

Poster Session

PART I

저장/포장/유통

P1-01

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

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This study aimed at ensuring the storage safety of wheat by investigating changes in quality characteristics under different packaging conditions in plasma storage. The Saegeumgang cultivar was utilized, and wheat was stored for 8 months under both gunny sack and vacuum packaging conditions. The plasma storage environment was maintained at 4°C with an ozone concentration of 1,000 ppm. Microbial contamination was assessed, indicating that wheat stored in gunny sacks maintained microbial levels below the detection limit ($<10^1$ CFU/g) for up to 5 months. Conversely, wheat stored in vacuum packaging exhibited a lower propensity for microbial proliferation. Fungal contamination remained below the detection limit ($<10^1$ CFU/g) for the first month of storage, with more pronounced suppression observed in vacuum-packaged wheat compared to that stored in gunny sacks. Moisture content showed an increasing trend post-storage, likely due to the high relative humidity within the plasma storage chamber. The acid value exhibited a gradual rise over the 8-month period, reaching 34.30 mg KOH/100 g in gunny sacks, with no significant difference between the packaging methods. In conclusion, vacuum packaging within a plasma storage chamber proves to be an effective method for ensuring the storage safety of wheat. Nevertheless, further research is warranted to optimize plasma storage conditions to minimize quality degradation.

P1-02

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

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Green onions are a vegetable with about 359,000 tons of 2022 produced nationwide per year in Korea, and are an item that requires supply and demand control due to large price fluctuations. Postharvest technology has focused much on inhibiting quality deterioration such as browning, wilting, and rot development. We established appropriate postharvest handling practices and published a manual to optimize quality during distribution. The shape of green onion leaves is round and easily broken, being careful not to damage them during harvesting and handling. To distribute fresh green onions, cooling to lower the produce temperature immediately after harvest is essential. During peeling, trimming, packaging, and storage the produce temperature difference with the surrounding air must be controlled so that it does not exceed 10°C to prevent wilting and rot. The main postharvest handling systems were classified into four categories: ① sorting, packaging and shipping directly from the field after harvest, ② sorting, packaging and shipping after transportation to the sorting facility, ③ sorting, packaging and shipping after forced air pre-cooling or short- and long-term storage, ④ producing fresh-cut green onions. Among these, the third method was recommended as the most ideal postharvest handling system to stabilize the supply of fresh green onions.

P1-03

Effects of low-dose electron beam irradiation on the quality characteristics of *Pa*-kimchi during refrigerated storageSo Yoon Park^{1,2*}, Suk-Min Yun^{1,2}, Ho Hyun Chun¹¹*Kimchi Industry Promotion Division, World Institute of Kimchi*²*Department of Integrative Food, Bioscience and Biotechnology,**Graduate School of Chonnam National University*

This study aimed to evaluate the effects of 2 and 4 kGy electron beam (EB) irradiation on the quality characteristics of *Pa*-kimchi (PK) stored at 6°C for 15 d. EB irradiation at 4 kGy decreased the total aerobic and lactic acid bacteria counts by 2.3 and 4.1 log CFU/g, respectively. It also decreased the total coliform count to a level below the detection limit (1 log CFU/g). After 15 d of storage, pH of PK without EB irradiation (control) decreased to 4.4 and that of PK irradiated at 4 kGy decreased to less than 5.0. EB irradiation at 4 kGy significantly ($P < 0.05$) retarded the increase in the titratable acidity of PK compared to that of the control throughout the 15 d of storage. Moreover, the reducing sugar content of PK irradiated at 4 kGy was significantly ($P < 0.05$) higher than that of PK irradiated at 0 and 2 kGy after 15 d of storage. Additionally, headspace CO₂ concentrations were significantly lower ($\leq 40.2\%$) in the packaging films containing 4 kGy irradiated PK than in those containing PK of other treatments. Overall, these results highlight the potential of EB irradiation at 4 kGy to control microbial growth and maintain the initial PK quality during refrigerated storage.

P1-04

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

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Cold plasma has emerged as a useful tool for preserving fruits and vegetables after harvest during storage. In this study, to elucidate the effect of cold plasma treatment on the storage quality of shiitake mushrooms (*Lentinula edodes* cv. Sanbaekhyang) during storage, we examined the quality attributes of shiitake mushrooms stored at 5°C with initial 24-hour (P-I24) or continuous cold plasma (P-C) treatment. During cold plasma treatment, the storage room (size: 3 x 4 x 3 m) contained approximately 60 ppb of O₃ with negative ions and free radicals generated by the cold plasma instrument: atmospheric air is subjected to high-energy UV light to generate plasma ions (Model: HKF-10, UV length: 240~272 nm, 14.4W, Biozone Scientific BiozoneKorea, Anyang, South Korea). Regarding quality attributes, the moisture content of shiitake mushrooms stored at 5°C without plasma treatment (Control) was lower than that of P-I24 and P-C after 2 weeks. Consequently, P-I24 showed the highest moisture content after 4 weeks, although the firmness of the cap was the lowest among treatments after 4 weeks. Meanwhile, decay of shiitake mushrooms was observed in the order of Control, P-I24, and it was not detected in P-C for 4 weeks. Additionally, the browning rate of the shiitake mushrooms was lower in P-C than in P-I24 and Control, and P-C exhibited the highest Hunter L* value among the treatments. These data indicate that plasma treatment influenced the quality of shiitake mushrooms and improved their visual appearance during storage.

P1-05

저온 숙성한 과일 농축액의 품질 특성

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과일 및 채소는 저장되는 동안 갈변 반응으로 인해 식품 고유의 빛깔이 퇴색되거나 변색 된다. 이러한 변색은 외관, 풍미 및 소비자의 기호성 저하에 영향을 미쳐 상품의 가치에 직·간접적으로 영향을 미칠 수 있다. 저온 숙성은 숙성 미(味)를 내기 위하여 생산 후 일정 조건에서 숙성시키는 것으로, 주로 와인, 커피, 소고기 등을 숙성시키는 과정에서 사용된다. 따라서 본 연구에서는 갈변 반응이 유발될 수 있는 과일이 포함되는 과일 농축액을 저온 숙성시켜 제품의 품질을 개선하고자 하였다. 과일 농축액 3종을 생산 직후 5℃, 25℃, 37℃에서 각각 5일, 10일, 20일간 숙성시켰다. 숙성된 농축액을 제품의 보관온도인 25℃에서 다시 0일, 10일, 20일, 30일간 보관하면서 숙성 온도 및 보관 기간에 따른 Brix, 산도, 색상 및 관능평가를 통해 품질 특성을 확인하였다. 3가지 농축액 모두 숙성 5일 차까지 Brix가 평균 약 0.3%, 10일 차까지 약 1% 상승하고 이후에는 일정하게 유지되었다. 산도의 경우에는 농축액 모두 숙성 5일 차까지 평균 약 6%, 10일 차까지 약 13% 감소하였다가 20일 차에 오히려 다시 증가하는 경향을 나타내었다. Brix와 산도 모두 숙성 기간 10일을 기점으로 수치가 크게 변화되었으며, 5℃에서 변화 속도가 가장 느린 것을 확인하였다. 숙성된 3가지 농축액의 보관 일자에 따른 색상 확인 결과 보관온도 및 기간이 동일함에도 불구하고, 숙성 시의 온도가 높을수록 갈변 정도의 차이가 확연함을 확인하였다. 또한, 각각의 온도에서 10일간 보관한 제품의 관능평가 결과 5℃가 가장 높은 점수를 나타내었으며, 37℃가 가장 낮은 평가를 받은 것으로 나타났다. 이러한 결과를 통해 품질 변화를 최소화하고, 소비자의 기호도를 향상하기 위해서는 5℃에서 10일간 저온 숙성시키는 것이 과일 농축액의 품질 특성을 개선 시키는데 가장 바람직한 조건인 것으로 생각된다.

P1-06

Development of compulsory air circulation curing chamber for sweetpotato storability improvement

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Curing treatment of sweetpotato (*Ipomoea batatas* L.) has been a well known method to reduce the risk of postharvest loss as well as to prolong the storage time minimizing the deterioration of its quality. To investigate the storage quality of sweetpotato as curing conditions in variation with the supplied wind speed, we fabricated the sweetpotato curing facility equipped with the forced air circulation system in which temperature and humidity of air was adjusted in a separate chamber. The controlled air was supplied to the main curing chamber through circulation ducts. The adjustable wind speed was 1.9~3.3m/s. The temperature, humidity, and retention time of curing were 35℃, 95%, and 3 days, respectively. Under given conditions, the quality change during 6 month storage period (Nov.3~Apr.23) was repeatedly measured in once a month including sugar content (Brix), corruption rate (kg/total weigh), weigh loss rate (weight/initial weight). Sugar content decreased in 2 Brix compared to those values of initial storage at all experimental conditions. The representative diseases occurring in the storage decreased, such as dry rot, soft rot, and fungal disease in all experimental curing conditions. Cured at the 2.1 ± 0.7 m/s of wind speed, corruption rate and weight loss rate have decreased by 25.5% and 1.9%, respectively. In especial, dry rot occurring after 100 days of storage significantly was reduced in comparison with that of the experimental control.

This study was carried put with the support of the “Research program for Agricultural Sciences & Technology Development (project No. PJ01677818)”, National Institute of Agricultural Sciences, Rural Development Administration, Republic of Korea.

P1-07

레토르트 조건에 따른 칼라옥수수 품질특성 비교

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옥수수(*Zea mays* L.)는 세계 3대 작물 중 하나로 식량, 가축사료, 산업용 원자재 등 광범위한 분야에 이용되고 있다. 강원특별자치도의 옥수수 재배면적은 5,306 ha(전국 15,633 ha)로 전국 34%를 차지하고 있다. 상온에서 유통되는 옥수수는 신선도가 오래 지속되지 못해 품질 유지에 한계가 있다. 또한 찹옥수수는 무가공 또는 단순 가공으로 90% 이상 판매되고 있어 농가 소득향상과 소비확대를 위해 부가가치가 높은 가공품 개발이 필요하다. 따라서 본 연구에서는 품종 육성된 칼라찰옥수수를 이용하여 연중소비가 가능한 레토르트 제품으로 개발하고자 수행하였다.

정선에서 '23년 재배된 칼라 찹옥수수(청춘찰)를 수확하여 사용하였다. 전처리용액은 NaCl(0.5, 1, 2, 3%)에 침지(30분, 1, 2, 3, 4, 5시간)한 후 품질 특성을 조사하였다. 전처리를 위하여 예비 실험을 통해 NaCl 침지 시간을 4시간으로 고정하여 처리하였다. 옥수수 레토르트 조건은 121℃(15분, 55분) 나누어 처리한 후 품질특성을 조사하였다. 전처리용액 NaCl을 농도별로 침지 하였을 때 침지농도가 높아질수록 당도, 염도의 함량이 높았다. 색도에 있어도 황색도 b값은 높아지는 경향을 보였고, 물성중 경도는 침지농도와 침지시간에 큰 변화는 보이지 않았다. 레토르트 시간별 품질특성을 조사한 결과, NaCl농도가 높을수록 당도, 염도가 높아졌다. 색도에 있어서는 큰 차이를 보이지 않았다. 수분함량은 53.3~63.2% 었다. 관능평가 결과 1% NaCl 처리시 기호도가 높았다.

P1-08

발효 기간에 따른 뜰보리수 열매 식초의 품질 특성 변화

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뜰보리수(*Elaeagnus multiflora*)는 보리수나무과(Elaeagnaceae) 보리수나무속(*Elaeagnus*)으로, 그 열매는 민간에서 당청 및 식초 형태로 주로 섭취되고 있다. 뜰보리수 열매는 유기산, 플라보노이드, 폴리페놀 등의 유용성분들을 함유하고 있으며, 항산화, 피로 방지 및 항염증 활성 등의 생리활성을 갖는다고 보고된 바 있다. 그러나 뜰보리수 열매 식초의 품질 특성에 대한 연구는 미흡한 실정이다. 따라서 본 연구에서는 발효 기간에 따른 뜰보리수 열매 식초의 품질 특성 변화를 이해하고자 하였다. 뜰보리수 열매 식초는 발효가 진행하면서 pH는 감소하고 총산도는 증가하였다. 백색도는 발효 15일째에 60.41로 유의적으로 높았고, 황색도는 발효 180일째 13.57로 가장 높았으나 적색도는 발효가 진행되는 동안 거의 변화가 일어나지 않았다. 뜰보리수 열매 식초의 총 페놀성 화합물 및 총 플라보노이드 함량은 발효가 진행되면서 유의적으로 증가하였다. ABTS radical scavenging 활성 및 철 환원력은 발효 35일째까지 증가하였다가 발효 180일째에 감소하였다. 뜰보리수 열매 식초의 제조과정 중 성분학적 특성을 파악하고자, UPLC-ESI-QTOF-MS를 이용하여 대사체 분석을 실시하였다. 그 결과, 다량의 유기산들을 비롯하여 아미노산 유도체, phenolic acid류, flavonoid류 그리고 tricoumaryl spermidine류로 동정되었다. Heatmap에서는 발효가 진행되면서 flavonoid류와 아미노산 유도체들의 함량은 감소하는 반면, phenolic acid류와 유기산의 함량은 증가하는 경향을 나타냈다.

P1-09

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

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저온저장실에서 꺼낸 원예생산물의 선별 및 포장 작업 시 과일 표면에 발생하는 결로현상은 작업 효율을 저하시킬 뿐만 아니라, 물기가 있는 상태로 포장되면 미생물 증식과 부패 발생이 증가하여 품질 저하를 초래할 수 있다. 또한, 비파괴선별 시 과일 표면의 물방울은 선별 정확도를 저하시킨다. 본 연구는 작업 시기의 기상조건, 에어컨 가동 시 온습도 변화 등 다양한 작업 환경을 설정하여, 선별장 대기의 수증기압과 과일 온도에 따른 수증기압을 비교함으로써 결로 현상을 회피할 수 있는 관리점을 도출하고자 하였다. 2022~2023년 동안 국내의 대형 사과 산지유통센터(APC) 8개소의 저장 및 선별장 환경 조사결과, 저장온도는 모두 0℃였으며, 선별장 환경은 상온이거나 에어컨 설비가동을 통해 20℃, 60% 상대습도(RH) 수준으로 관리되고 있었다. 수증기 압력 이론에 따르면, 에어컨 가동을 통해 온도 20℃, 상대습도 60% 수준을 유지하는 선별장에서 결로현상을 피하기 위해서는 저장고에서 사과를 꺼낸 후 12℃까지 온도가 상승해야 하는 것으로 관측되었다. 에어컨 시설이 없는 중소형 산지유통센터에서 다양한 상온 조건에서 선별작업을 진행할 경우, 결로 현상을 피하는 수증기압 평형점 도달을 위해서는 사과의 온도를 작게는 2℃에서(저습 환경) 크게는 16℃까지(고습 환경) 상승시켜야 하는 것으로 나타났다. 사과 수확 후 관리 지침에 따르면, 선별장에서의 결로현상을 피하기 위해 외기와 과일의 온도 차이를 6~9℃ 이내로 유지하거나, 선별장 온도를 10~12℃로 유지하는 방안을 권장하고 있다. 본 연구는 획일적인 지침을 벗어나 다양한 조건에서 결로현상을 회피할 수 있는 과일 온도 범위를 도출함으로써, 보다 효율적인 관리 방안을 제시하였다. 이는 선별 및 포장 작업의 효율성을 높이고, 품질 유지에 기여할 것으로 기대된다.

