한국식품저장유통학회

국제학술대회 및 정기총회

KoSFoP 2023 44th International Symposium and Annual Meeting

일 시 2023.08.16.(수) - 08.18.(금) **장 소** 제주국제컨벤션센터

주 제 New Opportunities and Possibilities of K-Food

주 관 사단법인 한국식품저장유통학회 The Korean Society of Food Preservation

주 최 재단법인 발효미생물산업진흥원 Microbial Institute for Fermentation Industry, KFRI 한국식품연구원, 제임실치즈&식품연구소, 장흥군버섯산업연구원 Jangheung Research Institute for Mushroom Industry, 한국핵융합에너지연구원 KOREA INSTITUTE OF FUSION ENERGY, JAMI Jeonju Agrobio-Materials Institute 전주농생명소재연구원, 농촌진흥청 국립농업과학원, 국립호남권생물자원관 섬야생생물소재 선진화연구단, 식품의약품안전처, 영남대학교 생활과학연구소, 동아대학교 바이오식품소재산업화연구소, 동아대학교 바이오헬스규제과학IP선도센터, 전주대학교 농생명융합연구소, 충남대학교 농업과학연구소, 농업과학기술연구소 경북대학교, 경북대학교 식품생물산업연구소, 경북대학교 발효생물공학연구소

후 원 ILDONG 일동바이오사이언스, 한국식품안전관리인증원, 한국식품산업협회 Korea Food Industry Association, NST BIO, (주)세존F&B, 순창군, 대구대학교 DAEGU UNIVERSITY, SGS, atc, DAEHAN CHEMTECH, 제주대학교, 전북바이오융합산업진흥원, 경북대학교 IP융합인재양성사업팀, 동아대학교 푸드바이오이노베이션센터

사단법인 한국식품저장유통학회
The Korean Society of Food Preservation

대한민국 치즈산업의 중심
재 임실치즈&식품연구소
Imsil Cheese & Food Research Institute

대한민국 치즈산업의 중심
(재)임실치즈앤식품연구소가 만들어 가겠습니다.

임실치즈의 대부(代父) **지정환**(벨기에명:디디에 세스테벤스) **신부님**이 임실 성당의 주임신부로 오셔서 가난한 농촌을 살리 고자 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

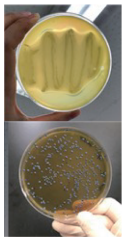
2022년 : **임실치즈 역사문화관 개관** 및 운영
2020년 : 2020 대한민국 베스트 신상품 **향긋한 독활차** 대상 수상
2019년 : 중소벤처기업부 산학연협력기술개발사업 공동개발기관 지정
2018년 : 유제품가공사 민간자격증 시행기관 지정
2016년 : (재)임실치즈과학연구소→**(재)임실치즈앤식품연구소**로 명칭 변경
2014년 : 산업통상자원부 장관상 수상
2011년 : 연구소 개소

연구수행 내용

지역특산자원 활용 소재개발 연구 활발

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

연구수행 내용



기능성 프로바이오틱스 균주개발 지속

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

DAESANG

대한민국 NO.1답게 새로움을 담다

김치의 또 다른 이름

종가
JONGGA

김치 부문 브랜드파워 1위
한국능률협회컨설팅 선정
(2001년~2023년)

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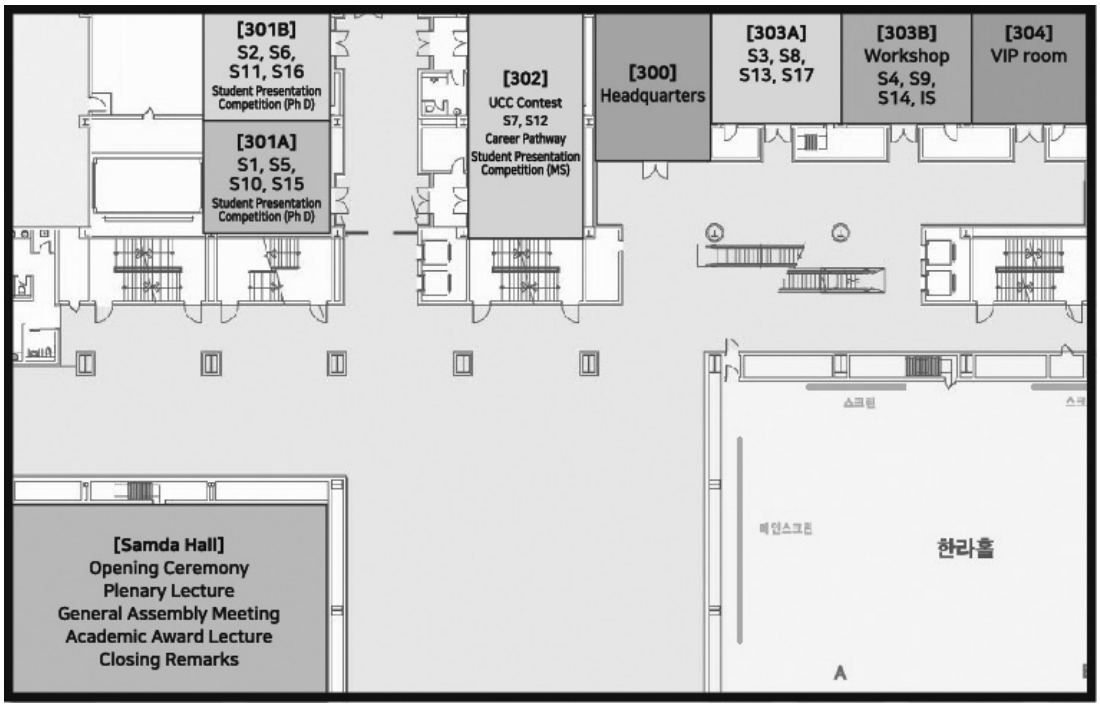

▷▷▷ 학술대회 일정표

2023 KoSFoP 44th International Symposium and Annual Meeting

August 16 (Wed)						
Time \ Place	Rm 301A	Rm 301B	Rm 302	Rm 303A	Rm 303B	Exhibition & Poster Hall
12:30-17:00	Registration					
13:00-18:00	Student Presentation Competition (Ph. D.)		UCC Contest	Workshop		Capstone Design Competition
18:00-20:00	Board Member Meeting					
August 17 (Thu)						
Time \ Place	Rm 301A	Rm 301B	Rm 302	Rm 303A	Rm 303B	Exhibition & Poster Hall
08:30-16:00	Registration					
09:20-09:30	Opening Ceremony					
09:30-10:20	[Plenary Lecture] Major consumer interests in processed meat products in the U.S. and the K-Foods Dr. Dong U. Ahn (Iowa State University)					
10:20-10:30	Break					
09:30-11:10	Session 1 Industrialization strategy and status of eumycetes utilization materials	Session 2 Exploring the scientific evidence for the functional efficacy of *Rhus verniciflua* extract	Student Presentation Competition (MS)	Session 3 K-Food safety management with smart HACCP	Session 4 Research on safety management of environmental pollutants in food	Poster Session 1
12:00-13:30	Lunch					
13:30-13:50	General Assembly Meeting / Award Ceremony					
13:50-14:30	[Academic Award Lecture] The softening of persimmon fruits (*Diospyros kaki*, L.) Seung-Ryeul Shin (Daegu Haany University)					
14:30-14:40	Break					
14:20-16:00	Session 5 Development of kombucha and health functional foods using extraction and fermentation technology	Session 6 Investigation of bio-materials and functional diversity from wildlife in Korean islands	Session 7 Research on mechanism of quality attribute change during storage of food	Session 8 Exploring the scientific basis for setting food use-by-date and spreading consumer consensus	Session 9 Present and future of development of functional ingredients for preventing and improving sarcopenia	Poster Session 2
16:00-16:10	Break					
16:20-17:50	Session 10 Plasma technology for improving post-harvest crop storage	Session 11 Functions, safety and microbiome in Korean traditional fermented foods	Session 12 Trends of intellectual property in food industry: Beyond food to biohealth	Session 13 Functionalized K-resource : Current and future strategies	Session 14 Investigation of pesticides in animal food distributed in Korea	Poster Session 3
August 18 (Fri)						
Time \ Place	Rm 301A	Rm 301B	Rm 302	Rm 303A	Rm 303B	Exhibition & Poster Hall
09:00-10:30	Registration					
09:30 -11:00	Session 15 Vitalization of Korean liquor industry to expand consumption of local agricultural products	Session 16 Prospect of industrial technology for FOOD-TECH	Career Pathway	Session 17 Strategy for the development of agricultural biomaterial industry for upcoming era	International Session New trends in food technology	Poster Session 4
11:00-12:00	Closing Remarks / Prize Drawing / Competition and Poster Award Ceremony					

▷▷▷ 초청의 글

존경하는 한국식품저장유통학회 회원 여러분!

우리 학회는 지난 30년간 식품 저장 및 가공 관련의 전문 학술단체로 그 역할을 충실히 수행하여 왔으며, 회원 여러분의 적극적인 협조와 성원에 힘입어 현재 2,000여 명의 회원을 보유한 대표적인 식품관련 학술단체 중의 하나로서 우리 학회에서 발간되는 학회지의 규모와 수준 또한 크게 높아 졌습니다.

우리 학회에서는 매년 국제학술심포지엄 및 정기총회를 개최하고 있으며, 올해에도 8월 16일(수)부터 18일(금)까지 "New Opportunities and Possibilities of K-Food"라는 주제로 제44차 국제학술심포지엄 및 정기총회를 제주국제컨벤션센터에서 개최합니다.

이번 학술대회에서는 Iowa 대학 안동욱 교수님의 "Major Consumer Interests in Processed Meat Products in the U.S. and the K-Foods"라는 제목의 기조강연이외에도 학술상 강연, 17개 세션과 international 세션에서의 학술발표 및 250여 편의 포스터 발표가 있을 예정입니다. 특히 국내 유수의 식품관련 연구기관과 산업체 및 대학들이 참가하여 그동안 수행했던 귀중한 연구결과들을 소개하고 교류하는 장을 제공할 것입니다. 이외에도 박사과정 대학원생 논문발표대회를 비롯하여 UCC 공모전, 통계워크숍, 캡스톤디자인 경진대회 등이 진행됩니다.

우리 학회에서는 이번 학술대회를 성공적으로 진행하기 위하여 최선을 다해 준비하였습니다. 우리 학회에서 정성들여 준비한 이번 학술대회에서 회원 여러분의 활발한 학술교류와 함께 회원들 간의 친목도모가 활성적으로 이루어지시길 바랍니다.

이번 학술대회를 성황리에 개최할 수 있게 준비해 주신 운영위원장님을 비롯하여 모든 운영위원님들, 그리고 사무국 직원 여러분에게 감사드립니다. 또한, 우수한 논문을 발표해 주시는 연구자님들, 세션 좌장을 맡아주시는 교수님들, 어려운 상황에서도 지원을 아끼지 않으신 세션 후원기관 및 산업체 관계자님들에 깊은 감사의 말씀을 드립니다.

끝으로 우리 학회의 모든 회원님들이 항상 건강하시고 가정에 무궁한 발전과 축복이 함께 하시길 기원합니다.

2023년 8월

㈔한국식품저장유통학회장 김 영 수

▷▷▷ Plenary Lecture

Major consumer interests in processed meat products in the U.S. and the K-Foods

Dong Uk Ahn
Iowa State University, USA

Over the past decade, several noticeable consumer interests in meat and other food products have been in the U.S. However, those trends are not limited to the U.S. market but are shared by consumers in many other countries worldwide. Consumers are more concerned about their foods' health, convenience, and safety than ever. Consumers are more interested in further processed meat, ready-to-eat food products, organic foods, low-fat/low sodium products, and uncured meat products. Consumers are more interested in the taste and flavor of foods, natural and functional ingredients, small portion sizes, combo-type foods, and eating outside. Also, the extensive exposure to international cultures and travel increased their interest in exotic/international foods. The meat and food industry, in general, is continuously changing to attract consumers by developing new products, introducing variations in a product, using new processing technologies and packaging, and marketing channels. The awareness of and interest in Korean foods has increased dramatically over the past decade, and several new Korean foods are also visible in the U.S. market because of the improved status in the international society through the rise of K-Pops, K-drama, and the economy. However, K-foods are not considered one of the major players in the U.S. food market. The K-foods are perceived as healthy, good taste, and high quality, but expensive and difficult to prepare. A few K-foods are known to U.S. consumers, but their availability and accessibility, price, and visibility are low. Also, compared with other major international foods, K-foods have no sauces that consumers can use in K-food preparations. To increase the interest and appeal of K-foods, the following strategies may be useful: emphasize the unique characteristics of K-foods (healthfulness), certify processor/producers and standardize K-foods, improve price/competitiveness, develop unique sauces and recipes (Bulgogi, bibimbap, etc.), introduce fermented foods and traditional beverages and alcohol products, develop more representative food items, develop ready-to-eat K-style products, and use Korean communities and businesses in the U.S.

▷▷▷ Academic Award Lecture

The softening of persimmon fruits (*Diospyros Kaki*, L.)

Seung-Ryeul Shin

Daegu Haany University, Korea

The cell wall components, polygalacturonase and β-galactosidase activities, cell wall protein, and structure of persimmon fruit were investigated during ripening and softening. The cell wall components were decreased during ripening and softening. Contents of pectin and alkali-soluble hemicellulose were increased during ripening, but contents of acid-soluble hemicellulose and lignin were decreased. Contents of pectin and alkali-soluble hemicellulose were decreased in soft persimmon however acid-soluble hemicellulose was increased remarkably. Cellulose contents were increased during ripening and this tendency was notable in soft persimmon. Contents of total pectin and insoluble pectin were increased during ripening but decreased in soft persimmon. Content of water-soluble pectin were increased during ripening and softening. Glucose, arabinose and total non-cellulosic neutral sugar contents of alcohol-insoluble substance were increased during ripening, but arabinose, galactose and total non-cellulosic neutral sugar contents were decreased in soft persimmon. The main non-cellulosic neutral sugars of cell wall were galactose, arabinose and glucose. Arabinose and galactose contents were decreased during ripening and this tendency was remarkable in soft persimmon. Pectic fraction contained 70-82% of uronic acid. The main non-cellulosic neutral sugars of hemicelluloses were glucose, xylose, and galactose. Galactose content of hemicellulose were decreased during ripening and softening. Polygalacturonase and β-galactosidase activities were not detected at turning stage. However polygalacturonase activities of mature and soft persimmon were 55.01 and 206.70 units/100 g of freeze dried, respectively. β-Galactosidase activities of mature and soft persimmon were 21.79 and 380.23 units/100 g of freeze dried, respectively. Polygalacturonase have two isoenzymes and both polygalacturonase Ⅰ and Ⅱ have molecular weight of 55,000 daltons. Polygalacturonase Ⅰ has Vmax of 0.195 μmole reducing-sugar/mL/30 min. and Km value of 3.50 mg/mL. The optimum temperature and pH of the enzyme appear to 40℃ and 3.5, respectively. Polygalacturonase Ⅱ has Vmax of 0.110 μmole reducing-sugar/mL/30 min. and Km value of 2.50 mg/mL. The optimum temperature and pH of polygacturonase Ⅱ appear 40℃ and 4.0, respectively. Polygalacturonase I was fairly stable at 60℃ while polygalacturonase Ⅱ appeared to be stable up to 40℃. β-galactosidase has molecular weight

of 115.000 daltons. β-galactosidase has Vmax value of 0.095 mmole p-nitrophenyl-galactoside and Km of 1.8×10-2 mM. The Optimum temperature and pH of β-galactosidase was 45℃ and 4.2, respectively. β-Galactosidase was inhibited by SDS. Salt-soluble protein content of green and mature persimmon were 1.5 and 2.0 mg/100 g of freeze dried, respectively, but that of soft persimmon was 58.9 mg/100 g of freeze dried. Protein contents of cell wall were increased during ripening but decreased in soft persimmon. The chrotogram patterns of salt-soluble proteins were remained same during ripening but the pattern of soft persimmon was different from those of ripening persimmon. Persimmon has two kinds of cell wall proteins and those proteins were changed into soluble protein during softening. Cell and intercellular space enlarged during ripening. The cell of soft persimmon was separated each other. Small vesicle appeared in cytoplasm of turning and mature persimmon. The middle lamella of intercellular space was degraded in mature persimmon. Activities of polygalacturonase and β-galactosidase were increased during ripening and softening of persimmon. The pectin contents of middle lamella in cell wall and contents of arabinose, galactose in pectin were decreased remarkable. The middle lamella of cell wall was degraded during softening of persimmon. The result was softed persimmon fruits.

Session 1

Industrialization strategy and status of eumycetes utilization materials

Organized by Jangheung Research Institute for Mushroom Industry

Session time : 10:30–12:00 **Venue : Room 301A**

Chaired by Ho Jin Heo (Gyeongsang National University)

speaker 1

Strategy for materializing regionally specialized resources using mushroom mycelia culture technology

Kyung-Yun Kang
(Suncheon Research Center for Bio Health Care)

speaker 2

Development of health functional foods and applied products using mushrooms

Da Im Jung (Onsemiro)

speaker 3

Development of health functional foods and applied products using

Seungju Kim (DayNbio Corp.)

speaker 4

Unveiling the structural diversity of seaweed polysaccharides through mass spectrometry: Unlocking the potential of high-value marine materials

Nari Seo (Chungnam National University)

speaker 5

Eumycetes research trend of domestic and international and differentiation strategy

Seongwoo Jin (Jangheung Institute for Mushroom Industry)

▷▷▷ Symposium Session

>>> S1

Industrialization strategy and status of eumycetes utilization materials

Chaired by Ho Jin Heo (Gyeongsang National University)

>>> S1-1

Strategy for materializing regionally specialized resources using mushroom mycelia culture technology

Kyung-Yun Kang

Suncheon Research Center for Bio Health Care, Korea

The need for various strategic materials industrialization using natural resources is becoming an issue as the income level improves and the health-oriented consumption propensity increases. This can be attributed to the increase in consumer interest in health-related products due to the increase in the incidence of adult diseases and chronic diseases, and the increase in value consumption due to the increase in the elderly population. In particular, interest in bioconversion materials among new materials using natural resources is increasing due to the recent increase in consumption for immunity and health due to corona. In order to respond to such demand, we utilized apricot plums and reed roots among local natural resources to materialize using mushroom mycelium instead of using enzymes and microorganisms. In the case of plums, unused plums were lyophilized into powder and used as a medium composition for Poria cocos mycelium to make a whitening functional skin improvement material. It has been made into a skin improvement material. It is thought that the developed material will be applied to inner beauty products in the future and strategically used for industrialization of specialized regional materials using mushroom mycelium.

>>> S1-2

Development of health functional foods and applied products using mushrooms

Da Im Jung

Onsemiro, Korea

Tomatoes contain various antioxidants, including two carotenoids, lycopene and beta-carotene, vitamin C and vitamin E, and polyphenols such as kaempferol and quercetin. Utilizing tomatoes with reduced marketability, we attempted to develop a material obtained by fermenting tomato remnants with mushroom mycelium. As a way to increase absorption of tomato physiologically active substances and safety to the skin, tomato peel remaining after extract of over mature or reduced quality tomato was fermented with mushroom mycelium to extract antioxidants such as vitamins and rutin from tomatoes. Tomato fermented with mushroom mycelium contains useful ingredients such as β-glucan and ergosterol of mushrooms, so it is possible to develop materials effective for skin health and anti-aging. A study was conducted to develop a material containing beta-glucan ergosterol produced by mushroom mycelium fermentation in tomato peel and lycopene extracted from juice. The optical evaluation of skin reactions applied the criteria of the international contact dermatitis research group (ICDRG) and the safety evaluation guidelines of the personal care products council (PCPC). The content of beta-glucan and ercosterol, which are useful components of mushrooms, and tomato lycopene content were increased through fermentation of tomato remnants mushroom mycelium. As a result of the primary stimulation test (safety, clinical evaluation) of the developed material, it was confirmed as non-irritating, and as a result of improving hyperpigmentation (functionality, clinical evaluation), it was confirmed that it was improved. Therefore, tomatoes fermented with mushroom mycelium are expected to be highly utilized as a useful material that combines antioxidant effects and immune components of mushrooms.

>>> S1-3

Development of health functional foods and applied products using mushrooms

Seungju Kim

DayNbio Corp., Korea

The mushroom industry was considered functionality and safety is experiencing a post-COVID-19 crisis. Both farmers and distributors were face decreased their source of income due to the rapid change in the mushroom industry. These problems can be overcome through the development of biomaterials for health functional foods using mushrooms and the development of applied products. The distribution structure of the major consumers is elderly in their 60s and 70s. Most mushrooms are distributed in the form of agricultural products, either dried or in a raw. Mushrooms are known to help with health, but they are not a favorite food ingredient for young people in their 30s and 40s, the main consumption abiltiiy group. Therefore, it is necessary to develop bio-materials for health functional foods that can be consumed by young people while maintaining the functionality of mushrooms. Efforts to expand the industry through the development of various applied products should be paralleled without stopping at developing materials. At the highlighting the advantages related to the development of health functional food materials of mushrooms and carrying out industrial expansion through the development of various application products, the stagnant mushroom industry can be revived. Consumers will be satisfied with improving the quality of life, and industrial groups will be able to improve income through various distribution methods and industrial improved. Compared to other crops and natural products, mushrooms can produce health functional food raw materials with improved functionality by taking advantage of the fact that it is easy to increase the target useful ingredient content through the control of the growth environment. In addition, it is relatively easy to standardize raw materials, which is the homework of materialization of natural materials, and various challenges for process improvement can be attempted.

›››S1-4

Unveiling the structural diversity of seaweed polysaccharides through mass spectrometry: unlocking the potential of high-value marine materials

Nari Seo

Chungnam National University, Korea

Marine-derived polysaccharides are attracting considerable interests as high value-added industrial materials due to increased recognition of their potential benefits. Despite their significant functional attributes, research efforts have predominantly focused on exploring the functional properties of polysaccharides while neglecting the essential aspect of their structural characterization. Above all, understanding their structures remains an analytical challenge as they reveal classes of macro- and complex- molecules that share similar but imprecise monosaccharide composition, linkage position, and monomer arrangement. In this study, we have developed a groundbreaking analytical platform based on liquid chromatography-tandem mass spectrometry (LC-MS/MS) that could be an innovative means of elucidating the functional roles and improving quality of marine-derived polysaccharides. In addition, we successfully determined structure and content of fucoidan and alginic acid, which are functional polysaccharides from brown algae. Then, the correlation between their physicochemical properties and biological reactions was investigated, and furthermore, they assisted in the screening of raw materials. Our strategy presents a systematic and efficient approach for the characterization of the most dominant polysaccharides in nature, ultimately providing insight into applications as high value-added materials in fields such as food science, pharmaceuticals, cosmetics, and biomaterials.

>>> S1-5

Eumycetes research trend of domestic and international and differentiation strategy

Seongwoo Jin

Jangheung Institute for Mushroom Industry, Korea

Eumycetes include fungi, yeasts, and mushrooms, with 72,000 species reported worldwide. The bio industry related to the microorganisms is recognized as a solution to various problems such as disease, food, environment, and energy. Eumycetes are essential resources of the high value-added bio industry in preparation for the future economy. Recent research trend of eumycetes were studies on the physiological activity of mushroom mycelium, such as anticancer activity, antioxidant activity, and immunity enhancement. And research on the field of fermentation technology using eumycetes are progressing. Industrial value of eumycetes is increasing at that same time. Eumycetes fermentation technics are becoming an important technology in the development of alternative protein products. It is an issue in the food industry, and plays a major role in reproducing the texture and taste of animal proteins in the development of alternative meat. Also, eco-friendly and healthy food additives are being developed through eumycetes fermentation. Eumycetes fermentation technology is expected to become an important in the future food market as an eco-friendly, healthy, and sustainable. In addition, eumycetes had the potentials for development as eco materials in various industries such as alternative leather, interior materials, and insulation materials. According to these requests, to lay the foundation for industrialization of microbial resources, eumycetes bio health material commercialization support center is being established. Through the development of high value-added products using eumycetes, such as health functional foods, food materials, and bioactive materials, we secure competitiveness and promote sustainable growth of small and medium enterprises.

Session 2

Exploring the scientific evidence for the functional efficacy of *Rhus verniciflua* extract

Organized by Imsil Cheese & Food Research Institute

Session time : 10:30–12:00 **Venue : Room 301B**

Chaired by Ki-Chan Ha (Healthcare Claims and Management Incorproation)

speaker 1

Reducing urushiol content in lacquer tree stem bark and its potential application in food

Han-Seok Choi
(Korea National College of Agriculture and Fisheres)

speaker 2

The protective effects of *Rhus verniciflua* extract (IBF-R) against obesity and its underlying mechanisms in hepatic and adipose tissue metabolism

Geum-Hwa Lee
(Jeonbuk National University Hospital)

speaker 3

Non-clinical strategies for the development of health functional food using plant-based materials including *Rhus verniciflua* extract

Youngchul Kim
(CORESTEMCHEMON Inc.)

speaker 4

Randomized double-blind human trial to evaluate efficacy and safety of *Rhus verniciflua* stokes *(Lacca Sinica Exsiccata)* and *Eucommia ulmoides* Oliver *(Eucommiae Cortex)* extract combination (ILF-RE) on improvement of liver function

Soo Jung Park (Woosuk University)

>>> S2

Exploring the scientific evidence for the functional efficacy of *Rhus verniciflua* extract

Chaired by Ki-Chan Hae (Healthcare Claims and Management Incorproation)

>>> S2-1

Reducing urushiol content in lacquer tree stem bark and its potential application in food

Han-Seok Choi

Korea National College of Agriculture and Fisheries, Korea

Rhus verniciflua Stokes (RVS), a deciduous tree of the Anacardiaceae family and indigenous to East Asia, is a representative example, and it is commonly known as the lacquer tree. RVS has been used as a food additive and as a traditional herbal medicine for cancers, gastrointestinal disorders, and diabetes since ancient times, despite its content of the plant allergen, urushiol. A new biological approach for the removal of urushiol from RVS stem bark (RVSB) using mushrooms is described. The components of urushiol congeners [C15 triene (m/z 314), C15 diene (m/z 316), C15 monoene (m/z 318), and C15 saturated (m/z 320)] were purified by HPLC and identified by GC–MS. A C15:3 (3–pentadecatrienly catechol) was found to be most abundant in RVSB. Urushiol analogues decreased remarkably from 154.15 to 10.73 mg/100 g (approximately 93%) by Fomitella fraxinea. Fermented Rhus verniciflua stem bark (FRVSB) extract, an urushiol–free extract of Rhus verniciflua Stokes (RVS) fermented with Fomitella fraxinea, has various biological activities. The potential toxicity of the FRVSB extract following single and repeated oral administration to Sprague–Dawley rats. In the single dose toxicity study, the FRVSB extract was administered orally to male and female rats at single doses of 0, 2,500, 5,000, and 10,000 mg/kg. No animals died and no toxic changes were observed in clinical signs, body weight, and necropsy findings during the 15–day period following administration. The approximate lethal dose of the FRVSB extract was 〉10,000 mg/kg in both

genders, the oral no-observed-adverse-effect level of the FRVSB extract was 〉5,000 mg/kg/day in both genders, and no target organs were identified. FRVSB extract is increasingly used in fermented soy products, fermented vinegars, and certain alcoholic beverages. Addition of FRVSB extract to doenjang resulted in a 28.2-45.4% increase in the amino acid content and a 1.3- to 1.5-fold increase in the concentrations of glutamic acid, which imparts a savory flavor to doenjang. PCA plots of electronic nose analysis data showed a significant differentiation of FRVSB-vinegar from different acetic acid bacterial strains. A sensory evaluation of all DRVs indicated that FRVSB fermented using Acetobacter malorum was superior in the aspect of flavor, tasted and overall preference.

>>> S2-2

The protective effects of *Rhus verniciflua* extract (IBF-R) against obesity and its underlying mechanisms in hepatic and adipose tissue metabolism

Geum-Hwa Lee

Jeonbuk National University Hospital, Korea

Obesity remains a critical global health concern. In light of this, we investigated the protective role of IBF-R, an extract derived from Rhus verniciflua, against obesity and its underlying mechanisms in the liver and adipose tissues of obese mice. The eight-week study with ob/ob mice demonstrated that IBF-R administration alleviated body weight, liver weight, and adipose tissue weight without affecting food intake. In both the liver and epididymal white adipose tissue (eWAT), the extract was found to regulate lipid metabolism. This was achieved by the reduction of lipogenesis and adipogenesis through the preservation of the AMPK-SIRT1 signalling pathway and modulation of the mTOR-SREBP1-ER stress pathway. In brown adipose tissue (BAT), the extract attenuated the effects of hyper-nutrient condition-induced mTOR-SREBP1-ER stress. This situation typically leads to amplified ROS production and subsequent mitochondrial dysfunction. However, IBF-R extract elevated the markers of mitochondrial biogenesis and thermogenesis, PGC1α and UCP1, through the maintenance of AMPK-SIRT1 signalling and the regulation of the mTOR-SREBP1-ER stress-mitochondrial function axis. Furthermore, the extract restored PGC1α acetylation through the SIRT1 pathway. Overall, our results suggest that IBF-R extract may serve as a protective agent against obesity. This is attributed to its multi-faceted regulatory role in liver steatosis, adipocyte metabolism, and BAT function. These protective mechanisms are linked to the activation of the AMPK-SIRT1 pathway and the regulation of ROS accumulation, which have associations with interstitial disorders, endoplasmic reticulum (ER) stress, and mitochondrial redox states. Our findings further underscore the importance of continued research on Rhus verniciflua extract (IBF-R) as a potential natural therapeutic against obesity and liver metabolic disorders.

››› S2-3

Non-clinical strategies for the development of health functional food using plant-based materials including *Rhus verniciflua* extract

Youngchul Kim

CORESTEMCHEMON Inc., Korea

We thought that the activity and safety of natural plants and/or foods are very important in the management of therapy for health. Functional foods are experiencing a growing demand worldwide as consumers seek ways to take control of their health. However, to date, there is no global consensus on the regulatory processes for nutraceuticals. To file a new functional foods application to improve health and well-being, certain nonclinical studies are required to support the safety and efficacy of clinical trials. One of the most critical requirements for such preclinical studies is that they should be GLP-compliant with system study plans. The nonclinical program for approval of functional foods should aim a standard definition of functional food for formal categorization. More stringent regulation and an effective system of integrity are required to ensure efficacy and safety and enable the adequate monitoring and increase consumer and healthcare professionals' confidence. I will discuss regulatory considerations and key nonclinical studies to support the functional foods including Rhus verniciflua extract development and approval process based on publicly available guidance.

>>> S2-4

Randomized double-blind human trial to evaluate efficacy and safety of *Rhus verniciflua* stokes *(Lacca Sinica Exsiccata)* and *Eucommia ulmoides* Oliver *(Eucommiae Cortex)* extract combination (ILF-RE) on improvement of liver function

Soo Jung Park

Woosuk University, Korea

The purpose of this study is to determine whether *Rhus verniciflua* Stokes with Latin name Lacca Sinica Exsiccata, and Eucommia ulmoides Oliver with Latin name Eucommiae Cortex Extract Combination (ILF−RE) improves laboratory test results in participants with liver function disorder. This study was conducted at Woosuk university Korean medicine hospital where participants with high serum alanine transaminase (ALT) levels from 45 to 135 U/L were enrolled. Subjects received ILF−RE 3.6 g (1.2 g/day as ILF−RE) or placebo 3.6 g for 12 weeks. It was confirmed that urushiol was not detected in ILF−RE. The primary outcomes were the decrement degree of serum ALT and gamma−glutamyl transferase (GGT) levels between two groups. The secondary outcomes were the decrement degree of serum aspartate transaminase (AST), alkaline phosphatase (ALP), lactate dehydrogenase (LD), total bilirubin, total cholesterol, triglyceride (TG) and fatty liver index (FLI) levels between two groups. Adverse events, skin prick tests, laboratory tests, and vital signs were observed and analyzed to confirm the safety of ILF−RE. In the ILF−RE group, the liver function index ALT, GGT, lipid metabolism index TG, and fatty liver index FLI were significantly decreased compared to the placebo group. There was no significant difference in ILF−RE group in terms of adverse events, severe adverse events, skin prick test, laboratory test, and vital signs compared with placebo group. ILF−RE was found to be effective in improving liver function. In addition, no clinically significant adverse events or body changes were observed during this study.

Session 3

K-Food safety management with smart HACCP

Organized by Korea Agency of HACCP Accreditation and Services

Session time : 10:30–12:00 Venue : Room 303A

Chaired by Jinhwan Hong
(Korea Agency of HACCP Accreditation and Services)

speaker 1

A case of smart HACCP registration for distribution field

Kyung Tae Kang
(Korea Agency of HACCP Accreditation and Services)

speaker 2

Application of risk simulation for SMART HACCP

Gyung Jin Bahk
(Kunsan National University)

speaker 3

Digital platform government and smart HACCP

Seokhyun Song
(Andong National University)

speaker 4

Food regulation and standards for major exporting countries

Heera Cho
(SGS KOREA)

>>> S3

K-Food safety management with smart HACCP

Chaired by Jinhwan Hong (Korea Agency of HACCP Accreditation and Services)

>>> S3-1

A case of smart HACCP registration for distribution field

Kyung Tae Kang

Korea Agency of HACCP Accreditation and Services, Korea

The food industry is directly related to safety and health, so in the event of a food accident, the public alerted. Consequently, a systematic food safety management is needed throughout the manufacturing process, and not just as a one-time incident response. Therefore, a Smart HACCP system using ICT technology based on "industry 4.0" was introduced as a way to resolve and enhance the difficulties faced in HACCP management. (Ministry of Food and Drug Safety Notice No. 2020-15, '20.3.11.). Smart HACCP is a system that can automatically monitor critical control points (CCP) and prevent data forgery and has registered 240 companies currently (23.06.30) since its introduction in March 2020. Consumer interest in safe food is increasing. Recently, smart HACCP has been introduced in the distribution field, which is a butcher shop or large mart that stores products and finally sells them to consumers. Automatic record management of critical control points (CCP), prevention of forgery and falsification of monitoring records, notification of deviation from limit standards, and countermeasures when the automatic record management system cannot be operated have been established. In addition, application of HACCP computerized management system, can reduce the number of management documents and personnel can focus on production. Since manual documents are computerized and monitored in real-time, it was possible to reduce food safety management costs by shortening the time and increasing the frequency. Also, unintentional mistakes and falsification of data by workers are prevented, giving consumers higher reliability in food safety.

