동해피해 예방법 및 병충해 방제법 확립 등 기술지도



▫ 대미 수출용 감 병해충별 적용농약 사용기준서 제작 및 농가보급

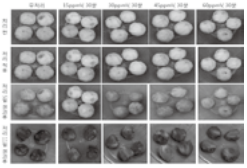


▫ 유황대체 처리 이산화염소 가스 훈증법 및 훈증제 농가 보급

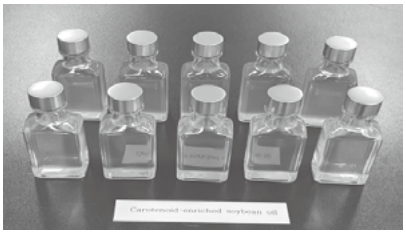
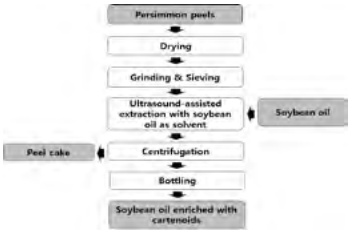
- 한국떫은감생산자협회를 통해 상주4농가, 청도1농가 시범사업 실시
- 이산화염소가스훈증방법 실시 : 농도 45ppmv, 훈증시간 30분





▫ 감을 활용한 다양한 가공품 개발에 따른 농가 체험형 교육 실시

- 초음파와 식용류 병용 감 껍질로부터 카로티노이드 추출공정 및 제품개발
- 카로티노이드 추출 특성 및 최적 공정 조건 확립

▫ 감을 활용한 다양한 가공품 개발에 따른 농가 체험형 교육 실시

- 감을 활용한 디저트 메뉴를 개발하여 감 소비를 촉진하며 농가 현장체험에 활용할 수 있도록 가공품 개발 교육




- 고품질 감식초 제조를 위한 농가 현장 기술지도

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주 소	전남 순천시 중앙로 255 A2 102호		
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및
취 급 품 목</td><td colspan="3">
<table>
<tr><th>구 분</th><th>최종 목표</th></tr>
<tr><td>축산(오리) 도축 공정 무인화</td><td>- 오리 입고, 전기/CO2 충격, 도체 정렬, 위치고정, 방혈, 절개 공정 등의 자동화/무인화 설비 개발
· 오리 킬링 공정 자동화 시스템 개발
- 공정 자동화를 위한 모니터링 및 정보 수집 등 자동화 통합 제어 기술 개발
- 통합 운영 플래닝 기술 개발</td></tr>
<tr><td>신뢰성 검증</td><td>- 수요기업을 대상으로 테스트베드 구축
· 킬링 (경동맥) 절개 장치의 성능 평가 검증
- 공정 데이터를 수집
- 공정 최적화 솔루션 개발과 적용을 통한 성능평가 검증</td></tr>
<tr><td>D/B 구축</td><td>- 웹기반 5G 통신 체계 구축</td></tr>
</table>
기대 효과

▫ 기술적 측면
- 오리의 방혈점 인식을 위한 딥러닝 기반의 인공지능 아키텍처 확보
- 도체 안정화 장치, 경동맥 천공 전용 비젼 시스템, 축산/식품 생산용 천공 로봇장치 등의 개발로 오리 자동화 공정 시스템의 구축
- 킬링 공정 시 수작업 및 자동화 후 육질, 선도 분석을 통한 데이터를 확보하여 향후 연구의 기반으로 활용

▫ 경제적 · 산업적 측면
- 킬링 작업자 대비 높은 정확성을 구축하여 품질 이상육 방지 및 제조손실 감소
- 도체 생산성 향상을 통한 오리 도축업계의 매출 증진
- 신규 시스템의 개발로 인한 기존 킬링 작업자의 복지 향상
- 폐기되는 혈액의 자원화를 통한 폐수처리 비용 감소 및 신규 부가가치의 창출
- 오리산업의 활성화로 신규 조직 및 인력의 고용창출 기대
- 기업의 애로사항 해결 및 부산물 사업의 상품화를 통한 매출 활성화 기대
- 국내에 적용되지 않은 자동화 시스템을 도입하여 오리산업의 경쟁력을 확보
</td></tr>
</table>

업 체 명	㈜힘찬걸음		
대표자 성명	김 병 현		
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한국무역협회 회원사 가입