P1-10

채소 품목 별 산지유통센터에서의 수확후 관리기술 변화 분석

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국내 원예생산물 유통은 산지유통센터(APC)를 중심으로 이루어지고 있으며, 고품질 농산물에 대한 시장의 요구, 재배 방식 및 기후 변화에 따라 APC에서 구사되는 수확후 관리기술도 변화하고 있다. 본 연구는 2022~2023년 동안 4개 품목 19개 APC(양파 8개소, 고구마 4개소, 참외 3개소 및 미니단호박 4개소)를 대상으로 수확후처리 및 저장기술의 중점 관리요소를 조사하여 변화 양상을 분석하였다. 양파, 고구마, 참외, 미니단호박을 대상으로 각 품목별 수확후 처리 및 저장기술의 변화를 조사하였다. 주요 조사 항목으로는 치유(큐어링) 기술, 저장기술, 세척기술, 예건치유 등이 포함되었다. 양파의 경우, 과거의 포장이나 노지 치유에서 저장실내 치유로 바뀌어 치유-저장이 하나의 흐름으로 이어지는 양상을 보였다. 점진적 온도저하, 부패 손실을 줄이기 위한 오존처리와 차압송풍식 저장 기술이 활용되고 있으며, 고습도 저장기술(상대습도 80%)이 보편화되었다. 고구마는 치유-저장이 동일한 저장실에서 이루어지고, 일부 APC에서는 미생물 제어를 위해 치유 기간 중 이산화염소 처리를 병용하고 있다. 치유기술의 최적화와 적정 저장환경 유지로 6개월 이상 장기저장이 가능하게 되었다. 참외는 소비지향적 품질관리 차원의 세척기술이 활용되며, 3일 이내의 단기저장을 하고 있다. 미니단호박은 수확후 선별 공간을 활용한 예건치유가 이루어지고, 1개월 이상의 장기저장을 위해 저장 전 예비선별을 거친다. 본 연구는 온습도 등 환경제어기술의 발전과 APC의 규모화에 따라 수확후 품질관리기술도 그 패러다임이 변하고 있음을 시사한다. 이러한 기술적 발전은 고품질 농산물의 안정적 유통과 저장을 가능하게 하며, 향후 APC의 운영 및 관리에 중요한 기초 자료로 활용될 수 있을 것이다.

P1-11

주요 과실 품목별 소비자 선호 품질인자 분석과 활용

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농산물 시장 개방과 웰빙 트렌드의 확산으로 인해 농산물의 품질과 안전성에 대한 소비자 관심이 급증하고 있다. 이에 따라 국내에서 생산되는 주요 과실의 객관적이고 과학적인 품질기준을 확립하기 위해 소비자 선호 품질인자를 규명하는 작업의 필요성이 대두되었다. 본 연구는 소비자가 과실을 구매할 때 고려하는 요인을 조사 및 분석하여 품목별 품질인증을 위한 기초자료로 활용하기 위해 실시되었다. 조사는 각 품목별 전국 광역도시 및 경기도에 거주하는 20~60대 여성 2,000명을 대상으로 연령대별로 균등하게 20.0%씩 구성하여 총 10,000명을 조사했다. 가구원 수는 4인이 31.7%, 3인이 27.5%, 2인이 22.4%, 1인이 11.6%로 분포되었다. 설문 조사는 사과, 배, 복숭아, 감귤, 참외 5개 품목을 대상으로, 구입 당시의 신선함, 가격, 크기, 단맛, 신맛, 매운맛, 아삭함, 색상, 향기, 품종의 중요도를 조사하였다. 본 연구에서는 각 소비 인자별 평균, 표준 편차 등을 계산하여 데이터의 중심 경향성과 변동성을 파악하였다. 상관관계 분석을 통해 소비 인자들 간의 관계를 이해하기 위해 상관계수를 계산하고, 이를 통해 밀접하게 연관된 인자들을 확인하였다. 상관계수의 유의성을 검정하여 통계적으로 유의미한 관계만을 해석에 포함시켰다. 주성분 분석(PCA)을 통해 소비 인자 간의 차이를 시각적으로 이해하기 위해 데이터의 차원을 축소하고, 주요 변동 요인을 파악하며 소비 인자들의 주요 특성을 시각화하고 집단을 확인하였다. 소비자의 구매에 영향을 미치는 품질인자는 5개 품목 모두 신선함, 가격, 당도 순으로 중요도가 높았다. 이들 인자의 상관관계 분석 결과, 과일의 당도와 가격 사이에는 높은 부의 상관관계($r=-0.807$, $P < 0.01$)가 확인되었으며, 아삭함과 색상 간에는 높은 정의 상관관계($r=0.992$, $P < 0.05$)가 나타났다. 이는 소비자들이 당도를 중시하면서도 가격이 낮을수록 구매 의사가 높아짐을 시사한다. 반면에, 소비자들이 구매 시 아삭함과 색상을 함께 고려함을 확인할 수 있었다. 이러한 결과는 소비자가 선호하는 과실의 품질정보는 농산물의 품질기준, 등급 및 표시방법의 표준화를 확립하는 데 긴요하며, 이는 과실의 상품성과 신뢰성을 향상시키는 데 기여할 것으로 판단된다. 따라서, 본 연구의 결과는 농산물의 유통 과정에서 농산물 품질 데이터베이스 구축에 도움이 될 것으로 기대된다.

P1-12

Influence of state/phase transitions on ice recrystallization in kimchi during frozen storageMiran Kang^{1,2*}, MinJi Kim¹, Hyun-Jung Chung², Sung Hee Park¹¹Technology Innovation Research Division, World Institute of Kimchi,²Department of Integrative Food, Bioscience and Biotechnology,

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This study investigates the effects of state/phase transitions, particularly temperature fluctuations, on the microstructure and physicochemical properties of Korean white kimchi (KWK) during frozen storage. The temperature of the frozen KWK was varied from -45°C to different states over 4 weeks: glassy state without fluctuations ($T_1 = -45^{\circ}\text{C}$), glassy state ($T_2 < T_g'$), partially freeze-concentrated state ($T_g' < T_3 < T_m'$), and rubbery state ($T_4 > T_m'$). After 4 weeks of frozen storage, the drip loss of KWK stored in the glassy state ranged from 28.08% to 37.59%, which was lower than that of the rubbery state (51.82%). The hardness of KWK in the glassy state without fluctuations ranged from 7.09 to 7.98 N over 4 weeks, while in the rubbery state it increased to 9.96 N. A more uniform and denser ice crystal structure was observed in the glassy state compared to the rubbery state. No significant differences ($p < 0.05$) were observed in pH, titratable acidity, and reducing sugar content among different states. Therefore, glassy state storage can minimize structural damage, and glassy state storage without temperature fluctuations is proposed as the optimal condition to maintain quality attributes.

P1-13

저장 기간에 따른 초절임 자색가지고추의 품질 특성 변화

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고추(*Capsicum annuum* L.)는 가지과(Solanaceae) 고추속(*Capsium*)으로, 전 세계적으로 널리 소비되고 있으며, 한국에서도 가장 많이 소비되는 채소 중 하나이다. 고추는 사포닌류, 플라보노이드류, 카로티노이드류, 비타민 등의 유용 성분들을 함유하고 있으며, 항산화, 항염증, 항비만, 항암 활성 및 간 보호 등 다양한 생리 활성을 발휘한다고 보고되고 있다. 또한 고추를 이용한 가공식품의 품질 특성에 관한 논문도 다수 보고되었다. 그러나 안토시아닌이 풍부한 자색가지고추의 가공식품에 대한 품질 특성 변화에 대한 연구는 미흡한 실정이다. 따라서, 본 연구에서는 4℃에서 60일동안 저장하는 동안 초절임 자색가지고추의 품질 특성 변화를 이해하고자 하였다. 저장 기간이 길어짐에 따라 적색도는 초절임 자색가지고추에서 감소한 반면, 초절임액에서 증가하였다. 초절임 자색가지고추의 경도는 저장 20일까지 크게 감소하였으며 이후 서서히 감소하는 경향을 나타냈다. 초절임 자색가지고추는 저장 기간이 길어짐에 따라 총 폴리페놀, 총 플라보노이드, 그리고 총 안토시아닌 함량이 서서히 감소하였다. LC-MS 기반 대사체 분석 결과, 초절임 자색가지고추는 저장 기간이 길어짐에 따라 그 주요 화합물인 diterpene glycoside류, flavonoid glycoside류, capsianoside류, 그리고 anthocyanin류가 감소하였으며, 일부의 페놀성 화합물들(플라보놀 배당체 및 캅시아노사이드)이 증가하였다. 이러한 결과들은 초절임 자색가지고추의 품질관리를 위한 기초자료로 활용될 수 있을 것으로 기대된다.

P1-14

Optimization of blanching temperature and concentrations of vitamin c and sucrose for inhibition of browning in apple dicesDawun Lee^{1*}, Jae-Hee Kim², Soo-Jung Kim^{1,2}¹*Department of Food Tech,*²*Department of Integrative Food, Bioscience and Biotechnology,
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Browning in apples is a phenomenon caused by oxidation during processing such as peeling and cutting. This affects the color of the final product, making it necessary to introduce a process to inhibit browning during processing. In this study, the optimal blanching temperature and concentrations of vitamin C and sucrose for inhibiting browning in diced apples were investigated. Diced apples with added vitamin C concentrations (0%, 0.05%, 0.5%, 1%, 1.5%) and sucrose concentrations (0%, 10%, 20%) were blanched at 80°C, 90°C, and 100°C, and the color was measured to assess the degree of browning. In the experiment results, the most significant browning inhibition effect was observed at 90°C blanching temperature and 0.5% Vitamin C concentration in the 0% and 10% sucrose concentrations. In the 20% sucrose concentration, the highest browning inhibition effect was observed at 80°C blanching temperature and 0.5% Vitamin C concentration. It can be observed that the optimal browning inhibition effect varies depending on the combination of blanching temperature and concentrations of vitamin C and sucrose. These research results are expected to provide useful information for the development process of processed food products using apples, such as beverages.

P1-15

수분함량에 따른 MA포장 쌀의 품질변화

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국산 쌀 수출은 '22년 기준 원조용 쌀을 제외한 수출액은 8,0백만불로 '21년 대비 55.2%증가하였다. 주요 수출국은 미국, 호주, 캐나다로 총 수출액의 약 71%(5.7백만불)를 차지 하고 있다. 수출용 쌀의 수송기간은 미국의 경우 25~30일, 유럽의 경우 40~45일이 소요되고 있으며, 상온 컨테이너로 수송하고 있다. 상온 수송 과정에서 지방 산패로 인한 쌀의 품질 저하가 발생하고 있다. 본 연구에서는 쌀의 수분 함량에 따른 MA포장 쌀의 품질변화를 분석하여 장거리 수송 쌀의 MA포장 수송 조건을 구명하고자 수행되었다. 추천품종 쌀의 수분 함량을 12%, 13%, 14%, 15%로 조절하여 질소와 일반대기를 충전하여 MA포장 하고 고온수송 환경을 고려하여 35℃에서 저장하며 품질변화를 관찰하였다. 수분함량 15%의 쌀은 질소 충전 MA포장하였을때 56일 수송 기준으로 약 17.5mgKOH/100g의 지방산가를 나타내었고 일반대기 충전 포장은 32.1mgKOH/100g수준으로 지방산가를 나타내었다. 수분 함량 14% 이하인 쌀은 일반대기 충전 포장에서 12.0mgKOH/100g이하로 유지되는 것으로 나타났다. 쌀의 백도 값은 기체충진 포장 조건 및 저장 기간 경과에 따라 큰 차이는 없는 것으로 나타났다. 수분 함량이 높은 15%쌀의 백도 값은 36.0 수준이었고, 수분 함량 14% 이하인 쌀의 백도값은 저장 온도 25℃기준으로 38~40사이의 값을 나타내는 것으로 나타났다. MA포장 쌀의 수분 함량 변화는 기체충진 포장 조건 및 저장 기간 경과에 따라 초기 수분함량과의 차이는 관찰되지 않았다. 이상의 결과에서 수출쌀의 수분함량을 13-14%로 조절할 경우 일반대기 포장조건에서 상온 수송가능한 것으로 판단되었다.

P1-16

누룽지 장기보관 시 발생하는 이취 제어 방법에 대한 보고

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한국인이라면 남녀노소 누구나 즐겨 먹는 음식인 누룽지 그러나 제품화된 누룽지는 장기 보관 시 이취가 발생하여 소비자의 만족도를 떨어뜨리고 품질 저하를 초래하는 문제점을 가지고 있다. 본 연구에서는 누룽지 장기 보관 시 발생하는 이취를 효과적으로 제어하기 위한 방법을 연구하고 분석했다. 먼저 이취의 원인으로 포장재 내의 남아있는 산소가 누룽지에 있는 소량의 지방함량과 만나 발생된 산패현상을 원인으로 보고 산소 제어에 중점을 두었다. 산소를 제어하기 위한 방법으로 탈산제를 선택하였고 누룽지 충전 시 탈산제를 첨가하여 제품 내 산소를 제거하는 방법으로 방향을 설정하였다. 실험 결과값이 제대로 도출되었는지 확인을 위하여 탈산제를 넣은 실험 제품과 넣지 않은 대조군 제품을 각각 만들어 1회/4주 주기로 최종 1년까지 잔존 산소 및 관능을 모니터링 하였다. 실험 결과 탈산제를 넣지 않은 제품은 일정 기간 경과 이후 이취가 발생한 것에 반해 탈산제 투입 제품은 소비기한 만료까지 이취가 발생하지 않음을 확인할 수 있었다. 탈산제를 넣지 않은 제품은 산소량이 높은 반면 탈산제 넣은 제품은 산소량이 낮아 이 취의 원인이 산패에 의한 것임을 입증할 수 있었으며 제품 내 산소 제거는 이취 발생을 억제할 수 있다는 결론에 도달하였다. 해당 실험을 통하여 제품품질이 향상되는 기대효과가 있으며 더 나아가 향후에는 누룽지 풍미를 증진시키기 위한 추가 연구를 수행할 예정이다.

P1-17

소비자 구매 후 저장 조건별 어묵류 소비기한 비교 연구

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식약처는 2023년 1월 1일부터 식품의 판매가능 기간인 유통기한을 대신해 섭취 가능기간인 소비기한을 도입했다. 본 연구는 어묵제품 구매 후 개봉 여부에 따른 냉장저장(10°C) 시 품질안전지표 변화를 비교하였으며, 상온보관(25°C) 동안의 변화를 관찰했다. 이화학적 품질안전지표로는 산가와 VBN, 미생물학 지표로는 총균수를 선정하였다. 저장성 연구결과, 상온(25°C)에서 총균수는 6일차에 6.06 log CFU/g로 Criteria limit (5 log CFU/g)을 초과하였고, VBN은 0일차 4.60mg%에서 6일차 5.14 mg%로 품질한계(20mg%)에 미치지 못했다. 산가는 0일차 8.08에서 6일차 10.62로 소폭 증가하였으나 품질에 영향을 주지는 못하는 수치다. 반면 10°C 냉장 저장의 경우, 개봉하지 않은 샘플은 20일차까지도 총균수가 1.45 log CFU/g가 유지돼 안전한 수준이었고, VBN도 0일차 2.66mg%에서 20일차 6.34mg%로 품질한계(20mg%)에 크게 미치지 못했다. 산가 역시 0일차 7.28에서 20일차 13.19 증가하였으나 품질에 영향을 주지는 못하는 수치였다. 그러나 냉장보관 시 개봉한 어묵의 총균수는 12일차에 5.3 log CFU/g에 도달해 Criteria limit을 초과하여 소비기한이 짧아졌다. 반면 VBN은 0일차 4.60 mg%에서 12일차 5.39mg%로 소폭 증가하였으나, 품질한계(20mg%)에 미치지 못했고 산가 역시 0일차 8.08에서 6일차 9.84로 증가하였으나 품질에 영향을 주지는 못하는 수치였다. 종합적으로 냉장 저장(10°C)시 개봉하지 않은 어묵류의 품질안전 한계기간은 20일이었지만 개봉 후 저장 제품의 품질안전 한계기간은 20일에서 12일로 감소하였다. 따라서 제품을 개봉하지 않은 경우, 소비기한이 지켜질 수 있으나 개봉한 후 냉장저장하며 소량씩 꺼내 섭취하는 식품은 소비기한 이내에도 품질안전 수치가 기준치를 벗어날 수 있으니 소비자는 개봉여부 및 보관온도에 주의해야 한다.