>>> S3-2

Application of risk simulation for SMART HACCP

Gyung Jin Bahk

Kunsan National University, Korea

Food companies following the introduction of Smart HACCP can automatically collect more accurate and more data than before. In the current Smart HACCP, the focus is mainly on data collection itself, and the application of the collected data is insufficient. Risk simulation is used as a method of using data obtained from Smart HACCP. Risk simulation is a method of estimating the level of risk that may occur in each food manufacturing process. Although not theoretically, the current HACCP has been carried out as hazard-focused in the food industry. However, since it is impossible to manage hazards with zero tolerance, risk-based management is necessary. If risk-based management is in progress, HACCP becomes risk analysis CCP, that is, RACCP. However, a lot of data is required to perform RACCP, and Smart HACCP will be able to make this possible. In order to apply risk simulation using data obtained from Smart HACCP, probability statistics methodology should be applied in addition to sufficient data. This presentation introduces a method for estimating the risk level by applying a probability distribution using various data that can be obtained from microbiological, chemical, and physical (foreign substance) hazards. In order to apply the current Smart HACCP to food safety management more efficiently, a risk simulation technique using probability distribution should be introduced.

>>> S3-3

Digital platform government and smart HACCP

Seokhyun Song
Andong National University, Korea

In the era of artificial intelligence and digital transformation, the Yoon Seok-Yeol administration seeks to realize a digital platform government as a government innovation task. A digital platform government is a government implementation in which people, businesses, and the government work together to solve social problems and create new values on a "digital platform" where all data is connected. The HACCP policy, which has been owned and managed for a long time, is innovatively changed to a smart HACCP policy centered on data utilization in line with the trend of the times. Therefore, in this study, we look at the digital platform government policy at the national level and look at the current address of the smart HACCP policy and the direction to move forward in implementing it.

>>> S3-4

Food regulation and standards for major exporting countries

Heera Cho

SGS KOREA, Korea

Food exportation of Korea have been growing for the past six consecutive years, which seems to have played a positive role in food exports due to increased global interest in Korean culture. As exportation of Korean food shows steady growth, the number of non-conformities for Korean export foods announced by the governments of exporting countries has also increased. Violation of labeling standards is the most common reason for non-conformance of Korean exported food, followed by violations of harmful substances in food such as microorganisms and pesticide residues. Without an accurate understanding of the laws and regulations of the exporting country, time and economic losses may occur due to violations of food safety laws and regulations. Therefore, an efficient support to resolve international requirements and difficulties is urgently needed. Depending on the exporting country, the laws and regulations of food are different, so companies in the early exporting stage have difficulties in identifying and applying them. This section covers food regulations and standards for major exporting countries such as China, Vietnam and Australia. China has a national standard called GB that published by the Standardization Administration of China (SAC), ISO and IEC China International Committee. GB standard is that individuals or companies that produce or manage food must comply with. All products sold in China, whether for domestic or export use, must meet GB standards, and if entering the Chinese market, it is necessary to prove that they meet GB international standards. Vietnam's food laws and regulations are managed jointly by three ministries, Ministry of Health, Industry & Trade and Agriculture and Rural development. Vietnam's food standards are composed of QCVN and TCVN. QCVN is a mandatory standard for food distributed in Vietnam, and TCVN is recommended standards, but need to be managed in terms of quality control before distribution in Vietnam. All food exported to Australia must comply with Australia's food standards and specifications for food safety and must comply with The Australia and New Zealand Food Standards Code legislation. Australia's standards (Inspection and Compliance) for imported food are largely divided into Risk and Surveillance.

Session 4

Research on safety manegement of environmental pollutants in food

Organized by Dong-A University

Session time : 10:30-12:00 **Venue : Room 303B**

Chaired by Soonho Lee (Ministry of Food and Drug Safety)

speaker 1

Current status management of persistent organic pollutants in foods

Seung Jung Shin
(Ministry of Food and Drug Safety)

speaker 2

Development of analytical methods for polychloroethylenes and polychlorobenzenes in food

Joon-Goo Lee
(Dong-A University)

speaker 3

Research on safety management of organotins in food

Young-Jun Kim
(Seoul National University of Science and Technology)

>>> S4

Research on safety manegement of environmental pollutants in food

Chaired by Soonho Lee (Ministry of Food and Drug Safety)

>>> S4-1

Current status management of persistent organic pollutants in foods

Seung Jung Shin

National Institute of Food and Drug Safety Evaluation, Korea

Foods such as agricultural, livestock and aquatic products are affected by the environment. When the environments are polluted, contaminants are accumulated in foods and adversely affect human health. Among these contaminants, there are substances that are not decomposed in the natural environment and accumulate in plants and animals through the food chain endangering people and ecosystems. Also, these substances are recognized as needing a separate management due to its characteristics. As result, the substances are referred to as persistent organic pollutants (POPs) and adopted in the Stockholm convention which is an international agreement on environment issues. In Korea, the Ministry of Environment enacted the related laws, and is managing POPs. Also, the Ministry of Food and Drug Safety is performing roles such as food monitoring, risk assessment and management for POPs substances. In order to successfully fulfill this role, a test method for detecting POPs from foods is created and various foods are analyzed, the contamination is investigated, and risk assessment is conducted based on these data. The Ministry of Food and Drug Safety will continue to conduct investigations and studies on new POPs to ensure that Koreas can consume safe foods.

››› S4-2

Development of analytical methods for Polychloroethylenes and polychlorobenzenes in food

Joon-Goo Lee

Dong-A University, Korea

Polychloroethylenes (PCEs) and polychlorobenzenes (PCBs) used in industrial activities are released to the environment and contaminated in food. These chemicals are toxic, persistent, and bioaccumulative, and they have a higher need for safety management. PCEs are chlorinated ethylene, and they are very volatile. The maximum levels of PCEs are set in drinking water due to their toxicity. Trichlorobenzenes (TCBs) are benzene which have three chlorines. These compounds can be produced unintentionally by combustion of organic materials in the presence of chlorine. TCBs have hepatic, renal and thyroid histopathological toxicity. Pentachlorothiophenol (PCTP) is a benzene with five chlorine and one thiol group. It is mainly used as a plasticizer for rubbers. PCTP strongly binds to thyroid hormone transport protein, and its metabolites cause malformations. In this study, analytical methods for determining PCEs and PCBs in food were developed with evaluating performance parameters. LOD/LOQ were ranged from 0.07 to 0.43 ppb for TCBs, and 2.28 to 2.66 ppb for PCTP. Accuracies were from 83.5 to 114.9 % for TCBs and 94.0 to 115.7% for PCTP. For the PCEs, LOD/LOQ were 0.27 to 1.40, and accuracy were 89.9 to 113.8. These values are acceptable based on the international criteria.

>>> S4-3

Research on safety management of organotins in food

Young-Jun Kim

Seoul National University of Science and Technology, Korea

Organotin compounds are persistent, bio-accumulative, and toxic (PBT) contained in antifouling paints used for ships, aquaculture and agricultural pesticides, and are likely to remain when exposed to the environment, contaminating food and adversely affecting humans. Antifouling paint is accumulated and decomposed in sediment as tributyltin (TBT), and most of the decomposed TBT is detected as dibutyltin (DBT) and monobutyltin (MBT). Biofouling on the bottom of a ship which is an organotin compound is mainly used to prevent crustacean attachment. Additionally, pesticides (organotin-based acaricide) used in agricultural products are organotin compounds. DBT (50 mg/kg or less) in PVC as food contact material has been regulated from MFDS (Standards and Specifications for Utensils, Containers and Packages). The European Commission Parliament adopted a regulation (No. 78/2003) which prohibited the usage of organotin based antifouling paints on all vessels of European member countries since 2003. To prevent food safety concern, GC/MS, GC/MS/MS, and LC/MS/MS are required to review procedure for analytical organotins methods for high-efficiency and resolution at low level concentration in food. For internal quality control, proficiency skill using CRM is important for confirming the assigned value with validation test such as selectivity, accuracy, precision, LOD, LOQ, measurement uncertainty, matric effect, etc. Consequently, the analytical results information on the levels of organotins present in distributed food products, which can be utilized for further risk evaluation of food intake and risk assessment is required.

Session 5

Development of kombucha and health functional foods using extraction and fermentation technology

Sponsored by NSTbio Co., Ltd.

Session time : 14:40–16:10 **Venue : Room 301A**

Chaired by Young-Min Kim (Chonnam National University)

speaker 1

The changes of contents and its characteristics by citrus Kombucha fermentation

Sung Soo Park
(Jeju National University)

speaker 2

Development of healthy juice beverage and healthy functional food using fermented noni *(Morinda citrifolia)* applied with lactic acid bacteria fermentation technology

Jae Yeon Lee
(NSTbio Co., Ltd.)

speaker 3

Immunomodulatory effect of polysaccharide from fermented *Morinda citrifolia* L. (Noni) on RAW264.7 macrophage and BALB/c mice

Sun-Il Choi
(Kangwon National University)

>>> S5

Development of kombucha and health functional foods using extraction and fermentation technology

Chaired by Young-Min Kim (Chonnam National University)

>>> S5-1

The changes of contents and its characteristics by citrus Kombucha fermentation

Sung Soo Park

Jeju National University, Korea

Kombucha is a slightly sour beverage fermented by symbiotic micro-organisms, including bacteria and yeasts. In this study, we examined the biological activities of citrus Kombucha (CK) produced by addition of citrus extract from Jeju Island to original Kombucha (K). After fermentation for 10 days, radical scavenging activity examined by ABTS and DPPH assays increased by approximately 20% compared to that of K. Moreover, content of total phenolic compounds significantly increased by 60% compared to that of K. Cell proliferation assays utilizing MTT showed that CK treatment significantly inhibited growth of bladder cancer cells, T-24 and 5637, in a dose-dependent manner. Annexin V staining showed that CK treatment led to apoptosis of cells in a dose-dependent manner. T-24 cells were more sensitive to CK treatment than 5637 cells. Western blotting showed that CK treatment led to up-regulation of apoptotic proteins, including caspases-3, -8, -9, and PARP, in bladder cells not in K-treated cells. Next, we investigated Citrus Kombucha (CK) produced by three different bacteria strains (Gluconacetobacter xylinus, Gluconacetobacter medellinensis, Gluconobacter oxydans; named as CK-MOX) identified from traditional Kombucha. Antioxidant activity, measured by DPPH, ABTS, and ORAC assays, markedly increased after fermentation. Moreover, fermented CK-MOX (Day 15) exhibited anti-proliferative and anti-migratory activities against EJ human bladder carcinoma cells. Western immunoblot assays showed that treatment with CK-MOX significantly up-regulated phospho-ERK levels. To distinguish whether or not up-regulation

of phospho-ERK is the cause or effect, Additionally, the in vitro inhibitory effects on α-glucosidase, angiotensin-converting enzyme (ACE) and DPPH radical scavenging capacity were analyzed using four types of citrus Kombuchas (CKs). Four types of CK were fermented for 14 days with or without citrus peel or non-fermented with or without citrus peel. CK14, fermented for 14 days without citrus peel, significantly inhibited the α-glucosidase level, which resulted in a decrease in postprandial glucose level. Antioxidant capacity, as measured by DPPH capacity, was markedly increased in a concentration-dependent manner in all four types of CK. All CK types had an inhibitory effect on ACE levels. But among the tested types, the effects were most prominent in fermented Kombucha (CK14 and CPK14), although the differences among the effects were insignificant. CK and CPK may be developed as a functional beverage.

>>> S5-2

Development of healthy juice beverage and healthy functional food using fermented noni *(Morinda citrifolia)* applied with lactic acid bacteria fermentation technology

Jae Yeon Lee

NSTbio Co., Ltd., Korea

Noni is one of the fruits that naturally grows in the South Pacific volcanic region and contains about 200 phytochemicals. Noni is known to be challenging to eat immediately after harvesting due to its disgusting smell and poor texture. Therefore, to consume noni, fermentation, and ripening processes are traditionally required. In this study, a standardized fermentation process was developed to improve the sensory and functional efficacy of noni by applying lactic acid bacteria fermentation technology. *Lactobacillus plantarum* NST1805, L. brevis NST707, seven types of NST complex lactic acid bacteria, and seven types of AON complex lactic acid bacteria were finally selected from various strains of lactic acid bacteria. By the fermentation of these strains, juice beverages were first developed as a general food, and healthy functional food ingredients are being developed secondly. As a result of the accelerated test for each fermented noni raw material and product, the preservation was very excellent. In addition, sensory evaluation of noni-beverage products showed excellent sensory properties.

>>> S5-3

Immunomodulatory effect of polysaccharide from fermented *Morinda citrifolia* L. (Noni) on RAW264.7 macrophage and BALB/c mice

Sun-Il Choi

Kangwon National University, Korea

Particulate matter, dust storms, and coronavirus disease 2019 (COVID−19) have significantly impacted people's health worldwide. The environmental and social impacts have resulted in an increased focus on healthcare across generations, leading to a growing demand for and interest in functional foods that can enhance immunity. This study aims to determine the immunomodulatory effects of a polysaccharide fraction from fermented *M. citrifolia* L. (FMP) in RAW 264.7 macrophages and Balb/c mice. *M. citrifolia* L. was fermented for 72 h using *Lactobacillus* brevis; polysaccharides were extracted using ethanol precipitation. Pathogens recognized by phagocytic receptors induce the production of various cytokines such as and activate effector cells that present antigens to the adaptive and innate immune systems. The RAW 264.7 cells exposed to FMP (50, 100, and 200 μg/mL) for 24 h showed increased NO production, cytokine (IL−1β, IL−6, and TNF−α) release, and COX2 and iNOS protein expression. FMP (100, 200 mg/kg) and deacetylasperulosidic acid (DAA) (20 mg/kg) administered orally to BALB/c mice for 14 days upregulated NO production and NK cytotoxicity in abdominal cavity and spleen, respectively. These results suggested that FMP have the potential to enhance macrophage activity and innate immunity. In addition, FMP increased Th1 and Th2 cell−related cytokines, demonstrating increased CD4+ helper T cell activity. The immune cell numbers increased in spleen, mesenteric lymph nodes (MLN), peritoneal exudate cells (PEC), Peyer's patches (PP), and peripheral blood mononuclear cells (PBMC). Taken together, FMP containing DAA can be used as materials for health functional foods to enhance immune responses.

Session 6

Investigation of bio-materials and functional diversity from wildlife in Korean islands

Organized by Honam National Institute Biological Resources

Session time : 14:40–16:10 **Venue : Room 301B**

Chaired by Kyung Min Choi (Honam National Institute Biological Resources)

speaker 1

National-wide investigation and characterization of biological activities from plants in Korean islands

WonWoo Lee
(Honam National Institute of Biological Resources)

speaker 2

A new approach to develop functional raw materials using domestic plant resources

Seok-Hee Lee
(Dongguk University)

speaker 3

Development and industrialization of K-Health and K-Beauty using natural resources

Ju-Hyoung Park
(Dankook University)

speaker 4

Development of functional food materials for improving exercise performance

Kil-Nam Kim
(Korea Basic Science Institute)

>>> S6

Investigation of bio-materials and functional diversity from wildlife in Korean islands

Chaired by Kyung Min Choi (Honam National Institute Biological Resources)

>>> S6-1

National-wide investigation and characterization of biological activities from plants in Korean islands

WonWoo Lee

Honam National Institute of Biological Resources, Korea

The advent of life-threatening adversities, including incurable diseases and infectious pathogens, has led to the discovery and development of new types of treatment. Extensive investigations on continental territories have left few unexplored extremes on Earth, such as volcanoes and the polar regions, in the search for unknown materials. Islands are a promising habitat for rare species due to the geographic isolation and unique ecosystems, and these characteristics can lead to the discovery of undocumented bioactive chemicals. Through the exploration of several islands, we collected hundreds of Korean indigenous plants and produced plant extracts by using 30% ethanol for functional analyses. The growth of Escherichia coli and Staphylococcus aureus was inhibited from six and two plant extracts, respectively. In addition, our collaborative institutions have been investigating the improvement of immune response, muscle and skin whitening, as well as the inhibition of diabetes and wrinkles in the skin. Overall, plant extracts are of valuable resources as natural anti-microbial agents and functional biomaterials. The comprehensive dataset information can play pivotal roles, not only in expanding our knowledge but also in the development of health products.

>>> S6-2

A New approach to develop functional raw materials using domestic plant resources

Seok-Hee Lee

Dongguk University, Korea

With the rapid advancement of technology, an increasingly diverse range of chemicals is being utilized in various sectors, leading to the widespread use of approximately 60,000 to 70,000 chemical substances worldwide. Consequently, human exposure to a wide variety of chemicals has become a prevalent reality, originating from sources such as food, household products, and the environment. In response to this issue, our research focused on the development of effective in vitro testing methods aimed at identifying endocrine-disrupting chemicals (EDCs) commonly found in everyday products. Specifically targeting estrogen and androgen receptors within the human body, our research established the correlation between these receptors and EDCs through dimerization assays and transactivation assays at the in vitro level. Consequently, we established an integrated hazard characterization approach that offers insights into the potential risks posed by EDCs at the in vitro level. Significant accomplishments were achieved through this research, with certain testing methods developed being adopted as OECD Test Guidelines or introduced as test methods within the Adverse Outcome Pathway (AOP) framework for EDC risk assessment. More recently, we confirmed that these testing methods were highly effective in screening functional ingredients for health functional foods. To screen functional ingredients, a process of investigating the functionality of substances through various methods was required, which traditionally involved significant time and cost. Therefore, in order to screen functional ingredients effectively, there was a need for high-throughput testing methods that could screen multiple candidate objects simultaneously, while also providing clear validation of their functional mechanisms. In this regard, the testing methods we have developed were suitable for screening functional ingredients that could contribute to the health issues of menopausal women and men. We would like to introduce a new approach to screening functional ingredients for health functional foods using domestic plant resources, applying the test methods for hazard characterization of EDCs at the *in vitro* level.

>>> S6-3

Development and industrialization of K-Health and K-Beauty using natural resources

Ju-Hyoung Park
Dankook University, Korea

Natural products are raw materials that can be used in various fields, and we are conducting research on separating effective substances and evaluating their efficacy from the collection of natural products. To discover various functional materials from plants that we can often pass by to traditional folk herbal medicines, we directly participate in government projects in the field of natural products to separate and refine indicators and active ingredients of natural products, carry out component analysis, and develop optimal process systems. Through molecular biological mechanism research, we are participating in the research and development process of natural medicines by exploring the pharmacological activity of active ingredients. Recently, we are conducting various research related to the development of natural product-derived functional cosmetics materials as well as research on the development of new drugs and functional ingredients for individually recognized health functional foods from natural products. Natural product-based materials are in line with the government's capacity building through localization of cosmetic raw materials. Cosmetics trends tend to shift from 'brand awareness' in the past to 'purpose' and 'functionality', and problems with cosmetic ingredients caused by endocrine disruptors or genetic modification are seriously emerging. There is an increasing demand for cosmeceutical cosmetics centered on natural products that can clearly present consumer sentiment that prefers 'natural' and scientific grounds for 'functional' and 'stability'. Consumers prefer nature-friendly plant materials rather than synthetic materials, and in particular, research and development of functional cosmetics on extracts using domestically grown plants has a large ripple effect to various industries, so research on this is necessary.

>>> S6-4

Development of functional food materials for improving exercise performance

Kil-Nam Kim

Korea Basic Science Institute, Korea

Growth and maintenance of skeletal muscle is essential for athletic performance and a healthy life. Stimulating the proliferation and differentiation of muscle cells may help prevent loss of muscle mass. In this study, we aimed to evaluate the effects of Catalpa bignonioides extract on the promotion of muscle growth and muscular capacity *in vitro* and *in vivo*. *C. bignonioides* is North American oriented naturalized plant. It is used as medicinal plant to promote urination, alleviate fever and pain. Flower and leaf extract of *C. bignonioides* is known for its antioxidation effect. Regardless of its medical benefits, the effect of 70% ethanol extract of *C. bignonioides* on improving exercise performance has not been reported, so this research focused on exercise performance improvement on cell and mouse. With the examination of proliferation effect of C2C12 myocytes by extracting 0%, 30%, 50%, 70%, and 100% ethanol from C. *bignonioides*, 70% extract had highest myocyte proliferation effect even at a low concentration (6.25 μg/mL). Accordingly, 70% ethanol extract was selected, and Western blot was performed to change factors related to myocyte proliferation and energy generation. As the result, when the 70% ethanol extract was applied, myocyte proliferation and differentiation-related factors such as p-Akt, p-mTOR, p-p70S6K, Myo D, and Myogenin were increased, and energy production-related factors such as p-AMPK, Glut4, p-SirT1 were increased. The effect of *C. bignonioides* extract was tested with orally administering the extract to mouse for 10 weeks and measured the time it took until exhaustion, and grip strengthen test was also used. After daily administration for 10 weeks, the research confirmed that there was no significant difference in body weight change, liver weight, and ALT/AST changed in serum. As the result of measuring the time it took until exhaustion, the control group took 2272 seconds while positive control group with the creatine treatment (200 mg/kg) took 2681 seconds, and the low extract concentration group took 2636 seconds until exhaustion. Thus, in low concentration extract (50 mg/kg) and high concentration extract (200 mg/kg) group the time it took until exhaustion increased by 16%, which was similar to positive control group with an increase of 18%. In the grip test, the control group had 0.424 Ibf, whereas positive control group had 0.538 Ibf, the low concentration extract group has 0.537, and the high

concentration extract group had 0.529lbf. Thus, in both low and high concentration extract group the grip test increased by 25%, which was similar to positive control group with an increase of 27%. Next, we evaluated muscle growth with several compounds isolated from *C. bignonioides*. Among these compounds, pinoresinol and vanillic acid increased C2C12, a mouse myoblast cell line, proliferation being the most without cytotoxicity. These substances activated the Akt/mammalian target of the rapamycin (mTOR) pathway, which positively regulates the proliferation of muscle cells. In addition, the results of in silico molecular docking study showed that they may bind to the active site of insulin-like growth factor 1 receptor (IGF-1R), which is an upstream of the Akt/mTOR pathway, indicating that both pinoresinol and vanillic acid stimulate myoblast proliferation through direct interaction with IGF-1R. These results reveal the unknown functions of *C. bignonioides* in muscle cell proliferation and energy metabolism and suggest its potential of being used as an effective natural agent for improving muscular strength.

Research on mechanism of quality attribute change during storage of food

Organized by Korea Food Research Institute

Session time : 14:40–16:10 Venue : Room 302

Chaired by Jeong Hee Choi (Korea Food Research Institute)

speaker 1

Investigation for postharvest ripening of avocado through NMR-based metabolomics approach

Dae-Yong Yun
(Korea Food Research Institute)

speaker 2

Mechanism of chilling-induced seed browning in stored pepper fruit

Jeong Gu Lee
(Seoul National University)

speaker 3

The latest postharvest technology for maintain the freshness of K-agricultural products

Min-Sun Chang
(National Institute of Horticultural and Herbal Science)

speaker 4

The effect of postharvest treatment on metabolites of green and yellow kiwi fruits during storage

Inhwan Kim
(Chung-Ang University)

>>> S7

Research on mechanism of quality attribute change during storage of food

Chaired by Jeong Hee Choi (Korea Food Research Institute)

>>> S7-1

Investigation for postharvest ripening of avocado through NMR-based metabolomics approach

Dae-Yong Yun

Korea Food Research Institute, Korea

As a climacteric fruit, avocado (*Persea americana* Hass) is commercially popular around the world for its good taste, high nutritional value and associated health benefits. However, the quality and marketability of avocados are largely influenced by the internal chemical changes that occur during postharvest ripening. In the present study, we utilized an NMR-based metabolomic approach to investigate metabolic perturbations in different parts of the avocado (peel, pulp, and seed) at different postharvest ripening stages. Significant perturbations of the metabolome, including various carbohydrates and amino acids, were observed in the peel and pulp according to postharvest ripening stages, but these perturbations were not as pronounced in the seed, relatively. These results highlight the distinct metabolic alterations associated with energy, degradation and synthesis metabolism of different parts of avocado during postharvest ripening. Therefore, the present study provides important insights into the fundamental metabolism of avocado fruits, contributing to a better understanding of their physiology for improved quality and storability.

››› S7-2

Mechanism of chilling-induced seed browning in stored pepper fruit

Jeong Gu Lee

Seoul National University, Korea

Pepper *(Capsicum annuum* L.*)* is sensitive to low temperature, and chilling injuries are easily seen during storage. Seed browning is a typical chilling injury symptom, which is a major problem in the storage and distribution of pepper. Therefore, this study was conducted to elucidate the mechanism of the seed browning from the viewpoint of transcriptome and metabolome. *C. annuum* 'Sinhong' pepper were stored at 2 and 10℃ for 30 days after harvest. Metabolome analysis showed that gamma-aminobutyric acid, tyrosine, phenylalanine, and isoleucine contents were significantly higher in the seeds of pepper stored at 2℃ than in those at 10℃. The imaging analysis and quantification of reactive oxygen species confirmed that its generation was highly correlated to seed browning. Then, to clarify the mechanism of chilling response in pepper from the viewpoint of transcriptome, chilling-sensitive and -insensitive peppers were selected from 36 *C. annuum* genotypes. The pepper fruits of chilling-insensitive 'UZB-GJG-1999-51' and chilling-sensitive 'C00562' were stored at 2℃ for 24 h. Transcriptome and metabolome analyses showed that relative contents of branched-chain amino acids such as leucine, isoleucine, and valine were significantly increased during cold storage. Totally, 3,140 differentially expressed genes were identified to be induced by chilling between the two genotypes. Particularly, a regulatory network of jasmonic acid synthesis/signaling and regulations of ethylene responsive factors (ERF), dehydration responsive element-binding factor (DREB), and jasmonate resistant 1 (JAR1) genes appear to contribute to chilling response in pepper fruit. When chilling treated to the 'UZB-GJG-1999-51' and 'C00562' fruits at 2℃ for 24 h, the expressions of JAR1, ERF1, 3, 5, and 10 increased in both genotypes. The expressions of ERF11 and DERB3 decreased in both genotypes. In addition, the expressions of JAR1, ERF1, 3, 5, and 10 were higher in 'UZB-GJG-1999-51', and the expressions of ERF11 and DREB3 were higher in 'C00562' demonstrating that the former genes are positive regulators, while the latter genes are negative regulators of candidate genes. In addition, fruits harvested from a total of 112 F2 plants obtained from cross between 'UZB-GJG-1999-51' and 'C00562', were grouped according to the seed browning rate after cold storage. Physiological traits, contents of amino acids and fatty acids, and gene expressions of ERFs, DREB3, and JAR1 were analyzed, and their correlations with the seed browning rate were evaluated. The gene expression of JAR1 was negatively correlated with the seed browning rate ($r = -0.80^{***}$), whereas the expressions of ERF11 and DREB3, and H_2O_2 contents were positively correlated with the seed browning rates of $r = 0.76^{***}$, 0.42^{**}, and 0.66^{***}, respectively. These results imply that JAR1, ERF11, and DREB3 are important factors influencing the chilling sensitivity of C. *annuum*. Although further studies on gene function are needed, these results could help understand the mechanism of chilling injury and chilling sensitivity of pepper.

>>> S7-3

The latest postharvest technology for maintain the freshness of K-agricultural products

Min-Sun Chang, Yoonpyo Hong

National Institute of Horticultural and Herbal Science, Korea

Recently, exports of K-agricultural products are expanding to abroad, but quality control is not good, so the product in overseas markets is far from high-end and premium. In order to maintain the freshness and export them, it is very important to upgrade products by applying postharvest management technology. Commercialization is carried out by APC, and about 558 are operated in Korea. Although there are some differences in the level of each APC, the hardware is generally good, but the software level is very low in terms of operational capability and quality control. This is because quality control for each commercialization process, such as harvesting, pretreatment (precooling, washing, curing), sorting, packaging, and storage, is not applied, leading to a loss rate during distribution. In agricultural advanced countries such as the USA and the Netherlands, the loss rate is less than 10% due to the input of optimal quality control technology for each stage of the postharvest process, whereas in Korea, it is very high at 25-35%. In order to overcome this, delicate quality control such as freshness maintenance treatment for each item, packaging, and temperature control must be supported. For example, strawberries that are easily softened, it is important to use postharvest technology such as precooling, simultaneous CO_2 + ClO_2 complex treatment, functional single-stage MA packaging, and keep them at 4℃. In addition, when exporting, CA containers are used to control the concentration of O_2 and CO_2 to control the respiration of strawberries and maintain freshness, thereby reducing softness and spoilage by 15 to 20% and extending freshness by 3 to 4 days. As a result of pilot exports to Southeast Asia by applying these technologies, the strawberry quality was good and received good reviews from local consumers. To improve the quality of K-agricultural products, quality management technologies such as optimal postharvest technology for each item, MA packaging, ripening control technology, and CA environmental condition setting must be continuously developed and applied to APC. In the future, it is hoped that K-agricultural products that have gone through the optimal merchandising process in Smart APC, where these technologies are concentrated, meet consumers in a delicious and fresh way in overseas markets, becoming a brand itself, and increasing its status.

* Project No. : (IPET)1545027216

>>> S7-4

The effect of postharvest treatment on metabolites of green and yellow kiwi fruits during storage

Inhwan Kim

Chung-Ang University, Korea

Kiwi fruits are popular in Asian markets owing to their desirable flavor and taste. Commercially, kiwifruit is harvested at physiological maturity but at an unripe stage and stored at low temperature (0℃) for proper storage, marketing distribution and longer shelf life. However, consumers prefer to purchase "ready to eat" kiwifruit. To fulfill the consumers' preference, it is inevitable to use postharvest techniques like exogenous ethylene and 1-MCP treatment at harvest or along the storage period. However, the effects of postharvest treatment on the quality of green and yellow kiwi fruits are unclear. Herein, the effects of a postharvest treatment on the volatile compounds and targeted metabolite profile in two kiwi fruits (i.e., green and yellow) were investigated during a 10-day storage period. Targeted metabolites (i.e., sugars, and organic acids) and volatiles were investigated using GC-MS. Ethylene and 1-MCP treatment helped maintain free sugar contents during storage. A total of 31 volatile compounds were identified. Storage increased the volatile compound concentrations, and the total concentration of volatiles in the ethylene treated kiwi fruits was higher than that of the untreated and 1-MCP treated kiwi fruits during storage. However, 1-MCP treatment helped maintain the concentrations of (2E)-hexenal which are responsible for the fresh odor in kiwi fruits. Thus, 1-MCP treatment may help maintain taste and fresh aroma of kiwi fruits during storage.

Session 8

Exploring the scientific basis for setting food use-by-date and spreading consumer consensus

Organized by Korea Food Industry Association

Session time : 14:40–16:10 **Venue : Room 303A**

Chaired by **Jung Beom Kim** (Sunchon National University)

speaker 1

Research on safe and scientific strategies for extending use-by-date

Cheol-Soo Lee
(Korea Advanced Food Research Institute)

speaker 2

Scientific evidence and quality/safety index for use-by-date experiment of processed foods

Sang-Do Ha
(Chung-Ang University)

speaker 3

A plan to establish a stable Use-by-date based on consumer perception survey

JeongSu Lee
(Korea National Council of Consumer Organizations)

Panel Discussion

- **Jung Beom Kim** (Sunchon National University)
- **Cheol-Soo Lee** (Korea Advanceed Food Research Institute)
- **Sang-Do Ha** (Sunchon National University)
- **Won-Young Choi** (Ministry of Food and Drug Safety)

>>> S8

Exploring the scientific basis for setting food use-by-date and spreading consumer consensus

Chaired by Jung Beom Kim (Sunchon National University)

>>> S8-1

Research on safe and scientific strategies for extending use-by-date

Cheol Soo Lee

Korea Advanced Food Research Institute, Korea

The use-by-date food labeling system came into effect on January 1, 2023. Therefore, except for some foods (limited to refrigerated milk products), most of them must be labeled from this year. We, Korea Research Institute of Food Science and Technology, conducted research for a total of 4 years with Chung-Ang University and the Consumer Organization Council through the Ministry of Food and Drug Safety research project, and completed the first year research. The presence or absence of sterilization/sterilization process, packaging material, and packaging method had an effect. The difference was caused by the type and amount of coagulant, heating temperature of soymilk, and pressure during compression. In the case of packaging materials, polyethylene (PE), polypropylene (PP) materials showed different characteristics, and when using laminated film (Nylon (Nylon, NY) + PE), the quality compared to the existing expiration date compared to items packed with PP material. It was confirmed that the safe period appeared long. Fermented milk items showed differences in use-by-date period due to the ratio of lactic acid bacteria (*Streptococcus thermophilus*, *Lactobacillus bulgaricus*, *Lactobacillus casei*, and *Lactobacillus plantarum*, etc.) or the characteristics according to the manufacturer, type, and amount of lactic acid bacteria input. It was found that there were many quality differences due to the variety of raw materials and external factors such as the sanitary conditions of manufacturers and the cleanliness of workers, and the consumption period of manufacturers with poor hygiene management was found to be relatively short use-by-date. Depending on various conditions, there is a difference in the use-by-date, and in order to extend the expiration date, it is thought that quality control suitable for the characteristics of the product is necessary.