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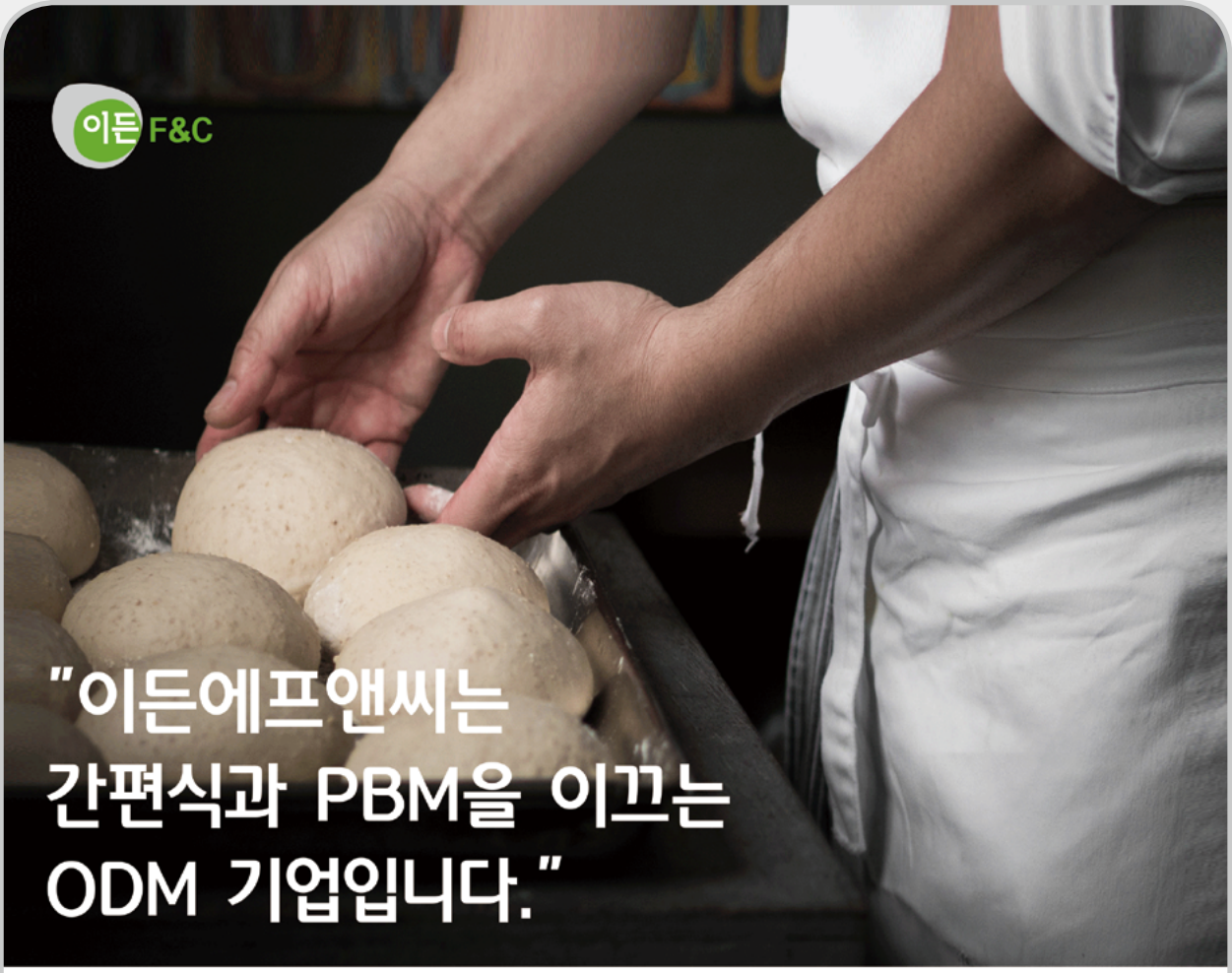

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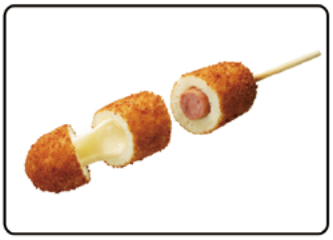

[핫도그] 미국, 호주, 싱가포르, 중국 등으로
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