P1-18

Quality characteristics of onions in different storage environments

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Long-term storage onions are typically harvested around June and stored in cold storage facilities for approximately 8–9 months until early-season onions become available the following year. To minimize losses during storage, systematic management of harvest operations, post-harvest curing, and storage conditions is essential. This study investigates the loss patterns of medium-late and late-season onions stored from June 2023 to March 2024 at three major onion agricultural product processing center (APC). Parameters such as storage temperature and humidity, weight loss, sugar content, firmness, sprouting, rooting, and decay incidence were measured. The primary causes of loss during storage were weight loss, decay, sprouting, and rooting. Notably, onions exposed to excessively low initial temperatures (below 1°C) or consistently high humidity (above 90%) during storage experienced significant losses. Compared to onions stored under optimal conditions, the storage duration was reduced by over a month, and the loss rate due to decay increased by 15–25%. Loss patterns also varied with storage duration. Softening of roots, scales, and neck areas occurred after 50 days of storage, progressing to decay after 150 days. Pathogen analysis of the softened and decayed tissues identified the presence of *Botrytis* sp., *Aspergillus* sp., and *Fusarium* sp. To prevent losses during long-term storage, onions should be gradually cooled to $1 \pm 0.5^{\circ}\text{C}$ within three months, starting from ambient temperatures of 20–25°C. Humidity should be maintained at 65–75% for the first 2–3 months and then gradually increased to 80–85% to minimize storage losses. (This work was carried out with the support of "Cooperative Research Program for Agriculture Science and Technology Development (Project No. PJ017191)" Rural Development Administration, Republic of Korea.)

P1-19

온도관리 및 세척방법에 따른 상추의 품질평가

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농산물은 유통단계 중 변온이 발생하면 품질 유지가 어려워짐에 따라 상품성이 감소하고 소비기한이 짧아질 우려가 있다. 이를 개선하기 위한 방법을 탐색하고자, 상추를 대상으로 온도관리와 세척방법에 따라 품질에 미치는 영향을 평가하였다. 미세척 후 유통 중 온도관리를 일정하게 유지하지 않은 처리구(Control, CT), 미세척 저온저장 처리구(None-Washing+Low Temperature, NW+LT), 와류세척 후 저온저장한 처리구(Running Washing+Low Temperature, RW+LT)를 본 연구에서 개발한 45℃의 가온 마이크로버블수로 세척한 후 저온에서 저장한 처리구(Microbubble+Heat shock Washing+Low Temperature, MHW+LT)와 비교 분석하였다. 세척이 완료된 상추는 표면 물기를 제거한 후, PP film(8 μ m, 32 \times 22cm)으로 포장하고 5℃에서 30일 동안 저장하면서 기체조성, 중량감소율, 전기전도도, 갈변도, PAL, 경도, 부패율 등을 측정하였다. 상추의 기체조성 결과, 포장지 내부의 O₂ 감소와 CO₂ 증가율은 CT > NW+LT > RW+LT > MHW+LT로 나타났다. 중량 감소율은 저장 직후부터 차이를 보였으며 저장 12일차에 CT, NW+LT는 약 2%, 세척 처리한 RW+LT, MHW+LT는 약 1.5%로 나타나, 세척처리가 중량감소율 억제에 효과적이었음을 알 수 있었다. 전기전도도의 변화는 저장 초기에 세척으로 인한 조직손상으로 세척처리구에서 이온유출량이 높게 나타났지만 저장 4일차부터는 CT에서 가장 높았고, NW+LT가 가장 낮았다. 이에 따라 세척 유무보다는 온도관리가 상추의 조직손상을 억제하는데 효과적이었음을 확인하였다. CT의 경우 저장 7일차부터 외관에서 부패가 관찰되기 시작하였으며, NW+LT, RW+LT, MHW+LT는 저장 20일차부터 부패가 발생되었다. 세척 처리구 중 RW+LT는 세척 과정에서 조직손상이 많이 유발되어 부패율이 높았고, MHW+LT는 마이크로버블수에 의한 기공 도포 효과에 의해 부패가 억제되었다. 본 실험의 결과, 마이크로버블 세척은 세척과정에서 입은 물리적 손상에 의한 피해보다 부패율 억제효과가 크고, 단순 저온 세척에 비해 부패억제효과가 증가하였음을 확인할 수 있었다.

P1-20

프로바이오틱스의 선박 운송 과정에서 생균 수 변화 연구

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프로바이오틱스는 적당량 섭취 시 인체에 유익한 효과를 주는 미생물로, 건강 기능 식품 원료로 널리 사용되고 있다. 프로바이오틱스 제품의 국·내외 수출 시 국가별로 상이한 제품의 기능성 인정 보장 균수 기준을 유지해야 한다. 하지만, 프로바이오틱스는 온도와 습도 등 외부 환경 변화에 매우 민감하여, 선박이나 항공기를 통한 해외 유통 과정에서 생균 수가 감소하는 문제가 발생하며, 유통 과정 시 외부 조건에 의한 생균 수 감소 관련 연구는 미비한 실정이다. 본 연구는 프로바이오틱스 유통 과정 모사 조건을 통해 생균 수를 보장하기 위한 최적의 조건을 선정하고, 생균 수 변화에 대한 기초 자료를 확보하고자 한다.

실험에 사용한 프로바이오틱스는 이노비사이언스에서 원료를 제공받아 실험을 진행하였으며, 한국식품산업클러스터진흥원에 의뢰하여 선박 내 다양한 유통 과정 모사 조건(On deck 최외각, On deck, Under deck, PS 보관)에서 총 21일 동안 스틱 포장 및 파우치 포장 상태의 생균 수 변화를 측정하였다. 각 보관 위치에서의 생균 수 변화를 평가하여 보관 조건별 생균 수 변화 양상을 분석하였다. 생균 수는 보관 위치별로 Under deck > On deck > PS 보관 > On deck 최외각 순으로 감소하는 경향을 보였다. 이는 보관 위치별 외부 환경과의 접촉 가능성 차이로 인해 발생한 결과로 판단된다.

본 연구 결과는 프로바이오틱스 원료의 수출을 위해 선박 유통 과정에서의 보관 위치에 따른 생균 수 변화를 이해하고, 수출 과정 중 프로바이오틱스 원료의 안정성 보장을 위한 유통 조건 최적화 연구에 기초 자료로 활용될 수 있을 것으로 기대된다.

P1-21

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

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'태추'단감은 저장력이 낮아 저장과 유통 중에 발생하는 연화 등의 장애로 인해 유통 및 수출에 어려움이 있어 저장력을 높이기 위해 신선도 유지제 '1-methylcyclopropene'(1-MCP)를 이용한다. 분말형 1-MCP는 α -사이클로텍스트린에 포장한 분말 혹은 알약형을 이용하는데, 제조가 어렵고 가격이 비싸 농가에서 사용하기에는 다소 무리가 있다. 이를 해결하기 위해 본 연구소에서는 제조가 쉽고 가격도 저렴한 액상형 1-MCP를 개발하였고, 제형별 효과를 비교하고자 호흡량 및 유통조사를 실시하였다. 태추 단감을 미숙과와 과숙과로 나누어 수확한 직후 신선도 유지제를 제형별로 처리하여 저온에 15일간 저장한 후 상온에 18시간 방치하여 호흡량을 조사하였고, 유통조사를 위해 신선도유지제를 처리한 단감을 상온에 두고 3~4일 간격으로 17일간 정도, Brix를 조사하였다. 조사결과, 무처리의 CO₂가 16.2ml · Kg-1h-1 일 때, 1-MCP 처리군의 호흡량이 제형에 관계없이 약 13.6ml · Kg-1h-1로 낮았으며, 에틸렌 발생량도 무처리군이 약 0.9 μ l · Kg-1h-1, 1-MCP 처리군은 제형에 관계없이 약 0.7 μ l · Kg-1h-1로 1-MCP의 제형에 따라 큰 성능차이는 없었다. Brix의 경우 상온에 방치한 기간이 길어질수록 무처리군의 미숙과는 0.3Brix, 과숙과는 0.5Brix씩 증가하였으나, 1-MCP를 처리군은 제형과 속도에 상관없이 0.3Brix씩 증가하여, 1-MCP 처리 유무에 따라 증가 속도가 차이남을 알 수 있었다. 정도는 모든 처리군에서 조사일자가 경과할수록 정도가 낮아졌으나, 무처리 미숙과는 13일차에서 8N, 과숙과는 10N이었고 1-MCP를 처리군은 13일차에 액상과 분말형 모두 13N으로 1-MCP를 처리한 단감의 정도가 10일 이상 경과하여도 10N 이상 유지되었다. 조사를 통해 태추 단가미이 유통 중 신선도 유지와 저장력을 높이기 위해서는 1-MCP를 사용하는 것이 유리할 것이며 제형간 성능차이는 없었다.

P1-22

감자의 녹변방지 및 온도상승억제를 위한 생분해성 필름 개발

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감자가 빛에 노출되면 녹변 현상으로 인해 표면이 녹색으로 변하며, 이는 시장 가치와 소비자 호소력을 크게 저하시킨다. 또한 플라스틱 사용량 증가는 환경호르몬의 검출과 미세플라스틱 문제를 야기하고 있다. 기존 감자포장에 사용되는 LDPE 필름 포장은 수분 투과율이 낮아 감자의 수분 배출을 방해하며, 임의로 구멍을 뚫을 경우 외부 위험요소에 취약하다. 이에 본 연구에서는 LDPE를 대체할 수 있는 생분해성 소재 PBAT/PLA 조성을 개발하고, 온도 상승을 억제하기 위해 PBAT:PLA(98:2, Black) 블렌드 필름 위에 젤라틴(White)을 오버레이하여 이중 유색 필름을 제조하였다. 이 필름은 LDPE와 유사한 기계적 특성을 보이며, 온도 상승 억제 효과가 뛰어남을 확인하였다. 감자를 이중 유색 필름으로 포장하여 6일 동안 형광등 아래에서 보관한 결과, 녹변을 나타내는 Hunter a값과 총 색차(ΔE)가 유의미하게 감소하였다는 것을 발견하였다. 또한, 이 필름의 높은 수분 투과율로 인해 밀봉 상태에서도 수분 배출이 원활하며 외부 위험요소를 효과적으로 차단할 수 있었다. 따라서 제조된 이중 유색 필름은 감자의 포장재로 사용할 경우 녹변 및 온도 상승을 효과적으로 억제할 수 있을 것으로 기대된다.

P1-23

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

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The objective of this study is aimed to compare the correlation between analyzed internal temperature and quality during the distribution process of small-package beef from 16 companies. To analyze the packaging method of small-package beef, the internal temperature, internal volume, type of refrigerant, and total capacity of the small-package box were investigated, and to analyze the quality of small-package beef, the core temperature, pH, color, and microbial test of the beef were examined. The internal volume and internal temperature of small packaging boxes showed a positive correlation. There was no significant correlation between the total capacity of refrigerant and the internal temperature. It was considered important to select the smallest packaging box size according to the order quantity to lower the internal temperature. In the correlation analysis between internal temperature and quality, there was a positive correlation with the beef core temperature, a negative correlation with pH, a positive correlation with lightness, and a negative correlation with redness and yellowness. Therefore, its expected that this study will be used as basic data to establish a safe and efficient domestic livestock product distribution system by improving the packaging method of small-packaged beef and predicting the quality of beef, thereby providing safe food to consumers.



P1-24

신품종 '화이트문' 사과 활용 신선편이 과일 제조 시 품질특성

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1인 가구 증가로 스낵형 신선편이 과일 시장이 꾸준히 성장함에 따라 커팅 과일의 품질 유지 기술에 대한 연구도 다양하게 수행되고 있다. 특히 상품화 과정에서 갈변이 문제가 되는 사과는 갈변저해 및 품질 보존성 향상을 위한 다양한 갈변억제제(ascorbic acid, citric acid 등)을 활용하여 제품화하고 있으나 한편 소비자들은 보존제 등 첨가물이 들어있는 제품보다 천연 원재료만 사용한 제품에 관심이 높아지고 있는 추세이다. 본 연구는 경남농업기술원 사과이용연구소에서 육성한 신품종 사과 중 부가적인 갈변 저해 처리를 하지 않고도 절단 시 갈변이 지연되는 '화이트문'을 활용한 신선편이 과일 상품화 시 품질 특성을 조사하였다. 품종별로 커팅한 후 4℃에서 5일 동안 용기에 저장하면서 갈변도를 조사한 결과, ΔL 값은 '후지'가 7.22인 반면 '화이트문'은 2.75였으며, ΔE 값은 '후지'가 13.66인 반면 '화이트문'은 5.40으로 갈변이 지연되는데 매우 효과적인 품종이었다. 조각 사과의 72시간 동안 종합적 기호도에 대한 관능검사(9점 척도법) 결과는 저장 당일 '후지' 8.3, '화이트문' 7.8이었으나 24시간 이후 부터는 '화이트문'이 '후지'보다 높은 기호도를 유지했다. 또한 일반세균수의 변화를 측정한 결과 '후지'는 48시간 뒤 3.42 logCFU/g이었으나 '화이트문'은 2.82 logCFU/g으로 '후지'보다는 낮은 경향을 보였다. 따라서 이러한 결과를 종합해 볼 때 신품종 '화이트문'은 부가적인 갈변 저해 처리 비용을 줄이고도 유통기한 동안 갈변 저해 및 품질 보존이 유지되는 신선편이 과일 상품화에 적합한 것으로 판단되었다.

P1-25

신품종 ‘마이’ 사과 활용 건조스낵 제조 시 품질특성

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최근 편리함과 간편함을 추구하는 젊은 연령층은 일반과일보다 건조과일 등 과실 가공품을 주로 섭취함에 따라 건조 과일류 간식 시장이 약 53% 성장세를 기록하면서 향후 시장 규모는 더욱더 확대될 것으로 예상된다. 한편 사과를 활용한 가공제품 생산 시 기존 생식용 사과를 활용할 경우 가공원료 단가 상승과 가공 수율 및 갈변 문제를 해결해야 하므로 가공전용 품종으로 대체할 필요가 있다. 이에 본 연구는 경남농업기술원 사과이용연구소에서 육성한 신품종 사과 중 가공 수율이 높으면서 갈변이 지연되는 ‘마이’를 활용한 건조스낵 제조 시 품질 특성을 조사하였다. 신품종 ‘마이’를 활용할 경우 가공 수율은 동결건조 분말 제조시 ‘후지’ 대비 15%, 사과 페이스트 제조 시 29.8%, 건조 다이스 제조 시 13%, 건조 스낵 제조 시 11% 높았다. ‘마이’를 활용한 건조 스낵의 가용성 고형분 함량은 8.9°brix, 산도는 0.2%, 수분 함량은 3.5%였다. 총폴리페놀 함량은 67.2mg/100g이었으며, 총식이섬유는 10.06g/100g으로 ‘후지’ 대비 16% 높은 함량을 보였다. 항산화 활성은 DPPH 라디칼 소거능 27.9%, ABTS 라디칼 소거능 21.1%으로 ‘후지’와 유의적 차이는 없었다. 따라서 이러한 결과를 종합해 볼 때 가공원료 생산 단가(적화 및 적과, 반사필름 비용 등)는 낮추고 수율은 높일 수 있는 신품종 ‘마이’를 활용할 경우 다양한 사과 가공품 생산이 가능할 것으로 판단되었다.

P1-26

이상기후에 따른 농업리스크 위험도 평가 연구 - FMEA분석을 중심으로

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지역농업네트워크 호남 협동조합

기후변화에 따른 이상기후 현상은 농업분야에 비정형적, 예측불가능한 피해를 주며, 농산물 생산량, 품질 및 가격에 부정적인 영향을 미치게 된다. 지구 온난화 등의 영향으로 폭염, 집중호우, 이상기온 등 이상기후의 종류와 발생빈도·강도는 점진적으로 증가할 것으로 예상되기 때문에 이상기후에 따른 체계적인 농업리스크 관리가 필요하다. 기존 연구를 통해 이상기후 리스크관리에 대한 중요성은 잘 알려져 있으나 이상기후로 나타나는 리스크 요인별로의 체계적인 분석과 대응은 이루어지지 않고 있다. 본 연구에서는 이상기후에 따른 리스크 요인에 대해 법에서 분류하고 있는 재해를 기초로 16가지 요인으로 분류하였으며, 각 요인에 대해 FMEA(Failure Mode and Effects Analysis) 기법을 활용, 요인별 발생빈도·검출도·치명도를 리커트(Likert) 5점 척도로 전문가 대상 설문조사를 실시하였다. 정량적인 설문결과를 바탕으로 16개 요인에 대해 RPN(Risk Priority Number)을 평가하였으며 각 요인별로 위험순위를 도출한 결과 이상기후 리스크 요인 중 이상기후에 따른 병충해 증가, 여름철 폭염피해, 봄철 저온에 따른 피해증가 순으로 위험순위가 높게 평가되었다. 연구결과를 활용하여 이상기후에 따른 농업리스크 요인별로 기술적·정책적 대응방안을 강구할 필요성이 있으며, 현장에서 품목을 생산하는 농업인들에 대한 조사결과와의 비교분석으로 이상기후에 따른 농업리스크 요인에 대한 종합적인 평가가 필요하다는 시사점을 도출하였다.