>>> S8-2

Scientific evidence and quality/safety index for use-by-date experiment of processed foods

Sang-Do Ha

Chung-Ang University, Korea

From January 1 of this year, the Ministry of Food and Drug Safety introduced the 'Use by date (consumption period)', which is the period during which food can be consumed or consumed, instead of the 'expiration date', which is the period during which products can be sold. The Ministry of Food and Drug Safety is carrying out a project to set the expiration date of about 2,000 items of 200 food types in the food code from last year to 2025. According to the 'Consumption Date Setting Report by Food Type (December 1, 2022)', which includes reference values for consumption dates of 23 food types and 80 items in the first year, tofu has an increased shelf life of 23 days (Use by date) from 17 days (Shelf life). Ham increased from 38 to 57 days, and fermented milk from 18 to 32 days. In addition, processed milk 16 days → 24 days, sweets 45 days → 81 days, fruit and vegetable beverages 11 days → 20 days, fruit and vegetable juices 20 days → 35 days, fish cake 29 days → 42 days, baby food for infants 30 days → 46 days, lactic acid bacteria beverages 18 day → 26th, etc. The existing quality safety indicators used to set the Use by date (Shelf life) include many unnecessary tests and sometimes missing essential test items. In addition, instead of setting the expiration date for each type, practical test items should be selected considering the characteristics of each food (pH, Aw, packaging type, sterilization/sterilization, etc.) even for the same type. Physicochemical indicators include moisture content, pH, ethanol, moisture in non-fat matter, milk fat, acidity, salt, total nitrogen, crude protein, crude fat, acid value, TBA, antioxidants, preservatives, volatile base nitrogen, sulfur dioxide, acetic acid, 10-hydrogen hydroxy-2-decenoic acid, etc., and microbiological indicators include number of bacteria, coliform group, colon bacillus, number of fungi, food poisoning bacteria (toxic type), appearance (mold, drip, sediment, caking, separation state, color, appearance, etc.), We plan to rationally improve the experimental items for setting the expiration date that have been carried out so far by examining off-flavor and texture (physical properties, viscosity, surface cracks, surface dryness, etc.).

>>> S8-3

A plan to establish a stable use-by-date based on consumer perception survey

JeongSu Lee

Korea National Council of Consumer Organizations, Korea

With the revision of the「Act on Labeling and Advertising of Food, etc.」, the consumption period system came into effect on January 1, 2023. Consumer awareness survey was conducted to find a way to settle down in a stable and beneficial way to consumers as the deadline indication system that has been familiar for 38 years may change and cause consumer confusion. As a result of a survey on whether there was a use-by-date system before the implementation of the use-by-date system in 2022, 65.5% of consumers said they were not familiar with the use-by-date system itself (11.4% not at all, 54.1% who had heard of it, but did not know). 85.6% of consumers were unaware of whether it was implemented (47.8% not at all, 37.8% heard but not sure). This shows the lack of consumer education and promotion of the use-by-date system. As the use-by date-labeling system is being promoted as a system that pursues social benefits and values such as reducing the cost of loss to households and businesses due to food waste, protecting the environment, and international trends, the benefits of introducing the use-by date labeling system should be able to return to consumers as well. To this end, thorough preparation and efforts from food companies and the government are needed. Policy plans are also needed to resolve consumer anxiety, such as how long the food expiration date extends as the food expiration date changes from sell by date to use by date, and whether there are any things that consumers should pay attention to when purchasing and storing food.

Session 9

Present and future of development of functional ingredients for preventing and improving sarcopenia

Organized by Institute of Human Ecology, Yeungnam University

Session time : 14:40–16:10 **Venue : Room 303B**

Chaired by Jeung-Hee Lee (Daegu University)

speaker 1

The ethanolic extract of *Sargassum serratifolium* exhibits inhibitory effects on muscle atrophy

Bonggi Lee
(Pukyong National University)

speaker 2

The useful plant-based bioactive compounds for muscle atrophy or sarcopenia

Na-Hyung Kim
(Institute of Human Ecology, Yeungnam University)

speaker 3

Effect of *Pisum Sativum* (Pea) hydrolysates extracted with different proteolytic enzymes on antioxidant properties and prevention of muscle atrophy

Choon Young Kim
(Yeungnam University)

>>> S9

Present and future of development of functional ingredients for preventing and improving sarcopenia

Chaired by Jeung-Hee Lee (Daegu University)

>>> S9-1

The ethanolic extract of *Sargassum serratifolium* exhibits inhibitory effects on muscle atrophy

Bonggi Lee

Pukyong National University, Korea

Skeletal muscle plays an essential role in glucose homeostasis. Recent studies of many cell types in the skeletal muscle indicate that secretion factors derived from macrophages are important for glucose metabolism in the skeletal muscle. Here, RNA Sequencing analysis showed that Lipopolysaccharide (LPS) treatment broadly altered the transcriptome of macrophages, of which signaling related to secretion factors was markedly altered toward elevating unfavorable cytokines to maintain skeletal muscle metabolism. On the other hand, the treatment of the Meroterpenoid-Rich Extract of *Sargassum Serratifolium* (MES), a strong anti-inflammatory and antioxidant extract found in our previous studies, reversed the LPS-induced signaling pathways. We further tested whether the treatment of conditioned media (CM) derived from LPS-macrophage (LPS-CM) or CM derived from LPS-macrophage treated with MES (MES-CM) affects glucose homeostasis in differentiated C2C12 myotube cells. LPS-CM treatment notably increased mRNA levels of muscle atrophy-associated genes including MuRF1, MAFbx, and Myostatin, and decreased glucose uptake, and MES-CM treatment reversed these characteristics, indicating that secretion factors induced by LPS or MES either impair or improve muscle glucose homeostasis, respectively. We further analyzed secretion factors inside by proteome array and data showed that LPS-CM includes GDF-15, IL-1 α/β, RAGE, etc related to muscle atrophy and glucose intolerance, which were significantly reduced in MES-CM. These data indicate that LPS- or MES-induced changes in the transcriptome in macrophages are closely related to the alteration in secretion factors toward either impairing or improving glucose metabolism in the skeletal muscle respectively. Of many, the decrease in macrophage-derived cytokine mentioned above may be important for glucose homeostasis in the skeletal muscle.

››› S9-2

The useful plant-based bioactive compounds for muscle atrophy or sarcopenia

Na-Hyung Kim

Institute of Human Ecology, Yeungnam University, Korea

Sarcopenia is a muscle disease characterized by loss of skeletal muscle mass, strength, and physical performance. Bioactive compounds are known to benefit human health in small doses, to be involved in human physiological activity, and to have nutritional value. Bioactive compounds from natural products are undergoing various studies for the prevention and treatment of muscle atrophy or sarcopenia. The useful natural products and plant-based bioactive compounds from natural products for muscle atrophy or sarcopenia were investigated in this study. Among these natural products, we evaluated the improvement effect of the ethanol extract of *Cibotii Rhizoma* (ECR) on dexamethasone-induced muscle atrophy in an in vitro cell model, the C2C12 myotubes. ECR in a concentration of 100 μg/mL increased the expression of MyHC, p-Akt, p-mTOR, and p-p70S6K in dexamethasone-induced muscle atrophy, while suppressed the expression of REDD1, KLF 15, MAFbx, and MuRF1. In addition, the 10 targets for component in ECR analysed in this study and 376 targets for muscle atophy or sarcopenia were collected. The 245 of biological process, 33 of molecular function, 23 of cellular components in GO, and 112 pathways in KEGG were significantly enriched. Together with these data, conclusively, it seems necessary to continue research on the development of therapeutic agents using natural products that are safe and effective for muscle atrophy or sarcopenia.

>>> S9-3

Effect of *Pisum Sativum* (Pea) hydrolysates extracted with different proteolytic enzymes on antioxidant properties and prevention of muscle atrophy

Choon Young Kim

Yeungnam University, Korea

Pisum Sativum (Pea), a well-known source of well-known high-quality plant proteins, has been less attention in research compared to Glycine max (soy). Enzyme-assisted extraction, a green extraction method, enables the production of food-derived bioactive compounds, including phytochemicals and protein-digested peptides and amino acids, without the use of organic solvents. The objective of this study was to identify and compare the antioxidant and anti-muscle atrophy properties from pea hydrolysates using various proteolytic enzymes. Pea hydrolysates (PH) were obtained through enzyme-assisted extraction using no enzyme (NT), Alcalase (A), Flavozyme (F), or Protamex (P), with the enzyme reaction carried out at pH 7.0 and 50℃ for 10 min. The PH extracted using Protamex (PHP) were subsequently fractionated using membrane ultrafiltration into F1 (molecular weight (MW) 〉30 kDa), F2 (MW 10-30 kDa), F3 (MW 3-10 kDa), and F4 (MW 〈3 kDa). The characteristics of the hydrolysates or fractions were assessed for antioxidant activity, amino acid composition, and in vitro anti-muscle atrophy effects. PH extracted using Alcalase (PHA) or PHP exhibited superior antioxidant activity and total polyphenol content compared to other PHs. Both PHA and PHP contained higher levels of branched-chain amino acids (BCAAs), and PHP demonstrated anti-atrophy properties in dexamethasone-treated C2C12 myotubes. This was evident through increased myotube width and regulated protein expressions related to protein homeostasis (elevated protein synthesis, but reduced protein degradation). Among the fractions from PHP, F3 displayed the highest values in terms of antioxidant activity, BCAA content, and anti-atrophic effects on cellular morphology. These findings indicate that enzymatic hydrolysates and peptide fractions derived from peas using sustainable techniques could be valuable ingredients in the functional food industry. Their potential benefits include reducing oxidative stress and mitigating muscle atrophy.

Session 10

Plasma technology for improving post-harvest crop storage

Organized by Korea Institute of Fusion Energy

Session time : 16:20–17:50 **Venue : Room 301A**

Chaired by Seungmin Ryu (Korea Institute of Fusion Energy)

speaker 1

Development of plasma technology to sustain storage quality of crops after harvest

Hyeongwon Jeon
(Korea Institute of Fusion Energy)

speaker 2

Plasma-catalytic removal of ethylene and fungi over Pd/ZSM-5-coated honeycomb catalyst

Young Sun Mok
(Jeju National University)

speaker 3

Importance of accurate measurement of gas concentration and selection of right sensor for long-term storage of agricultural products

Hi-Deok Lee
(Chungnam National University)

speaker 4

Safety assessment of plasma treatment technology for agricultural food: Regulation and strategies

Hee Jun Shin
(Safety Assessment Solution., Ltd.)

>>> S10

Plasma technology for improving post-harvest crop storage

Chaired by Seungmin Ryu (Korea Institute of Fusion Energy)

>>> S10-1

Development of plasma technology to sustain storage quality of crops after harvest

Hyeongwon Jeon

Korea Institute of Fusion Energy, Korea

We are conducting research on improving the storability of crops after harvest using plasma technology. Plasma type uses atmospheric pressure room temperature plasma, and plasma generation method uses dielectric barrier discharge (DBD) source. In addition, a cylinder type generator was manufactured to increase the efficiency of gas flow. The main factors hindering crop storage after harvest are decay and ripening. Plasma storage technology can solve these two problems. Eliminates rotting bacteria in stored crops by creating plasma active species that have the same sterilizing power as ozone. In the meantime, we have conducted post-harvest rot control experiments using crops such as onions and carrots and have achieved results in preventing rot. Ethylene is a crop ripening hormone, and crops after harvest also produce ethylene. Ethylene plays a role in accelerating the ripening of crops, so it is a factor that interferes with crop storability. We remove ethylene by adsorbing it through an ethylene adsorbent and removing it with plasma. Ethylene removal experiments were conducted using crops such as apples and tomatoes. The storability of plasma technology is evaluated through quality assessment. Quality assessment of stored crops can evaluate the ability of the storage technology and give consumers confidence. Quality assessment is performed by evaluating freshness such as weight, hardness, sugar content, acidity, and sugar acid ratio, and safety assessment for toxicity. In the future, we plan to develop a fully automated plasma storage system by completing a smart plasma device by applying an automatic control and monitoring method and establishing a storage database of crops after harvest.

>>> S10-2

Plasma-catalytic removal of ethylene and fungi over Pd/ZSM-5-coated honeycomb catalyst

Saud Shirjana, Duc Ba Nguyen, Seung-gun Kim, Young Sun Mok

Jeju National University, Korea

Agricultural products are generally divided in two categories, depending on their physiological characteristics after harvest. Climacteric fruits and vegetables can ripen after harvest, whereas non-climacteric fruits cannot. Climacteric fruit ripening is represented by an increased rate of respiration and the biosynthesis of ethylene. The biosynthesis of ethylene is known as autocatalytic, meaning that once ethylene starts to form, ripening is accelerated, producing more ethylene. Therefore, the removal of ethylene from the agricultural storage facility is essential to improve the storage stability. Another immediate cause for impairing long-term storage of agricultural products is fungi. In this work, plasma-catalytic reactor system combined with intermittent injection of small amount of ozone was applied to the storage of several fruits and vegetables such as apples, kiwis, broccoli and citrus. The plasma-catalytic reactor consisted of an alternating current (AC) high voltage power supply, Pd/ZSM-5 catalyst coated on cordierite honeycomb monolith and two wire-mesh electrodes placed at both ends of the honeycomb catalyst, which was operated in cyclic mode, i.e., adsorption of ethylene without plasma generation, followed by plasma-catalytic oxidation of the adsorbed ethylene. Once a day, a small amount of ozone of ~5 ppm (parts per million, volumetric) was fed to the agricultural storage mock-up (1-m^3 container) to suppress the fungal growth. The concentration of ethylene during the storage was a lot higher in the control group than in the ethylene-treated group. In particular, the storage stability of apples and kiwis was significantly enhanced, showing better quality in hardness, sugar content and acidity. In case of broccoli, the control group got brown after a few days, while the ethylene-treated group remained green during the same period. Besides, the loss rate of citrus was a lot higher in the control group, obviously due to the fungal growth. Overall, the storage stability of all the above-mentioned fruits and vegetables was substantially improved.

>>> S10-3

Importance of accurate measurement of gas concentration and selection of high-quality sensor for long-term storage of agricultural products

Hi-Deok Lee

Korea Sensor Lab, Chungnam National University, Korea

We are living in an era of global climate crisis and regional disputes, which have led to unstable agricultural production and supply. Long-term storage of crops is also crucial for food security. Reports indicate that inadequate management during post-harvest distribution results in domestic losses of approximately 20-30% or a minimum of 3 trillion won, highlighting the importance of storage from an environmental perspective as well. In agricultural storage facilities, various types of gases are generated due to the ripening or decay of crops. In such cases, it is essential to have composite sensors capable of accurately measuring gas concentrations. Gas sensors utilize the characteristic of output values changing according to gas concentration, but even the same product may exhibit variations in sensor characteristics, and different sensor products measuring the same gas can show significant differences in their characteristics. Therefore, selecting precise gas sensors and accurately measuring gas concentrations are of utmost importance. This presentation demonstrates through experimental data that even products with the same purpose can have diverse detection characteristics based on sensor performance. Additionally, there can be significant variations in results among sensors measuring the same gas. Therefore, to ensure stable long-term storage of agricultural products, it is crucial to thoroughly test the characteristics of gas sensors under various conditions. Choosing high-quality gas sensors is essential for achieving this goal.

Acknowledgment

This work was supported by the Technology development Program(S3302887) funded by the Ministry of SMEs and Startups (MSS, Korea).

>>> S10-4

Safety assessment of plasma treatment technology for agricultural food: Regulation and strategies

Shin Hee Jun

Safety Assessment Solution., Ltd., Korea

Plasma technology is known as an advanced manufacturing technology needed for semiconductor and display production, an environmental technology to remove fine dust and hazardous substances, and an energy technology for nuclear fusion power generation. In addition, it is gaining attention again as a future new technology in the agricultural field. Over the past decade, it has become a global trend to apply the plasma technology to agricultural technologies including sterilization, disinfection, preservation, and growth promotion. Particularly, plasma treatment technology for sterilization and disinfection of agri-foods is expected to grow to the point of replacing conventional methods. However, despite the various proven benefits of the plasma technology, its commercialization is limited by safety concerns over agri-foods and chemicals associated with plasma. While safety and regulatory assessments should be prioritized, international standards for the safety of the plasma treatment technology applied to agri-foods are still absent. Regulations for workplace safety, chemical management, electrical safety, pollutant discharge, and waste disposal in factories or facilities utilizing the plasma technology still lack standardization and evidence research.

For the plasma technology to go beyond the experimental stage and make a significant entry into the future agricultural industry, sufficient scientific and technical research must be conducted in advance. We have identified the need for safety assessment standards by investigating national or international trends in plasma technology regulations. It will be necessary to be accompanied by a clear understanding and standardization of plasma factors and their application mechanisms that can be useful depending on the application's purposes. Then it is required to analyze the application mechanisms of plasma treatment technology in detail, the facility and agri-foods in itself and gather the available safety data. These make it possible for the gap between the current regulations and technology to be exposed, the way we can establish the technology's direction to be settled down in domestic and foreign regulations upon the guarantee of safety.

Session 11

Functions, safety and microbiome in Korean traditional fermented foods

Organized by Microbial Institute for Fermentation Industry

Session time : 16:20–17:50 **Venue : Room 301B**

Chaired by Joo Hyoung Lee (National Food Safety Information Service)

speaker 1

Comparable mechanisms of traditional fermented materials by region on DSS-Induced Colitis Model

Kwang-Hyun Park
(Nambu University)

speaker 2

Confirming the clinical functionality and safety of soy fermented foods: The heart of K-Food

Su-Jin Jung
(Jeonbuk National University Hospital)

speaker 3

Functions in Korean traditional fermented foods: Cheonggukjang and Ganjang

Chan-Hun Jung
(Jeonju AgroBio-Materials Institute)

>>> S11

Functions, safety and microbiome in Korean traditional fermented foods

Chaired by Joo Hyoung Lee (National Food Safety Information Service)

>>> S11-1

Comparable mechanisms of traditional fermented materials by region on DSS-induced colitis model

Kwang-Hyun Park[1,2]

[1]Nambu University, Korea
[2]Chonnam National University, Korea

Many scientific colleagues worldwide have been tried to understand the initiation and progressive mechanisms of chronic inflammatory diseases such as ulcerative colitis. Due to the nature of inflammatory bowel disease, it is considered to be a very difficult to control interactions between basal functions of human organs, microbiotas and/or biochemical reactions. The effects of various fermented products with undefined microbiomes for the improvement of inflammatory bowel diseases have been continuously known in worldwide. In Korea, various fermented products have been created and utilized for centuries based on scientific evidence. Recently, efforts have been made to explore the evidence for their application in various diseases, enhancing their value. For example, Gochujang is a traditional Korean fermented product obtained by mixing fermented bean powder, red pepper powder, glutinous rice, and salt. We investigated the efficacy of Gochujang of different regions in Korea in a DSS-induced colitis mouse model. We observed that changes of physical integrities with biochemical and immunological parameters in in vivo colitis models. Our results suggest that traditional fermented materials are good resources for improves of innate immunity and intestine function.

>>> S11-2

Confirming the clinical functionality and safety of soy fermented foods: The heart of K-Food

Su-Jin Jung

Jeonbuk National University Hospital, Korea

Traditional Korean fermented soy foods, known for their high salt content, are often perceived as health risks. However, these foods, particularly those based on fermented soybeans, provide health benefits owing to the diverse microorganisms and metabolites they contain. The salt plays a crucial role in enhancing flavor and promoting beneficial bacteria, while inhibiting harmful ones. Despite this, most existing studies have been either pre-clinical or clinical, with limited evaluations of the impacts of commercially available fermented soybeans on the gut microbiome and overall health. Recent research indicates that consuming traditional soybean paste (Doenjang), especially those high in beneficial bacteria, can boost these helpful microbes within the digestive tract. This was observed in pre-diabetic individuals who consumed 6 g of three different types of Doenjang powder for four weeks. Although all three types of Doenjang were deemed safe and showed no significant difference in health benefits, the traditional Doenjang high in beneficial bacteria showed a more notable increase in these beneficial microbes. Additionally, when individuals with functional constipation consumed three types of Gochujang powder (a type of red pepper paste) for four weeks, an increase in butyric acid (a short-chain fatty acid beneficial for gut health) and a decrease in calprotectin (an intestinal inflammation marker) were noted, particularly in the group consuming the Gochujang high in beneficial bacteria. These results suggest potential for improved gut health and reduced inflammation through the consumption of traditional red pepper paste. Applying fermented soy foods, a cornerstone of Korean cuisine, in dietary interventions has shown promising results in managing hypertension and diabetes, promoting weight loss, and enhancing psychological stability. Despite increased intake of fermented soybean foods, patients' blood glucose levels remained stable, and their blood pressure did not increase over a 12-week period. Notably, there was a significant reduction in diabetes medication dosage. In conclusion, a clear correlation exists between a healthy lifestyle and the benefits of fermented soybeans. Given the absence of scientific evidence linking the salt content in traditional fermented soy foods to health risks, there may be a need to revise the current low-salt policy in Korea. Continuous research and development, aimed at confirming the functional benefits of traditional Korean fermented soy foods, could bolster the national economy, promote the globalization of Korean cuisine, and ensure the preservation and continuation of traditional food-making practices.

>>> S11-3

Functions in Korean traditional fermented foods : Cheonggukjang and Ganjang

Chan-Hun Jung

Jeonju AgroBio-Materials Institute, Korea

Traditional fermented foods, which are an important part of people's dietary structure, are widely consumed all over the world. Soybeans are one of the ingredients in Korean traditional fermented foods, and fermented soybean foods such as cheonggukjang, doenjang, ganjang, and gochujang are commonly made using microorganisms such as *Bacillus subtilis (B. subtilis)* and *Aspergillus*. These fermented soybean foods are known to have various health benefits, such as weight maintenance, cardiovascular disease risk reduction, antidiabetic and constipation benefits, glucose and lipid level improvement, immune system stimulation, and anticancer effects. Although the health benefits of soybean fermented foods continue to be reported, the mechanism underlying actions of its are poorly understood. Therefore, many studies are needed to understand the mechanisms involved in the disease and the role of soy fermented foods in preventing or managing these diseases. In this presentation, we would like to introduce the functions of cheonggukjang and ganjang in improving gut health.

Session 12

Trends of intellectual property in food industry: Beyond food to biohealth

Organized by Dong-A Universrty & Kyungpook National University

Session time : 16:20-17:50 **Venue : Room 302**

Chaired by Bokyung Lee (Dong-A University)
Chaired by Deokyeong Choe (Kyungpook National University)

speaker 1

Intellectual property management tips for food tech researchers

Jin Kyu Chang
(Panbridge Patent & Law Firm)

speaker 2

Patent and litigation case study in food and nutritional ingredients

Eunha Sung
(CHA Hospital)

speaker 3

Success strategies and challenges for biosimilars

Jong Hyun Kim
(Celltrion, INC.)

speaker 4

Role of intellectual property rights in the food and biohealth industries

Sang-Han Lee
(Kyungpook National University)

>>> S12

Trends of intellectual property in food industry: Beyond food to biohealth

Chaired by Bokyung Lee (Dong-A University)
Chaired by Deokyeong Choe (Kyungpook National University)

>>> S12-1

Intellectual property management tips for food tech researchers

Jin Kyu Chang
Panbridge Patent & Law Firm, Korea

As Korean government's efforts to synchronize R&D research with a visible commercialization result mature, researchers are required to manage the Intellectual Property (IP) developed through their R&D activities effectively and properly. In the perspective of R&D result management, Korean government keeps a very strict rule for the degree of contribution to a specific R&D project ranging from an earlier-filed patent application to a PCT (Patent Cooperation Treaty) or Paris-Convention based foreign application. The strict control by the government is applied not just to the indication of R&D project grant, but it can be imposed on the inventorship. Failure to mark all inventors by missing an inventor who substantially contributed to the completion of an invention, could result in an objection in the prosecution process and further lead to a criminal procedure beyond just an ethical matter. Thus, researchers need to know how inventorship works and pay close attention to the indication of all inventors. Detectability is attracting interests of researchers in parallel with the administration of patents. As R&D projects focus more on the commercialization result, detecting a potential infringement of a patent became an important matter not only in a mass production stage but also in the R&D phase. In addition to considering detectability into drafting a patent specification, it is also required to check whether the drafted specification is properly written to reflect all possible technical aspects and the combination of elements are well organized. In this context, practical tips of reviewing a patent specification drafted by a patent attorney or patent engineer are presented for Food Tech researchers who are not an IP professional.

›››S12-2

Patent and litigation case study in food and nutritional ingredients

Eunha Sung

CHA Hospital, Korea

Patents play a critical role in the food and nutritional ingredient industry, protecting novel innovations and providing companies with a competitive advantage. This case study examines two representative companies, Impossible Foods Inc. and ChromaDex, and their experiences with patent-related litigations in the field of food and nutritional ingredients. Impossible Foods Inc., established in 2011, specializes in developing plant-based substitutes for meat products. In March 2022, the company filed a lawsuit against Motif, accusing them of patent infringement. This legal battle marked the first instance of a new food tech company taking action over intellectual property rights for meatless meat in the United States. The case illustrates the increasing importance of patents in the plant-based food industry as companies seek to protect their innovative products from unauthorized copying. ChromaDex, a Los Angeles-based company founded in 1999, operates in the dietary supplement and food ingredient space. As a publicly-traded company on the NASDAQ, ChromaDex places significant emphasis on protecting its intellectual property through patents. In September 2018, ChromaDex filed a patent infringement lawsuit against Elysium, a former customer, signaling the company's dedication to safeguarding its patented technologies from potential misuse by competitors or customers. The food and nutritional ingredient industry is witnessing significant innovation, with companies like Impossible Foods Inc. and ChromaDex leading the way. Patents play a vital role in protecting these innovations and fostering a competitive landscape. Through proactive patent strategies, companies can secure their intellectual property rights, paving the way for continued growth, and contributing to advancements in the industry.

>>> S12-3

Success strategies and challenges for biosimilars

Jong Hyun Kim
Celltrion, INC., Korea

Biological products are usually recombinant therapeutic proteins produced through biotechnology in living organisms. Most biological products are difficult to characterize or identify due to the inherent variations based on structural complexity and highly complex manufacturing processes. For this reason, biological products cannot be identical copies of original products, and the term 'biosimilars' is used instead of 'biogenerics'. Biosimilars have recently received significant attention as a strategy to increase access to biologic treatments for several diseases including diabetes, cancer, and inflammation. Biosimilars are biological products that are highly similar to existing approved biologic drugs in terms of efficacy, quality, and safety. The best-known examples of biosimilars are monoclonal antibodies, growth factors, and human insulins. The global biosimilar market is expected to grow from US$30.0 billion in 2023 to US$69.5 billion by 2028. In addition, more than 55 blockbuster biologic drugs, each with annual sales over US$1 billion, are going to be off patent within the next decade. The patent expiry provides a tremendous opportunity for biosimilars to enter the market. This will motivate Korean pharmaceutical companies to invest in the growing global biosimilar market and expand their market share. However, there are still obstacles to overcome, such as high manufacturing costs, the conduct of global clinical trials, and a lack of guidelines for biosimilars. Overcoming these difficulties through innovative strategies is a challenge for the biosimilar industry. In the near future, biosimilars are projected to become an increasingly important part of the pharmaceutical industry because of their potential to reduce healthcare costs and increase access to effective and safe biological therapies.

>>> S12-4

Role of intellectual property rights in the food and biohealth industries

Sang-Han Lee

Kyungpook National University, Korea

Biological products are usually recombinant therapeutic proteins produced through biotechnology in living organisms. Most biological products are difficult to characterize or identify due to the inherent variations based on structural complexity and highly complex manufacturing processes. For this reason, biological products cannot be identical copies of original products, and the term 'biosimilars' is used instead of 'biogenerics'. Biosimilars have recently received significant attention as a strategy to increase access to biologic treatments for several diseases including diabetes, cancer, and inflammation. Biosimilars are biological products that are highly similar to existing approved biologic drugs in terms of efficacy, quality, and safety. The best-known examples of biosimilars are monoclonal antibodies, growth factors, and human insulins. The global biosimilar market is expected to grow from US$30.0 billion in 2023 to US$69.5 billion by 2028. In addition, more than 55 blockbuster biologic drugs, each with annual sales over US$1 billion, are going to be off patent within the next decade. The patent expiry provides a tremendous opportunity for biosimilars to enter the market. This will motivate Korean pharmaceutical companies to invest in the growing global biosimilar market and expand their market share. However, there are still obstacles to overcome, such as high manufacturing costs, the conduct of global clinical trials, and a lack of guidelines for biosimilars. Overcoming these difficulties through innovative strategies is a challenge for the biosimilar industry. In the near future, biosimilars are projected to become an increasingly important part of the pharmaceutical industry because of their potential to reduce healthcare costs and increase access to effective and safe biological therapies.

Session 13

Functionalized K-resource : Current and future strategies

Organized by Jeonju AgroBio-Materials Institute

Session time : 16:20-17:50 **Venue : Room 303A**

Chaired by Ki-Bae Hong (Jeju National University)

speaker 1

Valorization of K-resource through agricultural by-product utilization and food resource-spin-off

Tae-Gyu Lim
(Sejong University)

speaker 2

Creation of high added value through functional identification of local resources

Mi Hee Park
(Jeonju AgroBio-Materials Institute)

speaker 3

Digital-based food restructuring using food printing

Hyun Woo Kim
(Korea University)

speaker 4

Meat alternatives, innovation for a sustainable food system

Yooheon Park
(Dongguk University)

>>> S13

Functionalized K-resource : Current and future strategies

Chaired by Ki-Bae Hong (Jeju National University)

>>> S13-1

Valorization of K-resource through agricultural by-product utilization and food resource-spin-off

Tae-Gyu Lim
Sejong University, Korea

Utilization of food-industrial by-products and waste and spinning-off of food components to other industrial fields are appraised the admirable way to valorize the K-food resources. Herein, we propose two ideas to improve the value of K-resources. The first is about the application of food by-products to cosmetic ingredients. Pumpkin tendrils are being discarded as agricultural by-products after the pumpkin harvest. We discovered that the pumpkin tendrils extract exhibits potent free radical scavenging and tyrosinase inhibitory activities. As tyrosinase is a crucial enzyme for skin pigmentation, we checked the skin whitening activity of the pumpkin tendrils extract using 2D and 3D-cultured B16F10 melanoma cells. The extract reduced melanogenesis in this experiment by downregulating TRP-1, TRP-2, tyrosinase, and MITF expression. Furthermore, the phosphorylation of CREB was also diminished by the pumpkin tendril extract treatment. The bioactivity of pumpkin tendril extract was confirmed using the zebrafish model also. The second study is about applying food components to other industrial fields, such as cosmetic ingredients. In this study, we focused on the aged Allium sativum. The extract of the aged *Allium sativum* possesses anti-acne vulgaris activity. We detected the suppressive activity of the aged *Allium sativum* on lipase and protease, which are related to the deteriorating follicular stage in acne formation. Additionally, the hyperinflammation induced by Cutibacterium acne treatment was attenuated by the extract of *Allium sativum*. Next, we evaluated the skin microbiome changes after applying cosmetic cream, including the aged Allium sativum extract. Notably, the skin microbiome diversity was

enhanced after 5 days of treatment comparing the control cream application. And the genus level of Alistipes was significantly increased in the group assigning the cream containing the aged *Allium sativum* extract after 5 days. Previous studies have reported increased Alistipes, mainly found in young women's skin. The above two studies deal with utilizing food-industrial by-products and applying food components to other industrial fields. It seems that many researchers need to make efforts to K-food resource valorization, and I propose that the aboce two methods will be the way of to K-food resource valorization.

>>> S13-2

Creation of high added value through functional identification of local resources

Mi Hee Park

Jeonju AgroBio-Materials Institute, Korea

High value-added research using local resources is being actively conducted using various local materials. In order to harness the potential of local resources and create significant value, numerous studies are underway to develop functional materials and products that exhibit health-enhancing properties. This approach has the potential to generate added value several times to hundreds of times higher than simply utilizing primary products. In pursuit of high-value-added products, a region renowned for its exceptional plant species or agricultural produce engages in extensive research and development endeavors. Through these efforts, bioactive compounds with potential health benefits are identified and extracted. These compounds are then skillfully incorporated into functional food products or nutraceutical supplements, resulting in the creation of premium offerings that not only foster well-being but also captivate health-conscious consumers. Various local governments support and encourage cultivation of specific medicinal plants or herbs that thrive in the region's climate and soil conditions. These plants are then processed and used as raw materials for the production of herbal remedies, natural cosmetics, or herbal supplements. By leveraging the region's natural resources and traditional knowledge, the community taps into the growing demand for natural and alternative healthcare products. A local farming community focuses on growing niche or high-demand crops, such as organic vegetables, heirloom fruits, or specialty herbs. By emphasizing quality, sustainability, and traceability, they establish a reputation for premium produce, commanding higher prices in local and niche markets, and further enhance the value and profitability of these specialty crops. In this presentation, I would like to present the results of functional research using various local resources and the results of the response of products using them. In particular, the researchers of Jeonju AgroBio-Materials Institute have scientifically identified health functionalities for the luxury of *Oenanthe javanica* and *Moju*, which are local materials. In Jeonju AgroBio-Materials Institute, we are investigating the health functionality of *Oenanthe javanica* cultivated in Jeonju, and developing products using it. An optimal extraction method was developed to extract active ingredients from water parsley, and liver function improvement efficacy was evaluated with *Oenanthe javanica*

extract. As a result of the study, it was confirmed that alcoholic liver disease was suppressed and liver function was improved by treatment with water parsley extract. Using the results of this research, the Jeonju AgroBio-materials Institute is promoting the development of individually approved raw materials that help improve liver function. We also investigated the health functionalities of Moju, a specialty of Jeonju. Moju is the representative liquor of Jeonju, with the story that a mother who was worried about her son's health put herbal medicines such as ginger, cinnamon, and jujube in makgeolli and boiled it. We identified the whitening functionality of Moju, and is promoting human body application tests for the development of functional cosmetics using this. In addition to the aforementioned point, I aim to explore the current and future strategies of K-resources, specifically focusing on the identification of health functionalities with special products. Additionally, I will present noteworthy cases that highlight the promotion of luxury products through the utilization of diverse local resources.

>>> S13-3

Digital-based food restructuring using food printing

Hyun Woo Kim
Korea University, Korea

In recent years, food printing has emerged as an innovative technology that has the potential to revolutionize the way we design and produce food. One of the key benefits of food printing is its potential to address various challenges faced by the food industry and consumers alike. With the ability to control ingredient composition and portion sizes precisely, food printing offers opportunities for personalized nutrition and dietary management. This technology can be leveraged to meet the dietary needs of specific individuals, including those with allergies, intolerances, or specific dietary restrictions. Furthermore, food printing has the potential to reduce food waste by enabling on-demand production and optimizing ingredient utilization. Moreover, the digital nature of food printing allows for efficient collaboration between designers, chefs, and nutritionists. With the aid of computer simulations and virtual prototyping, the restructuring process can be streamlined, leading to faster iterations and enhanced creativity. This technology also facilitates the integration of scientific knowledge, enabling the development of functional and fortified foods tailored to specific nutritional requirements. While food printing presents exciting possibilities, several challenges need to be addressed before its widespread adoption. These include improving the affordability and accessibility of food printers, ensuring the safety and regulatory compliance of printed food products, and addressing the ethical implications associated with food customization. In conclusion, the advent of food printing technology offers immense potential for digital-based food restructuring. By leveraging the capabilities of additive manufacturing and computer-aided design, this technology can revolutionize the way we create, customize, and consume food. As further advancements are made and challenges are overcome, food printing has the potential to transform the food industry and contribute to a more sustainable and personalized approach to nutrition and gastronomy.

›››S13-4

Meat alternatives, innovation for a sustainable food system

Yooheon Park

Dongguk University, Korea

Sustainability has now become a foundational element of the industry, rather than just one of the various indicators pursued by the industry. Recently, the processes of food processing, consumption, distribution, and waste management have been referred to as the 'food system,' and the innovation of technology for sustainability is also needed in the food system. Therefore, the 'Meat Alternatives' technology is receiving attention as a solution to improve traditional protein production methods and address the increasing demand for animal-based protein. Plant-based Meat Alternatives are made from protein extracted from plants and have limited availability, but they are being sold as products. However, they fall short of fully replacing conventional meat due to limitations such as nutritional deficiencies and difficulties in reflecting consumer preferences in a vegetarian diet. Cultivated meat is proposed as an alternative to overcome the limitations of plant-based meat alternatives. Cultivated meat is produced by extracting cells from specific parts of an animal without slaughtering the animal, and compared to plant-based meat alternatives, it can offer a taste and flavor closer to meat. However, the question of whether it is safe to consume as food requires a verification process for safety. Consumer acceptance plays a significant role in the cultivated meat market, and while it is impossible to predict exact figures, if it is possible to perfectly replicate 'meat' that are similar to convention meat rather than just cultured cell masses, significant market growth is anticipated. Currently, there have been no cases of cultivated meat receiving approval as food in South Korea, but Singapore has given the world's first food approval for cultivated meat-related products, and recently, cultivated meat has also been recognized as food in the United States. Continuous research and development are being conducted to achieve better results in terms of taste and texture of cultivated meat, and it will be possible to produce improved meat alternatives by combining plant-based meat alternatives with cultivated meat, improving taste and texture. 3D food printing can also be used as a powerful way to overcome the current limitations. The advancement and commercialization of cultivated meat technology will provide solutions to the problems that humanity needs to address at this point in time, opening up a sustainable new era.

Session 14

Investigation of pesticides in animal food distributed in Korea

Organized by Daegu University

Session time : 16:20–17:50 **Venue : Room 303B**

Chaired by Guiim Moon (Ministry of Food and Drug Safety)

speaker 1

Monitoring of pesticides in animal food distributed in Korea

Moo-Hyeog Im
(Daegu Univesity)

speaker 2

Analytical method of imidazoline-based herbicides in livestock products

Seonghwan Moon
(SGS Korea)

speaker 3

Analytical method of dithiocarbamates in livestock products

Kyoung-Jin Park
(OATC)

>>> S14

Investigation of pesticides in animal food distributed in Korea

Chaired by Guiim Moon (Ministry of Food and Drug Safety)

>>> S14-1

Monitoring of pesticides in animal food distributed in Korea

Moo-Hyeog Im
Daegu Univesity, Korea

The aim of this study is to monitor the unintentional contamination of animal foods by pesticide residues, for safety management. Residues of dithiocabamate, imazamox, imazapyr, imazapic, and imazethapyr pesticides in beef, bovine liver, bovine kidney, chicken, chicken liver, milk, and eggs were studied. A total of 310 domestic animal products were collected from slaughterhouses and poultry farms across the country, and 140 imported products were collected from imported products. The organization in charge of this project quickly prepared manuals for sample collection, sample homogenization, and test method verification, to facilitate uniform analysis by participating institutions. Dithiocabamate pesticides were analyzed by the ultraviolet method notified in the Food Code, and the liquid chromatography－mass spectrometry/mass spectrometry (LC–MS/MS) method was applied to the samples in which pesticide components were detected, and the confirmation test was performed. Four herbicide pesticides including imazamox were analyzed using the LC–MS/MS method. The supervising institution reviewed the analysis methods found in food codes, research reports, and literature and imparted training to the institutions performing the analysis for ensuring efficiency. The results obtained from the pesticide monitoring of livestock products are intended for use in establishing pesticide residue standards for risk assessments.

>>> S14-2

Analytical method of imidazoline-based herbicides in livestock products

Seonghwan Moon

SGS Korea, Korea

Imidazolinone herbicides, which include imazapyr, imazapic, imazethapyr, and imazamox, control weeds by inhibiting the enzyme acetohydroxyacid synthase, which is a critical enzyme for the biosynthesis of branched-chain amino acids in plants. In this study, reliable method was developed for the simultaneous determination of imazapyr, imazapic, imazethapyr, and imazamox in beef, bovine liver, bovine kidney, chicken, chicken liver, milk, and eggs. The efficiency of fat removal was increased by adding hexane extraction to the modified QuEChERS method developed in previous studies. Also, four herbicide pesticides including imazamox were analyzed using the LC-MS/MS method. The method was validated according to the CAC (Codex Alimentarius Commision) guideline. Recoveries at three different levels of 5, 50 and 250 μg/kg, ranged from 71.7 to 100.3 % and the relative standard deviations (RSDs) ranged 0.2 % ~ 10.3 %. Limit of detections (LODs) ranged 0.52 ~ 0.74 μg /kg and limit of quantifications (LOQs) ranged 1.66 ~ 2.35 μg/kg for imazapyr, imazapic, imazethapyr, and imazamox. Also, it was confirmed that the range of Matrix effect was 14.9 ~ 31.2 % which had was not highly affected. The development method turned out to be suitable for legal regulation.

>>> S14-3

Analytical method of dithiocarbamates in livestock products

Kyoung-Jin Park
OATC, Korea

The aim of this study is to monitor the unintentional contamination of animal foods by pesticide residues, for safety management. Residues of dithiocabamate, pesticides in beef, bovine liver, bovine kidney, chicken, chicken liver, milk, and eggs were studied. A total of 310 domestic animal products were collected from slaughterhouses and poultry farms across the country, and 140 imported products were collected from imported products. The organization in charge of this project quickly prepared manuals for sample collection, sample homogenization, and test method verification, to facilitate uniform analysis by participating institutions. Dithiocabamate pesticides were analyzed by the ultraviolet method notified in the Food Code, and the liquid chromatography－mass spectrometry/mass spectrometry (LC–MS/MS) method was applied to the samples in which pesticide components were detected, and the confirmation test was performed. The supervising institution reviewed the analysis methods found in food codes, research reports, and literature and imparted training to the institutions performing the analysis for ensuring efficiency. The results obtained from the pesticide monitoring of livestock products are intended for use in establishing pesticide residue standards for risk assessments.

Session 15

Vitalization of Korean liquor industry to expand consumption of local agricultural products

Organized by National Institute of Agricultural Sciences

Session time : 09:30–11:00 **Venue : Room 301A**

Chaired by Jin Song (National Institute of Agricultural Sciences)

speaker 1

Establishment of key indicators for Makgeolli flavor

Bora Lim
(National Institute of Agricultural Sciences)

speaker 2

Characteristics of taste and aroma by beer type

Chul Cheong
(Seoul Venture University)

speaker 3

Selection and industrialization of native yeasts suitable for Korean wine

Hyang-Sik Yoon
(Wine Institute)

speaker 4

New product development of Korea's premium matured distilled spirits (K-SPIRITS)

Tae Wan Kim
(Korea Food Research Institute)

>>> S15

Vitalization of Korean liquor industry to expand consumption of local agricultural products

Chaired by Jin Song (National Institute of Agricultural Sciences)

>>> S15-1

Establishment of key indicators for Makgeolli flavor

Bora Lim

National Institute of Agricultural Sciences, RDA, Korea

The global mainstream has classification standards for consumers to choose from. Makgeolli, a traditional Korean alcoholic beverage, began to be manufactured to further enhance the palatability of rice grown in agricultural societies. In this study, we acknowledged that each person has different favorite characteristics of makgeolli, and set up a makgeolli flavor quality index and presented standards so that it would be possible to select makgeolli based on this. Quality characteristics (alcohol, organic acids, free sugars, etc.), quantitative descriptive analysis (trained panel = 11), and consumer acceptance (n = 117) were performed on eight commercial makgeolli samples. Through multivariate analysis, correlations between quality characteristics, QDA, consumer acceptance were identified. It was found that the preference was not for a specific ingredient, but for a product in which various ingredients were harmonized. The sugar acid ratio was judged to be suitable for expressing the consumer's preference. The components involved in sweetness and sourness are diverse in makgeolli, and the sweetness and sourness of makgeolli differ greatly. Accordingly, a threshold evaluation was conducted to determine the influence of each ingredient in makgeolli. It was most appropriate to express the influence of each ingredient on makgeolli as a taste value considering the threshold value. Of these, the main components that express sweetness and sourness are glucose, aspartame, and lactic acid. As makgeolli is a favorite food, providing flavor information rather than functional labeling will help consumers to make a better choice. When expressing the sweetness and sourness of makgeolli, it is necessary to consider the strength of each component rather than a single component.

›››S15-2

Characteristics of taste and aroma by beer type

Chul Cheong

Seoul Venture University, Korea

The birth of famous beer abroad is thanks to the establishment of science-based brewing technology and quality management system along with training of beer experts, and through this, standardization and standardization of the entire process from raw materials to packaging and distribution of beer has become possible. In addition, thanks to the development of analysis technology and microbes, overseas beers are constantly maintaining the quality of beer that meets the consumer's eye level by setting quality control indicators along with analyzing the origin of taste and aroma for each beer type and the cause of off-flavors. As such, overseas countries have already accumulated analysis data through in-depth research on beer flavor for a long time to set thresholds and aromas, and it is common to use them for quality control in the industry. In Korea, there is no basic research on beer flavor, and it is true that both consumers and manufacturers have a poor concept of delicious and good beer. In particular, beer workers need to inform consumers about product characteristics and characters of beer. However, the reality is that most of the domestic beer workers do not understand the quality characteristics of beer, and the expression of flavor is often very subjective and ambiguous. Consumers and beer workers in Korea have recently become more interested in the taste and aroma of beer, and accordingly, many beer-related sommeliers are being produced. There are no systematic and academic books related to beer flavor in Korea yet, so there are limitations in acquiring scientific information on beer flavor and using it in the field. This academic presentation aims to examine the main factors affecting the taste and aroma of each type of beer and to find out how each factor affects the characteristics of beer. It will also look at the evaluation criteria and ingredients for each beer type. Let's also find out how to manage the ingredients that affect the flavor and already smell of each beer type and how to improve the quality. n addition, we will find out the threshold value of flavor components for each beer type and examine which components actually affect the flavor of each beer type compared to the threshold value.

>>> S15-3

Selection and industrialization of native yeasts suitable for Korean wine

Hyang-Sik Yoon
Wine Institute, Korea

Wine market of Korea has grown rapidly, increasing by 50% compared to 2020, reaching KRW 1.5 trillion in 2021. The Korean wine market as a regional specialty made from domestic fruits also grew by 47.6% compared to 2020 based on shipment amount. Korean wine has great significance as an excellent alternative that can lead the consumption of local agricultural products and the creation of farm household income, and has a very high possibility as a tourism product linked to the 6th industry. In order to improve and differentiate the quality of Korean wine, yeast and brewing processes suitable for domestic grapes are required. The Wine Research Institute selected wine yeast suitable for Korean wine, and conducted various studies to improve the quality of wine produced by farmhouse wineries using the yeast. The native yeast was Saccharomyces cerevisiae ES22, which was finally selected from 17 grape fermentation broths such as Campbell Early, Delaware, and Sanmeoru cultivated in Korea. This yeast has a rich fruity and floral aroma and is suitable for brewing. For industrialization of this yeast, formulation conditions were set in consideration of growth characteristics and economic feasibility.

›››S15-4

New product development of Korea's premium matured distilled spirits (K-SPIRITS)

Tae Wan Kim

Korea Food Research Institute, Korea

The so-called 'open run' trend seen in the luxury goods market has recently been appeared in the alcoholic beverage industry centered on distilled spirits. The Korean alcoholic beverage market is undergoing a major change recently. A wide variety of premium distilled spirits produced in small and medium-sized companies are being launched. In 2021, per capita nominal disposable income exceeded $35,000, and the United Nations Conference on Trade and Development (UNCTAD) classified Korea as an advanced country. As the liquor industry and market respond to this trend, it is premiumized and diversified with a focus on distilled spirits. In order to increase the value of Korean alcoholic beverage and to have a competitiveness in the global market, it is necessary to utilize the traditional technology and resources of the country. For examples, the use of traditional Nuruk-derived brewing microorganisms, the modernization of traditional Sojut-gori distillation stills, the development of wooden casks for maturation using forest resources, and the development of maturation Onggi-pot pottery using soil resources. These technical elements centered on premium matured distilled spirits can also contribute to the vitalization of related industries and the establishment of a sustainable industrial ecosystem. Our matured distilled spirits will be able to establish the identity of Korean alcoholic beverages in the global market in the future.

Session 16

Prospect of industrial technology for FOOD-TECH

Sponsored by SeJun F&B

Session time : 09:30–11:00 **Venue : Room 301B**

Chaired by Sungjin Park (Korea University)

speaker 1

Effects of NaCl on the physical properties of corn starch-methyl cellulose mixtures in model system and pastes produced using 3D food printer

Youngseung Lee
(Dankook University)

speaker 2

Food technology development trends and commercialization strategies

Geum Su Seong
(Korea Food Research Institute)

speaker 3

Current state of care food industry and commercialization using local agricultural products

Seong Il Heo
(Hongcheon Institute of Medicinal Herb)

speaker 4

Technical development strategies for globalization of Topokki

Sanghyo Lee
(SeJun F&B)

>>> S16

Prospect of industrial technology for FOOD-TECH

Chaired by Sungjin Park (Korea University)

>>> S16-1

Effects of NaCl on the physical properties of corn starch-methyl cellulose mixtures in model system and pastes produced using 3D food printer

Youngseung Lee

Dankook University, Korea

It is well known that salts can play an important role in starch–hydrocolloid mixtures, for example viscosity control, gel formation, flavor enhancement, and stability control. This study aimed to examine the effects of NaCl on the physical properties of corn starch–methyl cellulose mixtures in model systems and pastes produced using a 3D food printer. The corn starch (CS) with methyl cellulose (MC) dispersions were prepared as 5% (w/w) by mixing at 17:0.5 (CS/MC) mixing ratio in the presence of 1.0, 2.0, 3.0, and 4.0% (w/w) NaCl levels. The effects of NaCl addition on the physical properties including swelling power, pasting properties, rheological behaviors of the CS–MC mixtures were determined. Pastes including the CS–MC mixtures added with rice flours were produced using a 3D food printer. Printing accuracy, dimensional stability, post–processing characteristics, cooking loss, shrinkage rate, mechanical properties were performed to determine the effect of NaCl on the 3D printer–produced pastes. The results showed that the physical properties of the CS–MC system depended on the NaCl concentrations. The CS–MC mixtures with NaCl were more difficult to gelatinize, resulting in a significant decrease in the peak, breakdown viscosity, and increase in a pasting temperature compared to the control (0% NaCl). All the mixtures exhibited shear–thinning behavior. The dynamic viscoelastic property values were higher than those of the control and tended to increase as the NaCl concentration increased. For the 3D–printed pastes, the addition of NaCl allowed the paste to flow smoothly from the nozzle, resulting in printing without loss of shape, and the layers were well stacked. Mechanical properties such as hardness and cohesiveness were improved, and shear force was also increased. Thus, it is important to optimize the levels of NaCl, showing a good applicability in the CS–MC mixtures in model system as well as pastes produced using a 3D food printer.

>>> S16-2

Food technology development trends and commercialization strategies

Geum Su Seong

Korea Food Research Institute, Korea

Due to the COVID-19 pandemic, digitalization being developed in each industry has accelerated. Among them, "FoodTech" is drawing the most attention. Food technology is a combination of food and technology, and refers to a new industry that combines technologies such as the food industry and ICT. It can be applied from the production of food to the processing, distribution, and restaurant industries. The most representative examples include food delivery drones, kitchen appliances that manufacture customized nutritional foods, and the large sports market that is made by cell culture. Most of the new technologies in the food industry that have recently emerged are classified as food technologies. Food tech is expected to create new added value as a paradigm for the food industry, and the market size is growing as much as it is surprised (about $250 billion in 2022 → about $342 billion in 2027). The reason why Food Tech is growing on a surprising market scale is as follows: First, non-face-to-face culture due to COVID-19, second, growing vegan consumption population, third, the trend of value consumption of the MZ generatio, fourth, it has emerged as a major solution to climate change and environmental pollution. Food tech is not just limited to food itself. It includes everything from production to delivery and consumption of food ingredients, and food technology is bringing about major changes in our lifestyle, including work efficiency improvement and business replacement, distribution platforms, production and manufacturing innovation, and next-generation foods. Today's speaker will talk about the latest technology trends for the next generation of food. In relation to food technology, 10 key food technologies such as cell culture food production technology, plant-based food manufacturing technology, food printing technology, smart manufacturing and distribution technology, food new utilization (upcycling) technology, eco-friendly packaging technology, and food technology robots are being researched and developed at home and abroad.

>>> S16-3

Current state of care food industry and commercialization using local agricultural products

Seong Il Heo

Hongcheon Institute of Medicinal Herb, Korea

This paper focuses on the significance and potential of integrating the care food industry with regional agricultural specialties, highlighting the increasing importance of the care food industry in an aging society. The rising interest in health and wellness has led to a higher demand for nutritious foods, and companies that proactively capitalize on this trend are experiencing prosperity. Conversely, local agricultural products are gaining popularity among consumers due to their distinctive characteristics and quality, but limited production volumes and challenges in distribution and marketing are hindering their full potential. Consequently, a business model that integrates and collaborates with the care food industry and local agricultural specialties has emerged. The paper initially examines the current state and prospects of the care food industry, proposing ways to utilize local agricultural products to create opportunities within the care food industry. Emphasizing the positive health impact of local produce, it explores strategies to effectively combine them with care food products. Commercialization using local agricultural products in a modern society that values social responsibility and sustainability can contribute significantly to improving the local economy and residents' quality of life. Therefore, we emphasize the importance of policy support to strengthen cooperation between local agriculture and the care food industry. This paper also discusses case studies of the integration of the care food industry with local agricultural products, highlighting the advantages of these business models and presenting the potential for market growth. Ultimately, it presents promising strategies that foster collaboration between companies and governments to achieve mutual development.

>>> S16-4

Technical development strategies for globalization of Topokki

Sanghyo Lee

SeJun F&B, Korea

Topokki, a representative Korean rice product, has captured the taste buds of the world, and the related industry has become a representative product group of the Korean food industry.

The strategies and preliminary tasks for Topokki products to enter the world include improving the texture to suit foreigners, developing sauces, and diversifying menus, but the most urgent and difficult task is to develop technology for shelf-stable distribution of Topokki, a high-moisture food. Topokki, which contains more than 40 per cent water, must be refrigerated or frozen for long-term distribution, such as for export. However, the relatively high-cost distribution structure of refrigerated and frozen distribution is one of the biggest weaknesses of globalization, so only the realization of room temperature distribution can break through the already saturated domestic Topokki market by exploring overseas markets. The technical know-how of aseptically packaged rice (Hatban) for long-term distribution at room temperature, introduced in Korea 30 years ago, was achieved through a process of washing, soaking, sterilization of raw materials, rice cooking, cooling and aseptic packaging, and this technology was originally applied to aseptically packaged rice cake manufacturing technology. It is hoped that the Topokki product, which can be distributed at room temperature for one year, will once again develop into a global product with excellent quality and competitiveness in the domestic and global markets.

Session 17

Strategy for the development of agricultural biomaterial industry for upcoming era

Organized by Korea Food Research Institute

Session time : 09:30–11:00 **Venue : Room 303A**

Chaired by Dong Bum Shin (Jeju National University)

speaker 1

Evaluation of agricultural biomaterials based on the cell line and its application

Jinyoung Hur
(Korea Food Research Institute)

speaker 2

In vivo test of agricultural biomaterials and its application

Tae Ho Ryu
(Berry & Biofood Research Institute)

speaker 3

Development of agricultural biomaterials based on the fermentation and its application

Seungwha Jo
(Microbial Institute for Fermentation Industry)

speaker 4

Cases of application of functional food formulations and corporate support

Mun Yeon Baek
(The Food Industry Promotional Agency of Korea)

>>> S17

Strategy for the development of agricultural biomaterial industry for upcoming era

Chaired by Dong Bum Shin (Jeju National University)

>>> S17-1

Evaluation of agricultural biomaterials based on the cell line and its application

Jinyoung Hur

Korea Food Research Institute, Korea

In this study, cell line-based efficacy and safety were evaluated in the preclinical stage for health functional food development, and preclinical studies were conducted through metabolomics analysis for standardization. As a standardization study, profiling natural products and food materials was performed to analyze metabolites qualitatively, and flavonoids, phenolic compounds, organic acids, and amino acids were analyzed using the Korea Food Research Institute database. In addition, UPLC-QTOF-MS was used to analyze the index and active components of agricultural biomaterials, so quantitative analysis of target metabolites was performed, and standardization of substances required by companies was carried out. Through metabolomic analysis of fermented products of agricultural food samples, a total of 68 substances, including phenolic compounds, were identified in phenolic compounds of non-fermented and fermented products, and it was found that 26 main substances increased by fermentation confirmed. In addition to developing health functional food, SOP was established according to the Ministry of Food and Drug Safety guidelines, and cell-based efficacy evaluation for skin health, antioxidant, anti-inflammatory, and immune function was performed. To confirm the oxidative stress reduction effect of the Lactobacillus fermented material, a hydroxyl radical-induced NIH3T3 cell model was established, and cell viability and MDA production were measured. As a result, it was confirmed that oxidative stress decreased in a concentration-dependent manner. In addition, by evaluating the antioxidant effect of the agricultural and biomaterials, it was also confirmed that there was a difference in $ABTS^{+}$,

DPPH, and hydroxyl radical scavenging ability according to the production process condition. When we treated lactic acid bacteria and soybean extract in the UV-induced human dermal fibroblast cell line, the expression level of MMP-1 decreased, and collagen production and hyaluronic acid synthesis increased. When confirming the immune function enhancement effect according to the difference in the mixed material extract, the difference in NO production and PGE2 production was shown for each extract. In addition, to evaluate the anti-inflammatory effect of the mixed extraction according to extraction conditions, a hyper-immune response was induced in the RAW264.7 cell line with LPS. The results showed that the expression levels of NO and PGE2 were reduced without reducing cell viability. Based on these cell-based evaluation results, we are currently conducting animal-based preclinical studies, and we will conduct toxicity tests for human application tests in the future so that supporting companies can smoothly develop and industrialize health functional foods. This study is a fundamental study to promote industrialization technology based on agricultural biomaterials, and it will be possible to strengthen technological competitiveness for entering the global market along with product competitiveness through establishing a corporate support system and industrialization.

>>> S17-2

In vivo test of agricultural biomaterials and its application

Tae Ho Ryu

Berry & Biofood Research Institute, Korea

The agriculture and food industry is one of the most important sectors of the local economy in Jeollabuk-do, playing a central role for the processing of agricultural materials and food supply. Over the past few decades, consumer requirements in the field of food production have changed considerably. Food no longer satisfies hunger, but plays an important role in maintaining and promoting health and preventing disease. Many researchers have suggested that the best functional foods are created through selecting and identifying agricultural products rich in functional ingredients and analyzing their mechanisms. Functional foods contain dietary fiber, polyphenols, carotenoids, and other molecules, and *in vitro, in vivo* tests prior to clinical trials are essential to determine whether these foods contribute to human health. In vivo experiments are testing the effects of various biological entities on the behavior or body changes of living organisms, usually in animals, as opposed to tissue extracts or dead organisms. Therefore, the health-promoting effects of agricultural biomaterials possessed by various companies in Jeollabuk-do were elucidated through animal experiments: blood pressure control effect of sword bean extract in hypertensive rats, constipation protective effect of fermented soybean-based products, anti-obesity effect of kombucha, and immune enhancing effect of Platycodon grandiflorum extract. We believe that by verifying the functionality of agricultural biomaterials through *in vivo* testing, we can contribute to securing technological competitiveness in the agricultural industry and revitalizing the local economy.

›››S17-3

Development of agricultural biomaterials based on the fermentation and its application

Seungwha Jo

Microbial Institute for Fermentation Industry, Korea

Agricultural biomaterials refer to natural or biomaterials substances derived from agricultural resources. This study aims to develop and understand how to apply these agricultural biomaterials based on microorganisms and fermentation. Fermentation is a process using microorganisms to produce useful substances and transform natural products into desired forms. Fermentation, in traditional meaning, is a metabolic process that produces chemical changes in organic substances through the action of enzymes, and can be seen as part of the modern bioconversion process. Intention of using agricultural biomaterials is to discover various biomaterials and obtain better results in absorption rate, function and etc. compared to original materials. We have identified the possibility of material development in Cassava leaf that are discarded as a byproduct by fermenting with Lactobacillus brevis. The fermented Cassava leaf enhanced ACE inhibition and PLI activity, and increased of ornithine contents. Also, a material containing functional ingredients was developed by fermenting defatted sesame seeds extract using Bacillus subtilis increased total lignan contents and various antioxidants components. The seasoning material by applying the fermentation method to soybeans was manufactured so that it could be used as various processed food ingredients such as pastes and sauces. Furthermore, new fermentation materials were developed by fermenting various agricultural life resources and optimizing the production conditions of target substances. These fermentation materials are delivered to the enterprises through material formulation after evaluation of effectiveness and functionality is made. In this matter, the discovery of industrially usable fermentation materials is expected to be helpful for the agricultural bio-industry.

>>> S17-4

Cases of application of functional food formulations and corporate support

Mun Yeon Baek

The Food Industry Promotional Agency of Korea, Korea

Functional food formulations refer to the forms (shapes) of functional products (foods) ingested by consumers, and there are a total of 13 types of formulations, including tablets, capsules, pills, and granules. Formulation development can have the effect of facilitating the intake of products, helping consumers to take the correct amount of daily intake and protecting products from atmospheric oxygen or moisture. The health functional food market has grown by 25% compared to 2019, surpassing 6 trillion won in domestic market size, and the rapid rise of the self-medication trend is expected to segment functional ingredients according to the age, gender, and preferences of consumers. Examples of diversification of formulations due to this are investigated, and examples of technical support for actual companies (process development, new material development, recipe development, processing suitability analysis support, process standardization support, etc.) are introduced.

International Session

New trends in food technology

Session time : 09:30–11:00 Venue : Room 303B

Chaired by Mi-Kyung Park (Kyungpook National University)

speaker 1

Recent trends and approaches in food technology

Muhammad Sajid Arshad (Government College University, Pakistan)

speaker 2

Microbial effects and quality management of greater amberjack (*Seriola dumerili*) treated by slightly acidic electrolyzed water

Shuai Wei (Guangdong Ocean University, China)

speaker 3

Application of *in vitro* gastrointestinal digestive system to seek for personal prebiotics

Tatsuya Unno (Chungbuk National University)

speaker 4

Incremental and groundbreaking options, including comparisons to current packaging solutions and some challenges for the near future

Mikael Gällstedt (Stora Enso, Sweden)

speaker 5

Food packaging sustainability and opportunities for K-Food

Kit L. Yam (Rutgers Universty, USA)

speaker 5

In vitro, *in situ*, and *in vivo* monitoring of recombinant lactic acid bacteria and their products

In Young Choi (University of Wisconsin-Madison, USA)

>>> IS

New trends in food technology

Chaired by Mi-Kyung Park (Kyungpook National University)

>>> IS1

Recent trends and approaches in food technology

Muhammad Sajid Arshad

Government College University, Pakistan

With the passage of time, people of the World have entered to advance lifespan. However, the people are demanding new foods. Researchers, scientists and industrialists are trying to develop new foods that play a functional role in daily life. For this purpose, different new technologies have been introduced. Moreover, different extraction techniques have been introduced including ultrasounds, microwave and enzyme-assisted extraction. Food technology in recent years has benefited significantly from various innovative research developments. The scientific interest demonstrated by nutritionists for the globalization of functional food products and food-processing technologies in light of promoting general health and wellbeing of their consumers has been a prevalent thrust. Pioneer methods in areas of nanotechnology in food production, processing, packaging and sensing have proved promising results. Furthermore, new cooking methods are used to develop different food products. Today, some non-thermal techniques are used to development of food including plasma, ozone, high-pressure processing, irradiation and ultrasounds. These all green technologies are responsible for producing safe and quality food according to consumer requirements.

>>> IS2

Microbial effects and quality management of greater amberjack *(Seriola dumerili)* treated by slightly acidic electrolyzed water

Shuai Wei

Guangdong Ocean University, China

Greater amberjack is one of valuable marine economic fish. As one of the top daily foods, it is often sold in the form of raw fish fillets. Thus, the requirements for microorganisms are very strict. Aquatic products are susceptible to microorganisms and endogenous enzymes after death, resulting in deterioration of freshness, until the loss of edible quality. At present, studying the specific spoilage bacteria and new preservation technology of Greater amberjack fillets is of importance. Slightly acid electrolyzed water (SAEW) is an effective disinfectant with good bactericidal effect and high safety with low cost and no pollution. Greater amberjack was stored at room temperature, cold storage, ice temperature and partial freezing storage. After reaching the end point of corruption, the changes of microflora in different storage stages were obtained by high-throughput sequencing, and the specific spoilage bacteria of greater amberjack were analyzed. Then, SAEW was used to study the sterilization of specific spoilage bacteria in greater amberjack. The effect of SAEW on the quality as well as protein and flavor changes of greater amberjack fish fillets during cold storage was investigated. *Proteobacteria* and *Firmicutes* are the main phyla that cause changes in quality and shelf life during the storage of greater amberjack fillets. *Pseudomonas* is the main genus causing spoilage. The shelf life of greater amberjack under ice and mild freezing storage conditions was 21 days and 36 days, respectively. SAEW could effectively inhibit the growth of Pseudomonas and had a significant bactericidal effect on the inoculated greater amberjack fillets. The cell membrane and cell wall were destroyed which caused nucleic acid and protein leakage, inhibited antioxidant enzyme activity, and led to changes in DNA conformation. The higher the effective chlorine concentration, the higher the degree of damage to the bacteria. SAEW inhibited the increase of TVC and TVB-N during storage. SAEW treatment generally delayed the process of yellowing and greening during cold storage, and the increase of pH value was generally delayed during storage. SAEW could better maintain the original elasticity of greater amberjack fillets. SAEW treatment effectively slowed down myofibrillar protein degradation and fish tissue softening and inhibited the increase of MFI value. SAEW inhibited the bacteria growth, maintained the fish quality, and caused less changes of protein and fish tissue, which showed a promising application in raw fish fillets.

>>> IS3

Application of in vitro gastrointestinal digestive system to seek for personal prebiotics

Tatsuya Unno

Chungbuk National University, Korea

About a decade of studies have revealed the importance of gut microbiota in controlling our health. It has become a common knowledge that gut microbiota dysbiosis cause various health problems such as obesity, diabetes, intestinal inflammation, neurodegenerative diseases, depression, Alzheimer's disease and so on. Dietary intervention is a most commonly used approach for modulation gut microbiota. The method includes the application of probotics, prebiotics, and synbiotics. In animal model experiments, these approaches showed quite promising results. In human application, however, only limited number of these are verified. The main reason behind this is individual gut microbiota difference. Gut microbiota is ecologically different across people due to complex factors such as host genetics, dietary habits, life cycle difference, stress, age, culture, and geography. Therefore, dietary intervention should be developed according to personal requirement. In this study, we investigated effects of various prebiotics on several human subjects in vitro. Positive effects were measured through the increase of beneficial bacteria such as Lactobacillus and Bifodobacterium and production of short chain fatty acids. Moreover, we tested several machine learning algorithms to see if machine learning can predict proper prebiotics for each subject. Our study still requires further investigation but the approach seems to be promising for identifying personal prebiotics requirement.

>>> IS4

Incremental and groundbreaking options, including comparisons to current packaging solutions and some challenges for the near future

Mikael Gällstedt

Stora Enso, Sweden

Littering is a well known problem today. Plastics, including microplastics, contaminates a major part of our planet. This has been know for decades but the technology as well as legislations and cost profiles has so far prevented a wider implementation of biodegradable options. Many of the "degradable plastics" has neither really been biodegradable in its true meaning. However, things are changing quickly now, very much due to technological progresses as well as new upcoming EU legislations. The packaging systems of today is developed along with the current plastics. But by making some changes in the packages and the packaging systems, there are indeed possibilities to meet the needs fo the value chain also with the biodegradable and renewable options. The presentation will provide some examples of both incremental as well as more ground breaking options, including comparisons with current packaging solutions, and some challenges for the near future.