P1-27

Field trials of postharvest CO₂ treatment effects on selected peach cultivars

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Peaches undergo rapid softening after harvest and are susceptible to physical damage, making them prone to spoilage. Therefore, the field applicability of CO₂ treatment was evaluated at the packing house on the palletized peaches for the following cultivars of 'Odama Akazuki', 'Great Jumbo Akazuki', and 'Kawanakajima Hakuto'. After treatment with 30% CO₂ for three hours, changes in flesh firmness, soluble solids content, titratable acidity, and decay rate were observed during simulated distribution at 23°C. For all cultivars, the CO₂ treatment was effective in suppressing flesh softening during shelf-life. In addition, the CO₂ treatment reduced the decay rate compared to the control, which extended the shelf-life by 2~3 days. This study demonstrated that postharvest CO₂ treatment can play an important role in maintaining quality of peaches by maintaining flesh firmness and inhibiting decay during the room temperature distribution.

P1-28

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

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Peel yellowing is a significant postharvest concern for cucumbers, with mechanisms varying by cultivar. However, the mechanisms regulating this phenomenon remain elusive and are dependent on cultivars and environmental factors. This study aimed to evaluate peel yellowing in two cucumber cultivars, 'Baekdadagi' and 'Mini,' stored at 20°C for 12 days. To uncover potential molecular mechanisms, gene expression analysis related to chlorophyll biosynthesis was conducted. 'Mini' cucumber exhibited significantly lower b^* values throughout the storage period, indicating greater resistance to peel yellowing, but was less firm with higher soluble solids content than 'Baekdadagi' cucumber. Higher expression levels of HEMA, GSA, HEMB, CHLM, and PORB in 'Mini' cucumber, especially on days 2 and 6 of storage, suggest a potential role in delaying yellowing. These findings enhance understanding of peel yellowing in cucumbers. This study was supported by the 2024 RDA Fellowship Program of NIHHS (Project No. PJ01719102), Republic of Korea.

P1-29

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

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Composite films based on Poly(lactic acid) (PLA), were prepared by incorporating various amounts of zinc oxide nanoparticles (ZnONPs) (0, 0.5, 1.0, and 2.0%) and lavender essential oil (LEO) (0, 0.5, 1.0, and 2.0%). For comparison, five different oils such as LEO, mineral oil, basil oil, cinnamon oil, and lemon oil were also incorporated into PLA composite films. Among these, the film containing LEO demonstrated the most improved mechanical properties. As a result, LEO was chosen for the fabrication of the PLA/ZnONP/oil composite film. The physical, morphological, mechanical, water vapor barrier, thermal, color, optical, and antimicrobial properties of the PLA composite films varied depending on the type of fillers and their concentration. Scanning electron micrograph (SEM) result indicated that ZnONPs and LEO were homogeneously distributed in the polymer matrix. The color of the film increased in redness (a-value) and yellowness (b-value) by adding CuONPs rather than LEO, and the transparency of the film also showed a greater decrease by adding ZnONPs, but both fillers had strong UV blocking properties. In addition, the addition of CuONPs and LEO showed clear antibacterial properties against *Escherichia coli* O157: H7 and *Listeria monocytogenes* and exhibited synergistic antibacterial activity when these fillers were used together. Packaging application test using minced fish paste also showed that the PLA/ ZnONP/LEO film was more effective to prevent bacterial growth than other films.

P1-30

마늘 품종별 능동형 CA 저장 효과 분석

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마늘은 호냉성 월동채소 작물로 우리나라를 포함한 중앙아시아와 지중해 지역 등에서 많이 생산 및 재배되며 국내에서 고추, 배추, 무 다음으로 많이 재배되는 채소이다. 크게 한지형(단양, 의성, 서산)과 난지형(남해, 제주, 창녕)으로 구분 가능하며, 주요 양념 채소로 신선도를 유지하고 저장 중 저장장해에 의한 폐기물을 줄이기 위해 장기저장기술이 필요한 실정이다. 본 연구에서는 마늘의 장기저장을 위한 CA저장시스템을 적용하여 남도종과 대서종의 저장 기간에 따른 정도, 중량감소율, 부패율, 멍아율 등을 확인했다. 저장조건은 저온저장과 CA저장으로 구분하였으며, 저산소(1% 이하)와 고이산화탄소(10%) 조건에서 장해 발생 여부를 확인하였다. 그 결과, 남도종의 대조구 멍아율이 60%로 매우 높게 나타났다. 고이산화탄소 처리구에서 부패는 가장 낮게 나타났고 전반적인 품질은 높게 나타나 가장 좋은 저장 성능을 보였으며 저산소 및 고이산화탄소를 처리했을 경우 저장장해가 나타나지 않았다. 대서종은 남도종에 비해 멍아율과 부패율이 높게 나타나 저장성이 낮게 나타났다. 따라서, 습도조절을 세분화하여 곰팡이 및 부패를 억제할 경우 마늘의 품질 유지 효과를 더욱 높일 수 있을 것으로 기대된다.

P1-31

농산물 수확후처리시설 내부의 총부유세균 및 곰팡이 측정

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식품제조공정은 위해요소분석(Hazard Analysis) 및 중요관리점(Critical Control Point) 즉, HACCP제도를 이용하여 위해요소를 관리하고 있다. 반면에 농산물 수확후처리시설은 농산물 입고에 따른 반복적인 미생물 오염환경에 노출되어 있지만 관리기준이 미비한 실정이다. 본 연구에서는 저장고 내부에서 총부유세균 및 곰팡이를 측정하여 수확후처리시설의 관리기준을 수립하는 기초자료로 제공하고자 한다. 총부유세균 및 곰팡이를 측정하기 위해 마늘, 양파, 고구마 등이 저장된 저온저장고 내부의 총부유세균 및 곰팡이를 실내공기질공정시험기준(ES 02701, 1e, ES 02702, 1c)에 맞춰 측정하였다. 그 결과, 마늘저장고의 세균 및 곰팡이는 각각 56, 36CFU/m³, 양파저장고는 148, 30CFU/m³, 고구마저장고는 258, 114 CFU/m³로 나타났다. 이때, 농산물 저장품목에 따른 곰팡이 및 세균의 형상이 다르게 확인되었으며, 유전체분석을 통해 주요농산물에 따른 세균 및 곰팡이를 파악하고 그에 따른 제어방법이 연구되어야 할 것으로 사료된다.



P1-32

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

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The red snow crab (*Chionoecetes japonicus*) is the most industrially processed crab species, and is mainly processed into cooked meat and distributed frozen. The conventional crab processing includes boiling and cooling to prevent rapid spoilage and separate the crab meat. However, there was a great demand for quality improvement due to the loss of taste and nutritional components in the processes. As the crab muscle is attached to the shell, it is difficult to separate the muscle without the protein denaturation of the subcuticular membrane. Our research team has developed a meat separation technique that induces the protein denaturation through freezing and sequential thawing, which reduces the nutritional decline to less than 20%. The non-thermal processed crab meat undergoes spoilage rapidly during refrigeration storage. The present study was conducted to explore the major biochemical indicators associated with quality degradation of the non-thermal processed crab meat, through investigation of the biochemical changes of the crab meats with or without heat treatment during refrigeration storage. During refrigeration storage, shelf-stability of the heat-treated crab meat was maintained until day 8, while that of the non-heat-treated crab meat was limited by day 2. Among the various biochemical parameters, volatile base nitrogen content, bacterial cell count, alkaline phosphatase and tyrosinase activities, hypoxanthine, ornithine, and ammonia contents showed consistent increases in the non-heat-treated meat during storage, and these were expected to be major biochemical indicators.

Funding: the Korea Institute of Marine Science and Technology Promotion (KIMST) funded by the Ministry of Oceans and Fisheries (20220131)

P1-33

The quality changes of paprika (*Capsicum annuum* L.) by packaging materials during the export processMi-Ryung Kim^{1*}, Jun-Hyung Lim¹, Chan Suk Yoon², Chang-Soo Kang²¹Department of Food Science and Culinary Art, Silla University,²Department of Agriculture and Fisheries Processing,
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Paprika is a representative horticultural crop that has been mainly exported to foreign countries in Korea. In order to maintain the quality of paprika during long-distance export process, post-harvest storage techniques such as temperature control and packaging methods are required. This study aimed to investigate the effect of different packaging materials on the quality of paprika during the simulated export process. The alternating temperature, maintaining 10°C for 2 weeks and then 22°C for 2 weeks, was applied as simulated temperature condition, to confirm the effect of temperature change during local distribution after shipping. The packing materials for paprika were non-packing, non-perforated film (PE), perforated film (PE), oxygen barrier film (OB, oxygen transmission rate: 0.5 cc/m² · day), and thermo plastic starch (TPS) film. The quality characteristics of paprika such as weight loss, general appearance (freshness index), firmness, soluble solids contents, and anti-oxidative activity were compared. The paprika packaged with OB film showed a weight loss of less than 0.1%, freshness index of 5.0, and hardness of 17.7 N in the 4th week of storage, maintaining the high quality of paprika. These results will be used as basic data for preserving the quality of paprika during long-distance export process.

P1-34

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

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The market for fresh-cut is expanding as single-person households increase and consumption diversifies. In this study, the safety distribution limit was reset by comparing the salad online distribution status and quality characteristics by mixing condition. As a result of investigating the packaging format of two types of salad products, product A was composed of three combinations of lettuce, romaine, and leaf beet, and product B was composed of four combinations of lettuce, cabbage, red cabbage, and chicory, and each was wrapped in 25g PE film. It was packaged in 5 packs each in a PET container. In addition, immediately after online distribution, a lot of condensation occurred due to temperature deviation. CO_2 was higher in product B compared to product A, and O_2 was significantly decreased in product A. There was no significant difference in off-flavor depending on the mixing conditions, but the off-flavor was very strong as soon as the packaging was opened on the 9th day of storage. The degree of browning was high in product A on the 6th day of storage, and it was not marketable. Overall, the higher the CO_2 in the packaging, the stronger the browning and the faster the quality change. The safe expiration date for the salad was within 3 days for a combination of 3, and within 6 days for a combination of 4. It is judged that research on optimal mixing combinations and ratios to maintain salad freshness and marketability needs to be continued.

P1-35

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

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In this paper, we introduce the preparations for a study to increase the storage temperature of apples to 10°C by applying plasma technology. It is expected to serve as an alternative to low-temperature storage by inhibiting decay and ripening, which are factors that hinder the storability of apples, using plasma technology.

To prepare for the plasma storage test, we need a plasma storage device, a monitoring device and a temperature/humidity-controlled storage room. In addition, preparations were made according to the quality evaluation procedure and quality evaluation items for quality evaluation of stored apples.

The plasma storage unit is a device that includes a source for sterilization and ethylene removal, a power supply, a pump and a flow meter, and can be operated automatically or manually. The monitoring device can measure ozone, ethylene, carbon dioxide, temperature and humidity, and can store data through a separate storage device. The plasma storage unit and monitoring unit have been operating continuously in a storage environment for more than two months to confirm operational stability.

The quality evaluation sheet for quality evaluation of stored apples consists of introducing quality evaluation items, quality evaluation methods and measurement devices for each quality evaluation item. The quality evaluation items are weight, chromaticity, hardness, sugar content, acidity and ethylene generation, and the quality evaluation method includes the number of apple samples, measurement method and number of repetitions.

In the future, we plan to conduct plasma high-temperature storage tests using Hongro and Fuji apples after this preparation.

P1-36

Quality analysis of potato soup with fermented soybean powder

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This study aimed to enhance potato soup's nutritional components, such as protein, by adding fermented soybean powder, improve digestibility, and increase the availability of isoflavones. For soybean fermentation, *Bacillus subtilis* which has proteolytic enzyme activity and reduces the production of biogenic amines was selected. The final *Bacillus subtilis* was chosen by analyzing fermented soybean metabolites and active ingredients of fermented soybeans using the selected *Bacillus subtilis*. Fermented soybeans were freeze-dried, powdered, and then added at 5 to 10% to prepare powdered potato soup. The general components, aroma components, color, physical properties, and sensory evaluation of potato soup were analyzed. In the future, we plan to develop a convenient meal using fermented soybeans that can be used as a meal replacement.

P1-37

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

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This study explores the enhancement of microcrystalline cellulose (MCC) films and hydrogels properties by optimizing their curing conditions. MCC has significant potential in various applications, including packaging and biomedical fields. However, the physical properties of MCC-based materials are highly dependent on the curing process. In this research, the correlation between the curing time on the mechanical strength and transmittance of MCC films and hydrogels was examined. Curing time conditions were systematically varied (1, 3, 6, 12, 24, 48, 72 hours) to assess their impact on the final properties of the MCC films and hydrogels. Physical properties were evaluated using compressive strength tests for gels and transmittance analysis for films. The results indicate that curing for 48 hours yields the best performance, resulting in higher compressive strength. For films, the highest transmittance was observed at 72 hours of curing, while the lowest was recorded at 12 hours. This study highlights the potential of tailored curing conditions to significantly enhance the properties of MCC-based materials. These findings provide valuable insights into the development of advanced MCC films and hydrogels with improved performance for diverse industrial applications, such as biodegradable packaging materials



P1-38

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

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This study aims to enhance the freezing tolerance of salted kimchi cabbage (SKC) through various pretreatment methods (blanching, dehydration and the cryoprotectant treatment). Samples were prepared using different dehydration processes, including blanching and centrifugal dehydration, followed by freezing at 40°C for 24 h, and then stored at -18°C for 1 month. Physicochemical properties such as salinity, sugar content, moisture content, thawing loss, texture, DPPH, total polyphenol content (TPC) and microstructure were analyzed to assess freezing resistance characteristics. Following freeze-thaw cycles, all samples exhibited reduced moisture content, antioxidant activity and hardness, while salt and sugar content remained unaffected. The blanching process reduced DPPH, TPC and hardness by 72~74%, 60~63% and 7~11%, respectively. Centrifugal dehydration samples showed higher hardness, lower moisture content and reduced thawing loss compared to general dehydration samples. Glucose-treated samples had 19% higher hardness and 21% lower thawing loss than untreated samples. SEM observations revealed that ice crystal size and pore sizes varied with pretreatment methods. Unblanched, centrifugally dehydrated, glucose-treated SKC was identified as potentially maintaining quality during frozen storage. These findings could help improve the quality characteristics of frozen SKC and boost the kimchi industry's market growth.

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

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Recently, real-time processing and smart management of logistics computer systems have become the most important issues in the mobile logistics system of agricultural products. In order to implement this efficiently, related organizations are supplementing the existing barcode system and building RFID-based automated logistics systems of wireless new technologies. In this study, for the development of pallet-based smart logistics systems for agricultural products, the integrated module of RFID tag and GPS, which are easy to attach pallets, and the low power of RFID tag were studied. An application circuit was designed and implemented using an LTE router processor designed as an ultra-low power SOC (system on chip) targeting 2.4 GHz RFID tags and a wireless-based ESP RISK-V Processor. The application algorithm on the Embedded Linux-based OS is a new technology that has recently been attempted in a periodic and aperiodic Methods. A low-frequency recognition algorithm required for low power was proposed and designed and implemented.

Key words: Active RFID Tag, Embedded Linux, Logistics, Distribution products, Barcode, United palette, Agricultural products, Freshness

Acknowledgement

This research was carried out with the support of Cooperative Research Program for Development of data application technology for postharvest management (Project No. : RS-2022-RD010022; Rural Development Administration,

P1-40

Application of nano-zeolite to extend post-harvest shelf life of tomatoYue Zhao^{1*}, Jiyeon Chun¹¹*Sunchon National University*

Fresh fruits ripen too quickly, limiting their marketability. However, the current conventional post-harvest preservation techniques are not satisfactory. This study aimed to investigate the potential application of a biodegradable material in the food preservation industry. Polycaprolactone/chitosan/nano-zeolite (PCZ) nanofibrous film was prepared by electrostatic spinning technique. The specific surface area of PCZ was 275 m²/g with a multilayer microporous structure. SEM images showed that the zeolite particles were dispersed on the porous fiber bundle scaffolds. The PCZ film also acted as an adsorbent to remove ethylene even after the breakthrough point was reached. The PCZ film showed a potential to extend the shelf life of film-packed tomatoes, in which there was no significant change in the hardness of the tomatoes and minimal weight loss. In addition, no mold growth was observed on tomatoes in direct contact with the film during 7 days of storage, demonstrating the promising application of PCZ film as active food packaging materials.