>>> IS5

Food packaging sustainability and opportunities for K-food

Kit L. Yam

Rutgers University, USA

Packaging plays a pivotal role in driving the global popularity of K-Food, offering valuable opportunities for Korea to boost export potential, advance food technology and innovation, and promote Korean culture worldwide. A prominent and ever-evolving trend in the food packaging industry is sustainability, demanding packages that are not only environmentally friendly but also economically feasible and aligned with society's needs. Furthermore, the concept of sustainability is dynamic, subject to changes over time. What may have been considered sustainable in the past may not necessarily hold true today. Therefore, achieving sustainability is challenging. Typically, packaging fulfills society's need through four basic functions: containment, protection, convenience, and communication. Besides addressing one or more of these functions, an effective package system should also be economically viable and environmentally friendly. Striking a balance between these requirements has prompted the emergence of innovative technologies like active packaging, intelligent packaging, and environmentally friendly packaging. Active packaging and intelligent packaging are cutting-edge technologies that aim to enhance the traditional functions of packaging. Active packaging involves incorporating components that interact with the packaged product to extend shelf life, improve freshness, or even release active compounds for preservation. Intelligent packaging leverages technology like sensors, indicators, and artificial intelligence to provide real-time information and decision support to ensure food quality and safety throughout the supply chain. In response to the growing need for environmental responsibility, the packaging community is also actively developing new and improved biobased and recyclable materials. However, meeting functional and eco-friendly requirements alone is not enough; it also requires a blend of creativity, innovation, and hard work to design packaging systems that are functional, environmentally responsible, and cost-effective. By embracing the practice of food packaging sustainability, Korea has the potential to cement its position as a global leader in culinary exports, showcasing its unwavering commitment to environmental stewardship, and making a positive contribution to shaping the future of the food industry.

>>> IS6

In vitro, *in situ*, and *in vivo* monitoring of recombinant lactic acid bacteria and their products

In Young Choi

University of Wisconsin-Madison, USA

Biotherapeutic approaches, such as the application of engineered microbes to deliver therapeutic molecules, offer a significant potential for health promotion. However, without precision tools to detect therapeutic microbes and their products, we are limited in monitoring and optimizing therapeutic delivery. To address this, we developed a bioluminescent peptide tagging system for use in lactic acid bacteria, a group of organisms which are commonly exploited as delivery vehicles of therapeutics and vaccines. As a proof-of-concept, we developed various Limosilactobacillus reuteri strains that each produced a recombinant therapeutic protein with an eleven amino acid tag, which is essential to yield a luminescent signal. The bioluminescent signal-based detection of recombinant protein was more robust than commercially available enzyme-linked immunosorbent assays. Furthermore, the bioluminescent peptide tagging system enables in situ recombinant protein detection in a continuous-culture parallel bioreactor system, offering exciting opportunity to track recombinant protein production dynamics in response to different stimuli. After orally administering these engineered microbes, we could detect luminescent signal from intestinal and fecal samples rapidly, with equal sensitivity to conventional plate count method. Since we demonstrated the functionality of this bioluminescent peptide tagging system in 12 species encompassing 9 genera, our approach will simplify the optimization of protein production and quantification *in situ*, *in vitro*, and *in vivo* and will create previously unexplored opportunities in the development of next-generation probiotics.

OP-01

Effects of gamma ray irradiation and grafting on structure and functionality of myofibrillar protein

Yea-Ji Kim*, Tae-Kyung Kim, Ji Yoon Cha, Yoo-Jung Choi, Yun-Sang Choi

Korea Food Research Institute

For improving protein functionality, structural modification can be applied. Irradiation of gamma ray has been commonly used to inhibit microbial contamination, meanwhile, it can also induce structural modification of components in food. Grafting is a reaction that conjugates proteins with reducing sugar to enhance the functionality of proteins by conformation changes. Thus, the purpose of this study was to investigate the effects of gamma ray irradiation and grafting after irradiation on the structure and functionality of the myofibrillar protein. Myofibrillar protein solution (10 mg/mL) was irradiated by different three doses (0.5, 1.5, and 2.5 kGy), and irradiated proteins were grafted with palatinose at 37℃ for 8 h. Grafting degree, browning index, protein solubility, surface hydrophobicity, tertiary structure, zeta potential, polydispersity index, mean particle size, emulsion droplet size, emulsifying capacity, and emulsion stability were demonstrated. The grafting degree was increased and the browning index was decreased as the irradiation dose was increased. Protein solubility was decreased by irradiation, however grafting enhanced it. Also, surface hydrophobicity and zeta potential were the highest at proteins with grafting after gamma ray irradiation at 2.5 kGy. These resulted from the structural unfolding and fragmentation of proteins, which were identified by fluorescent intensity of protein and mean particle size. The small protein size induced a reduction of oil droplet size in the emulsion prepared with irradiated and grafted myofibrillar protein. The decreased oil droplet size in emulsion directly influenced emulsifying capacity, thereby grafted proteins after high dose irradiation were superior to non-grafted or low dose irradiated proteins. Consequently, the grafting of irradiated myofibrillar protein with 2.5 kGy gamma ray can effectively modify protein structure for improving protein functionality.

OP-02

Effects of lactic acid bacteria and yeast on volatile compounds and sensory profiles in fermented Protaetia brevitarsis larvae

Ji Yoon Cha[1,2*], Tae-Kyung Kim[1], Yea-Ji Kim[1], Jaejoon Han[2], Yun-Sang Choi[1]

[1]Research Group of Food Processing, Korea Food Research Institute
[2]Department of Food Science and Biotechnology, Korea University

Edible insects have abundant nutrients and various biological activities and are one of the important future protein resources for food security. Edible insects have high protein content per 100 g and low carbon dioxide emissions. It also contains high concentrations of unsaturated fatty acids, similar to fish and poultry, and is rich in micronutrients such as zinc and iron. Despite these advantages, consumers are negatively aware of undesirable scents, disgusting appearances, and negative images. Despite these advantages, consumers in a variety of foods using edible insects tend to use small quantities with undesirable scents, repulsive appearances, and negative images. Considering these concerns, consumers need to increase their preference for edible insects. Protaetia brevitarsis is one of the permitted edible insects in Korea, is a traditional East Asian medicine ingredient and is known for its excellent biological activity. This study investigated the volatile compounds and sensory properties of fermented Protaetia brevitarsis using lactic acid bacteria and yeast to improve flavor properties. A total of 99 types of compounds were qualified, and 32 types of compounds were detected in Protaetia brevitarsis larvae before fermentation, and the composition of volatile compounds changed after fermentation. Therefore, the insect fermentation process has confirmed the possibility of improving the unique smell and flavor and shows that it can be used as a food material.

OP-03

LSTM 순환신경망 기반 양파의 저온 저장 중 물성 변화 예측 모델 개발

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최근 신선식품 시장이 급격히 성장함에 따라 농식품에 대한 효과적인 저장 및 유통 기술에 대한 관심도 증가되고 있다. 그 일환으로 새로운 패키징 방법이나 물류 시스템 개발 등 다양한 연구가 수행되고 있으나 저장 중 품질 저하에 대한 연구는 아직 활발하게 이루어지지 않고 있다. 이에 따라 본 연구에서는 대표적인 저장 농산물 중 하나인 양파를 대상으로 저온 저장기간 중 품질 저하를 예측하기 위한 연구를 수행하였다. 양파는 긴 저장기간 못지않게 높은 저장 손실률로도 유명하며, 저장 환경에 따라 각종 생리장해 및 부패가 쉽게 발생할 수 있어 효율적인 환경 모니터링이 필요하다. 따라서 실제 양파 저장 환경을 모사한 모의 저장 환경을 준비하였으며, 온습도, 이산화탄소, 에틸렌, 암모니아 등의 환경 정보를 실시간으로 기록할 수 있는 센서 네트워크를 구축하였다. 또한, 저장 기간에 따른 양파의 품질 저하를 정량적으로 확인하기 위해 주기적인 샘플링을 바탕으로 한 파괴 실험도 수행되었다. 수집된 환경 및 품질 정보를 활용하여 예측 모델의 적절한 독립변수 및 종속변수를 선정하였으며, 입력된 데이터의 형태를 고려하여 다양한 구조의 순환신경망 기반 모델들을 개발하였다. 모델의 세부 구조 및 학습인자 선정을 위해 Grid Search를 수행하였으며, 최적화된 하이퍼 파라미터를 바탕으로 구조별 대표 모델을 결정하였다. 선정된 각 모델들을 동일한 테스트 데이터에 대해 비교 평가한 결과 RMSE 기준 약 5~6% 수준의 준수한 오차를 기록하는 것을 확인하였다. 저장 중 농산물 품질 예측과 관련된 많은 선행 연구들이 고전적인 기계학습 및 통계적 식에 기반한 단순 회귀 방식을 사용한다는 점을 고려하였을 때, 본 연구의 결과는 누적된 시간 동안의 실제 저장 환경 이력을 바탕으로 수일 이상 미래의 품질 정보를 예측할 수 있다는 점에서 의미가 있다고 판단된다. 향후, 개발된 모델은 저장 중 품질 예측 시스템뿐만 아니라 적정 출하 시기 선정을 위한 의사 결정 시스템, 저장 중 이상치 탐지 시스템 등에 요소 기술로서 활용할 수 있을 것으로 기대된다.

OP-04

Persimmon leaf extracts inhibits inflammation by reducing endoplasmic reticulum stress and promoting autophagy in LPS-treated RAW264.7 macrophage

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Persimmon (*Diospyros kaki* L.) leaves are commonly consumed as functional tea in Asian countries and are known to possess pharmacological properties. This study aimed to explore the impact of persimmon leaf ethanol extract (PLE) on inflammation, endoplasmic reticulum (ER) stress, and autophagy in macrophages. RAW264.7 macrophages were treated with lipopolysaccharide (LPS) along with varying concentrations of PLE for 24 h. The study analyzed key proteins and genes associated with inflammation, ER stress, and autophagy. The results showed that PLE treatment dose-dependently reduced the levels of pro-inflammatory mediators, such as nitric oxide, reactive oxygen species, interleukin (IL)-1β, tumor necrosis factor (TNF)-α, and IL-6. PLE also suppressed LPS-induced translocation of NF-κB subunit into nuclei, indicating inhibition of the NF-κB signaling pathway. Furthermore, PLE treatment attenuated the PERK-ATF4-CHOP pathway and IRE1α-XBP1/JNK pathway among ER stress branches. Interestingly, PLE treatment reversed LPS-reduced autophagy. PLE upregulated protein levels of LC3BⅡ/Ⅰ ratio, p65 and beclin1 while downregulated the protein levels of Atg5-Atg12 complex, compared to LPS treatment alone. Notably, PLE treatment elevated the levels of p62 and LC3B, main autophagy flux markers, over a time course. PLE treatment also increased the formation of autophagosomes and autolysosomes, as observed by monodansylcadaverine staining and transmission electron microscopy. Even in the presence of autophagy inhibitor chloroquine, PLE treatment activated the autophagy process. Overall, PLE treatment attenuates LPS-induced inflammation by suppressing ER stress and promoting autophagy in RAW264.7 macrophages. Thus, persimmon leaves may potentially be used as a functional ingredient in the health food industry.

OP-05

In-depth examination of the cellular estrogen signaling in representative estrogen receptor ligands by In vitro dimerization assay and transactivation assay

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Estrogen receptor (ER)-mediated signaling pathways play an important role in a variety of physiological and biochemical processes, particularly in the environment and food. These pathways rely on two types of ERs: alpha (ERα) and beta (ERβ). The relatively low similarity of the ligand-binding domains (LBDs) of ERα and ERβ may complicate their physiological action on estrogenic substances. This study aimed to evaluate the comprehensive activity of representative ER ligands using the bioluminescence resonance energy transfer (BRET)-based ERα and ERβ dimerization assay developed by our research team and the OECD Test Guideline 455 transcriptional activation assay. By examining 12 natural and synthetic estrogenic substances, the results showed that 11 chemicals mediated both ERα and ERβ dimerization. Among these substances, 7 chemicals were confirmed as estrogen agonists, while 5 chemicals acted as antagonists. The study demonstrated that BRET assays could be utilized for high-throughput screening of endocrine-disrupting environmental agents, as the consistency between BRET dimerization and transactivation responses was observed. Additionally, the study provided valuable insights into receptor specificity and cellular estrogen signaling pathways through dimerization assays. Overall, this research contributes to understanding the importance of the ER-mediated signaling pathway and its role in evaluating potential environmental endocrine disruptors.

OP-06

Identification and confirmation of anti-inflammatory peptides in *Lactobacillus paraplantarum* fermented *Cannabis sativa* L. (hemp) seeds: based on *ex-vivo*, metabolomics, and *in silico* analysis

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Cannabis sativa L. (hemp) seeds have a rich history as a food source and contain various bioactive compounds, making them highly promising for food applications. Inflammatory diseases pose a significant burden on modern society. Therefore, this study aimed to investigate hemp seeds anti-inflammatory activity and explore their potential bioactivity enhancement through fermentation. Additionally, the metabolomics and correlation analysis revealed significant changes in the levels of AAELIGVP (P1), AAVPYPQ (P2), and VFPEVAP (P4) during the fermentation process. Furthermore, SDS-PAGE analysis confirmed high protein degradation during fermentation. P1, P2, and P4 demonstrated robust anti-inflammatory potential in ex-vivo assays. Molecular docking studies indicated that these peptides (P1, P2, and P4) exhibited higher binding energies to the active sites of IKK. These findings suggest that these hemp seed-derived peptides could serve as promising natural anti-inflammatory ingredients for use in functional food products.

OP-07

Mitigating muscle atrophy *in vitro* and *in vivo* : valuating the effectiveness of cow milk-derived extracellular vesicles through microbiome alteration

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Sarcopenia is characterized by the age-associated decline in skeletal muscle mass, strength, and functional capacity, profoundly impacting overall health and quality of life. The presence of bioactive proteins, including growth factors, microRNAs, and specific lipids, within milk exosomes holds promising therapeutic potential for addressing sarcopenia. This study aims to investigate the efficacy of bovine colostrum-derived exosomes (BCEs) in mitigating sarcopenia through the modulation of gut microbiota and metabolite profiles. Our findings demonstrate that treatment with BCEs effectively attenuates dexamethasone (DEX)-induced myotube atrophy in C2C12 cells, as evidenced by the stimulation of muscle differentiation markers, specifically MHCs expression. Furthermore, in GFP-tagged myo-3 gene transgenic C. elegans, BCE treatment results in the upregulation of muscle-related genes, as observed through RT-qPCR and fluorescence expression analysis. Consistent outcomes are observed in the DEX-induced muscle atrophy mouse model, where BCE administration significantly mitigates muscle strength decline and ameliorates muscle weight loss. These effects are associated with the downregulation of the muscle growth inhibitor (myostatin) and the inflammatory factor TNF-α. Notably, the administration of BCEs leads to a substantial increase in the abundance of the Lachnospiraceae family within the gut microbiome profile, as well as elevated levels of unsaturated fatty acids (such as linoleic acid and oleic acid) within the metabolite profile. These findings corroborate the beneficial role of BCEs as a preventive measure against sarcopenia, primarily by mitigating muscle loss and improving functional outcomes.

OP-08

Evaluation of the digestion and absorption properties of 1,3-dipalmitoyl-2-oleoyl-glyceride (POP)-rich lipid using a Caco-2 cell model coupled with *in vitro* digestion and absorption.

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A coupled model was designed to evaluate the digestion and absorption characteristics of POP-rich lipids (PoL). This model involved the sequential implementation of in vitro multi-step digestion and in vitro Caco-2 cell absorption, followed by the analysis of the composition of re-synthesized and released triacylglycerols (TAGs) of PoL. I) The cytotoxicity of the substances used in this coupled model on Caco-2 cells was evaluated by cell viability, cell apoptosis, and TEER recovery (%). Based on Caco-2 cell viability by MTT assay, the IC50 values for sodium taurocholate, bile salts, pancreatin, and oleic acid were 12.6 mM, 0.26 mM, 0.25 mg/mL, and 3.55 mM, respectively. Acridine orange/ethidium bromide (AO/EB) staining showed that apoptosis occurred at concentrations above the IC50, resulting in an increase in orange-colored apoptotic Caco-2 cells, while the cell monolayer tight junctions were destroyed, resulting in reduced TEER recovery (%). Whereas, bovine serum albumin (0.01 - 0.2 mM), TAG (1 - 10 mM), and an acylglycerol mixtur e (1 - 10 mM) exhibited no cytotoxicity toward Caco-2 cells, while the cell monolayer tight junctions were maintained relatively well. II) The digested POP-rich lipid (DPoL) contained the free fatty acids as oleic acid (1,000.8 nM/mg of lipid) and palmitic acid (1,075.2 nM/mg), and the TAG composition was in the order of POP 〉 POO 〉 PLP 〉 PPO 〉 PPP 〉 OOL/OLO 〉 OOO 〉 PLO/OPL/POL. The re-synthesized TAGs absorbed into Caco-2 cells after 72 h of treatment with DPoL were composed of PPO (100.4 nM/mg of extracted lipid), PPP (82.6 nM/mg), and POO (75.9 nM/mg). Trace amounts of POP, PLO/OPL/POL, OPO, OOL/OLO, OOO, PLP, and PPL were also detected. The released TAGs from Caco-2 cells were in the order of PLO/OPL/PLO 〉 PPP 〉 PPO 〉 OOL/OLO 〉 POO 〉 OOO 〉 OPO. In this study, the Caco-2 cell model coupled with in vitro digestion and absorption was established and evaluated the digestion and absorption properties of specific TAGs. During the digestion and absorption processes of the TAGs, the TAG composition and content of PoL were changed, and the rate of absorption, re-synthesis, and release of digested TAGs in the intestine were affected by the type of fatty acids incorporated into TAG.

OP-9

Development and evaluation of protein-enhanced brown rice snacks incorporating pea and germinated chickpeas: optimization, physicochemical properties, and *in vitro* digestibility

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This study aimed to develop a protein-enhanced snack using peas and germinated chickpeas. The research consisted of three parts: optimization of chickpea germination conditions, optimization of snack formulation, and evaluation of antioxidant properties during in vitro digestion. Chickpea germination conditions were optimized using response surface methodology (RSM) for total phenolic content (TPC), total flavonoid content (TFC), 2,2-dephenyl-1-picryhydrazyl (DPPH) radical scavenging activity, and soluble protein content. The optimized germination conditions were as follows: 6 h of soaking time, 30℃ of germination temperature, and 6 d of germination day. For protein-enhanced snacks, a mixture design was employed using optimally germinated chickpea, brown rice, and pea proteins. Responses variables included crude protein content, water absorption index (WAI), water solubility index (WSI), bulk density, porosity, expansion index, and hardness. The optimized snack formulation consisted of 96.41 g of brown rice, 1.09 g of germinated chickpeas, and 2.50 g of pea protein. In addition, the sensory evaluation indicated favorable consumer preference for both brown rice snacks and protein-enhanced snacks while comparing them with commercial black bean snacks. Then, germinated chickpeas and protein-enhanced snacks exhibited high in vitro protein digestibility. Antioxidant activity was initially high in adults during the oral phase and significantly decreased during the gastric and intestinal digestion phases. In conclusion, this study demonstrated the potential commercialization of a protein-enhanced snack incorporating germinated chickpeas.

OP-10

양파간장분말 첨가 시즈닝의 품질특성과 항산화 활성

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본 연구에서는 맛의 다양화와 기능성을 부여하는 경쟁력 있는 복합 조미료의 개발이 요구됨에 따라, 양파간장을 이용한 가공품의 생산으로 양파의 부가가치를 향상 시키고, 한식간장의 품질개선 및 기능성 향상을 도모하고자 양파간장 분말 조미료를 개발하고자 하였다. 이를 위하여 양파간장분말을 기본으로 한 복합 조미료를 제조한 후 조미료로서의 품질과 가공식품으로서의 가치를 평가하였다. 일반성분의 결과, 수분, 조회분, 조단백, 조지방 및 조섬유 모두 양파간장 분말 30% 첨가 시료구가 각각 6.15% 22.68%, 5.91%, 0.46%, 0.45%로 가장 높은 값을 보였으며, 양파간장 분말 함량이 증가함에 따라 pH 값은 낮아지는 경향을 보였고, 적정산도는 증가하였다. 당도는 7.00°Brix로 일정한 값을 나타내었으며, 염도는 양파간장 분말 30% 첨가 시료구가 5.40%로 가장 높은 값을 보였다. 색도는 양파간장 분말 함량이 증가할수록 L값은 감소하고 a, b값은 증가하는 경향을 보였다. 환원당 함량은 양파간장 분말 함량이 증가할수록 감소하는 경향을 보였으며, 흡습성은 무첨가 시료구에서 1.28-6.24%로 가장 낮은 흡습력을 나타내었다. 주요 유기산으로는 citric acid으로 양파간장 분말 첨가 30% 시료구에서 1,462.92 mg/100 g로 가장 높은 함량을 보였으며, 유리당은 양파간장 분말 첨가량이 많아질수록 fructose, glucose, maltose는 증가하는 경향을 보였다. 또한 양파간장 분말의 함량이 증가할수록 quercetin 함량이 증가하였으며, 양파간장 분말 30% 첨가 시료구가 0.57 mg/100 g으로 가장 높은 값을 보였다. 총 폴리페놀 함량 및 총 플라보노이드 함량은 양파간장의 분말의 함량이 많아질수록 함량이 증가하였으며, DPPH free radical scavenging activity 및 ABTS radical scavenging activity은 양파간장 분말의 함량이 많아질수록 활성이 증가하였다. 또한 Superoxide dismutase-like activity은 양파간장 분말 무첨가 시료구에서 63.08%로 가장 높은 활성을 보였다. 관능평가 결과, 전체적인 선호도에서 양파간장 분말 20% 첨가 시료구가 가장 높게 나타났다. 따라서, 양파간장 분말의 시즈닝 제조 시, 양파간장 분말 첨가량이 증가할수록 품질 및 기능성이 향상됨을 확인하였으며, 양파간장 분말 20% 첨가가 적합할 것으로 판단된다.

OP-11

콤부차 제조용 초산균 선별을 위한 분리, 동정 및 발효특성

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콤부차(Kombucha)는 녹차, 홍차를 우려낸 물에 설탕과 함께 symbiotic culture of bacteria and yeast(SCOBY)를 넣어 발효시켜 만든 탄산음료이다. SCOBY는 초산균, 젖산균 그리고 효모 등의 다양한 미생물을 포함하는 것으로 알려져있다. 콤부차의 품질은 미생물 조성과 제조 과정에 따라 다양한 풍미가 생성되며, 폴리페놀, 아미노산 및 각종 유기산 등의 물질생성으로 항산화, 소화증진 및 피부미용 등의 다양한 기능성을 부여한다. 이와같이 콤부차 제조에 있어 미생물은 중요한 요인으로 알려져 있으나, 국내 콤부차 제조에 있어서 콤부차 분말 또는 발효복합종균(scoby)은 대부분 수입에 의존하고 있다. 이처럼 국내 콤부차 제조용 균주 연구는 미비한 실정이다. 따라서 수입에 의존하고 있는 초산균을 국내 발효식품과 농산물에서 분리, 동정하여 콤부차 제조에 적용하기 위해 발효특성을 확인하였다. 수집된 발효식품과 농산물에 포함되어 있는 미생물 중 집락(colony) 주변에 투명한 환을 형성하고 형태학적, 생물학적으로 초산균의 특징을 나타내는 균주를 선별하여 동정한 결과 *Acetobacter* 및 *Gluconobacter* 계열로 *Acetobacter pasteurianus* 16종, *Acetobacter orientalis* 3종, *Acetobacter cibinongensis* 1종, *Acetobacter pomorum* 7종, *Acetobacter ascendens* 3종, *Acetobacter malorum* 5종, *Gluconobacter oxydans* 2종으로 확인되었다. 총 37종의 균주에 대한 내산성과 알코올 내성 등을 확인하여 7종의 우수균주를 선별하였으며, 선별된 균주 7종으로 발효온도 및 기간에 따른 발효 특성을 pH, 적정산도, 생균수, glucuronic acid 및 gluconate를 통해 확인하였다. 발효온도는 모든 균주가 30 – 35℃에서 높은 활성을 보였으며, 콤부차 발효는 미생물의 공생발효로 제조되므로 발효 온도는 30℃로 설정하였다. 그리고 발효기간에 따른 발효특성 결과에 의해 *Acetobacter* 속은 *Acetobacter pasteurianus* SFT-18 균주가 적정산도 1.68%, 초산균 수 9.52 logCFU/mL로 우수하였으며, *Gluconobacter* 속은 *Gluconobacter oxydans* SFT-27 균주가 glucuronic acid 10.32 mg/mL, gluconate 25.49 mg/mL로 발효특성이 우수하였다. 최종적으로 2종의 균주가 콤부차 제조용 균주로 선정되었다. 최종적으로 발효복합종균(scoby) 개발 및 배양공정 확립을 위해 젖산균, 효모를 탐색, 분리 및 동정하여 발효특성을 확인해 우수균주를 선정하고 미생물 간의 융복합 최적 조성물 설계 및 발효조건을 확립하여 콤부차 제조 기술 확립을 수행할 예정이다.

OP-12

복합 발효차 제조를 위한 공생발효에 적합한 효모 (*Saccharomyces serevisiae* SFT-70)의 탐색 및 품질특성

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효모는 균계에 속하는 미생물로 약 1,500 종이 알려져 있고, 뜸팡이, 이시트(yeast) 라고도 불리며, 무기호흡을 통해 산소의 공급 없이도 육탄당을 분해하여 에너지를 얻을 수 있다. 흔히 빵이나 맥주의 발효에 이용되며 프로바이오틱스 발효차로 알려진 콤부차의 스코비 생성에 초산균, 젖산균 및 효모 등의 미생물을 접종하여 이용된다. 미생물 구성 중 효모는 당을 이용하여 알코올을 생성하며, 초산균은 이를 초산 및 글루콘산으로 산화시킨다. 이처럼 알코올 생성 뿐만 아니라 알코올을 초산으로 산화시키는 과정을 포함하는 콤부차의 경우 공생발효에 적합한 효모가 필요하다. 따라서 본 연구는 공생발효에 적합한 효모를 탐색 및 선발하고 발효특성을 확인하여 콤부차 제조에 적합한 효모를 선정하고자 하였다. 효모는 기관에서 분양받은 효모와 발효식품에서 분리보관 중인 효모를 대상으로 하였으며, 탐색항목은 pH 및 적정산도, 내산성, ethanol 생성력 및 내성, cellulase 분해활성과 CO_2 생성력 그리고 균수 측정을 실시하였다. 먼저 총 20종의 균주 중 cellulase 분해활성, ethanol 및 CO_2 생성력이 우수한 5종을 선발하였다. 선발된 5종 중 ethanol 및 CO_2 생성력이 각각 6.75% 및 10.0 CO_2cm/40h, Celllulase 분해활성은 3.30mm 그리고 pH 5.28, 적정산도 0.28% 및 효모수 9.59 log CFU/mL로 확인된 *Saccharomyces serevisiae* SFT-70 균주가 콤부차 제조에 적합할 것으로 판단된다. 향후 본 연구로 선별된 *Saccharomyces serevisiae* SFT-70 그리고 초산균과 젖산균의 공생발효 특성, 최적 조성물 설계 및 발효조건 확립 등을 통해 배양공정 매뉴얼을 확보하고자 하며, 확보된 매뉴얼을 바탕으로 제품화 적용 가능성을 확인해보고자 한다.

OP-13

Ultrasound-assisted extraction of capsaicin from scotch bonnet using alkaline-based deep eutectic solvent

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An effective extraction of bioactive compounds based on a combination of ultrasound and deep eutectic solvents (DES) was established in this work. Capsaicin was extracted from C. chinense using ultrasound-assisted extraction (UAE); to evaluate their extraction effectiveness, alkaline- and acid-based DESs, as well as a conventional solvent were carried out. Alkaline-based DES, named KCG, showed the highest capsaicin yield compared with acid-based DES and ethanol in the initial screening of DESs. Alkaline-based prepared from potassium carbonate and glycerol at a 1:7 molar ratio. The alkaline extraction process was further optimized by response surface methodology. The optimum extraction parameters for obtaining the highest yield of capsaicin from *C. chinense* was achieved at a solvent-to-solid ratio of 64 mL/g, water content of 31%, and extraction time of 23 min. In addition, acceptable recovery of optimized capsaicin from KCG extraction solvents was obtained by marcroporous resins SP850, XAD2, and XAD16N, and SP850 showed the highest recovery ratio. The results of this study provides an eco-friendly, practical and efficient way to extract capsaicin from *C. chinense*.

OP-14

A comparative analysis of physicochemical properties among five promising protein sources for meat analog

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In recent years, there has been increasing interest in plant-based alternatives due to their environmental, ethical, economic, and health benefits. Selecting the right plant-based protein source is crucial for determining product quality based on desired properties and processability. However, research on how the raw material composition and nature impact the product is still lacking, leading to empirical reliance in plant-based alternative studies. This study aims to predict the quality of meat analogs by comparing the physicochemical properties of soy protein, pea protein, mung bean protein, rice protein, and wheat gluten, which are promising plant protein sources. Measurements included proximate composition, water activity (Aw), water holding capacity (WHC), oil holding capacity (OHC), water solubility index (WSI), water absorption index (WAI), oil absorption index (OAI), color, and amino acid composition. Soy protein had relatively low crude fat (0.04-1.96%) and crude fiber (0.76-2.61%) content, and high protein content (83.78-85.53%). It exhibited high hydration and emulsification properties, with a relatively high cysteine content (0.87-0.98%) likely to form disulfide bonds, positively impacting meat analog. Pea protein showed low crude fat content(0.35%), starch content (0.07%), WHC (1.09) and OHC (1.09%). Therefore, when used alone, it may negatively affect meat analog, but blending with other protein sources can regulate product quality. Mung bean protein had a high WSI, and thus it may lead to enhancing juiciness. Rice protein showed a high cysteine conten t (1.70-1.73%), but high crude fat (3.77-4.40%) and crude fiber content (2.97-3.01%) that may negatively affect extrusion molding when used alone. It also had low WSI (3.05-4.05%) and WAI (1.30-2.63%). Wheat gluten, with its high starch content (9.45-12.45%), cysteine content (1.48-1.52%), and viscoelastic properties, may positively affect the texture formation in meat analog.

OP-15

Classification of defected red pepper powder (huiari) using hyperspectral imaging

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Red pepper can be susceptible to stem rot, anthracnose, and mold diseases during cultivation, post-harvest storage, and drying processes. These diseases can lead to a critical deterioration in the quality of red peppers. In this study, we prepared Subicho red pepper by hot air drying. The dried peppers were then categorized into normal (A), and huiari (C) and ground into red pepper powder. Petri dishes were prepared with varying ratios based on 3 g, representing huiari inclusion rates of 100, 80, 60, 40, 20, 15, 10, 5, and 0%. The quality evaluation of red pepper powder was predicted using shortwave infrared (SWIR) hyperspectral imaging (HSI) technology. We obtained data consisting of 56 samples per inclusion rate. The collected hyperspectral data was subjected to partial least squares discriminant analysis (PLSDA) to create a model to measure whether classification was achieved for the 0% and 1:1 matching samples. Achieving 100% Accuracy in Classification and Prediction Using Developed Models for Red Pepper Powder with A100% Composition and A95%-C5% Ratio These results suggest the possibility of rapid discrimination between normal and huiari red pepper powder to produce commercially viable red pepper powder.

OP-16

In vitro characterization of lactic acid bacteria from ginseng sprouts for probiotics potentials

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Lactic acid bacteria (LAB) are beneficial bacteria for humans and animals and live not only in fermented foods but also in natural products such as various crop surfaces, and this study aims to isolate new strains of LAB from hydroponically grown crops and investigate their probiotic potential in vitro. Forty-two strains of LAB were isolated from hydroponic ginseng sprouts (*Panax ginseng* C.A. Meyer) and these isolates were identified as *Lacticaseibacillus rhamnosus* (31 strains), *Lactiactobacillus sakei* (4 strains), *Leuconostoc lactis* (2 strains), *Leuconostoc mesenteroides* (2 strains), *Streptococcus salivarius* (3 starins) by 16S rRNA sequencing. First, the viabilities of all the isolates were evaluated in various environmental conditions including temperature, pH, nutrients and H_2O_2 to find an optimal growth condition for each strain. Bile salt hydrolase and hemolytic activities of these isolates were also evaluated to assess the safety of these strains. Next, the viabilities of these strains were assessed in gastrointestinal conditions (pH 3.0 and 0.3% bile salts), antioxidant activity, auto-aggregation, and hydrophobicity to investigate the probiotic properties of these isolates. Finally, antimicrobial activities of all these strains were tested by antibacterial activity and co-aggregation against pathogenic bacteria. With these results, this study indicates that Korean ginseng could be a good source of a new probiotic strain, showing a new opportunity and possibility of hydroponic ginseng sprouts as K-Food.

OP-17

Effects of stepwise KCl-NaCl salting on processing characteristics and instrumental saltiness of ground pork

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Potassium chloride (KCl) is a salt replacer for reducing sodium chloride (NaCl) in processed meat, and the mixture of 1% KCl and 1% NaCl are used practically. However, since potassium ion belongs to the chaotropic ion that improves protein solubility, the order of stepwise salting might change the cation-muscle protein bindings, which could affect the quality attributes of processed meat. Thus, this study aimed to determine the effect of time-interval stepwise KCl-NaCl salting on water-holding capacity, texture, and instrumental saltiness in ground pork. Four portions of ground pork (leg muscles) were formulated as follows, respectively; 2% NaCl (w/w, control), 1% NaCl (RC), mixed 1% KCl+1% NaCl (MS), and stepwise 1% KCl+1% NaCl (SS). For stepwise salting, the ground pork priorly salted with 1% KCl was stored at 4℃ for 6 hours, and then 1% NaCl was additionally mixed into the sample. The samples were cooked in a water bath at 75℃ for 30 min, and the cooked samples were used for further analysis. When compared to MS, SS showed significantly higher protein solubility and hardness but lower cooking loss. In the saliva mimic system, SS showed slightly higher sodium ion concentration than MS. In E-tongue analysis, remarkably, SS had increased saltiness and umami intensities as compared to MS. Taken together, time-interval stepwise KCl-NaCl salting could improve the lower charge density and ionic strength of potassium ions, which may have positive impacts on the technological properties and instrumental saltiness of ground pork.

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OP-18

Isolation and characterization of *Penicillium nalgiovense* from mudflat as a potential domestic starter culture for dry fermented sausage

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With the increasing demand for charcuterie, including fermented sausages, the importation of commercial starters has become more prevalent. Currently, *Penicillium nalgiovense* is the only authorized fungal starter for dry fermented sausages in Korea, approved by the Ministry of Food and Drug Safety. However, its dependency on imports due to a foreign company's monopoly presents a challenge. This study aimed to isolate and characterize a Korean fungal starter, evaluate the quality and safety of dry fermented sausages inoculated with *Penicillium nalgiovense* isolates, and propose a potential Korean native starter. The seventy-two strains were isolated from the Seondo-ri mudflat, Nuruk (a traditional Korean fermentation starter), and Jeotgal, and subjected to morphological analysis and PCR identification to select *Penicillium nalgiovense* species. One strain, named *Penicillium nalgiovense* SJ02, was identified as a *Penicillium nalgiovense* species. *P. nalgiovense* SJ02 exhibited high enzymatic activity (proteolytic and lipolytic) and growth rate compared to the commercial starter Mold600 from Christian Hansen. Dry fermented sausages were prepared using both starters, and no significant differences in quality (color, texture, and microbial aspects) were observed. Chemical analysis, including fatty acids and TBARS, showed improved quality in the samples inoculated with *P. nalgiovense* SJ02. Thus, *P. nalgiovense* SJ02 is proposed as a potential Korean fungal starter for dry fermented sausage production.

OP-19

Unveiling the impact of emulsifiers on physical characteristics of meat analogue produced by low-moisture extrusion process

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In this study, we investigated the physical properties of meat analogue by adding emulsifiers in the extrusion process to explore their impact. The formulations consisted of 50% isolated soy protein (ISP), 40% wheat gluten, and 10% corn starch at, with varying concentrations of emulsifiers (0%, 1%, and 3%). The emulsifiers used were sodium caseinate and glycerin fatty acid ester. The results of expansion ratio showed an increasing trend as the emulsifier concentration increased. The water absorption capacity increased with the increasing emulsifier content, and a significant increase was observed at 3% glycerin fatty acid ester concentration. The results of texture profile analysis revealed that the addition of 3% glycerin fatty acid ester led to increased elasticity and cohesiveness, while chewiness decreased. On the other hand, the addition of sodium caseinate resulted in a decrease in elasticity, cohesiveness, and chewiness. As a result of measuring the cutting strength, it was found that the cutting strength decreased as the amount of emulsifier was increased. Overall, the results indicated that the addition of emulsifiers in the low-moisture extrusion process increased the expansion ratio and water absorption capacity of meat analogue, thereby influencing the texture of the final product. This study demonstrates that the addition of emulsifiers in low-moisture extrusion can modulate the expansion ratio, water absorption capacity, and texture of meat analogue.

C-01

어린이집 급식실 설비 손잡이의 미생물 오염도 평가

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본 연구에서는 어린이집 급식실에 설치된 냉장고, 냉동고, 자외선 살균기 손잡이의 미생물 오염도를 조사하고 냉장고, 냉동고, 자외선 살균기 손잡이의 위생관리 방법을 제시하고자 하였다. 실험에 사용된 냉장고, 냉동고, 자외선 살균기의 손잡이는 전라남도 소재 보육 시설 101곳의 냉장고, 냉동고, 자외선 살균기의 손잡이를 대상으로 하였다. 보육 시설에 따른 냉장고 손잡이의 일반세균 오염도는 국공립 어린이집 1.8 ± 1.0 CFU/100 cm^2, 민간 어린이집 2.1 ± 0.9 CFU/100 cm^2, 가정 어린이집 1.9 ± 0.8 CFU/100 cm^2, 지역 아동 센터 1.9 ± 0.1 CFU/100 cm^2 검출되었다. 대장균군의 경우 국공립 2.0 ± 1.8 CFU/100 cm^2, 민간 0.4 ± 0.8 CFU/100 cm^2, 가정 0.4 ± 0.8 CFU/100 cm^2로 검출되었고 지역 아동센터는 검출되지 않았다. 냉동고 손잡이의 일반세균 오염도는 국공립 1.6 ± 0.9 CFU/100 cm^2, 민간 2.0 ± 0.9 CFU/100 cm^2, 가정 1.7 ± 0.8 CFU/100 cm^2, 지역 아동 센터1.5 ± 1.0 CFU/100 cm^2로 나타났다. 대장균군의 경우 민간에서만 0.7 ± 0.7 CFU/100 cm^2 검출되었고 다른 어린이집에서 검출되지 않았다. 자외선 살균기 손잡이의 일반세균 오염도는 국공립 2.3 ± 1.1 CFU/100 cm^2, 민간 2.1 ± 1.1 CFU/100 cm^2, 가정 1.9 ± 1.0 CFU/100 cm^2, 지역 아동 센터에서 1.7 ± 0.6 CFU/100 cm^2로 나타났다. 대장균군의 경우 국공립 0.4 ± 0.8 CFU/100 cm^2, 민간 1.5 ± 1.1 CFU/100 cm^2, 가정 0.4 ± 0.8 CFU/100 cm^2로 검출되었고 지역 아동 센터에서는 검출되지 않았다. 실험 결과 어린이집 급식실에 설치된 냉장고, 냉동고, 자외선 살균기 손잡이의 일반세균수 오염도는 민간 어린이집에서 가장 높게 나타났으며, 국공립 어린이집, 가정 어린이집, 지역아동센터 순으로 오염도가 낮게 나타났다. 이러한 결과를 종합하여 볼 때, 교차오염에 의한 식중독 발생을 예방하기 위해 어린이집 급식실 냉장고, 냉동고, 자외선 살균기의 손잡이에 대한 지속적인 청결 관리가 필요한 것으로 판단되었다.

C-02

치즈 부산물 유청을 활용한 한식간장 제조 방법 연구

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본 연구에서는 한식간장에 유청을 접목시켜 한식간장의 관능적 품질을 상승시키고, 환경오염과 관련된 사회적 문제해결과 산업적 연계를 도모하기 위해 실시하였다. 기존 한식간장 제조과정에서 물 첨가 대신 유청의 첨가량에 따라 한식간장을 제조하여 pH, 적정산도, 당도, 환원당, 색도, 식염, 조단백질, 조지방, 총균수, 총 플라보노이드 함량, 총 폴리페놀 함량, 관능검사를 실시하였다. 발효 기간 중 간장의 pH는 유청 함량이 많아질수록 감소하는 경향을 보였다. 적정산도, 당도, 환원당, 조단백질, 조지방의 경우 유청의 첨가량이 증가함에 따라 값이 증가하였으며, 모두 유청 100% 첨가 간장이 가장 높은 함량을 나타내었다. 관능평가 결과 모든 항목에서 유청 100% 첨가 간장이 가장 높은 기호도를 보였다. 식염 함량은 모든 시료구에서 발효 10일차에 가장 높은 함량을 나타냈으며, 이후 점차 감소하였다. 색도의 a 값은 발효기간이 경과함에 따라 증가하였으며, L 값과 b 값은 10일차까지 증가 후 점차적으로 감소하는 경향을 보였다. 총 플라보노이드의 경우 유청 50% 첨가 시료구가 47.51 mg/100 g 로 가장 높은 함량을 나타내었고, 총 폴리페놀 함량의 경우엔 유청 100% 첨가 시료구가 119.92 mg/100 g로 가장 높은 함량을 나타냈다. 이는 한식간장 제조에 유청을 활용 시 품질 향상을 확인하였으며 한식간장의 새로운 제품 개발을 위한 기초자료가 될 것이라 판단된다.

C-03

Evaluation on quality characteristics of Makgeolli according to the added amount of Maesil Cheong

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In this study, the quality characteristics of Makgeolli were compared according to the amount of Maesil cheong added in an effort to promote the consumption of Maesil and Makgeolli. Using the method for manufacture of Makgeolli, fermentation was carried out for 15 days with addition of 20, 25, 30, and 35% of Maesil cheong relative to the weight of rice on day 5 after the start of fermentation. No significant difference in pH, titratable acidity, and alcohol content according to the amount of Maesil cheong added was observed. A significant concentration-dependent difference in °Brix and reducing sugar content according to the amount of Maesil cheong added was observed. The highest value was observed for Makgeolli with 35% Maesil cheong at 16.5°Brix and 10.92%. Although no significant difference in the L value according to the amount of Maesil cheong added was observed, the a and b values showed a significant increase as the amount of Maesil cheong increased. According to the results of the sensory evaluation, the sample group with 35% Maesil cheong showed the highest overall acceptability.

C-04

유기산 침지 및 미생물 발효에 따른 아크릴아마이드 감소율 변화

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세계보건기구(WHO) 산하 국제암연구소 (IARC)에서 인체 발암 우려 물질로 규정하고 있는 아크릴아마이드는 감자나 시리얼 같은 탄수화물 식품에 160℃ 이상의 고온에서 가열할 때 급속도로 생성되며 가열 시간이 길어질수록 양이 더 늘어난다고 보고되어지고 있다. 아크릴아마이드는 튀김류나 과자 등의 섭취를 많이 하는 현대사회에서 가까운 미래에 많은 문제를 일으킬 수 있으며 저감화를 위해 여러 연구를 하고 있지만 실제 공정에서 적용하기 어려움을 격는 기업들이 있다고 보고되어있다. 이에 본 연구에서는 효율적으로 쉽게 식품 가공 공정에 적용할 수 있는 아크릴아마이드의 저감화 방법을 연구하였으며, 아크릴아마이드 전구체인 환원당을 감소시켜 최종적으로 아크릴아마이드의 함량이 감소하려 하였다. 유기산인 Lactic acid와 세균 *Acetobacter cerevisiae*, *Bacillus subtlis*을 사용하여 환원당을 감소시키고 DNS 법으로 감소율을 측정하였다. 1%의 Lactic acid 용액에 침지하여 환원당의 감소율을 확인한 결과 15분, 30분 침지했을 때, 대조군과 비교하여 20.9% ,16.0% 수준으로 환원당이 감소하였다. *Acetobacter cerevisiae* 균에 60분 반응 시킨 경우, 18.5% 수준으로 감소하여 가장 높은 환원당 감소율을 나타내었다. 두 가지 조건(Lactic acid 1%, 60분; *Acetobacter cerevisiae* 균에 60분) 을 혼합한 경우, 대조군과 비교하여 환원당이 8.1%까지 감소하는 결과를 나타내었으며 아크릴아마이드의 함량을 비교 분석하였다. 본 연구결과를 통하여 식품 산업체에서 효율적으로 손쉽게 아크릴 아마이드 저감화를 실현 할 수 있을 것으로 기대한다.

C-05

울금, 강황분말을 첨가한 한천묵의 제조 및 품질평가

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본 연구는 울금(Turmeric)과 강황(Curcuma)이 갖고있는 커큐민(Curcumin)을 주로하는 갖가지 폴리페놀 성분들을 전통식품이고 칼로리가 낮은 묵과의 조화를 생각하여 항산화 효과, 성인병 예방 등 건강한 식품을 전통식품과 함께 거부감 없이 섭취할 수 있는 방법과 울금과 강황의 차이를 이화학적인 부분과 관능적인 부분도 알아내기 위해 연구를 진행했다. 본 연구는 현재 대한민국이 고령화 사회가 가속되고 있는 상황에서 노인계층에게 건강증진 측면에서 도움을 줄 수 있으며, 카레에서 접하기 쉬운 재료를 사용함으로써 일반인들에게 익숙하게 접할 수 있는 식품이 되고, 다양한 식품으로 발전 가능성이 있는 묵의 특성상 활용도가 높다. 울금과 강황의 차이를 알기위해 105℃ 상압가열건조법을 이용한 수분측정과 색차계를 이용한 색도측정, Rheometer을 이용한 물성측정을 진행했고, Folin-Denis법을 이용한 폴리페놀 성분의 함량을 알기 위해 총 폴리페놀 함량을 측정했다. 또한 관능적인 부분도 평가하기위해 관능검사도 진행했다. 위와 같은 실험을 통해서 수분 측정에서는 울금, 강황함량이 증가함에 따라 약 1%씩 감소하는 차이를 볼 수 있었다. 색도 측정에서는 ΔE(전체적인 색차)가 울금과 강황의 함량이 증가함에 따라 울금에서는 약 2.17씩 감소했고, 강황에서는 약 2.59씩 감소했다. 물성 측정에서 울금과 강황의 함량이 증가함에 따라 울금과 강화의 강도와 경도 모두 약 0.1e + 001g/㎠씩 감소했다. 총 폴리페놀 함량 측정에서 울금은 약 3%씩 증가했고, 강황은 약 10%씩 증가했고, 관능검사에서는 울금과 강황함량이 증가함에따라 선호도가 다소 떨어졌지만 양념장과 함께 섭취를 했던 부분에서는 다소 높게 평가되었다. 본 연구 결과를 통해 강황분말을 첨가한 묵을 제조하게 된다면 건강증진을 위하고, 이를 이용한 다양한 식품을 개발할 수 있을 것이다.

C-06

해조류를 이용한 시리얼 바 개발과 품질분석 연구

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현대인들은 바쁜 일상으로 인해 건강지향적인 가공식품에 대한 관심이 높다. 본 연구에서는 식이섬유, 미네랄 및 건강 기능성이 우수한 현미와 해조류를 이용해 언제든지 쉽게 섭취가 가능한 건강한 시리얼 바를 개발하고자 하였다. 해조류 시리얼 바의 개발에 있어서 제조공정 개발, 배합비 개발, 저칼로리 당액 제조, 시작품 제작, 품질분석 및 관능평가를 실시하여다. 공정도 또한 개발하여 시리얼 바를 만들었다. 해조류로 비교적 해조취가 적은 톳과 꼬시레기를 이용하였다. 해조는 식감과 접착성을 높이기 위하여 톳은 분말로 사용하였으며 꼬시레기는 160℃에서 튀김처리하여 사용하였다. 당액은 알룰로스 50 g과 스테비아 75 g에 물엿 10 g을 약불로 가열하여 83°Brix로 조절하여 사용하였다. 시료는 건조한 톳과 꼬시레기 각각 2.5%와 5%, 꼬시래기 시리얼 바 2.5%, 5%의 시작품을 제작하였다. 시작품에 대하여 영양성분, 칼로리, 색도, 물성 및 관능평가를 실시하였다. 색도는 밝은 갈색을 보였으며 물성은 시판 시리얼바에 비하여 부드럽고 바삭한 식감을 보였다. 관능평가 결과 톳과 꼬시레기 모두 2.5% 첨가구에서 선호도가 높았으며 시판제품과 유사한 결과를 보였다. 영양성분 분석결과 탄수화물 함량이 높게 나와 열량이 높은 결과를 보였으나 이는 식이섬유 함량이 포함된 결과로 실제는 크게 낮을 것으로 판단된다. 세균수는 55 cfu/g이었으며 아플라톡신과 타를색소는 검출되지 않아 적합함을 알 수 있었다. 연구결과가 실용화되면 소비자의 해조류 소비 촉진 및 응용제품 개발 가능성을 제고하고 내수시장과 수출시장을 발굴할 수 있을 것으로 기대된다.

C-07

감자의 녹변 억제를 위한 친환경 활성 포장재 개발 및 적용

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감자는 수확 후 일반적으로 특별한 보호 없이 보관되며 보관 및 유통 중에 종종 빛에 노출된다. 감자가 빛을 받으면 표면이 녹색으로 변하는 녹변이 발생하며 감자의 가치를 크게 떨어뜨린다. 본 연구는 감자 녹변을 억제하기 위한 활성 필름 제조 과정을 최적화 하였다. 기존 플라스틱 포장재를 대체하기 위해 생분해성인 폴리부틸렌 아디페이트-코-테레프탈레이트 (PBAT)를 용매 캐스팅법을 사용하여 블렌드 필름을 제조하였다. 생분해성 포장재의 광차단 특성 향상을 위하여 필러로 유기물질 2종과 무기물질 4종을 사용하였다. 필러가 혼합된 복합 필름은 광투과율을 측정하고 감자 포장 적용성 평가를 진행하였다. 필러로 사용된 무기물질 중 Copper oxide nanoparticles (CuO)이 첨가된 필름의 광투과율이 유의적으로 낮았다. 개발된 포장재의 녹변 억제 효과를 확인하기 위하여 HDPE, PBAT, PBAT/CuO 필름으로 포장된 감자와 포장하지 않은 감자를 형광등 아래에서 3일 동안 보관하였다. 보관된 감자는 3일 후 보관 전 감자에 비해 Hunter L값(밝기)와 a값(녹색도-적색도)가 감소하였고 b값(청색도-황색도)는 증가하였다. 그러나 녹변을 나타내는 Hunter a값과 감자의 표면색 차이를 나타낸 총 색차(ΔE)는 포장에 따라 유의미한 차이를 보였다. PBAT/CuO 필름은 다른 포장군에 비해 Hunter a값과 ΔE의 감소가 가장 낮아 녹변의 억제를 확인할 수 있었다. 제조된 활성 필름을 감자의 포장재로 사용 시 녹변 억제 효과를 기대할 수 있다고 판단된다.

C-08

Hovenia tree branches to soaking in alcohol for hangover relief

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In general, a hangover cure was separately taken after drinking. To solve an inconvenience to taking a hangover cure apart from drinking, we developed a novel hangover cure to taking while drinking and to make a better atmosphere. The commercial hangover cures were investigated to contain 1 g of Hovenia tree extracts. The Hovenia tree branches known to be effective in relieving hangover were cut into 15-20 mm in diameter and 5-8 cm in length to put into soju bottles. As a result of the moisture retention experiment, Hovenia tree branches was turn out to be able to retain above 1 g of liquid through soaking treatment for 5 min. Hovenia tree extracts of 65 brix were concentrated to 90.72 brix with vacuum rotary evaporator to maked Hovenia tree branches coated better. Hovenia tree branches was coated in 1, 2, 3 and 4 layers with concentrated Hovenia tree extract, and then freeze-dried. Through absorbance test at 400 nm, 2, 3, and 4 layer coated Hovenia tree branches was confirmed to elute above 1 g of Hovenia tree extracts even after 5 minutes soaking in alcohol. A double layer coated Hovenia tree branches was selected as a final product and then vacuum-packaged. It was considered that the novel hangover cure can be applicable in various fields such as tea in addition to drinking.

C-09

못난이 단감을 이용한 대체감미료 개발 연구

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못난이 농산물은 일부 대기업의 주스 공장에서 사용되는 양을 제외한 대부분이 생산단계에서 산지 폐기되어 매립지에서 악취발생, 수질오염 야기, 온실가스 배출 등 환경오염을 심화시키고 있다. 따라서 못난이 농산물과 같은 낮은 상품가치의 식재료에 아이디어와 기술을 투입해 새로운 부가 제품으로 가공함으로써 환경을 보호해야할 필요가 있다. 못난이 단감에 Box-Behnken Design (BBD)을 사용하여 Ultra SP-L (30, 60 min), pectinex (0, 0.2, 0.4mL), Celluclast1.5L (0, 0.3, 0.6mL)를 독립변수로 하여 RSM (반응표면분석법)을 통해 종속변수인 Brix, Yield, 혈당저하가능성 연구 (α-glucosidase inhibition assay)를 측정하였다. 총 17가지의 조건 중 Brix는 17번 샘플에서 61.8%로 가장 높게 나왔으며 6번 샘플에서 51%로 가장 낮게 나왔다. 수율은 8번 샘플에서 15.25%로 가장 높게 나왔으며 6번 샘플에서 9.46%로 가장 낮게 측정되었다. α-glucosidase inhibition은 5번 샘플에서 72.5%로 가장 높게 나왔으며 12번, 17번 샘플에서 68.631%로 가장 낮게 측정되었다. 이를 통해 0.438mL Celluclast, 0.165mL Pectinex, Ultra 33분으로 최적 조건을 도출하였다. 이러한 최적 조건에서의 최적값은 Brix 60.625%, 수율 14.447%, α-glucosidase inhibition assay 72.313%로 나타났다. 결론적으로 이러한 연구 결과는 못난이 감의 효소 추출을 위한 최적의 조건과 항당뇨 특성을 가진 감미료 대체물로 못난이 감 추출물을 사용할 수 있는 가능성을 시사한다.

C-10

미세조류 *Haematococcus pluvialis* 에 함유되어 있는 astaxanthin의 추출 방법 및 가공식품 소재로의 가능성 탐색

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카로티노이드계 천연 지용성 색소 중 하나로 붉은색을 띠는 astaxanthin은 항산화, 항암, 면역력 증강 등의 기능성을 가지고 있다고 알려지면서 건강기능식품의 소재로 사용되는 등 관심이 높아지고 있는 물질이다. Astaxanthin은 갑각류나 *Phaffia rhodozyma*라는 미생물로부터 주로 생산되는데 함유량이 낮거나 불순물이 많아 생산 단가가 매우 높다. 때문에, 현재 astaxanthin은 일부 건강기능성식품 원료로 사용되고 있을 뿐 가공식품 소재로 폭넓게 사용되지 못하고 있는 상황이다. 최근 미세조류의 일종인 *Haematococcus pluvialis*가 광학적 스트레스를 받는 조건에서 다량의 astaxanthin을 생산하여 체내에 축척한다고 알려지면서 세계적으로 이에 대한 관심이 높아지고 있다. 본 연구에서는 *Haematococcus pluvialis*에 함유되어 있는 astaxanthin을 효과적으로 추출할 수 있는 방법을 탐색한 후 얻어진 *astaxanthin* 추출물에 대하여 가공 특성을 조사함으로써 가공식품 소재로의 활용 가능성을 확인하였다. 이를 위해 먼저 spectrophotometer와 HPLC를 활용한 astaxanthin 분석법을 확립하였으며 열수, 용매, 초음파, 고온고압, 저온고압, 아임계 및 초임계 등의 방법을 통해 얻어진 각 추출물의 astaxanthin 함량을 분석하여 추출 수율을 최대화할 수 있는 방법을 확립하였다. 또한, 확립된 방법을 통해 얻어진 astaxanthin 추출물에 대하여 가공 특성 및 안정성을 조사하여 가공식품 소재로의 활용 가능성을 확인하였다. 그 결과, 본 연구를 통해 확립된 방법으로 생산되는 astaxanthin 추출물은 다양한 고부가가치 가공식품 소재로의 활용 가능성이 매우 높다고 판단되었다.

C-11

과채류에서 열충격(heat-shock)을 이용한 효소적 갈변의 억제

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생명체에 두 종류의 스트레스가 주어졌을 때 생명체는 두 종류의 스트레스에 모두 반응하는 대신 모든 역량을 좀 더 위급한 스트레스를 극복하는데 사용하여 다른 스트레스에 대한 반응이 나타나지 않을 수가 있다. 본 실험에서는 이런 생각의 산업적 이용가능성을 조사하는데 목적이 있었다. 효소적 갈변은 과채류를 박피 및 절단하는 과정 중에 나타나는 반응으로 식물의 상처에 대한 반응이다 (wounding response). 본 실험에서는 식물이 wounding stress 해결보다 더 절박하게 해결 할 스트레스로 열충격 스트레스를 사용하였다. 실험에 감자, 연근, 사과, 마늘을 사용하였다. 이들 과채류를 박피 및 절단(0.5 cm 두께)한 후 열충격을 주기 위해 45℃ 항온수조에 2분간 침지하였다(45T). 그리고 양성대조군으로 효소적 갈변 원인 효소 polyphenol oxidase 저해제인 ascorbic acid를 처리한 시료를 사용하였다(AA). 그리고 아무처리를 하지 않은 그룹을 대조군(Control)으로 사용하였다. 이후 시료를 4℃ 냉장고에 보관하면서 색도변화, 총페놀화합물 변화를 8일동안 관찰하였다. 감자, 연근, 사과 모두 색도 변화(L값)에서 대조군은 시간에 따라 크게 감소하는데 비해 열충격군(45T)은 L값의 변화가 크지 않았다. 이 효과는 양성대조군(AA) 보다 더 좋은 것으로 나타났다. 효소적 갈변반응의 기질이 되는 페놀물질의 변화를 조사한 결과, 대조군은 시간에 따라 많이 증가하는데, 열충격군(45T)은 거의 증가가 나타나지 않았다. 이 결과로부터 감자, 연근, 사과의 경우 열충격이 효소적 갈변 억제에 효과가 있는 것으로 나타났다. 그러나 마늘의 경우 다른 식물과 달리 열충격의 효과가 나타나지 않았다. 마늘의 경우 다른 식물과 달리 스트레스에 대한 대응이 다른 방식으로 진화가 이루어졌기 때문으로 사료된다.

C-12

The study of optimal control of bread baking machine using artificial intelligence

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Maintaining consistent product quality and increasing process flexibility are two big challenges in the baking industry. Maintaining bread quality in a traditional baking machine process relies heavily on skilled staff to monitor the baking operation and adjust the temperature and time accordingly with the quantitative recipe. In addition, maintaining the quality of bread in a baking machine is difficult because the power of the heater and motor is not always constant. In this study, an Artificial Intelligence Bread Machine (AIBM) was developed and it obtains data on the fermentation step and bread baking step during the bread machine is operated. And it learns to terminate the process at the peak of fermentation and the optimal point of bread baking. Also, The AIBM can bake the optimal quality bread using learned intelligence even if different recipe ingredients are added. The AIBM is equipped with gas sensors, MQ-3 and MQ-135, to monitor gas data during the fermentation and baking process instead of a human nose, and a temperature sensor to monitor the temperature inside the bread machine and control the heater. An ultrasonic sensor was installed to monitor the expansion of the bread, and a camera was installed to monitor the color of the bread during the baking process. The data obtained during the baking process was trained through machine learning to create an AI model that proceeds to the baking stage when the fermentation stage reaches the peak, and ends the baking at the moment when the bread is no longer blackened. Based on the results of this study, bread with various ingredients can be baked by an AIBM to obtain optimal quality bread.

C-13

*Saccharomyces boulardii*를 종균으로 한 막걸리의 품질특성 연구

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최근 젊은 소비자들 사이에서 각종 영양성분이 풍부한 건강 주류로서 '막걸리'가 인기다. 더불어 장내 마이크로바이옴이 면역기능을 조절하고 각종 대사물질을 생성하는 것은 물론, 비만과 당뇨 · 아토피 · 암 · 자가면역질환 · 우울증 등에도 연관이 있다는 것이 밝혀지면서 현대인들의 장건강에 대한 관심 또한 꾸준히 증가하고 있다. 리치와 망고스틴 열매에서 분리된 열대 효모인 *Saccharomyces boulardii*는 잘 알려진 probiotics 균주로 세균성 항생제에 대한 내성이 있으며, 염증성 장 질환 및 장내 균총에 긍정적인 영향을 미친다는 연구 결과가 보고되면서 설사병과 과민성 대장 증후군 등의 치료 및 예방에 사용하고 있다. 또한, Helicobacter에 의해 유발된 gastric lymphoid follicles 형성 억제 효과가 밝혀짐으로써 위염 유발성 pylori의 치료 및 부작용 완화에도 *S. boulardii*를 사용하고 있다. 특히 병원균의 생장을 억제하고, 높은 온도와 낮은 pH에 내성을 가져 생균을 식후 섭취하여도 좀 더 많은 양의 균이 살아있는 상태로 장에 도달할 수 있다는 장점이 있다. 본 연구에서는 건강 기능성이 강화된 막걸리를 개발하기 위해 막걸리 제조에서 *S. boulardii* 발효를 수행하였다. 발효주 제조에 일반적으로 사용되는 효모 중 하나인 *Saccharomyces cerevisiae*를 이용해 제조한 막걸리와 비교하여 *S. boulardii*를 이용해 제조한 막걸리의 미생물 생균수와 이화학적 특성 및 발효 특성을 확인하였다. 그 결과, *S. boulardii*는 충분한 알코올 발효능을 가지고 일반적인 특성을 보이는 것으로 본 효모 균주는 알코올 발효를 통한 막걸리 제조에 적합한 균주임을 확인할 수 있었다. 따라서 *S. boulardii*를 종균으로 하여 건강 기능성이 부여된 막걸리 개발이 가능할 것이며, 이는 현대인들의 장 건강 개선에 도움을 줄 수 있을 것이다.

C-14

젓갈을 활용한 어간장 소스 제품 개발

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우리나라에서 다양한 수산물을 염장하여 발효시킨 젓갈을 여과하거나 분리한 것을 액젓이라 하고 대표적으로 멸치액젓, 까나리액젓 등이 있다. 액젓은 소금 함량이 20~30%가 되어 최근 나트륨 저감화를 추구하는 사회적 요구에 적합하지 않을 뿐만 아니라, 제조 공정상의 위생 문제나 어취 등도 기피 요인으로 나타나고 있다. 따라서 본 연구의 목적은 전통 수산발효식품인 액젓을 활용하여 젊은 소비층의 선호도에 적합한 위생적인 어간장 소스를 개발하고자 하였다. 시중에서 판매되고 있는 액젓의 저염화를 위해 75%와 95% 주정을 활용하여 탈염 공정을 분석한 결과 95%의 주정을 첨가하였을 때 식염 함량은 최대 22%까지 감소하였고, 75%의 주정 첨가 경우에는 최대 16%까지 식염 함량이 감소 됨을 확인하였다. 이에 어간장 기본 베이스 액젓은 75% 주정을 첨가하여 탈염 공정을 통해 식염 함량을 16%로 저염화하였으며, 휘발성 염기질소(VBN, volatile basic nitrogen) 함량은 82.64 mg% 감소하여 114.88 mg%, 아미노태 질소(AN, amino nitrogen)은 0.2% 감소하여 1.1%로 나타났다. 저염화된 액젓에 다양한 배합비로 과일 및 조미 농축액을 첨가하여 제조한 실험군 중 정제수(52.4%), 멸치액젓(12%), 사과식초(10%), 레몬농축액(6.9%) 등의 혼합비로 제조한 실험군이 식품을 전공하고 있는 20대(20~25세) 30명을 대상으로 진행한 관능평가에서 가장 높은 점수를 나타내었다. 특히 개발된 어간장은 샐러드 소스로 적합하다는 의견이 높게 나타나 기존 액젓의 어취 등 기피 요인이 개선됨을 확인하였다. 미생물학적 안전성 분석을 위해 63 ℃에서 30 분간 살균한 최종 시제품의 대장균군 분석결과 음성으로 나타났으며, 9대 영양소 분석결과 100 g 당 함량 기준으로 열량 25.41 kcal, 나트륨 592.01 mg(30%), 탄수화물 5.06 g(2%), 당류 4.79 g(5%), 단백질 1.27 g(2%) 지방과 콜레스테롤은 각 0.0 g(%)의 나타났다. 이러한 결과를 바탕으로 전통 수산발효식품인 젓갈(액젓)을 활용하여 젊은 소비층의 선호도가 높은 다양한 제품 개발 및 수입 수산물 소스도 일부 대체 가능할 것으로 판단된다.

▷▷▷ UCC 영상공모전 참가자 및 발표순서

순서	제 목	팀 명	팀 원	소 속
1	미생물 감지 손잡이	더위(생)사냥	정현정, 박성진, 조승현	순천대학교
2	크바스 소개 및 제조 방법	사피엔스	이진영, 장윤원, 신윤아 장준하, 배진경, 정찬엽	상명대학교
3	2033년 푸드테크	푸드득	최민지, 김수민, 김지윤 서정진	창원대학교
4	음식사진을 찍는 또다른 이유-푸드스캐너	창식이	전보영, 김현섭, 김의진 권나영	창원대학교
5	단짠 줄이기 VLOG: 변화된 나의 식탁	저염 식단 먹을사람? 저염!	이윤주, 유가영	국립공주대학교
6	단짠 거리두기	나트륨소거당	강채연, 김화선, 황서연	국립공주대학교

포스터 발표 논문 목록

포스터발표 시간 안내

구 분	발표일시	발표번호
	8.16(수) 13:00–15:00 Standing Time : 13:30–14:00	캡스톤 디자인
Poster Session Ⅰ	**8.17(목) 10:30–12:00** Standing Time (홀수) : 10:40–10:55 (짝수) : 10:55–11:10	P1–01 ~ P1–09 P2–01 ~ P2–17 P3–01 ~ P3–08 P4–01 ~ P4–14 P5–01 ~ P5–15
Poster Session Ⅱ	**8.17(목) 14:40–16:10** Standing Time (홀수) : 14:50–15:05 (짝수) : 15:05–15:20	P1–10 ~ P1–17 P2–18 ~ P2–35 P3–09 ~ P3–17 P4–15 ~ P4–28 P5–16 ~ P5–29
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– 포스터 발표장은 제주국제컨벤션센터 3층 로비입니다.

– 각 session 발표시간을 확인해 주시기 바라며 게시 및 철거는 직접 완료해야 합니다.

– 발표자는 정해진 Standing Time에는 의무적으로 포스터 앞에서 질문에 응해야 합니다.

– 우수 논문포스터시상이 있을 예정입니다. 시상자 발표는 8월 18일(금) 11시부터 삼다홀에서 있을 예정입니다.