P1-41

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

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Existing technology to prevent condensation caused by changes in the respiration rates of agricultural products after harvesting at home and abroad is at the level of controlling some moisture through internal moisture aggregation prevention technology using functional packaging materials, and there is no optimal environmental control technology for each item at home and abroad to prevent condensation through real-time environment (temperature, humidity, etc.) monitoring of agricultural products after harvest. The existing functional packaging material and Modified Atmosphere (MA) packaging technology used to prevent condensation simply uses film packaging material that prevents moisture permeation to suppress some of the moisture, and there is a limitation that it cannot solve the problem of self-condensation caused by changes in temperature and environment during the distribution process. There is no optimal environmental control technology for each item to prevent condensation through real-time environment monitoring of the entire process after harvest. This study attempted to minimize quality degradation during the distribution of fresh agricultural products by developing condensation prevention technology through real-time monitoring of the entire process of post-harvest management, storage, shipment, and distribution of agricultural products, and to develop MA condensation prevention packaging film for unit packaging of fresh agricultural products.

P1-42

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

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The purpose of this study was to evaluate the antibacterial activity value (RL) of photofunctional polymer films against food-borne pathogens and spoilage bacteria using a test method modified from KS L ISO 27447 and ISO 22196.

The photofunctional polymer film was provided by BI Biophotonics Co., Ltd. The test target bacteria are food-borne pathogens and spoilage bacteria, including four Gram-positive species (*Bacillus subtilis*, *Listeria monocytogens*, *Serratia fonticola*, *Staphylococcus aureus*) and five Gram-negative species (*Escherichia coli*, *E. coli* O157:H7, *Pantoea agglomerans*, *Salmonella* sp., *Yersinia enterocolitica*) was used. The test method was performed by modifying the methods of KS L ISO 27447 and ISO 22196, and the light source was replaced with an LED lamp (1500 lux) instead of a UV lamp. The test results showed that at 12 hours of incubation, the antibacterial activity values of Gram-positive bacteria *B. subtilis*, *L. monocytogens*, and *S. fonticola*, and Gram-negative *E. coli* ranged from 4.87 to 6.32. At 24 hours of incubation, the antibacterial activity values for Gram-negative bacteria *E. coli* O157:H7, *P. agglomerans*, *Salmonella* sp., and *Y. enterocolitica* ranged from 4.08 to 5.94. On the other hand, the antibacterial activity value of *S. aureus*, a gram-positive bacterium, was 2.82 at 48 hours of incubation, showing the lowest antibacterial activity value.

From the above results, the antibacterial effect of the photofunctional polymer film was confirmed for food-borne pathogens and spoilage bacteria, and it was evaluated that Gram-positive bacteria showed higher sensitivity than Gram-negative bacteria.

P1-43

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

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Ethylene, which accelerates the maturity and ripening of fruits and vegetables as a plant hormone, is still generated after harvesting crops. Thus, ethylene adsorbents have been developed to remove the post-harvest ethylene from storage and maintain the freshness of the produce.

Pd@ZSM-5, ZSM-5 zeolite decorated by palladium nanoparticles, was reported as an efficient ethylene adsorption with strong durability under plasma discharge. The reported synthesis method is a wet impregnation method using PdCl₂ as a precursor and water as a solvent. However, this causes lots of precipitates and decreases reproducibility. Furthermore, an excessive amount of solution is required, resulting in a large amount of precursor being discarded during the synthesis process.

Therefore, in this study, we modified the synthesis method by adding hydrochloric acid to the ethanol solvent to remove the precipitate and slowly evaporating the solvent to preserve the precursor as much as possible. The ethylene adsorption performance of the improved Pd@ZSM-5 was tested and regenerated stably and quickly through DBD discharge.



P1-44

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

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The export of winter mushrooms to Southeast Asian countries such as Vietnam has recently been increasing, so there is a need to develop new packaging materials that can maintain freshness. In this study, imported film, domestic film, and developed film were applied to enoki mushrooms and the organic acid content, free sugars content, and free amino acids were measured according to the storage temperature (4°C, 15°C, 25°C, 35°C).

The weight change of winter mushrooms was similar for each films, but imported films showed slight differences. As a result of analyzing the free sugars content, the free sugars content tended to increase slightly as the storage temperature increased.

As the storage temperature increased, free amino acids methionine increased, while tyrosine decreased. The change in length of the winter mushroom stalk showed the greatest difference in the film distributed domestically. And the rate of change was greatest in that order: developed fabric, imported fabric, and domestic fabric. The test group stored at 4~25°C did not show much change in organic acid content, but the test group stored at 35°C decreased the malic acid content and increased the acetic acid content.

Therefore, the developed film is expected to contribute to improving the storage period of winter mushrooms.

P1-45

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

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Recently, many studies on packaging and distribution technologies have been conducted due to the need for technology in the cold chain of domestic and foreign agricultural products and pharmaceuticals. Cold chain technology has become an issue in various fields and is emerging as an important technology in the logistics field. Recently, various technologies for low-temperature distribution containers for storage and distribution of domestic harvested agricultural products have been studied, but research on smart unit load systems incorporating internal air purification technology and RFID smart plastic boxes to prevent quality degradation of harvested agricultural products during storage and distribution is very insufficient. This study attempted to evaluate the quality change of Korean melons through RFID recognition evaluation of internal loading plastic boxes and loading plastic boxes containing melon samples of smart unit load systems developed to prevent quality degradation during storage and distribution of harvested agricultural products. As a result of the evaluation, the recognition rate of RFID in the box showed 91% of RFID mounted in all boxes with the smart container door open, and the change in the bioyield strength for Korean melons in smart boxes was 5–12% less than that of the control group.

P1-46

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

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Freezing storage is recognized as an effective method in the initial stages of low-temperature distribution, as it significantly slows down physiological and biochemical metabolic rates, thereby extending shelf life. To investigate the optimal freezing and storage temperature for Kakdugi during long-term storage, samples were frozen at -18°C , -40°C , and -80°C for 4 months, followed by thawing at 2°C until the core temperature reached 0°C . The analyzed quality characteristics are as follows: pH, titratable acidity (TA), salinity, total aerobic count (TAC), total lactic acid bacteria (TLAB), antioxidant content (DPPH), and thawing loss of Kakdugi. The pH values of Kakdugi stored at -40°C and -80°C remained stable above 6.0 after 2 weeks, compared to samples frozen at -18°C . The TA and salinity values notably decreased for Kakdugi stored at -40°C during the storage period. However, the total aerobic count, lactic acid bacterial values, and antioxidant content were highest for the treatments frozen at -80°C . These results indicate that storage at -80°C preserves the beneficial microbial community and nutritional properties of Kakdugi. Furthermore, Kakdugi frozen at -80°C exhibited the lowest thawing loss during the storage period compared to those stored at -18°C . Considering these results, a deep-freezing temperature of -80°C was more effective in maintaining the quality of Kakdugi during long-term storage. The findings of this study are expected to aid in improving the storage period of diced radish kimchi (Kakdugi) and can be used as basic data for optimizing storage conditions for fermented foods.

P1-47

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

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Pathogenic microorganisms posed perniciousness for postharvest fruits and vegetables, as well as brought potential risks to human health. In this study, active food packaging of polycaprolactone/chitosan/nano-zeolite (PCZ) was prepared by electrostatic spinning technique. The microstructure of the PCZ film showed uniform fibrous microstructure with an average diameter range of 187~215 nm. The addition of nano-zeolite increased the hydrophobicity of the PCN film (107.12°), as well as the good air permeability ((WVTR)(g/m² day)). In addition, the PCN film showed excellent antibacterial activity (90.01%) against the growth of *Escherichia coli*. It also showed the ability to inhibit the growth of *Staphylococcus aureus* (92.3%). Furthermore, the non-biototoxicity of PCZ film was demonstrated by a co-culture experiment with fish. In application experiments, PCZ film retarded post-harvest decay, spoilage, and storage quality loss of cherries, demonstrating the great potential for application as active food packaging materials

P1-48

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

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Laver, an alkaline food with high protein (over 30%), low fat (less than 1%) and rich in minerals, is gaining popularity as a low-calorie product domestically and overseas. In particular, dried laver, which contains many polysaccharides and polyphenols known to have antioxidant anti-inflammatory, and immune-boosting effects, showed high growth, with exports reaching \$600 million in 2020. In this study, to increase the processability of the laver, we tried setting the use date of the laver chip prototype developed using an air fryer and reaction flavor technology. As quality indicators, acceleration experiments were conducted with a total of 14 factors, including six chemical factors (Aw, water, pH, total acid, volatile acid, and TBARS), two microbiological factors (aerobic plate count and coliform bacteria), three physical factors (brittleness, hardness, and color value), and sensory factors (appearance, flavor, and texture), and the shelf-life (use of date) of laver chip products was calculated by selecting highly correlated quality indicators through linear regression analysis. The correlation factors (R²) of the total acid and sensory evaluation (flavor) were the highest at 0.8443 and 0.9623, respectively. All of them followed the zero-order reaction, and the activation energy (E_a) was -788.26 and 1,879.64 cal/mol, respectively. The quality limit value of the total acid by substituting the sensory limit criterion (4.0) was 0.4846 mg. The use of day of the laver chip prototype, calculated by the number of days of distribution according to annual temperature in Korea, was predicted to be 135 days.

P1-49

매생이 동결건조 Block 제조를 위한 성형기의 개발

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매생이 동결건조품 제조 공정에서 주요 공정의 하나인 동결건조 공정을 위한 전단계 공정으로서 매생이 성형 성형 공정이 중요하다. 최적의 매생이 치수를 결정하고 성형공정의 각각의 세부공정을 적절하게 설계함으로써 동결건조 공정에서의 에너지 절약 및 동결건조 시간의 최적화를 통한 품질의 제고 및 규격화가 가능하므로 유통 합리화의 효과를 가져올 수 있다. 동결건조용 매생이의 블록 제품 성형기의 구성은 1) 상부 프레임 2) Push Unit 3) 베이스, 바디, 슈트, 배출 유니트 4) 콘트롤 박스, 누름유니트로 개발하였다. 연구 개발 결과 최적의 매생이 블록 제품 성형기의 특성으로 1) 치수 : 지름 35mm 두께 20, 원형 타입 2) 측정 범위 : 개별 블록 당 25- 30g 3) 성능 : 생산량 60개/분 4) 정밀도 : 오차 중량 1g 내외 5) 용량 : 40,000개/일 로 결정하였다. 기능성 재료를 첨가하여 제조한 스프를 매생이와 혼합하여 제조한 스프 첨가 매생이의 최적동결건조시간은 63시간으로 나타났으며, 초기 중량에 대한 중량 감소율은 91.23%, 초기 중량에 대한 고형분 잔존량은 8.77%로 나타났다.

P1-50

LED 저온 저장 시스템에 의한 갯김치의 품질 특성 향상

김민용

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소비자는 갯김치의 숙성도에 대한 기호도가 다르므로 소비자 기호에 맞는 갯김치의 숙도를 제공함으로써 제품의 신뢰도 및 소비 확대의 효과를 얻을 수 있다. (1) LED이용 저온 숙성 제어시스템 개발을 위하여 수출용 기능성 갯김치의 LED 및 저온 숙성 온도별 숙성 기간에 따른 숙도 변화를 측정하고 숙도 - 숙성 기간 - 저장온도의 상관 관계를 Data Base화 하였으며 (2) 갯김치 숙도의 단계별 제공이 가능한 제어 시스템 설계 및 제어 회로를 구성하여 시스템을 개발하였다.

LED 저온 저장 제어시스템은 LED의 RGB 각각 3실로 구성하고 각 실에 숙성 속도 및 저장 온도별로 다시 세부적으로 3단계 제어로 설정하였다. 또한 갯김치의 원하는 출하 시기에 출하할 수 있도록 숙성기간 및 저온저장 온도를 설정할 수 있으며, RGB별 저장기간-pH-저장온도와의 Data로 숙도를 제어하였다.

PART II

가공/품질

P2-01

가공 식품 이미지 인식을 위한 AI 학습용 DB구축과 성능에 관한 연구

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대구경북과학기술원 ICT연구본부

최근 해외 직구 등을 통해 국내로 유통되는 수입 가공 식품들의 종류와 수량이 꾸준히 증가하고 있으며, 소비자들의 선호도도 동시에 증가 추세에 있다. 그러나, 대부분의 수입 식품들의 포장지 앞면은 현지 외래어로 표기되어 있어서, 일반 소비자들이 해당 식품의 정확한 품목명을 비롯한 원산지, 원료, 성분 등을 정확히 식별하기가 어렵다. 이에 따라, 다양한 인공지능 기반의 식품 자동 인식 기술이 활발하게 연구되고 있으나, 어떻게 학습용 데이터베이스를 효율적으로 설계할지는 여전히 어려운 문제이다. 본 연구에서는 실제 수입 가공 식품에 대한 인공지능 학습용 데이터의 이미지 획득 방법을 제안하고, 이미지 수량에 따른 인식 성능의 차이를 분석한다. 특히, 일반 소비자들은 스마트폰을 이용한 이미지 촬영에 익숙하므로, 스마트폰을 통한 이미지 데이터의 구성방법과 촬영기법을 예시를 중심으로 설명한다. 또한, AI학습을 위해서는 대표적인 객체 검출 알고리즘인 YOLO를 채택하여, 학습용 데이터셋을 100장에서부터 최대 800장까지 증가시키면서 검출률 성능을 분석하였다. 결과적으로 학습용 데이터셋이 증가할수록 인식 성능도 비례하여 증가하였으며, 평균 90%이상의 인식을 확보를 위해서는 800장 이상의 이미지가 필요함을 확인하였다.

Acknowledgement : 본 연구는 식품의약품안전처 출연연구사업의 지원으로 수행되었습니다.

P2-02

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

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This In this study, *Zophobas morio* protein (ZMP) was extracted via combining alkaline extraction with ultrasound-assisted (AU) or microwave-assisted (AM) extraction in comparison with their respective single extraction methods and conventional method. Both AU and AM exhibited a higher extraction yield, 40.68% and 36.80%, respectively, superior to single methods and conventional method, which ranged from 29.19%–35.89%. Changes in the protein molecular patterns were observed by SDS-PAGE according to methods, with AU and AM inducing new formation of smaller molecular weight proteins. Moreover, AU and AM decreased α -helix content, whereas increased β -sheet by unfolding the structure of ZMPs, resulting in increased protein solubility. Additionally, ZMP ameliorated LPS-induced excessive expression of immune modulators (nitric oxide, iNOS, TNF- α and IL-6) and upregulation of CD80 expression in RAW264.7 cells, suggesting the anti-inflammatory potential of ZMP. In conclusion, the combined methods proposed in our study are applicable for efficient extraction of ZMP with improved biological activities.

P2-03

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

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As the vegan market expands, hempseed protein is considered a good solution to the protein shortage in vegan diets due to its balanced amino acid composition and low allergenicity. However, its low solubility and poor emulsification capabilities make it difficult to utilize in the food industry. Therefore, the study aimed to improve the food applicability of hempseed protein (unmodified: CON) through physical (microwave: MH), chemical (deamination: DH), and enzymatic (alcalase: AH) modifications.



P2-04

Comparative analysis of baromi-2 (powdered rice) gluten-free bread quality and properties enriched with various types of fiberYun-Ju Jang^{1*}, Nurul Saadah Said¹, Wonyoung Lee^{1,2}¹*School of Food Science and Technology, Kyungpook National University,*²*Research Institute of Tailored Food Technology, Kyungpook National University*

This study investigated the effects of different fiber sources on the quality characteristics of gluten-free bread made from Korean powdered rice (Baromi-2). Rheological properties and quality characteristics of these fiber-enriched breads were evaluated. These findings highlight that fiber type and concentration significantly impact gluten-free bread's texture and structure. It is concluded that it offers valuable insights for optimizing gluten-free bread formulations to improve quality and consumer acceptance.

P2-05

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

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This study focuses on the development of an intelligent film utilizing pectin and betacyanin extracted from dragon fruit peel, enhanced with titanium dioxide (TiO₂) nanoparticles to immobilize betacyanin. Two types of films were prepared: a double-layer film, where betacyanin was embedded in a pectin film acting as the sensing layer, and a sodium alginate film matrix containing TiO₂ nanoparticles as the protective layer; and a composite film made by mixing the pectin and sodium alginate solutions. The properties of these films were assessed, particularly their effectiveness in monitoring the freshness of mackerel fillets.



P2-06

Pectin/PLA bilayer films with schiff base infusion: pH-responsive release of bioactive ingredients as active packaging in fruit preservationNurul Saadah Said¹, Won-Young Lee^{1,2*}¹*School of Food Science and Technology, Kyungpook National University,*²*Research Institute of Tailored Food Technology, Kyungpook National University,*

This study explores bilayer films combining pectin and Polylactic Acid (PLA), enriched with Schiff bases derived from phenylalanine and vanillin at concentrations of 0,25 g/g (P/PLA 0,25) and 0,50 g/g (P/PLA 0,50). Single-component films of pectin (P 0,25 and P 0,50) and PLA (PLA 0,25 and PLA 0,50) were also prepared for comparison. Schiff bases were selected for their ability to release bioactive compounds in acidic conditions, crucial for preventing enzymatic browning and preserving fruit quality, especially pears. These bases form an iminium ion ($C=N^+$) in acidic environments, enhancing antioxidant and antimicrobial properties by releasing aromatic amines and aldehydes into food matrices. The study investigates the physical, mechanical, and functional properties of these films and assesses their suitability as active packaging materials for the preservation of pear-cut fruits during storage.

P2-07

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

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As a curing agent, sodium nitrite is essential to facilitate the color development and prevent lipid oxidation of meat products. Nevertheless, due to the potential health risks on this chemical, a natural nitrite source can be used. The fermented *Angelica keiskei* (FA) exhibits a high nitrite content and antioxidant effect, which can be employed in the curing process of meat. Vitamin C (VC) is a well-known effective antioxidant, and ultrasound treatment (UT) contributes to the meat tenderness. This study aimed to investigate the effect of FA and a combination of FA, VC, and UT on the quality of cured meat. Pork loins were cured without nitrite (NC), with sodium nitrite (SN), with FA (FA), with FA and VC (FA+VC), with FA and UT (FA+UT), and lastly cured with FA, VC, and UT (FA+VU). FA enhanced redness, curing efficiency and inhibited lipid oxidation compared with NC. VC lowered residual nitrite than SN; however, pH value was also lowered and shear force was increased than FA. UT with FA and VC (FA+VU) exhibited better moisture content, protein solubility and tenderness. Therefore, VC and UT can improve the physicochemical properties of FA-cured pork loin.

P2-08

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

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김지수, 이주영, 권혜영, 주경천

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갈색거저리(*Tenebrio molitor*, mealworm)는 국내 식용으로 등록된 식용곤충 중 하나로 단백질은 50.32%, 조지방 함량은 33.7%로 알려져 있다. 이처럼 고단백 영양학적 이점으로 인해 대부분의 연구는 곤충의 단백질과 관련된 연구에 치중되어 있어, 갈색거저리 가공시 부산물로 버려지는 기름에 관한 연구는 부족한 실정이다. 따라서 본 연구는 갈색거저리의 기름을 식품 및 미용 소재로 활용하기 위하여 추출방법별 기름 추출수율과 이화학적 특성을 조사하였다. 시료는 마이크로웨이브로 건조(수분함량 5% 미만)시켜 온도별(60, 90, 120℃) 압착추출과 헥산을 이용한 용매추출을 통해 기름의 추출방법별 수율과 이화학적 특성을 조사하였다. 압착추출 수율은 온도가 증가함에 따라 18.16%, 21.41%, 22.88%로 높아졌고, 색도의 명도(L*)와 황색도(b*)는 감소하여 120℃ 추출한 처리구에서 명도가 81.24 ± 0.24 , 황색도가 33.3 ± 0.7 로 가장 낮게 측정되었다. 산가와 과산화물가는 가장 높은 온도에서 추출한 120℃ 압착추출 시료의 값이 각각 $0.33 \pm 4.05(\text{mg/g})$, $5.00 \pm 1.32(\text{meq/kg})$ 로 가장 높았다. 지방산 분석결과 불포화지방산 함량은 90℃ 추출 처리구에서 72.23%로 가장 높았으며, 주요 구성 지방산은 올레인산 42.07%, 리놀레산 27.15%로 나타났다.

P2-09

유산균을 첨가한 발효화분빵의 기능성 분석

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벌 생산물 중 화분은 단백질, 비타민, 미네랄, 아미노산 등 다양한 영양소가 풍부하게 함유되어 있으며 루틴, 퀘세틴, 카테킨 등의 플라보노이드 성분은 항산화, 항염증, 항암 효과 등이 있는 것으로 알려져 있다. 또한 면역력 강화, 피로 해소, 소화 촉진, 노화 방지 등의 기능성을 가지고 있어 다양한 건강 기능 식품으로 개발되고 있다. 본 연구에서는 벌 화분을 유산균으로 발효시킨 후 빵에 첨가하여 관능평가, 저장성 및 기능성 성분 변화를 조사하였다. 관능평가 결과 화분 첨가 비율이 8%인 빵에 대한 선호도가 가장 높았으며 저장성 조사 결과 8% 첨가 빵은 30일까지 품질 유지가 가능하였다. 일반 성분 함량 변화는 미미했으나, 조단백 16%, 총폴리페놀 3배, 총플라보노이드 1.5배 증가했다. 이는 빵에 벌 화분을 첨가하는게 기능성 증가에 영향을 미칠 수 있음을 시사한다.



P2-10

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

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red sage(*salvia miltiorrhiza*) and polygonatum(*polygonatum sibiricum*) have been extensively used as medicinal plants throughout history. This study aims to assist in the selection of extraction solvents for the potential use of red sage and polygonatum in food applications. Domestic dried red sage and polygonatum were purchased and extracted using four different solvents at a 1:10 ratio for 24 hours at 30°C. The results showed that water extracts of both red sage and polygonatum exhibited superior antioxidant activities, such as ABTS and DPPH radical scavenging activities. Specifically, the ABTS activity of red sage was approximately 2.5 times higher than that of polygonatum. The total polyphenol content was also higher in the water extract, with red sage containing up to three times more polyphenols than polygonatum (red sage: 1171.71mg/100g, polygonatum: 362.36mg/100g). Total flavonoid content was significantly higher in the water extract of red sage compared to polygonatum. In terms of color, 70% ethanol, methanol and acetone extracts of red sage appeared red, while the water extract was brown (a value of other extract: 55.10~63.45, water extract: 8.97). Similarly, polygonatum extracts were yellow with all solvents except water, which produced a dark brown extract. In conclusion, water extraction proved to be the most effective method for achieving high biological activity in both red sage and polygonatum.

P2-11

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

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In order to investigate the quality characteristics of sweet potato liqueur with grapes(Cheongsoo and Campbell Early), pH, total acid, alcohol contents, total polyphenol, tannin, anthocyanin and total flavonoid contents, antioxidant activity were analyzed. These samples were prepared with 30% of the sweet potato liqueur and extracted for 8 weeks. The total acid contents in these samples increased during the extraction period, on the other hand, the alcohol contents and pH in these samples decreased. These samples were evaluated for contents of total polyphenol, flavonoid and antioxidant activities using ABTS and DPPH radical scavenging activities and these were measured with spectrophotometric methods. The contents of total polyphenol and flavonoid were the highest in liqueur with Campbell Early (68.04 and 33.77 mg/100 mL). Also sweet potato liqueur with Campbell Early showed high ABTS and DPPH radical scavenging activity. These results provide useful information that quality characteristics of sweet potato liqueur with grapes cultivated in Korea.

P2-12

Quality characteristics of paprika mixed jam with different types of sugar

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This study investigated the quality characteristics of paprika mixed jam with different types of sugar for to promote paprika consumption. As for the types of carbohydrates, sugar, fructooligosaccharides, jocheong, and allulose were used. The rest of the ingredients such as paprika were prepared in the same way. The pH of jams varied from 4.00 to 4.27, whereas there was no significant difference in the total acidity. In color, the lightness (L), redness(a) and yellowness (b) significantly decreased in jam treated with allulose. Also, the antioxidant activity and total polyphenol content increased in jam treated with allulose. Reducing sugar of jams treated with allulose showed the highest value of 24%, whereas jams treated with fructooligosaccharides showed the lowest value of 13%. In the results of the sensory evaluation, overall preference of jams treated with allulose was high among the samples. By adding allulose, it can enhance function and taste of paprika jam. Considering the low reducing sugar and cost of paprika jam, it is better to add jocheong.

P2-13

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

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This study investigated the quality characteristics of paprika mixed jam with different types of 'cheong' for to promote paprika consumption. As the types of 'cheong' for decrease smell of grass, lemon, grapefruit, green tangerine and citron were used. The rest of the ingredients such as paprika were prepared in the same way. The pH of jams varied from 3.98 to 4.05. In total acidity, it showed the highest value in jam treated with control, while the lowest value in jam treated with citron cheong. In case of color and reducing sugar, it found depending on the the types of 'cheong'. The total polyphenol contents, DPPH and ABTS radical scavenging activities showed significantly higher values in jam treated with lemon cheong, green tangerine cheong and citron cheong, whereas the total flavonoid contents significant 143mg% highest values in jam treated with grapefruit. In the results of the sensory evaluation, overall preference of jams treated with citron cheong was high among the samples. So, by adding citron cheong it can enhance function and taste of paprika jam.



P2-14

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

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This study investigated the physicochemical and sensory quality characteristics (Electronic nose and tongue) of glutinous (GR) and non-glutinous rice (NGR) *nurungji* added with radish root juice at different levels 20, 40, and 60%. Four *nurungji* samples added with radish root juice were prepared for both GR (GRN-0, GRN-20, GRN-40, GRN-60) and NGR rice (NGRN-0, NGRN-20, NGRN-40, NGRN-60). The total polyphenol and total flavonoid were higher in GRN-60 with 24.80 ± 1.53 mgGAE/mL and 36.70 ± 2.10 mgNE/mL). TPC, TFC, pH, and WAI, WSI increased as the amounts of radish root juice increased while L hunter value, TSS, hardness, and SC were significantly decreased for both GR and NGR rice *nurungji* samples. The electronic tongue results showed that NGRN-60 sample had high scores for umami while GRN-60 had higher scores for sweetness. The addition of 60% radish root juice to both GR and NGR rice *nurungji* was more favorable based on physicochemical and sensory quality characteristics.

P2-15

국산 커피를 활용한 커피맥주 제조 공정 개발

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2023년 기준 맥주 시장은 3조 7천억원으로 추정된다. 증가하는 추세의 주류 시장 속 맥주 원료의 국산화 비율은 5%에 불과하며, 국산 농산물 원료화에 대한 연구가 필요한 실정이다. 기후 변화의 영향으로 수입 생두의 생산량이 불안정하고 유통되는 커피의 품질 저하로 국산 커피 재배에 대한 관심이 고조되고 있으며, 특히 전남에서는 국산 커피를 활용한 다양한 제품 개발에 대한 연구를 추진하고 있다. 본 연구는 국산 생두를 활용하여 커피 맥주를 제조하고 기능성 지표 성분 분석 및 관능평가를 통해 국산 커피 활용 고부가가치 시제품 개발을 목표로 한다. 국산 커피 제조는 맞춤형 종균을 활용하여 발효한 국산 생두를 사용해 비율에 맞춰 콜드브루 침출식 방법으로 제조하였으며, 균 수 측정 후 맥주 제조에 사용하였다. 제조한 커피는 맥주 제조 과정 중 살균 과정(Boiling) 전후로 비율에 맞춰 투입하여 제조하였다. 이후 5일간의 발효와 약 한 달간의 숙성을 통해 공정을 마무리했으며, 어떤 공정이 커피 향과 맥주 맛이 가장 어울리는지 평가하기 위해 관능평가를 시행했다. 국산 커피 활용 커피 맥주 공정 개발을 통해 수제 맥주 원료의 국산화 비율을 높이고, 국산 커피 제품화 개발 연구에 기여하고자 한다.

P2-16

국산 커피 생두를 활용한 커피 증류주 제조 공정 개발

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1조 5천억 원 규모의 수입 커피 생두는 지구 온난화 등 기후변화의 영향으로 생산량이 불안정하고 유통되는 커피의 품질 저하로 인해 국산 생두 및 원두의 관심이 고조되고 있다. 전남은 국내 최대의 커피 재배지이지만 연중 재배 생산, 가공상품개발 생산 시설이 거의 없는 실정이다. 해외 원두가 주를 이루고 있는 스페셜티 커피 시장에서 국산 커피를 활용한 다양한 제품 개발로 국산 커피에 대한 고부가가치화가 필요하다. 본 연구는 선행연구에서 전통 발효식품 유래 균주를 활용한 중국 및 효모를 접종, 삼양주 기법으로 개발한 커피 막걸리를 이용하여 커피 증류주를 개발하였다. 증류주는 기본적으로 쌀을 발효시켜 담근 밀술을 증류하여 만든 소주로 희석식 소주와 달리 화학적인 맛이 덜하고 맛과 향이 풍부한 특징이 있어 프리미엄 주류로 인식된다. 국세청 주세 신고현황에 따르면 2022년 증류식 소주 출고량은 4,905kl로 전년 대비 2배 가까이 급증하였다. 본 연구에서 개발한 커피 증류주는 관능 평가와 함께 카페인, 클로로겐산 등을 기능성 지표 성분으로 설정, 분석하였다. 국산 커피를 활용한 커피 증류주의 제조 공정 개발은 국산 커피를 활용한 다양한 제품 개발의 일환으로 커피 재배 농가 고부가가치화에 기여하고자 한다.

P2-17

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

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Cordyceps militaris is a mushroom that grows on insects, deriving nutrients from the host to form fruiting bodies. It is used for various health functions, primarily in herbal medicine rather than as a food source. Probiotics in fermented milk are gaining popularity for their health benefits, leading to an increase in consumption worldwide. This study aimed to enhance the value of *Cordyceps militaris* as a functional food ingredient. *Cordyceps militaris* obtained from types of edible insects (*Allomyrina dichotoma* larvae, AL; *Tenebrio molitor* larvae, TM; *Oxya sinuosa*, OS) was extracted with water, fermented with *Lactobacillus bulgaricus* (Lb) and *Streptococcus thermophilus* (St), and then the lactic acid bacteria fermentation extract was added to produce fermented milk. The quality characteristics and sensory evaluations of the fermented milk were conducted. In the OS-Lb sample, the lactic acid bacteria count was highest at 8.17 log CFU/mL. The TM-St sample exhibited the highest levels of free sugar and total polyphenol contents, respectively, as well as the highest antioxidant activity in the evaluation. Following the sensory evaluation, no significant difference was observed between the samples.

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

P2-18

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

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Salting kimchi cabbage in brine is well known as a method of preservation and flavor enhancement. In kimchi preparation, salting the kimchi cabbage is a critical process. The salting condition significantly impact growth of lactic acid bacteria and taste of kimchi. Furthermore, optimizing kimchi salting conditions is very important in the large-scale kimchi industry. To develop an ACB system, properties of kimchi cabbage were analyzed according to the seasonal variety and temperature. Also, the salting condition of kimchi according to produce capacity were investigated. As the result, several factors affecting pickled quality were proven. Among the factors, the difference of salt concentration in salting tank is most crucial impact to final products. The maximum difference NaCl concentration between top and bottom in salting tank is 5%. The purpose of this study is to develop a system that can automatically circulate brine (ACB) to improve the quality of salted kimchi cabbage. ACB systems can maintain consistent salt concentration in the salting tank. The ACB system offers substantial potential to improve salting conditions, particularly in large-scale kimchi production

P2-19

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

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Kimbugak is a food made by applying glutinous rice paste to dried *Kim*, adding an extra layer of *Kim*, drying it, and then frying it in oil. However, *Kimbugak* has a drawback in that its shelf life is shortened due to the rancidity of the vegetable oil used during the frying process. Currently, the shelf life of *Kimbugak* is six months, but rancid odor can develop in a shorter period, leading to product returns and difficulties in export. This study aims to improve the quality of *Kimbugak* by addressing rancidity issues. During the manufacturing process, green tea extract with antioxidant properties was added to the glutinous rice paste, and herbal extract, also an antioxidant, was added to the vegetable oil used during the frying process. The changes in peroxide values were measured at intervals of 0, 10, 15, and 20 days during accelerated storage at 45°C for 20 days. The results showed that the peroxide value of *Kimbugak* with herbal extract added after 20 days was 13.22 meq/kg, while that of the control group was 61.95 meq/kg, indicating a reduction in rancidity in the sample with the herbal extract. Future work will focus on evaluating the effectiveness of extending the shelf life of *Kimbugak* produced with herbal extracts in a large-scale production system.