▷▷▷ 포스터발표 논문 목록

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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

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Effects of CA containerized export on the quality and metabolites of strawberries during distribution

Hyang Lan Eum*, Me-Hea Park, Jae-Han Cho, Min-Sun Chang, Jihyun Lee, Pue Hee Park

Postharvest Technology Division, National Institute of Horticultural and Herbal Science, Rural Development Administration

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김세은[1]*, 이다솜[1], 이유정[1], 김배용[2], 이소미[3]

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[1](주)피러스, [2]단국대학교 공과대학, [3]전라남도농업기술원 과수연구소

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한국핵융합에너지연구원 플라즈마기술연구소

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순천대학교 식품공학과

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Dongsoo Choi[1]*, , Jinse Kim[1], Yonghoon Kim[1], Chunwan Park[1],
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[4]Dept. of Bio-industrial Machinery Engineering, Pusan National University, Korea

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Jongmin Park[1]*, Wontae Seo[2], Hyunmo Jung[3]

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[2]R&D Innovation Center, Jeju Province Development Co.
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WooChul Ju[1]*, Sung Jin Park[2], Min Jung Lee[2], Sung Hee Park[2]
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Eunsu Do[1]*, Woochul Ju[1]*, Da-yeong Ko[1], Eungu Ji[1], Ji-Hyun Lee[2], Kang-Mo Ku[1]

[1]Department of Plant Science, Korea University
[2]Post-Harvest Research Division, National Institute of Horticultural and Herbal Science

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Chae Wan Baek*, Ha Yun Kim, Yong Sik Cho, Hyun Wook Jang

Department of Agrofood Resources, National Institute of Agricultural Science

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Hongjun Jean[1*], Yooheon Park[1,2], Kwang-Suk Ko[3]

[1]*Department of Food & Medical Products Regulatory Policy, Dongguk University*
[2]*Department of Food Science and Biotechnology, Dongguk University*
[3]*Department of Nutritional Science and Food Management, Ewha Womens University*

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Suhyun Kim[1*], Soyeon Oh[1], Yooheon Park[1,2]

[1]*Department of Food & Medical Products Regulatory Policy, Dongguk University*
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Yonghyun Kim*, Hyun Ji Eo, Uk Lee

Special Forest Resources Division, National Institute of Forest Science

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Pue Hee Park*, Ji Hyun Lee, Min-Sun Chang, Haejo Yang, Hyang Lan Eum, Me-Hea Park

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Ji-Hyun Im[1*], Kang-Pyo Lee[2], Ye-Won In[2], Ok-Hwan Lee[1], Boo-Yong Lee[3]

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이린아*, 오명협, 김효정

제주특별자치도농업기술원

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[2]Smart food manufacturing project group, Korea Food Research Institute

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오재영*, 곽원주, 노윤이, 김단희, 원동재, 장미순

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Fermented Processing Food Science Division, National Institute of Agricultural Sciences, RDA

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Hyun-Mo Jung[1*], Jong-Min Park[2], Dong-Soo Choi[3], Ghi-Seok Kim[4]

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[2]*Dept. of Bio-industrial Machinery Engineering, Pusan National University*
[3]*Postharvest Engineering Division, National Institute of Agricultural Sciences*
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[3]*Smart Food Manufacturing Project Group, Korea Food Research Institute*

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Ki Hoon Shim*

Department of Food & Cooking Science, Sunchon National University

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남종웅*, 정민정, 김병목, 전준영

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[2]*Research Institute of Tailored Food Technology, Kyungpook National University*

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Hyun-Ju Eom*, Hye Jin Park, Hye Jeong Kang, Yoon jin Jeong, Ju-Hyoung Kim, Hyunman Shin

Chungcheongbukdo Agricultural Research and Extension Services

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Hyun-Ju Eom*, Hye Jin Park, Hye Jeong Kang, Yoon jin Jeong, Ju-Hyoung Kim, Hyunman Shin

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Hye Jin Park*, Hyun-Ju Eom, Nu Ri Gwon, Ju-Hyoung Kim, Hyunman Shin

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Minkyeong Park[1*], Geumhwa Lee[2], Young Yoon[1]

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Jisu Lee*, Minkyeong Park, Young Yoon

Imsil Cheese & Food Research Institute

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김경미[1*], 이수미[1], 이현정[1], 우수영[2], 조윤선[3]

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남인주[1*], 김정수[1], 김지윤[1], 문광덕[1,2]

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농촌진흥청 국립농업과학원 농식품자원부 발효가공식품과

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한국식품연구원

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Bo Ram Kim*, Hyun Ho Kang, Ji Eun Kang, Ji Ho Choi

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

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김인선[1*], 문광덕[1,2]

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

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[2]Food and Bio-Industry Research Institute, Kyungpook National University

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Yejin Shin*, Bora Lim, Ji-Eun Kang, Soo-Hwan Yeo, Ji-Ho Choi

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

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김표현*, 이유석, 이선경, 이세라, 마경철, 이진우

전라남도농업기술원 친환경농업연구소

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데치기 시간에 따른 유채, 미역취, 곤드레의 품질특성 변화

김표현*, 이유석, 이선경, 강현주, 마경철, 이진우

전라남도농업기술원 친환경농업연구소

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

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이유석*, 이선경, 지수현, 김표현, 이은실, 임아영, 마경철, 이진우
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이선경*, 이유석, 지수현, 김표현, 강혜원, 윤영애, 마경철, 이진우
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이선경*, 이유석, 지수현, 김표현, 신정엽, 윤영애, 마경철, 이진우
전라남도농업기술원 친환경농업연구소

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전라남도농업기술원 친환경농업연구소

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Jueun Lee*, Youngmi Kim, Jieun Kang, Jiho Choi
Fermented & Processed Food Science Division, National Institute of Agricultural Sciences

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Effect of high hydrostatic pressure (HHP) treatment of soaked rice grain on quality characteristics of garaeduk

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Quality characteristics of fruit wine according to Daehong peach pretreatment

Young-Mi Kim*, Ju-Eun Lee, Bo-Ra Lim, Ji-Ho Choi, Gwi-Jeung Han, Ji-Eun Kang

Fermented & Processed Food Science Division, National Institute of Agricultureal Sciences

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Jueun Lee*, Youngmi Kim, Jieun Kang, Jiho Choi

Fermented & Processed Food Science Division, National Institute of Agricultural Sciences

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Jueun Lee*, Youngmi Kim, Jieun Kang, Bora Lim, Jiho Choi

Fermented & Processed Food Science Division, National Institute of Agricultural Sciences

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블렌칭 조건별 산마늘 분말의 품질특성 비교

권혜정*, 임재길, 박지선, 엄남용, 임계현, 윤정애, 장경아

강원도특별자치도농업기술원 농식품연구소

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정유정[1*], 김민희[1], 최덕영[1,2]

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홍주연[1*], 김민우[2], 김진철[3], 김동한[3]

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Chaeyeon Kang*, Hojin Jung, Bon-Jae Gu

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Yunju Lee*, Bon-Jae Gu

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Seung-Hun Chae[1], Sang-Hyun Lee[1], Seung-Hwan Kim[2], Jae-Hak Moon[3], Jeong-Yong Cho[3*]

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박여옥[1*], 하기정[1], 김현영[1], 김봉신[1], 김판열[2], 최재혁[1]

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Effect of hydrostatic high pressure treatment of dry-milled rice ("Baromi2") flour

Hyeonbin Oh*, Jung-Hyun Nam, Hyun Wook Jang, Ha Yun Kim, Yong Sik Cho

Fermented & Processed Food Science Division, Department of Agrofood Resources, National Institute of Agricultural Science

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송영은[1*], 김은주[1], 한현아[1], 이송이[1], 김창수[2]

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송영은[1*], 김은주[1], 한현아[1], 이송이[1], 김창수[2]

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Park Jeong Been*, Kim Dong Ho, Yang So young

Icheon-Si Agricultural Technology Center, Division of Research and Development

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Effect of anaerobic fermentation conditions to skate (Raja kenojei) muscles on enzyme activity and myoglobin redox forms

Ah-Hyun Kim[1*], Nam-Hyeok Koak[1], Jong-Bang Eun[1,2]

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Change of physicochemical characteristics and functional components in the mugwort (*Artemisia dubia* Wall.) by different drying methods

Ah-Hyun Kim[1*], Ju-Yeon Jeong[1], Ji-Eon Jeong[2], Seo-Hee Yang[2], Dong-Hyeon Shin[2], Jong-Bang Eun[1,2]

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블랜칭 조건별 더덕, 도라지, 땅두릅순의 품질특성 비교

권혜정*, 임재길, 박지선, 엄남용, 권향, 김선영, 박한울

강원도특별자치도농업기술원 농식품연구소

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Changes on the physicochemical properties of sweet potato stem by blanching in alkali or calcium solution

Jung-Hyun Nam*, Hyeon Bin Oh, Hyun-Wook Jang, Ha Yun Kim, Yong Sik Cho

Fermented and Processed Food Division, National Institute of Agricultural Sciences, Rural Development Administration

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황준[1*], 양나은[2], 김대년[1], 손우영[1], 오상현[3], 장재철[3], 김현욱[1,2]

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Protein recovery from soybeans using extrusion and enzyme treatment

Su Jin Byun[1*], Hee Mang Kim[2], Sang Hyun Lee[2]

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김대년[1*], 양나은[2], 손우영[1], 황준[1], 김현욱[1,2]

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Physicochemical characteristics of hamburger patty added with different flour as binding agents

Dong-Hyeon Shin[1*], Ah-Hyun Kim[2], Jong-Bang Eun[1,2]

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Young-Woo Koh[1], Kyung-Je Kim[1], Seong-Woo Jin[1], Seung-bin Im[1], Neul I Ha, Hee-Gyeong Jeong[1], Sang-Wook Jeong[1], Tae-Young Park[2], Jae-Heoi Hong[2], Kyeong-Won Yun[3], Yu Jin Choi[4], Kyoung-Sun Seo[1*]

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[4]*Research engineer, Imsil Cheese & Food Research Institute*

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Comparisons of the nutrient components from fermented mycelia and fruiting bodies of *Tuber borchii*

Seung-Bin Im[1*], Kyung-Je Kim[1], Seong-Woo Jin[1], Young-Woo Koh[1], Neul-i Ha[1], Sang-Wook Jeong[1], Hee-Kyung Jeong[1], Dong Uk Kim[1], Dong Hyeon Lee[1], Kyoung Sun Seo[1]

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Charcteristics of brown rice for manufacturing rice Gangjung according to process conditions

Min Su Jung*, Dong Ho Kim , Hyun Joo Lee

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Development of 3D printed hybrid chicken with improved structural characteristics using plant-based proteins and transglutaminase

Jiyoon Kim[1*], Jung Soo Kim[1], Jinsu Sung[1], Yu Min Seo[1], Kwang-Deog Moon[1,2]

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Quality characteristics of Makgeolli using Seolgitteok from Icheon rice

Dongho Kim*, Jeongbeen Park, Yoonhee Jo, Minsu Jung, Hyunju Lee

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Investigation of quality characteristics of commercial rice flour premix

Dongho Kim[1*], Yoonhee Jo[1], Eunkyeong Lee[1], Jeongbeen Park[1], Minsu Jung[1], Jungjin Lee[2]

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[2]*Gyeonggi-Do Agricultural Research&Extension Services, Division of Crop Research*

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Investigation of the characteristics of powder by rice variety produced by jet mill

Dongho Kim[1*], Eunkyeong Lee[1], Yoonhee Jo[1], Jeongbeen Park[1], Jungjin Lee[2]

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Effect of different pretreatment methods on physico-chemical characteristics of dried and air-fried apple chips coated with superfine rice powders

Yoon-Han Kang[1], Dieudonne Iradukunda[2*], Dong-Jin Kwon[1]

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Carbon dioxide treatment alleviates chilling injury by influencing membrane-related process in paprika

Malka Siva Kumar*, Hyung Lan Eum, Jae Han Cho, Me-Hea Park

Postharvest research division, National Institute of Horticultural and Herbal Science

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Changes in physical properties of protein sources by adding vegetable protein sources and seaweed and treating with transglutaminase (TGase)

KO HYEON JUNG[1], Eun-Suk Shin[1], Choi Geun Pyo[2], Min-Soo Kim[3], Kwontack Hwang[1*]

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Isolation of proteins from Cricket *(Gryllus bimaculatus)* using enzymes and microorganisms and investigation of the characteristics of the isolated proteins

Eun-Suk Shin[1], KO HYEON JUNG[1], Choi Geun Pyo[2], Min-Soo Kim[3], Kwontack Hwang[1*]

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반응표면분석법에 의한 하수오발효 식물 추출복합물 열수추출 조건의 최적화

박태영[1*], 홍재희[1], 서경순[2], 오준석[3]

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PART III 화학/분석

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한국에서 유통되는 화분식품의 잔류농약 함량 분석

김병태*, 김재관, 손미희, 조영선, 한나은, 최종철, 이성남, 박명기, 박용배

경기도보건환경연구원

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대파 조리 과정 중 boscalid의 잔류량 변화

조미현[1]*, 김명헌[1], 안소은[1], 김서홍[2], 임무혁[1]

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김지은*, 김양희, 박신희, 김대환, 윤수정, 최영주, 강효정, 민지현, 이명진

경기도보건환경연구원 식품의약품연구부

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식용곤충과 현미를 이용한 동충하초(*Cordyceps militaris*)의 이화학적 특성 비교

이원희[1]*, 장혜미[3], 최유리[1], 이동훈[1], 이채윤[1], 조형우[1],
김은혜[1], 김환희[1], 정재희[1], 김수환[2], 허창기[1,2]

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Analytical method development and monitoring in instant noodles of ethylene oxide and its metabolite 2-Chloroethanol by the QuOil or the QuEChERS method and GC-MS/MS

Seonghwan Moon*, Euna Chong, Yechan Kim, Kwangsoo Jeon,
Chulhan Park, Dooho Park, Bongpyo Hong

SGS Korea

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Variations on phytochemical component and antioxidant activities by season and plant parts in *Daphne jejudoensis*

Ji-yeon Lee[1], So-hee Jang[1], Yoon-A Kang[2], Ji-soo Han[2], Ji-Yeong Bae[1,2]*

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유전자 종판별 기술을 이용한 식품접객업소조리식품의 수산물 원재료 진위판별 모니터링

김대환*, 김양희, 윤수정, 김지은, 최영주, 강효정, 민지현, 이명진

경기도보건환경연구원 식품의약품연구부

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채정우*, 조희선

경기도산림환경연구소

P3-09

Androgen receptor-mediated endocrine disrupting potential of environmental phenolic compounds in food and house products

Da-Woon Jung[1*], Jiwon Kim[2], Da-Hyun Jeong[1], Hee-Seok Lee[1,2]

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송이토마토의 과피색에 따른 품질 특성 비교

이다움*, 임정호, 박기재, 최정희

한국식품연구원

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재배방법에 따른 병풀의 기능성분 및 대사체 변화

김경미[1*], 이수미[1], 이현정[1], 임동혁[2], 김태현[2], 조윤선[3]

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홍삼 부위별 초분광영상을 이용한 등급 판별

김민현[1*], 성진수[1*], 김정수[1], 김지윤[1], 조정석[2], 임정호[2], 문광덕[1,3]

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Chemical and biological profiles of dendrobium in two different species on LC-QToF MS and cytotoxicity analysis

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Structural determination of cyanidin 3-O-(2-O-xylosyl)galactoside in fruits of *Eleutherococcus sessiliflorus*

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Development of an analytical method for the determination of benzotriazole UV stabilizers in food

Adebayo J. Akinboye*, Ki-Yun Kim, Jung-a Lee, Hong-Jo Park, Ji-Hun Jeong, Hye-Gyeong Lee, Jun-Hyeong Park, Joon-Goo Lee

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Development and validation of analytical method for determination of polycyclic aromatic hydrocarbons in livestock products

Ji-Hun Jeong*, Jung-A Lee, Hong-Jo Park, Jun-Hyeong Park, Hye-Gyeong Lee, Ki-Yun Kim, Adebayo J. Akinboye, Joon-Goo Lee

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Hye-Gyeong Lee*, Jun-Hyeong Park, Jung-a Lee, Hong-Jo Park, Ji-Hun Jeong, Adebayo J. Akinboye, Ki-Yun Kim, Joon-Goo Lee

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Development of analysis method for pentachlorothiophenol (PCTP) in food using GC-MS

Jun-Hyeong Park*, Hye-Gyeong Lee, Jung-a Lee, Hong-Jo Park, Ji-Hun Jeong, Adebayo J. Akinboye, Ki-Yun Kim, Joon-Goo Lee

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Image analysis of Kimchi cabbage penetrated with brine and seasoning using a serial block face ccanning electron microscope and energy dispersive X-ray spectroscopy

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A comparative study of cell wall soluble polysaccharide between Brewer's spent yeast and yeast strains on sugar composition and antioxidant enzyme activities

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하기정[1]*, 박여옥[1], 김현영[1], 김봉신[1], 최재혁[1], 김영광[1], 이정훈[2]

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이상현[1]*, 양나은[2], 강문혜[3], 김관태[4], 김현욱[1,2]

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Development and validation of an analytical method for determining per- and polyfluoroalkyl substances in agricultural products using LC-MS/MS

Ji-Eun Lee*, Yongwoon Shin, Hakseung Ryu, Na eun Kim, Minji Jung, Seung Jung Shin, Soonho Lee

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Development and validation of per- and polyfluoroalkyl substances (PFASs) analytical method in aquatic products

Hakseung Ryu*, Ji-Eun Lee, Na eun Kim, Minji Jung, Yongwoon Shin, Seung Jung Shin, Soonho Lee

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Pre-gelatinized rice improves rheological properties and 3D printability of mealworm powder

Legesse Shiferaw Chewaka*, Bo-Ram Park, Chan Soon Park, Shin-Young Park

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Development of multi-analytical method for alkenylbenzenes in food using GC-MS/MS

Su-jin Oh*, Young Woon Kang, Min Woo Choi, Junghyuck Suh, Soon Ho Lee

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이다훈[1*], 양나은[2], 김경수[3], 김광연[4], 문양수[1], 김현욱[1,2]

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Identification of taste-activity value (TAV) on the taste-active compounds in commercial Makgeolli

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Qualitative and quantitative analysis of phospholipids in domestic citrus fruits and vegetables

Eun-Ju Cho*, Ho-Chang Kim, Jeung-Hee Lee

Department of Food and Nutrition, Daegu university

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Analysis of total aflatoxin in soy sauces and pastes for school meals in Chungcheongnam-do using LC-MS/MS

Suha Kim*, Hansol Shin, Seoungsoon Yeo, Doekyoung Kwon, Myounghee Shin, Kyoungah Baek, Hyunmee Hong

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Potential of FT-NIR spectroscopy for detection of chilling injury in Kimchi cabbage

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경기도 내 카페에서 판매되는 음료별 당류 함량 조사

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경기도보건환경연구원 식품의약품연구부

PART Ⅳ 미생물/발효/안전성

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양조용 포도 품종별 포도주의 페놀화합물 비교 연구

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국립원예특작과학원 과수과

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Hot pepper (*Capsicum annuum* L.) powderas a noble and economic fermentation enhancer for yeast and alcoholic beverage

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Chan Yong Kim[2], Ho-Yong Sohn[1]
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유승진*, 유광필, 조혜선, 임자연
(주)창억

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Reduction of odor components in distilled Soju produced using domestic hops

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A comparative analysis of the physicochemical properties of enzyme-treated raw rice fermentation liquor

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Korea National University of Agriculture and Fisheries

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이채윤[1*], 이동훈[1], 최유리[1], 조형우[1], 이원희[1], 김은혜[1],
김환희[1], 김수환[2], 정재희[1], 허창기[1,2]

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Development of seasoning products using fermented onion Korean soy sauce powder

Chae Yun Lee[1*], Dong Hun Lee[1], Yu Ri Choi[1], Hyeong Woo Jo[1], Won Hee Lee[1],
Eun Hye Kim[1], Hwan Hui Kim[1], Jae Hee Jeong[1], Su Hwan Kim[2], Chang Ki Huh[1,2]

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Evaluation and quality characteristics of excellent yeast (*Saccharomyces cerevisiae* SFT-70) for complex fermented tea production

Hyeong Woo Jo[1*], Yu Ri Choi[1], Dong Hun Lee[1], Chae Yun Lee[1], Won Hee Lee[1], Eun Hye Kim[1],
Sun yong Kim[1], Jun seo Jang[1], Jae Hee Jeong[1], Su Hwan Kim[1], Sang Ah Kim[3], Chang Ki Huh[1,2]

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Quality characteristics of kombucha Fermented with commercial SCOBY during fermentation

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Fermented Food Industry support Center (FFIC)

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Quality chrarcterisics of rice Makgeolli fermented by the processing forms of *Crepidiastrumson sonchifolium*

Seul-Gi Lee[*], Su-Jin Shin, Kwanghyun Kim, Bong-Yun Oh

Fermented Food Industry Support Center (FFIC)

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Quality characteristics of fermented rice Makgeolli by Nuruk

Bong-You Oh*, Seul-Gi Lee, Su-Jin Shin, Byung-Kuk Choi,
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A microbial response to oxidative stress via transcription factors

Sungmin Hwang*, Jung Up Park, Bohyun Yun, Ji-won Park, Go Kyoung Na,
Ji Soo Kim, SongYi Han, Kyoung Min Choi, WonWoo Lee

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Fermentation characteristics of Cheonggukjang prepared with non-germinated Pungsannamul-soybean

Eun Ah Sim*, Eun-Gyung Mun, Hyeonbin Kim, Ui-Lim Choi,
Seungil Jeong, Boung-Jun Oh

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전통발효식품 유래 유용균주 발굴 및 이를 활용한 천연물 발효 추출물 제조

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커피체리 펄프를 활용한 막걸리 제조기술 개발 및 그 특성

주진규[1]*, 김권채[1], 김재민[1], 최민재[1], 차상화[2], 손동모[2], 백지환[1]

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강현진[1]*, 최준민[1], 문세희[1], 전지연[1], 박예진[1], 차상화[2],
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멸균 지표미생물의 D, Z-value 비교

남주희*, 정은선, 김채영, 임지유, 정두영, 김은영, 김중범

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임지유*, 김채영, 김은영, 남주희, 정두영, 김중범

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Occurrence of fungi in dried ginseng by storage environment

Jang Nam Choi*, So Soo Kim, Ji Seon Baek, Mi Jeong Lee, Ja Yeong Jang, Theresa Lee

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A BRET-based rapid detection of PAHs by fusion protein expression system

Ahreum Seo*, Hyeyeong Seo, Huiwon Seo, Hayeon Lee, Seok-Hee Lee, and Yooheon Park

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A survey on a status of pesticide residues in seafood during the distribution and production stages

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광주지역 유통 가금육에서 분리된 캠필로박터균의 항생제 내성 조사

이민규*, 정혜진, 서은진, 이세미, 이향희, 오그네, 서정미, 김용환, 김애경

광주광역시보건환경연구원

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남해안 서식 패류의 미생물학적 안전성 분석

김채영*, 임지유, 김은영, 남주희, 정두영, 김중범

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세척 공정에 의한 생미역의 미생물 안전성 및 품질에 미치는 영향

박지운*, 최은지, 우승혜, 성정민, 박종대

한국식품연구원 가공공정연구단

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Fecal microbiota profiling of dairy cattles, holstein and jersey, in South Korea : a comparative study

Gwangsu Ha*, Ji-Won Seo, Hee Gun Yang, Soo-Young Lee, Do-Youn Jeong, Hee-Jong Yang

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Metagenomic biomarker discovery and comparative microbial community in Cheonggukjang supplied *Bacillus subtilis* SRCM102059, using next generation sequencing

Hee Gun Yang*, Su Ji Jeong, Ji Won Seo, Gwangsu Ha, Hee-Jong Yang, Do-Youn Jeong

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Complete genome sequence of *Acetobacter senegalencis* Gb7 isolated from kombucha

Eunbi Oh*, Suyeon Gu, Seungwha Jo, Doyoun Jeong

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Physiological activities and functional characteristics of radish vinegars using *Acetobacter pasteurianus* SRCM102411

Su Yeon Gu[1]*, Eun Bi Oh[1], Seung-Wha Jo[1], Hyeon Hwa Oh[2], Do-Youn Jeong[1]

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Aroma patterns and their potential biomarker of different fermentation stages by farm-produced vinegars

Hee-Min Gwon*, Sun Hee Kim, Woo Soo Jeong, So-Young Kim, Soo-Hwan Yeo

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Inverse association of daily fermented soybean past("Jang") intake with metabolic syndrome risk, especiallly body fat and hypertension, in men of a large hospital-based cohort

Su-Ji Jeong[1], Sunmin Park[2], Ji-Won Seo[1], Hee Gun Yang[1], Myeong Seon Ryu[1], Hee-Jong Yang[1], Do-Youn Jeong[1]*

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Optimization of ethanol production by *Saccharomyces cerevisiae* SRCM 500093 through response surface methodology

Ji-Won Seo, Su-Ji Jeong, Hee Gun Yang, Myeong Seon Ryu, Hee-Jong Yang, Do-Youn Jeong*

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Microbial community of fermentants prepared with composite strains

Su Jeong Lee*, Soo-Hwan Yeo, So-Young Kim, Woo Soo Jeong

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Changes in the ginsenoside content during the fermentation process using *Lactobacillus plantarum* KCCM 42962

Su Jin Byun[1]*, Suah Bak[1], Sang Hyun Lee[2]

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Microbial consortium of Jeju traditional fermented foods and their cosmetic ingredient potentials

Sung-Eun Bae[1], Sungmin Bae[1], Pomjoo Lee[2], Chang-Gu Hyun[1]*

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Analysis of the fermentation properties of Godulbaegi Kimchi

Lee Su Jung*, Gim Sung Woong, Kim Eui Jin

Berry&Biofood research institute

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Manufacturing Takju by raw material using complex starter and investigation of quality characterisitcs

Hee-Min Gwon*, Sun Hee Kim, Woo Soo Jeong, Soo-Hwan Yeo

Fermented and Processed Food Science Division, Department of Agrofood Resources, NIAS, RDA

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시판 84개 한식메주를 이용한 간장의 품질특성

류정아*, 윤성란, 박정민, 류현정, 임소현

경상북도농업기술원

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Comparison of microbial communities, quality characteristics, and sensory characteristics of commercial Makgeolli

Seung-A Woo*, MyeongHui Han, SeongEui Yoo, SeoYeon Kwak, WooSoo Jeong, Soo-Hwan Yeo, SoYoung Kim

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Selection of superior yeast strains for high alcohol production and fruit aroma generation in solid-state fermentation

Han Byul Kang*, Su Jeong Lee, Sun-Hee Kim, So-Young Kim, Soo-Hwan Yeo, Woo Soo Jeong

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Antimicrobial and potential probiotic activity of JSRB 8 *Bacillus velezensis* isolated from traditionally fermented soybean products

Myeong Seon Ryu*, Ji-won Seo, Su-ji Jeong, Hee-Jong Yang, Do-Youn Jeong

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Comparison of fermentation and functional characteristics of useful fungi isolated from traditional Nuruk

Woo Soo Jeong*, Su Jeong Lee, So-Young Kim, Soo-Hwan Yeo

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Lactobacillus strains isolated from Perilla frutescens leaf are candidates for probiotics and may improve blood cholesterol levels

Seokmin Kim[1]*, Ji-eun Lee[1], Enam Ahmed[1], Selin Jung[2], Bokyung Lee[1,2]

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Comparison of *Saccharomyces boulardii* cell surface display system for endo-inulinase expression

Gayoung Lee[1]*, Jamin Shin[1], Yong-Su Jin[2], Minho Song[3], Soo Rin Kim[1]

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Effects on nutrients composition of Tenebrio molitor according to fermentation by *Cordyceps militaris* Mycelia

Neul-I Ha[1], Seung-Bin Im[1], Kyoung-Sun Seo[1], Kyung-Je Kim[1], Seong-Woo Jin[1], Sung-Tae Yee[2]*

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Synthesis of dextran like exopolysaccharide from rice flour hydrolysate by *Gluconobacter oxydans* ATCC 11894 bioconversion

Seung-Min Baek*, Bo-Ram Park, Chan Soon Park, Shin-Young Park

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Optimal culture conditions and anti-inflammatory compositions hot water extract from fermented *Coix lacryma-jobi* L. var. mayuen Stapf. by *Hericium erinaceum* mycelials

Seong-Woo Jin[1], Dong-Uk Kim[1], Kyung-Je Kim[1], Young-Woo Koh[1], Seung-bin Im[1], Jeong Sang Wook[1], Neul I Ha[1], Hee-gyeong Jeong[1], Dong-Hyeon LEE[1], Kyeong-Won Yun[2], Yu Jin Choi[3], Kyoung-Sun Seo[1]*

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The research trends of eumycetes genomics

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

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Strategy of *Lentinula edodes* log cultivation smart farm system establishment

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

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Development and application of phage cocktail treatment to control *Pectobacterium carotovorum* subsp. carotovorum in lettuce

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

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Synergistic effect of vB_EcoS_EC phage and pleurocidin peptide against antibiotic-resistant *Escherichia coli*

Yu-Bin Jeon*, Su-Hyeon Kim, So-Hui Park, Mi-Kyung Park

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Optimization of a novel and efficient polyvalent phage infecting *Escherichia coli* and *Salmonella* spp. for scale-up production

Seoyoung Kim*, Yu-Bin Jeon, Su-Hyeon Kim, Jaein Choe, Mi-Kyung Park

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Metagenomic analysis of bacterial community and functional capacity in Cheongsan Island Local Kimchi

Sangdon Ryu*, Seunghui Song, Kira Moon, Jae-Cheol Lee, Nakyeong Lee, Yun Ji Kim, Sung Moon Lee, Se won Chun, Jae-Hyoung Joo

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Isolation, identification, and fermentation characteristics of acetic acid bacteria (*Acetobacter pasteurianus* SFT-18 and *Gluconobacter oxydans* SFT-27) for Kombucha manufacturing

Dong Hun Lee[1]*, Chae Yun Lee[1] Yu Ri Choi[1], Hyeong Woo Jo[1], Won Hee Lee[1], Eun Hye Kim[1], Sun Yong Kim[1], Jun Seo Jang[1], Jae Hee Jeong[1], Su Hwan Kim[2], Byung Kuk Choi[3], Chang Ki Huh[1,2]

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Development of lingonberry wines co-fermented with mulberry, apple and pear

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Anti-stress (Relaxation) and gut microbiota mediated mechanism of psychobiotic *Limosilactobacillus reuteri* fermented brown rice

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PART V 생리활성 / 영양 / 기능성

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Safety and inhibition of hypersensitivity from sprout ginseng-derived postbiotics using smart agriculture

Kiman Lee*, Jin Hong Park, Da Hee Lee, Nam Jun Kim, Youngmin Park

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Quantification of triterpenes in *Centella asiatica* cultivated in a smart farm, and their activation in keratinocytes

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Anti-inflammatory and anti-obesity effect of the new cultivar *Salvia miltiorrhiza* 'Hongdan'

Jong Won Han[1]*, Yejin Kim[2], Samuel Park[2], Hui-Jeon Jeon[3], Kyung Ho Ma[1], Jeong Hoon Lee[1], Jin Tae Jung[1], Jeehye Sung[2]

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Comparison of nutritional and physicochemical characteristics between Korean native pepper variety and improved variety

Ji-Min Kim[1]*, Soo-Yeon Park[1], Kil-Su Chang[3], Chan Yong Kim[3], Jong-Sik Kim[2], Ho-Yong Sohn[1]

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Anti-oxidant, anti-diabetes, and anti-thrombosis activities of Gounbit, a Korean native hot pepper variety

Ji-Min Kim[1]*, Soo-Yeon Park[1], Kwang-Seop Kim[3], Chan Yong Kim[3], Jong-Sik Kim[2], Ho-Yong Sohn[1]

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Anti-oxidant, anti-diabetes, and anti-thrombosis activities of Sumihyang, a Korean native hot pepper variety

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Anti-thrombosis, anti-oxidant and anti-tyrosinase activities of the aerial part of *Apocynum lancifolium*

Ji-Min Kim[1*], Hui-Seon Jo[2], Jungwoo Chae[2], Ho-Yong Sohn[1]

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Anti-thrombosis, anti-oxidant and anti-tyrosinase activities of the leaves of *Rhododendron fortunei*

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Anti-thrombosis, anti-oxidant and anti-tyrosinase Activities of of *Abies nephrolepis*

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A study on the functional ingredients of Jeollanam-do Kimchi

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Anti-coagulation and platelet aggregation inhibitory Activities of the edible root of *Dioscorea alata* L.