P2-20

Effect of drying conditions on the functional compounds in *Paeonia lactiflora* Pall. rootsYonghyun Kim¹, Hyun Ji Eo¹, Chung Ryul Jung², Uk Lee^{1*}¹Special Forest Resources Division, National Institute of Forest Science²Forest Entomology and Pathology Division, National Institute of Forest Science

Paeonia lactiflora Pall. is a perennial herb, the roots of which have been widely used in the pharmaceutical industry due to their pharmaceutically active ingredients, such as paeoniflorin and albiflorin. The roots of *P. lactiflora* Pall. are generally dried after harvest to maintain the level of their pharmaceutical compounds during long-term preservation. To evaluate the effect of drying conditions on the pharmaceutical and antioxidant compounds in the roots, the harvested roots of *P. lactiflora* Pall. were cut into slices with a thickness of 3–4 mm and dried at 30, 40, 50, 60, and 70°C, each for 48 hours. The level of pharmaceutical and antioxidant compounds was then analyzed. The maximum levels of paeoniflorin and albiflorin were detected at 40°C and 30°C, respectively, with 40°C showing the highest total pharmaceutical compounds. Among the antioxidant compounds, the highest levels of flavonoids and phenolics were observed at 50°C. The highest level of antioxidant scavenging activity was detected at 40°C, comparable to that at 50°C. However, the levels of these compounds and antioxidant activity decreased with drying temperatures above 60°C. The changes in the levels of functional compounds with varying drying temperatures reported here could provide essential information for establishing optimal processing technologies for herbal plants after harvest in the pharmaceutical industry.

P2-21

Improved quality of black ginseng via fermentation with stevia

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This study investigated the impact of stevia addition during black ginseng production using traditional fermentation methods. Black ginseng was prepared with ginseng (93% w/w), *Aspergillus oryzae* (2% w/w), and either no stevia (control) or 1% stevia (w/w). Fermentation occurred at 50–55°C. Compared to the control, stevia-fermented black ginseng exhibited significantly ($p < 0.05$) improved sensory characteristics, including overall preference, aroma, color, taste, and mouthfeel. Additionally, stevia increased brix (sugar content) by 18% (6.5 vs. 5.5 °Bx) and slightly raised pH (3.77 vs. 3.79). These findings suggest that stevia inclusion during fermentation enhances black ginseng quality by promoting desirable sensory attributes and potentially affecting sugar content and acidity.

P2-22

소스 제품에 적용 가능한 당류 및 칼로리 저감 감미료 조성물 개발

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(주)우리식품

소비자들의 식품 섭취량이 증가하고 개인의 건강에 신경을 쓰는 경향이 나타나면서 다양한 식품 영역에서 당류 저감화가 실현되고 있으며, 지속적으로 관련 시장이 성장하면서 자연스러운 맛을 내는 저당 제품의 사례 역시 늘어나고 있다. 본 연구에서는 팬데믹 이후로 지속적으로 상승하고 있는 소스 시장의 당류 저감화에 주목하여, 소스류 제품에 사용되는 감미료인 액상과당을 대체하는 당류 저감 소재를 개발하고자 하였다. 액상과당의 감미 특성을 고려하여, 다양한 감미료 중 액상과당의 감미 특성을 부분적으로 구현할 수 있을 것으로 예상되는 감미료 6종을 1차 선정하였고, 전체적인 감미의 상호작용에 관여하는 당류 소재인 트레할로스를 같이 고려하여 대체당 개발을 진행하였다. 먼저 액상과당의 감미 강도 및 관능 특성을 1차적으로 고려하여 기본 배합비를 구성하였으며, 각 감미료별 첨가량을 일정 범위 내에서 조절하여 감미에 미치는 변화를 평가한 결과 알룰로오스 61.28%, D-솔비톨액 6%, 자일로오스 3%, 에리스리톨 3%, 수크랄로스 0.050%, 트레할로스 8%, 정제수 18.67%의 배합비를 획득하였으며, 과당이 갖는 자연스러운 단맛의 구현 및 감미의 상승 작용을 목적으로 짠맛과 감칠맛 성분의 첨가 테스트를 진행하여, 정제염 0.17%, L-글루탐산나트륨 0.50%을 상기 배합비에 적용하였다. 조성물의 전체적인 감미 특성이 조화로운지를 확인하기 위하여 서로 다른 몇 가지의 감미료별 배합물과 비교 평가한 결과, 해당 조성물 배합은 액상과당과 가장 유사한 감미질을 갖는 것으로 나타났으며, 차이 식별 평가에서도 90%가 차이를 인지하지 못하는 것으로 응답하여 관능적 유사성을 확인하였다. 본 조성물의 상대 감미도는 액상과당의 80% 수준이며, 과당 대비 당류 함량은 80% 이상, 열량은 75% 이상 저감하는 효과를 달성하였다. 본 조성물의 활용을 통해, 소스 내 감미료의 단맛은 유지하면서 당류 저감을 효과적으로 달성하는 데 기여할 수 있을 것으로 기대된다.

P2-23

패션프루트 와인 제조를 위한 희석비율별 품질 특성 변화

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패션프루트(*Passiflora edulis*)는 ‘백향과’라 불리는 시계초과(Passifloraceae)에 속하는 다년생 덩굴성 과수로 브라질 남부, 아르헨티나 북부 등 열대 및 아열대 기후에서 자라며, 우리나라에서는 전남, 전북, 제주 등에서 주로 재배되고 있다. 또한 패션프루트는 비타민 A와 베타카로틴, 항산화성분이 풍부하게 함유되어 노화방지, 고혈압 등에 효과적인 것으로 알려져 있고, 전체 과실은 과육과 과피로 구성되어 있으며 과육은 당류, 비타민류, 카로틴, 과피는 폴리페놀, 섬유질 등을 함유하고 있다. 향과 신맛, 단맛이 풍부하여 과육으로는 음료나 청을 제조하며, 전체 과실의 약 50%를 차지하는 과피는 가축사료나 펙틴 제조 등에 활용 중이다. 패션프루트 와인 제조를 위한 희석비율은 과육 대비 정제수를 2, 3, 5배로 첨가하였고 무첨가를 대조로 설정하였으며 당도가 8 °Bx 될 때까지 발효하였다. 발효 후 희석비율에 따른 품질을 알아본 결과 pH는 2.97~3.05를 나타내었고 산도는 희석비율이 증가함에 따라 감소하여 무첨가 6.23%, 2배 희석 3.39%, 5배 희석은 1.95%를 나타내었다. 색도 역시 희석비율이 증가함에 따라 적색도, 황색도는 모두 감소하였으며 희석비율별 패션프루트의 총폴리페놀 함량은 무첨가시 1.2 mg/g, 2배 희석에서는 0.6 mg/g으로 감소하였으며 희석비율이 증가함에 따라 점차 감소하는 경향이었다. 항산화활성 중 ABTS와 DPPH 라디칼 소거활성은 대조에서는 각각 54.8%, 57.9%로 측정되었으나 2배 희석에서는 39.3%, 33.1%로 감소하여 희석비율이 증가함에 따라 더욱 감소하는 경향을 보였다.

P2-24

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

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Extreme weather conditions of high temperature and humidity caused by global warming have a significant impact on agriculture and food production. Recently, due to an increase in mycotoxin contamination, the National Agricultural Products Quality Control Service–Gyeongnam Provincial Office (NAQS–GN) monitored approximately 150 grain samples throughout the production and storage stages. As a result, a large number of cases of red mold disease were found within the legal limit, and mainly the mycotoxins deoxynivalenol and zearalenone were detected in wheat and barley. In order to provide safe agricultural products to consumers, research was conducted on mycotoxin reduction methods, especially on the investigation of mycotoxin content in grains based on the milling process. Whole wheat before milling contained 1.32mg/kg deoxynivalenol, which decreased by 81.5% to 0.24 mg/kg after completing the milling process. Similarly, in barley, it decreased from 2.25mg/kg to 0.12mg/kg, a decrease of 94.7%. Zearalenone was only detected within the legal limits in barley husks and was not detected after the milling process. Milled barley for human consumption is safe from mycotoxins, but care should be taken as the husk may have a high mycotoxin content. Also, efforts should be made to store wheat and barley in a dry, well-ventilated place immediately after harvest, as the rainy season after harvest can be hot and humid.

P2-25

갈색거저리 유산균 발효소재를 활용한 기능성 펫푸드의 품질특성

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본 연구는 식용곤충인 갈색거저리의 소비자 인식개선을 위해 유산균 발효를 통한 소재화 및 이를 활용한 제품연구로 물리적 변화를 도모하는 동시에 대사산물에 의한 기능성을 증진하고자 진행하였다. 본 실험에 사용한 갈색거저리는 2023년 9~12월 윙플레이스 사육실에서 온도 $26 \pm 1^\circ\text{C}$, 습도 $60 \pm 10\%$ 로 100일간 사육한 갈색거저리 유충을 수확하여 1일간 절식한 다음 세척 후 -18°C 에서 급랭하여 사용하였다. 유산균 발효는 단백질 소화율을 높이고 필수 아미노산과 지방산의 함량을 증가시켜 제품의 영양성분과 안정성을 향상시키는 것으로 알려져 있다. 유산균 발효를 통해 제조한 펫푸드의 품질특성은 일반성분, 항산화활성, 폴리페놀, 플라보노이드와 미생물 수 등을 측정하고 결과 발효물의 함량이 높을수록 단백질 함량과 항산화 활성이 증가하는 경향을 보였다. 발효물이 첨가된 펫푸드의 폴리페놀 함량은 $30 \sim 80\text{mg}/100\text{g}$ 이었고, 플라보노이드 함량은 $45 \sim 73\text{mg}/100\text{g}$ 이었다. 따라서 갈색거저리 유산균 발효소재는 영양적 가치가 높고 환경 영향력이 뛰어나 다양한 가공품으로서의 가능성이 높은 것으로 판단된다.

P2-26

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

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The quality characteristics of legume protein supplement(LPS) (soy protein isolate supplement, SPIS; pea protein isolate supplement, PPIS; faba bean protein supplement, FPS) and yeast protein supplement(YPS) were comparatively evaluated. LPS contained higher protein content(SPIS, 87.13g/100g; PPIS, 78.64g/100g; FPS, 84.90g/100g; YPS, 77.55g/100g) and lower lipid and carbohydrate contents than YPS($p<0.05$). The essential amino acid content was significantly higher in YPS(36.14%) compared to LPS(30.76–32.29%)($p<0.05$). The branched-chain amino acids, which are utilized in muscle cell metabolism, were significantly higher in YPS(16.21%) compared to LPS(14.16–15.45%)($p<0.05$). YPS had lower *in vitro* protein digestibility than LPS; however YPS had a higher amino acid score and protein digestibility corrected amino acid score (PDCAAS)($p<0.05$). Water absorption capacity(WAC) was significantly higher in LPS(370.41–391.23%) compared to YPS(279.40%)($p<0.05$), while oil absorption capacity was highest in YPS(188.59%), due to its higher hydrophobic amino acid content. The water solubility index(WSI) tended to increase with higher WAC and increased NaCl concentration($p<0.05$), reaching the lowest at pH 5 and the highest at pH 10. These chemical characteristics and nutritional quality of LPS and YPS could be utilized as foundational data for replacing animal proteins supplements.

P2-27

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

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Soju, a Korean distilled liquor generally consumed as an alcoholic beverage, is produced with granule-based raw materials including rice, barley, and wheat. Wheat is valuable in ancient Korea; therefore, wheat *soju* was considered as high-quality liquor. Recently, distribution of wheat is mainly imported from USA, because domestic wheat cultivar is not widely used for food producing due to the higher cost and low-understanding of physiochemical properties with food products produced with domestic wheat cultivates. The objective of this study is to determine the differences physiochemical properties of wheat *soju* mash produced with different domestic wheat cultivar, 13 *soju* mashes (12 domestic, 1 imported) were produced by 2-step brewing procedure, and physiochemical properties were analyzed. The physiochemical properties of *soju* mashes were differentiated by the content of polysaccharide and protein; cultivar with high polysaccharide were characterized with high reducing sugar, alcohol content, and sugar-acid ratio. Cultivar with high proteins were related with amino acid contents, °Brix and organic acids including acetic and succinic acids, that related with off-flavors of alcoholic beverages. Exceptionally, Hojoong and Baekchal were highly related with lactic and malic acid. Determination of physiochemical differences of wheat *soju* mash with different cultivar could support development of distilled *soju* market industry for better flavor characterization.

P2-28

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

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Soju, a Korean distilled liquor generally consumed as an alcoholic beverage, is produced with granule-based raw materials including rice, barley, and wheat. Consumption of *soju* is increasing in domestic market, however, a traditionally produced distilled *soju* is mostly produced with rice, wheat *soju* is not frequently produced due to the limited information of relationship between physiochemical characteristics of wheat *soju* by its cultivar. The objective of this study is to obtain physiochemical properties of wheat *soju* mash with different domestically bred wheat cultivar. 13 *soju* mashes (12 domestic, 1 imported) were produced by 2-step brewing procedure with commercial yeast, and physiochemical properties were analyzed. The physiochemical properties of *soju* mash were generally characterized by their acidity differences, the cultivar with higher total acid showed high reducing sugar, °Brix, and volatile acid content, with higher acetic and lactic acid. While cultivar with high pH showed higher alcohol content, *Hwanggeumal*, cultivar contained high protein were related with mineral, fat, and organic acids including succinic acid, but high amount of succinic acid was reported to influence low flavor quality. Understanding of physiochemical differences of wheat *soju* mash with different cultivar could support development of distilled *soju* industry for improvement of final product quality.

P2-29

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

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The objective of this study is to assess the quality characteristics of barley nuruk with varying grinding ratios and inoculation rates. Thirty percent-milled barley was used at two grinding ratios: coarsely milled (B1) and finely milled (B2). The inoculating strain was *Aspergillus luchuensis* 34-1, with inoculation rates set as follows: non-inoculated (N), 0.1%, and 1% compared to the raw material. For quality characteristics, a series of measurements were taken, including those of moisture content, temperature, pH, acidity, amino acidity, organic acids, and free amino acids. Enzyme activity was quantified for saccharification power, α -glucosidase, glucoamylase, α -amylase, and carboxypeptidase.

The temperature of B1 remained relatively constant throughout the fermentation process, whereas B2 exhibited a rapid increase to 35°C on the second day of fermentation, followed by a subsequent decline. The pH decreased initially and then slightly increased, while acidity and amino acidity increased, with B2 displaying higher values. The principal organic acid present in barley nuruk was citric acid, and the 0.1% inoculation group exhibited a rapid increase in organic acids as fermentation proceeded. A total of 19 amino acids were identified in the nuruk, with their content increasing as fermentation proceeded in all treatment groups. The N and 0.1% groups exhibited a considerable presence of aerobic bacteria, while the 1% group demonstrated a notable surge in yeast and the emergence of bacteria and coliforms at relatively low levels. These findings imply that the most optimal treatment for nuruk production entails the fine milling of barley and the inoculation of 1% *Aspergillus luchuensis* 34-1.