Su-Gyeong Jeon[1*], So-Young Choe[1], Kyung-Ran Im[1], Jong-Pil Lee, Jun-Hong Park[1], Ho-Yong Sohn[2]

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Analysis of minerals and functional ingredients in domestic and foreign laver *(Pyropia spp.)*

Eun-Jin Yang[1,2*], Ho-Chul Yang[1], Ki-Bok Yoon[1], Hyo-Jeong Kang[1]
Yeon-Ju Lee[1], Su-Jeong Choi[1], Seul Lee[1], Won Kim[1], Da-Eun Jung
Yun-Ji Park[1], Mi-Yeong Shin[1], Yang-Joon An[1]

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Antioxidant activity and anti-obesity effect of Sunchang kombucha vinegar

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Do Youn Jeong[2], Young-Soo Kim[1]

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Effect of beneficial bacteria and harmful components in traditional soybean paste on the anti-obesity

So-Won Jang*, Ju-Eun Kang, Ra-Yeon Kim,
Soo-Min Park, Geun-Seoup Song

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Anti-hyperlipidemia and hepatocellular protective effect of ethanol extract from *Lithospermum erythrorhizon*

Byung-Min Oh*, Hyun-Wang Kim, Hye-Soo Jung, Hee-Jin Kim,
Young-Soo Kim, Geun-Seoup Song

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Nrf2-mediated protective effect of protein hydrolysates from *Protaetia brevitarsis larvae* against H_2O_2-induced cytotoxicity in AML12 hepatocytes

Hyeon-Ji Yoon*, Jeong-Min Lee, Syng-Ook Lee

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Nrf2/HO-1-mediated protective effect of protein hydrolysates from silkworm (*Bombyx mori*) Pupae against H_2O_2-induced cytotoxicity in AML12 mouse hepatocytes

Gyu-Hyeon Park*, Chan-Hyeon Park, Syng-Ook Lee

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Dual targeting of KRAS and ß-catenin by Isoalantolactone, an NR4A1 inactivator, inhibits colon cancer cell growth

Hyo-Seon Lee[1*], Keuk-Jun Kim[2], Syng-Ook Lee[1]

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Anti-tumor effect of Ganjang (Korean soy sauce) on AOM/DSS-induced colitis-associated colorectal mouse model

Hyeon-Ji Lim[1*], In-Sun Park[1], Se-young Yang[1], Su-Ji Jeong[2], Gwangsu Ha[2], Hee-Jong Yang[2], Do-Youn Jeong[2], Seon-Young Kim[1], Chan-Hun Jung[1]

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Effects of Cheonggukjang (fermented soybean) the development of colitis-cssociated colorectal cancer in mice

Hyeon-Ji Lim[1*], In-Sun Park[1], Su-Ji Jeong[2], Gwangsu Ha[2], Hee-Jong Yang[2], Do-Youn Jeong[2], Seon-Young Kim[1], Chan-Hun Jung[1]

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Anti-proliferative effect of *Euonymus alatus* (Thunb.) Siebold leaf extract by apoptosis in human breast cancer cells

Won Joo Yoon[1*], Hye Ji Min[2], Song Eun Park[3], Hirofumi Tachibana[1],Kwon Il Seo[2]

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A tool to screen for identify potential anti-aging effects of probiotics bacteria using *Caenorhabditis elegans* animal model

Bohyun Yun[1*], Jung Up Park, Ji-Won Park, Sungmin Hwang, Go Kyoung Na, Jisoo Kim, Songyi Han, WonWoo Lee

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Immunopotentiating activity of *Platycodon grandiflorum* extracts in immunosuppressed rats

Ki-Young Song[1*], Hye Ran Choi[1], Young-Ho Kim[2], Tae Ho Ryu[1]

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The protective effect of fermented soybean snacks against loperamide-induced constipation in rats

Sang-Min Kim[1*], Hye Ran Choi[1], Hyung-Min Choi[2], Tae Ho Ryu[1]

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Effect of fermented blackberry extracts on 3T3-L1 differentiation

Jae Young Park[1*], Seung-Hyeon Lee[1*], Ha-Rim Kim[1], Eun-Mi Noh[1],
Sang-Wang Lee[2], Seon-Young Kim[1], Mi Hee Park[1]

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Anti-inflammatory effect and signaling mechanism of glycine max hydrolyzed with enzymes from *Bacillus velezensis* KMU01 in a dextran sulfate sodium-induced colitis mouse model

Seung-Hyeon Lee[1*], Ha-Rim Kim[1*], Eun-Mi Noh[1], Jae Young Park[1],
Min-Ju Kim[1], Se-Young Yang[1], Mi-Sun Kwak[2], Ye-Jin Jung[2], Hee-Jong Yang[3],
Myeong-Seon Ryu[3], Hyangyim Seo4, Hansu Jang[4], Boung-Jun Oh[1],
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영지버섯에 의한 꾸지뽕나무 잔가지의 고체발효 및 생물변환 생성물들의 xanthine oxidase 및 angiotensin converting enzyme 저해활성

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이다은*, 정다은, 유종희, 나수창, 김대운, 오효빈, 황대일, 김태영

(재)진안홍삼연구소

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Changes and characteristics of cultured lactic acid bacteria depending on fermentation time of red ginseng rice malts

Da Eun Jeong*, Da Eun Lee, Jong Hee Yoo, Hyo Bin Oh, Tae Young Kim

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발효 홍삼의 진세노사이드 및 벤조피렌 분석

최하경*, 주선민, 김태영, 황대일
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Metabolomic changes during aging of fermented black ginseng vinegar

Hyo Bin Oh[1]*, Jong Hee Yoo[1], Da Eun Jeong[1], Da Eun Lee[1], Tae Young Kim[1]
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Anti-obesity effects of *Cirsium pendulum* Fisch and *Polygonum multiflorum* Thunberg in a high-fat diet-induced obese C57BL/6J mouse model

Seon Min Ju[1]*, Ha Kyoung Choi[1], Tae Young Kim[1], Na yeon Kim[2],
Shalom Sara Thomas[2], Youn Soo Cha[2], Dae Il Hwang[1]
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산림약용자원의 항염증 효능평가를 통한 호흡기 및 면역질환 개선용 식소재화 가능성 연구

황대일[1]*, 최하경[1], 김대운[1], 나수창[1], 오효빈[1], 이다은[1], 정다은[1], 김태영[1], 임이택[2]
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인삼의 Minor ginsenoside성분이 함유되어 있는 콤부차의 품질특성

나수창*, 김대운, 김하빈, 심상협, 김태영
(재)진안홍삼연구소

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***In vitro* evaluation of natural estrogenic compounds from citrus peel through BRET-Based ER dimerization and transactivation assays**

Hayeon Lee*, Hyeyeong Seo, Ahreum Seo, Seok-Hee Lee, Yooheon Park
Department of Food Science and Biotechnology, Dongguk University

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Efficacy and safety evaluation of fermented soybean (Deonjang powder) intake on intestinal microbiome and metabolic disease in pre-diabetic subjects

Hui-Yeon Jang[1]*, Si-Yeon Lee[1], Su-Jin Jung[1,3], Hee-Jong Yang[2],
Su-ji Jeong[2], Myeong-Seon Ryu[2], Seung-Ok Lee[1,3,4], Soo-Wan Chae[1,3]
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Contents of major components and antioxidant effects of green Coffea arabica 'Geisha' beans cultivated in Korea

Yun-Suk Kwon*, Seolah Kim, Eun Yong Song, Yong Hee Kwon, So Jin Lee, Doo-Gyung Moon

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Comparison and analysis of antioxidant activity according to a garlic cultivar produced in Jeju

Byung-Hyuk Kim*, Minji Shin, Seong Eun Lee, Kyeong Hwan Moon, Hyun-Hee Han

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Antioxidant activity and anti-obesity effects of mixture of *Brassica juncea* and black rice bran

Ji-Hyun Im[1]*, June seok Lim[2], Xionggao Han[1], Xiao Men[1], Geon Oh[1], Geun hee Cho[2], Sun-Il Choi[3], Woon-sang Hwang[4], Ok-Hwan Lee[1]

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Inhibition effect against 20 bacteria and 4 cell lines of methanol and water extracts from pawpaw (*Asimina triloba* [L.] Dunal) cultivated in Korea

Jin-Sik Nam[1], Hye-Jun Oh[2], Hyo-Jeong Lee[3], Young Ha Rhee[4], Hye-Lim Jang[5]*

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Inhibition of melanogenesis by Piper betle leaf essential oil via an activation of MAPK signaling and the antioxidant pathway

Jun-Hwa Shin[1]*, Md Badrul Alam[1,2], Young-Bin Yeo[1], Bo-Rim Song[1], Sang Woong Kim[2] Sang-Han Lee[1,3]

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Attenuation of UVB-induced photoaging by oleanolic acid and ursolic acid: structure-activity relationship, molecular docking and elucidation of molecular mechanism

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Dillenia indica L. Bark extract: A natural antidiabetic food remedy with antioxidant properties in insulin-resistant cells and diabetic mice

Bo-Rim Song[1*], Md Badrul Alam[1,2], Shin-Jun Hwa[1], Young-Bin Yeo[1],
Won-Sik Choi[3], Tae Hun Lee3, Sang-Han Lee[1,2]

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Whitening, wrinkle inhibitory, and anti-obesity activities of sword bean _(Canavalia ensiformis)_ fermentation liquid fermented by _Lactobacillus_ sp.

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Functional properties of enzymatic hydrolysates of sesame seed meals

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The inquiry into the osteogenic potential and physicochemical properties of chickpea protein extracts from three different enzyme hydrolysis

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Cirsium japonicum var. maackii attenuates weight gain, reduces thrombus formation, and prevents atherosclerosis in high-fat diet-induced C57BL/6 mice

Seon Il Jang[1,4*], Jae Young Shin[1,2], Byoung Ok Cho[1], Ji Hyeon Park[1],
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음나무_(Kalopanax septemlous)_의 가시, 잎, 가지 열수 추출물에 항산화 활성 연구

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Comparative study on the physicochemical properties and antioxidative activity of various berry vinegars

Gim Sung Woong*, Lee Su Jung, Kim Eui Jin

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Ant-inflammation effects of *Elsholtzia ciliata* in poly I:C stimulated RAW264.7 cells

Ji Hyeon Park[1], Jang Hoon Kim[2], Ji Hwan Heo[1], Jae Young Shin[1], Seon Il Jang[1],Jang Ho Kim[1], Byoung Ok Cho[1]*

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Antioxidant activities and ACE inhibitory effects of fermented green tea by *Lactobacillus species*

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Effect of six herbal medicine water extracts and their mixed extract on antioxidation and preadipocyte differentiation

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Skin-lightening, anti-wrinkle, and anti-obesity effects of sword bean (*Canavalia ensiformis*) pod fermentation liquid

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Physiological activity of fermented *Coix lacryma*-jobi L. var. *ma-yuen* by mushroom mycelial

Kyung-Je Kim[1], Dong-Hyeon Lee[1], Seong-Woo Jin[1], Young-Woo Koh[1], Seung-Bin Im[1], Neul-I Ha[1], Hee Gyeong Jeong[1], Sang-Wook Jeong[1], Kyeong-Won Yun[2], Yu Jin Choi[3], Kyoung-Sun Seo[1]*

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Comparison between perilla and sesame seed meal extracts on oxidative stress and inflammation in LPS-treated RAW 264.7 cells

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P5-56

Fucoidan of saccharina japonica improves the inflammatory responses and skin barrier deterioration in fine dust (FD)-stimulated HaCaT keratinocytes

Si-Won Yoo[1], Arachchige Maheshika Kumari Jayasinghe[1], Kirinde Gedara Isuru Sandanuwan Kirindage[1], Namki Cho[2], Seok Ho Cho[3], Hee Min Yoo[4], Ginnae Ahn[1,5]*

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Anti-allergic effect of *Curcuma longa* L. leaf hot water extract in IgE/BSA-stimulated mast cells and a passive cutaneous anaphylaxis (PCA) mouse model

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P5-58

Exploring the potential of *Sargassum horneri* ultrasonic ethanol extract in inhibiting melanogenesis: mechanisms and efficacy

Kirinde Gedara Isuru Sandanuwan Kirindage[1], Arachchige Maheshika Kumari Jayasinghe[1], Si-won Yoo[1], Chang-ik Ko[3], Yong-Seok Ahn[3], Ginnae Ahn[1,2]*

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P5-59

Extraction of food intake from the Korean population for risk assessment of persistent organic pollutants (POPs): data from the Korea national health and nutrition examination survey 2016-2021

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주 요 기 술 및 취 급 품 목

- 학부생 및 대학원생을 대상으로 '지식재산 컨퍼런스'와 '특허캠프'를 포함한 교육 프로그램 및 특강 실시
- 교원을 대상으로 지식재산 인식제고 및 전문성 강화를 목적으로 '지식재산 세미나' 개최
- 한국발명진흥회와의 주기적인 교류로 지식재산권의 가치를 공유를 통한 학생 및 교원의 지식재산 역량 강화 및 인식 확산을 위한 노력
- 1차년도 교육과정 운영, 지식재산 특강, 경진대회, 발명특허 등 다양한 영역으로 추진해 왔으며, 그중 교과목 운영성과, 수강생 수, 만족도, 특허출원 건수 등 대부분의 달성률을 초과함. 특히 참여학생의 특허출원 건수도 기준목표의 300%를 넘게 달성함

◆ **신산업 분야 지식재산 양성사업 1차년도 달성 목표**

구분	지표명	단위	목표값	달성값	달성 정도
핵심 성과 지표	신산업분야 지식재산 교육과정 구성 및 운영 성과	강좌	2	3	150.00%
	신산업분야 지식재산 교육과정 수강생 수	명	20	83	415.00%
	신산업분야 지식재산 교육과정 교원 확보 수	명	2	9	450.00%
	신산업분야 지식재산 교육과정 담당직원 수	명	1	1	100.00%
	신산업분야 지식재산 교육과정 수강생 만족도	점	70	89	127.14%
자율 성과 지표	지식재산능력시험 응시자	명	20	60	300.00%
	특허출원 건수	건	5	15	300.00%
	대내외 IP 경진대회 및 행사 참석 학생 수	명	2	74	3700.00%

- 2차년도에는 바이오헬스에 관련된 현장교육강화, 경진대회 참가, IP 네트워크 구축을 위한 MOU 등 다양한 프로그램을 운영할 계획

업 체 명	경북대 IP융합인재양성사업팀		
대표자 성명	이 상 한		
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홈 페 이 지	https://instagram.com/knu_foodbio?igshid=Y2IzZGU1MTFhOQ==		
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주 요 기 술 및 취 급 품 목

- 지식재산에 대한 인식 확산 노력.
- 지식재산에 학부생 및 대학원생에 대한 교육 및 연구방법에 대한 교육, 및 세미나 특강 실시.
- 한국발명진흥회와 주기적으로 교류하면서 지식재산권의 가치를 공유하며 지역의 산업발전을 위하여 노력.
- 1차년도 교육과정 운영, IP인식제고세미나, 경진대회, IP융합장학금, 발명특허 등 다양한 영역으로 추진해 옴. 그 중 교과목 만족도, IP관련 행사 참여학생의 만족도 등이 달성률을 초과함. 특히 참여학생의 IP출원건수도 기준목표의 850%를 넘게 달성함.

□ 핵심성과 지표 달성도

구분	지표명	단위	기준값 (1차년도)	달성치	달성률 (%)
핵심성과지표	신산업분야 교육과정 구성 및 운영 성과	강좌	2	2	**100**
	신산업분야 교육과정 수강생 수	명	30	44	**146**
	신산업분야 교육과정 수강생 만족도	점	70	83.8	**119**
	신산업분야 교육과정 교원 확보 수	명	2	2	**100**
	신산업분야 교육과정 전담직원 수	명	1	1	**100**

□ 자율성과 지표 달성도

구분	지표명	단위	기준값 (1차년도)	달성치	달성률 (%)
자율성과지표	대학내 교수대상 IP인식제고 행사 개최 수	건	1	1	**100**
	참여학생의 취창업 목적을 위한 기업IP멘토링	건	5	9	**180**
	참여학생의 IP출원 건수	건	2	17	**850**
	산학연 IP관련 초청 강연 수	회	1	10	**1000**
	IP관련 행사(기업IP멘토링, IP관련 초청 강연, 캡스톤 디자인 수업, IP인식제고 학생 아이디어 경진대회)에 참여하는 참여학생의 만족도(100점 만점 대비)	점	70	90.5	**129**

- - 2차년도에도 바에오헬스에 관련된 지식재산 교육과정 증설, 현장실습교육강화, CES참가 장려, 지식재산 썸머스쿨 지원 등 다양한 프로그램을 운영할 계획.

업 체 명	국립호남권생물자원관		
대표자 성명	류 태 철		
전 화 번 호	061-288-8984	팩스번호	061-288-8979
홈 페 이 지	https://hnibr.re.kr/		
이 메 일	una93kr@hnibr.re.kr		
주 소	전라남도 목포시 고하도안길 99(달동)		
주 요 기 술 및 취 급 품 목	• **국립호남권생물자원관** - 국립호남권생물자원관은 국내 유일 섬·연안 생물소재 전문 연구 기관입니다. - 섬과 연안에서 발굴된 야생생물자원의 가치 창출로 생물자원 보전과 국가 생물주권 확립에 기여하고자 합니다. • **국립호남권생물자원관 섬생물소재은행** - 섬생물소재은행에서는 국내 섬·연안 지역에서 발굴된 생물소재의 다양한 활용을 위해 산·학·연 수요자 분들을 대상으로 생물소재 무료 분양 서비스를 수행하고 유용성 정보를 제공하고 있습니다. - 섬생물소재은행은 배양체(세균, 균류, 미세조류)은행, 유전자원은행, 천연물은행으로 총 3개의 은행을 운영하고 있습니다. - 섬·연안 생물소재(천연물, 유전자원, 배양체) 분양 및 유용성 정보 제공		

업 체 명	재단법인 순천바이오헬스케어연구센터		
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전 화 번 호	061-750-5445	팩스번호	061-750-5459
홈 페 이 지	www.sbrc.kr		
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주 소	전남 순천시 중앙로 225 A2 102호		
주 요 기 술 및 취 급 품 목	◆ **주요기술** ① 출원 번호 : 10-2023-0053827 - 특허명 : 탈지된 새싹땅콩의 발효물 또는 이의 추출물을 유효성분으로 포함하는 피부 보습, 피부 장벽 강화 또는 주름 개선용 조성물 ② 출원 번호 : 10-2023-0043455 - 특허명 : 탈지 갈색거저리 유충의 발효 추출물을 포함하는 항비만 및 면역증강용 조성물 ③ 출원 번호 : 10-2022-0108358 - 특허명 : 수산 부산물인 탈지어피 유래 저분자 대체단백소재 및 이의 제조 방법 ④ 출원 번호 : 10-2022-0054113 - 특허명 : 큰개비자나무 추출물을 포함하는 항산화 또는 항염증용 조성물 ⑤ 출원 번호 : 10-2021-0002222 - 특허명 : 아로니아 식초를 포함하는 항염증용 조성물 ◆ **취급품목** ① 아이케어 홍삼아로니아 - 6년근 홍삼농축액과 천연소재를 활용한 아로니아식초, 순천지역 재배 배 농축액을 배합하여 만듦 - 항산화 및 면역기능에 도움을 주는 항노화 제품 ② 나디카 갈대발효콜라겐마스크 팩 - 갈대를 원료로 이용한 상황버섯 균사체 발효배양액 추출물을 이용하여 만든 지역 천연소재 이용 마스크팩 - 2016년부터 꾸준히 연간 12,000개씩 판매되고 있는 제품 ③ 에브리지 핸드 케어 크림 & 세정제 - 스마트팜으로 재배한 새싹인삼 및 천연발효 아로니아 식초를 첨가한 제품 - 새싹인삼을 이용한 컴파운드 K의 제조방법 및 이에 따라 제조된 컴파운드 K를 포함하는 항산화 및 항균용 조성물 - 피부자극이 없는 독일 더마테스트 “excellent”등급 인증 완료 ④ 아이케어 뷰티 안티폴 A - 아로니아 식초, 배 농축액 등을 배합한 피부 트러블 케어에 도움을 주는 이너뷰티 제품 - 항산화 및 미백에 탁월한 조성물로 음료로 가볍게 마시는 음료에서 건강과 피부 건강까지 지키는 제품 ⑤ 댕댕이 멀티 스틱밤 - 전남이 자생지인 큰개비자나무의 가지/잎 추출물을 함유한 독자적인 포뮬러로, 건조한 반려동물의 피부에 보습막을 형성, 촉촉하고 매끄러운 피부로 가꿔주는 멀티밤		

업 체 명	(재)전남바이오산업진흥원 천연자원연구센터		
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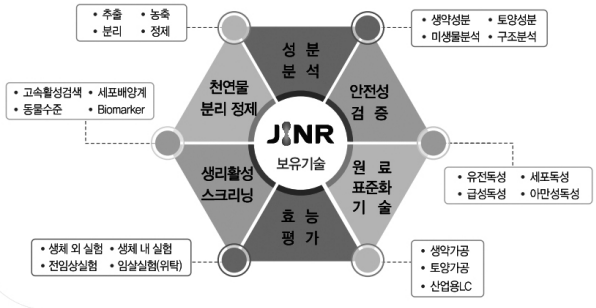
주 요 기 술 및 취 급 품 목	본 기관은 300여종의 첨단장비와 시설 구축· 40여명의 석·박사급 전문인력을 중심으로 천연자원 기반 식·의약·향장소재 등의 유효성 검증·(전)임상 연구개발(R&D) 및 국가·지자체·기업 등과 공동 R&D 사업을 진행하는 R&D에 특화된 공공연구기관입니다. 이를 통해 개발된 소재 및 기술을 중소·중견 기업에 이전하고 원할한 원재료 수급을 위해 농가와 계약재배를 함으로써 기술의 제품화와 농가 수익 증대의 선순환 생태계를 구축하고 있습니다. 또한 입주기업제도 및 창업보육센터의 운영을 통해 벤처기업의 창업 및 보육을 활성화 시키고 산업체를 위한 현장인력양성과 마케팅 지원등 다각적인 기업지원 활동을 수행하고 있습니다. ◆ one stop service  One stop service(152종 312대) - 자원에서 제품까지 - ◆ 핵심역량  		

업 체 명	제주지역혁신클러스터육성사업단		
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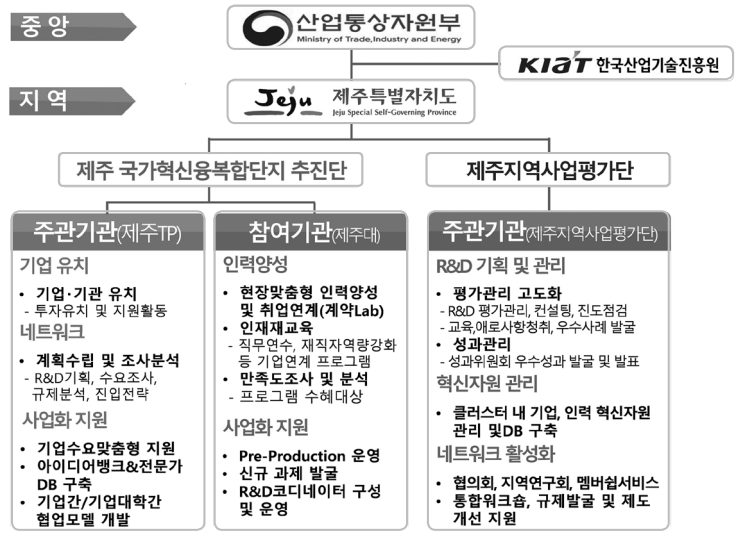
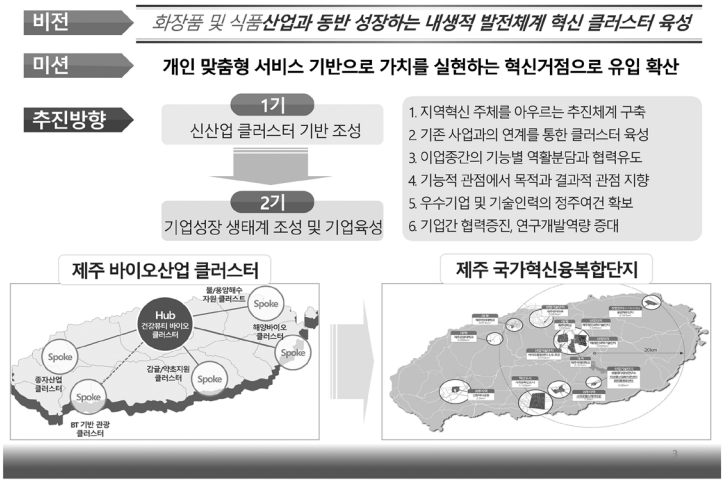
주 요 기 술 및 취 급 품 목

◆ 제주국가혁신융복합단지 추진단 ◆





업 체 명	한국핵융합에너지연구원 플라즈마기술연구소		
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이 메 일			
주 소	전라북도 군산시 동장산로 37 (플라즈마기술연구소)		
주 요 기 술 및 취 급 품 목	**• 수확 후 작물의 저장을 위한 플라즈마 기술 개발** - 국부패 억제를 위한 플라즈마 살균 기술 - 과숙 방지를 위한 플라즈마 에틸렌 제거 기술 **• 수확 후 작물의 저장용 플라즈마 장치 개발** - 장치 구성 · 플라즈마 발생원 · 전원 장치 · 플라즈마 활성종 및 저장 환경 측정용 모니터링 장치 · 플라즈마 장치 제어 시스템 · 데이터 저장 장치 - 플라즈마 장치 운전 조건 결정 · 작물 종류에 따른 저장 조건 · 저장 환경에 따른 장치 운전 조건		

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<tr><td>업 체 명</td><td colspan="3">(재)장흥군버섯산업연구원</td></tr>
<tr><td>대표자 성명</td><td colspan="3">김 성</td></tr>
<tr><td>전 화 번 호</td><td>061-862-8846</td><td>팩스번호</td><td>061-862-8847</td></tr>
<tr><td>홈 페 이 지</td><td colspan="3">www.jmi.re.kr</td></tr>
<tr><td>이 메 일</td><td colspan="3">jmi8628846@gmail.com</td></tr>
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· 버섯의 분자생물학적 연구
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· 공동연구 수행 및 기술이전</td></tr>
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· 버섯산업 인프라/클러스터 구축</td></tr>
<tr><td colspan="2">주요사업</td><td>· 진균류기반소재제품고도화 지원사업
· 진균류바이오헬스소재상용화 지원사업</td></tr>
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◆ 부서별 기능 및 역할
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<tr><th>부 서 명</th><th>기능 및 역할</th></tr>
<tr><td>연구행정실</td><td>연구원 예산 집행, 연구원 운영관리, 농가 및 산업체 행정지원</td></tr>
<tr><td>가공산업화연구실</td><td>버섯 품질기준 설정 및 제품 표준화 연구개발
산업화 경쟁력 향상을 위한 부가가치 연구</td></tr>
<tr><td>육종기능성연구실</td><td>버섯 유전자원 확보 및 성능평가
표고 신품종 개발, 재배기술 개발 및 농가지원</td></tr>
<tr><td>바이오 헬스소재
상용화기술지원실</td><td>진균류 대량 배양 및 소재화
진균 자원 활용 산업화 및 상용화 지원</td></tr>
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안전을 담다,
안심을 먹다

스마트 HACCP
식품의약품안전처

대한민국 최고의 식품안전 전문기관 **한국식품안전관리인증원**이
식품안전관리 패러다임을 선도하겠습니다.

인증원은 국민의 보다 나은 내일을 위해 대한민국 최고의 식품안전 전문기관의 자부심과 긍지로
국민의 눈높이에 맞는 식품안전을 위해 최선을 다하겠습니다.

주소 충청북도 청주시 흥덕구 오송읍 오송생명5로 156

전화 (본원)1599.1102 (서울) 02.860.6900 (부산) 051.933.0100 (경인) 031.390.5200 (대구) 053.741.5210 (광주) 062.380.0500 (대전) 042.251.1169

소통창구 홈페이지 유튜브 인스타그램 카카오채널 블로그 페이스북

"제주혁신융복합단지추진단"

산학협력프로그램 역량강화 심포지엄

일시 2023.08.16(수) 16:00~18:00 장소 제주국제컨벤션센터

프로그램

이너뷰티 피부임상 최신동향 _(주)더마프로 **백지훈** 박사

미생물자원 다양성 및 산업화 _국립생물자원관 **지원재** 박사

생물전환과 화장품 원료개발 _선문대학교 **김승영** 교수

주최 및 주관

제주특별자치도
산업통상자원부
한국산업기술진흥원
제주혁신융복합단지추진단
(재)제주테크노파크
(재)제주지역사업평가단
제주대학교 산학협력단

제주대학교 지역혁신클러스터육성사업단이
산학협력 현장착근형 인재양성을 책임지겠습니다.

계약Lab운영 지원사업

사업개요 제주국가혁신클러스터 내 바이오산업 및 전후방산업 특화산업 관련 기업과 대학이 공동으로 기업의 수요 발굴 후 문제해결형 산학협력 공동프로젝트 수행을 통한 맞춤형 인력양성 및 취업 연계 지원

지원규모 참여기관(팀)별 최대 8천만원 이내

산학협력 프로젝트Lab 지원사업

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

지원규모 참여기관(팀)별 최대 2천만원 이내

유망기업 혁신인재 재직자교육 프로그램

사업개요 클러스터내 네트워크 활용 성장육성형 중심의 맞춤형 바이오산업 기술역량 강화를 통한 기술혁신형 강소기업 육성 기반 미련

강좌수 1개 프로그램, 10개 강좌 내외

운영기간 2023. 8 ~ 2023. 8 (1개월)

기획역량강화(프리프러덕션) 지원사업

사업개요 혁신 네트워크 활동(캡스톤 디자인, 아이디어 피칭데이 등)을 통해 선정된 아이디어를 대상으로 신기술·시장성·사업성 분석·비즈니스모델 개발 등 사전기획을 지원

지원규모 참여기관(팀)별 최대 2천만원 이내

제주대학교 JEJU NATIONAL UNIVERSITY JTP Jeju 제주특별자치도 Jeju Special Self-Governing Province KIAT 한국산업기술진흥원

피부 개선효과를 가지는 갈락토올리고당

갈락토올리고당분말(네오고스-P70)

건강 기능식품
식품의약품안전처

[식품의약안전처 기능성인정] 자외선에 의한 피부손상으로부터 피부건강에 도움을 줄 수 있음
일일섭취량 : 갈락토올리고당분말(네오고스-P70)으로써 2g/일

갈락토올리고당분말(네오고스-P70)은 고순도 갈락토올리고당 (High Purity Galactooligosaccharide: GOS)으로,
프리바이오틱스로써 고유한 생리활성을 가지며, *in-vitro* 와 *in-vivo* 평가 및 인체적용시험을 통해 피부건강개선 효과를 검증하였습니다.

갈락토올리고당분말(네오고스-P70)의 특징

피부건강에 도움 (건강기능성 개별인정 소재)	*In-vitro, in-vivo,* 인체적용시험을 통해 피부건강 효과 입증함.
특허등록소재	제조기술 특허로 갈락토올리고당의 함량을 증가시켜 고순도 갈락토올리고당을 개발함.
제품화 강점	부드러운 감미로 다양한 제품군 적용 가능함.
안정성	pH와 온도변화에 안정함.

갈락토올리고당분말(네오고스-P70)의 피부개선효과

동물평가결과

【피부주름개선효과】

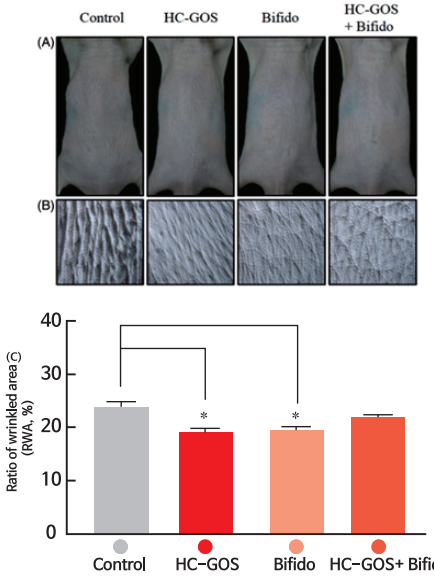


그림2. 갈락토올리고당분말(네오고스-P70)의 피부표면 주름 상태 개선효과
1) Control (+UVB, saline 섭취), 2) HC-GOS (+UVB ,갈락토올리고당분말(네오고스-P70)100mg섭취군, 3) Bifido (+UVB , Bifidobacteriumlongum 10^9CFU 섭취군, 4)HC-GOS+Bifido (+UVB,갈락토올리고당분말(네오고스-P70)100mg + Bifidobacteriumlongum 10^9 CFU)섭취군, 각군당 6마리 , SKH-1 hairless mice, 12week 12week . * $P < 0.05$
출처: *Int J Food Sci Nutri* , 2015; 66(8): 923-930)

인체적용시험

【한국인 성인 대상 갈락토올리고당(네오고스-P70) 섭취 후 피부개선 효과 확인】
(인체적용시험 결과가 모든 사람에게 동일하게 적용되는 것은 아님)

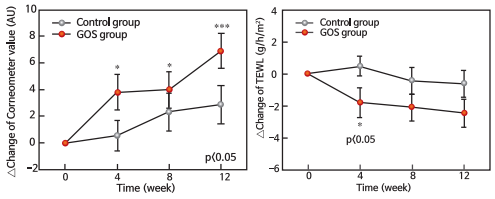
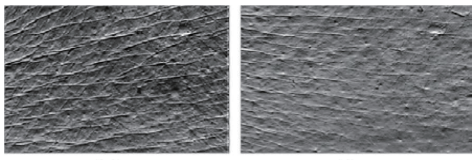


그림4. 인체내 피부 수분상태 개선효과 * $P < 0.05$
(출처: *Asia Pac J Clin Nutr* 2017;26(4):613-618)

임상시험에 참가한 40-60대 성인남녀 건강인을 대상으로 갈락토올리고당(네오고스-P70)을 12주 동안 하루 2g/일 섭취 후, 수분보유량(Corneometer value), 피부 경표피수분손실량(TEWA: Transepidermal water loss) 측정
갈락토올리고당(네오고스-P70) 섭취 시 수분보유량은 4주,8주,12주까지 유의적으로 증가하였음. (4주(P<0.05), 8주(P<0.05), 12주(P<0.001)피부 경표피수분손실량(TEWA: Transepidermal water loss)은 4주차에 유의적으로 감소하였음. (P<0.05)

【피부주름개선효과】



Before　　After

피부표면 변화를 측정하기 위해 피임상자의 피부 모사판(Replica)을 이용한 피부주름의 총 넓이(Total wrinkle area), 분포율(Percent of wrinkle area)의 지표를 관찰한 결과 갈락토올리고당(네오고스-P70) 섭취 12주 후의 주름의 총 넓이와 주름 분포율은 유의적으로 감소하였으며, 피부상태가 개선되었음.

CREMAR (주)네오크레마 서울특별시 송파구 가락동 중대로211 Tel : 02-401-4088 Fax : 02-401-4087

경북 바이오첨단산업 인재양성사업 교육생 모집

1년에 딱 20명

접수기간 :23.08.14.월 – 23.08.27.일

월 100만원 받으면서
취업 준비를?!

분야

√ 바이오(안동대학교 주관, 20명 선발)

교육일정

'23.09.~'24.01.(5개월),
총 500시간, 3+2 교육 프로그램

모집대상

대학 졸업 후 18개월 이내(학사 이상) 및
2024년 2월 졸업예정자 포함 / 미취업자

*접수마감일 기준 주민등록상
주소가 경북 또는 대구 거주자

교육특징

고급 현장 실무형 교육(3개월),
기업협업 프로젝트(2개월), 취업 연계교육 등

신청방법

이메일로 신청서 제출(hustar@anu.ac.kr)
https://gbinnovator.org/

신청절차 및 문의처

안동대학교 바이오산업 인재양성사업단
(T: 054.820.6360)

신청방법

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사단법인 한국식품저장유통학회
The Korean Society of Food Preservation

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