P2-30

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

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The purpose of the study is to produce fruit-flavored *makgeolli* by adding *Humulus lupulus*(Hop). To produce fruit-flavored *makgeolli* with hops, the hop content and processing methods were different. *Makgeolli* was made by adding rice, water, enzymes(glucoamylase), yeast(YM56), and hops(Sazz and Hongchen hop). After mixing the above ingredients, it was fermented at 25℃ for 6 days, fermented at 35℃ for 3 days, and aged at 10℃ for 24 hours. The total alpha acid content of sazz and Hongchen hop was 7.34% and 12.08%, respectively. And the total beta acid content of sazz and Hongchen hop was found to be 4.39% and 5.46%, respectively. In the case of soluble solids and reducing sugars, treatment C showed the highest content. The alcohol content was higher in all treatments than in the control. It was found that there was no significant difference in pH, total acidity, and amino acid. Through this study, it is believed that *makgeolli* with high sugar content and excellent sensory quality can be produced by adding hops. Also, it is believed that additional research on fruit flavors will be needed.

P2-31

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

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This study investigates the development of a Scallop Snack using vacuum-assisted low-temperature frying technology. For the production of scallop snacks, an optimized sugar and salt soaking process was employed. The water (A, 70.4~83.1%, v/v), high fructose corn syrup (B, 15.7~27.5%, w/v) and salt (C, 0.9~4.2%, w/v), with X_1 (A/(B+C)) and X_2 (B/C) selected as independent variables based on a central composite rotatable design (CCRD). In accordance with this design, 11 samples were prepared with X_1 and X_2 , and the dependent variables included moisture content (Y_1), browning index (Y_2), and sensory evaluation (Y_3). Optimal ratios were determined as 79.0% (w/w), 19.7% (w/w), and 1.3% (w/w), respectively. The data indicated an ideal mix ratio for the scallop snack that satisfies moisture content measured 5.4 ± 0.1 g/100 g, browning index was 0.578 ± 0.2 , and overall acceptability scored 8.2 ± 0.1 points. There was no significant deviation between predicted and actual values ($P < 0.05$). Accordingly, this study successfully developed a sugar-salt immersion process for scallop snacks utilizing vacuum-assisted low-temperature frying technology. The established model parameters for optimal conditions were deemed appropriate for achieving consistent product quality.

P2-32

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

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The use-by date of *Gambas al ajillo* retort food with scallops was predicted using the food use-by date setting program (MFDS, 2023) after an accelerated experiment [stored in an incubator at 15°C, 25°C, and 35°C for six months]. In this case, the quality indicator components for predicting the use-by date were selected as acid value (AV) and peroxide value (POV), which are measures of lipid rancidity, as lipid rancidity is a concern for foods with high lipid content.

Changes in AV and POV as a function of storage conditions (temperature and term) of *Gambas al ajillo* retort with scallops were determined immediately after storage and for 6 months. The AV was 0.8 mg/g immediately after storage, and the change by temperature (15, 25, and 35°C) at 6 months was 2.0, 2.3, and 2.8 mg/g. The POV immediately after storage was 18.8 meq/kg, and the change by temperature (15, 25, and 35°C) at 6 months was 29.1, 48.1, and 55.8 meq/kg.

As a result of setting the use by date of the AV of *Gambas al ajillo* retort food with scallops, the safety factor was 0.90 with a quality specification of 5.00 and an annual change amount of 2.54, and the consumption period calculated by setting the consumption period quality index for peroxide prices was 18.8000, a quality specification of 60.00, an annual change amount of 29.62, a safety factor of 0.90, and a consumption period of 15 months. Therefore, the use by date of the *Gambas al ajillo* retort food with scallops according to the quality indicators was predicted to be 18 months for the AV and 15 months for the POV, and the final use-by date was set at 15 months, which is the shortest quality safety limit.

P2-33

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

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In this study, the freshness stability of vacuum-packaged frozen mackerel (*Scomber japonicus*) fillets was evaluated during room temperature storage using both prototype container [eco-friendly packaging container/freezer pack (3AC)] and a control container [commercial container/freezer pack (CC)]. The freshness stability of the vacuum-packaged frozen mackerel was assessed through chemical (pH and VBN), physical (odor intensity), and microbiological (viable cell count) evaluations.

When vacuum-packed frozen mackerel was stored in prototype and control containers(storage for 72 hours), the pH values was in the range of 5.81 to 6.24 and 5.84 to 6.42, respectively, and the VBN values varied from 15.9 to 58.8 mg/100g for 3AC and 13.7 to 82.7 mg/100g for CC. Odor intensity levels ranged from 117 to 727 for 3AC and 113 to 1,140 for CC, while viable cell counts ranged from 2.8 to 7.2 log CFU/g for 3AC and 2.9 to 8.7 log CFU/g for CC, both measured up to 72 hours of storage.

These results demonstrated that storing vacuum-packed frozen mackerel in the prototype container reached the spoilage standard late, meaning that the prototype container showed superior cooling performance compared to the control container.

In addition, it is expected to present a method to increase the distribution safety of marine products, including frozen mackerel, vacuum-packed using prototype containers, and to contribute to the development of seafood packaging technology.

P2-34

식용곤충 소재별 탈지분말 및 유지추출물의 이화학적 특성 분석

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식용곤충은 영양학적으로 유익하며 유엔식량농업기구에서는 미래 식량으로 인정받고 있다. 국내에서는 식용곤충으로 버메뚜기, 백강잠, 누에, 흰점박이꽃무지 등 10종을 지정하고 있다. 특히 누에는 성장단계에 따라 특성이 달라 각 시기에 맞는 건강증진 효능 구명을 통해 한가지 원료로부터 다양한 기능성 소재를 생산할 수 있다는 장점이 있다. 이와 같이 다양한 식용곤충의 산업적 활용 비율을 높이기 위해서는 곤충 소재별 맞춤형 제형화 연구가 필요하다. 본 연구에서는 5령 3일인 누에, 홍잠, 누에번데기, 그리고 흰점박이꽃무지의 탈지분말 및 오일의 특성을 구명하고 적합 소재화 기술을 개발하고자 했다. 식용곤충을 n-hexane 용매 추출과 180℃ 고온 압착 추출을 비교한 결과, 탈지 분말 회수율은 180℃ 고온 압착 추출법에서 더 높게 나타났다. SEM 현미경을 통한 입자특성 분석, 분말의 유동성 측정, 그리고 DPPH와 ABTS 라디칼 소거능 분석을 이용하여 항산화 활성을 비교 분석을 통해 탈지분말과, 유지 특성을 평가했다. 안식각 분석에서는 흰점박이꽃무지, 5령 3일 누에, 홍잠의 탈지 분말이 감소한 반면, 번데기의 탈지 분말은 증가하였다. 또한 번데기의 탈지 분말은 겔보기 부피와 탭 부피가 증가하였다. 중성지질과 MDA (Malondialdehyde) 측정 결과, 홍잠과 번데기가 5령 3일 누에보다 높았으며, DPPH 라디칼 소거능 분석에서 번데기의 유지와 탈지 시료가 높은 항산화력을 보였다. ABTS 라디칼 소거능 분석에서는 5령 3일 누에의 탈지 시료가 높은 항산화력을 보였다. 이러한 결과를 고려할 때, 곤충 종과 탈지, 유지 소재의 특성에 따라 다양한 결과 값이 나타나므로, 기능성 증진을 위한 소재에 따른 맞춤형 제형개발이 필요하다.

P2-35

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

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An effective method to reduce unhealthy fat in food is to use gelators to structure liquid oils into oleogels, replacing solid (or trans) fat. Currently, many oleogelation techniques have been developed using templates from emulsions, foam, and hydrogels. In this study, foam-structured oleogels composed of *Tenebrio molitor* larvae protein (TMP) and two types of hydrocolloid (carrageenan, guar gum) were used to replace butter in sweet pan bread. The combination of TMP and hydrocolloid increased both foam capacity and stability. At the same concentration, the oleogel samples with carrageenan showed higher oil absorption, viscoelasticity, and firmness compared to those with guar gum. Sweet pan bread was then prepared by replacing 50% of the butter with oleogels. The highest viscoelastic properties of dough were observed in the control (butter), followed by the 0.5% carrageenan sample. Additionally, the 0.5% carrageenan sample was most similar to the control group in terms of bread height and hardness, showing no significant differences. The bread containing TM oleogel without hydrocolloids had the hardest texture and lowest height. In the color results, the L^* value and a^* values of the bread samples containing oleogels replaced with butter were lower than those of the control group, with the 0.2% carrageenan sample showing the greatest color change.

P2-36

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

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Utilizing technological advancements in smart farming worldwide, the development of meat analogs based on plant resources is underway. The recognition of mushrooms as promising candidates is growing, driven by their rich nutritional profiles and capacity to enhance texture. In this study, plant-based meat analogs were formulated by incorporating Oak mushroom (OM, *Lentinula edodes*) and chickpea flour at ratios of 50:50, 75:25, and 100:0 (w/w), and their rheological and physicochemical properties were evaluated. The control exhibited the highest water-holding capacity, whereas the 50:50 sample demonstrated the lowest value. For this reason, the 50:50 sample had the highest viscoelasticity properties and firmness. The firmness of the meat analogs decreased with increasing the OM content whereas the cooking yields increased. As a result of the storage stability of plant-based meat analogs, the pH, TBARS, and VBN values increased as the storage period increased, and the 50:50 sample showed the greatest change, showing low storage stability. In particular, the VBN values of the 75:25 and 100:0 samples were consistently low during all storage periods, notably recording the lowest values on day 0 and remaining below 2.00 (mg %) by the 7th day. This work was supported by Innovative Human Resource Development for Local Intellectualization program through the Institute of Information & Communications Technology Planning & Evaluation(IITP) grant funded by the Korea government(MSIT) (IITP-2024-2020-0-01489).

P2-37

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

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Tenebrio molitor (TM) larvae are evaluated as nutritionally superior edible insects due to their protein content of about 50% and richness in minerals. In this study, protein-enriched fried snacks (Keropok) were developed by replacing tapioca with different levels of TM powder (0%, 5%, 7%, 10%, 15%), and their physicochemical properties were evaluated. In the RVA results, the control had the highest peak viscosity of 3883.04 cp, and the peak viscosity decreased with increasing TM powder. As the substitution level of TM powder increased, both hardness and fracturability decreased. The inner-structures of the fried snack evaluated by SEM were indicated that both the size and quantity of bubbles decreased with increasing as the substitution level. As the TM powder replacement ratio increased, the peroxide value increased lower than control and the oxidation stability of TM snacks was improved. In sensory evaluation, the fried snack replaced with 5% TM powder showed a higher preference in overall preference measurement.

P2-38

딸기(설향)의 재배 환경(하우스 및 스마트팜)에 따른 품질특성 비교

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딸기는 우리나라 시설과채류 중에서 재배비율이 높은 작물중에 하나이다. 기존 노지에서 재배되던 딸기는 시설원에 기술의 발달과 함께 시설 내에서 토경 또는 양액을 활용한 재배 방식으로 전환 되었고, 최근 기후변화로 인해 스마트팜 수요가 늘어나면서 스마트팜 딸기의 생산량이 늘어나고 있는 실정이다. 따라서 최근 수요가 늘어나고 있는 스마트팜 딸기의 품질 데이터를 확보하기 위해 딸기 품종중 가장 많이 재배되고 있는 “설향” 품종을 대상으로 일반하우스 재배 딸기와 스마트팜 재배 딸기의 수확시기별 당도, 환원당, 총균수, 관능평가, 폴리페놀 및 플라보노이드 항목에 대해 비교 분석한 데이터를 소개하고자 한다. 당도의 경우 일반하우스 재배 딸기는 9.00–11.60°Brix 범위였으나 수확시기에 따른 편차가 크게 나타났고, 스마트팜 재배 딸기는 9.60–10.40°Brix 범위였으며 수확시기가 경과할수록 유의적으로 당도가 높게 나타나는 경향을 보였다. 환원당 함량은 당도 측정 결과와는 다르게 재배 환경과 수확시기에 따른 유의성을 보이지 않았다. 총균수의 경우 일반하우스 재배 딸기는 3.14–4.27 log CFU/mL였고, 스마트팜 재배 딸기는 1.68–3.31 log CFU/mL로 스마트팜 재배 딸기의 총균수가 낮게 나타났다. 관능평가 결과 외관, 색 및 종합기호도 항목에서 일반하우스 재배 딸기는 4.83, 4.83 및 5.70였고, 스마트팜 재배 딸기는 6.63, 6.67 및 6.20으로 스마트팜 재배 딸기가 유의적 차이를 보이며 높은 기호도를 보였다. 총 폴리페놀 함량 측정 결과 일반하우스 재배와 스마트팜 재배 딸기 모두 수확시기가 경과할수록 함량이 높아지는 경향을 보였다. 재배 환경에 따른 함량은 일반하우스 재배 딸기는 535.68–729.52 mg/100 mL였고, 스마트팜 재배 딸기는 685.78–1,026 mg/100 mL로 스마트팜 재배 딸기가 높게 나타났으며, 총 플라보노이드 함량 또한 스마트팜 재배 딸기가 함량이 높게 나타났다.

감사의글 : 이 논문은 정부(과학기술정보통신부)의 재원으로 정보통신기획평가원의 지원을 받아 수행된 지역지능화혁신인재양성사업(IITP-2024-2020-0-01489)

P2-39

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

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농산물과 식품의 저장성은 산업화 및 제품화를 위한 중요한 요소중 하나이다. 따라서 농산물의 재배 환경에 따른 저장성 차이 연구, 수확한 이후부터 소비자 식탁에 전달되기 까지 발생할 수 있는 생리변화, 변질억제 및 신선도 유지에 관련한 연구가 다양하게 이루어져야 한다. 최근 스마트팜 시설을 활용한 다양한 작물들이 생산되고 있는 실정에서 스마트팜의 최적 재배 시스템과 청결한 환경에서 생산되는 결과물에 대해 저장성의 차이를 보일것으로 판단하여, 일반하우스 재배 환경에서 생산한 딸기와 스마트팜 재배 환경에서 생산한 딸기의 저장 기간에 따른 품질 특성을 비교하고자 하였다. 딸기의 품종은 “설향” 품종을 선정하였고, 수확후 생과를 냉장 보관하면서 20일 동안 pH, 적정산도, 당도 및 외관 변화를 관찰하였다. pH 측정 결과 수확 즉시 일반하우스 재배 딸기는 3.69였고, 스마트팜 재배 딸기는 3.86으로 유의적 차이를 보였다. 저장 20일째 pH는 일반하우스 재배 딸기 4.10, 스마트팜 재배 딸기 4.16으로 저장 기간에 따른 pH 변화는 저장 기간이 경과할수록 값이 높아졌다. 하지만 변화 폭을 살펴보면 일반하우스 재배 딸기는 0.41의 값이 상승하였고, 스마트팜 재배 딸기는 0.30의 값이 상승하여 일반하우스 재배 딸기의 변화 폭이 크게 나타났다. 적정산도는 일반하우스 재배 딸기의 경우 저장 6일째에 급격히 증가하다 저장 12일째 급격히 감소하였고, 이에 반해 스마트팜 재배 딸기는 비교적 일정한 수치를 보였다. 당도의 경우 수확 직후 일반하우스 재배 딸기는 9°Brix였고, 스마트팜 재배 딸기는 10.4°Brix로 스마트팜 재배 딸기가 높은 당도를 보였다. 저장 기간에 따른 당도의 변화는 일반하우스 재배 딸기의 경우 불규칙적으로 감소하였고, 스마트팜 재배 딸기는 비교적 일정한 패턴으로 당도가 낮아졌다. 저장 기간에 따른 딸기의 외관 변화를 확인한 결과 두 시료구 모두 저장 7일째까지는 외관상 큰 차이는 보이지 않았으나 8일째부터 일반하우스 재배 딸기의 부패정도를 눈으로 확인할 수 있었다. 외관의 형태는 곰팡이가 확인되었고 물러지는 현상이 발생하였으며 부패취의 냄새 감각이 느껴졌다. 이에 반해, 스마트팜 재배 딸기는 저장 기간이 20일이 경과해도 곰팡이와 물러짐, 부패취의 냄새 감각이 느껴지지 않아 충분히 생과로 판매 및 소비가 가능할 정도의 외관을 유지하였다.

감사의글 : 이 논문은 정부(과학기술정보통신부)의 재원으로 정보통신기획평가원의 지원을 받아 수행된 지역지능화혁신인재양성사업업(IITP-2024-2020-0-01489)

P2-40

Quality characteristics of defatted soybean flour texturized vegetable protein according to the degree of mixing of isolated soybean protein

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In this study, the quality characteristics of defatted soybean flour texturized vegetable protein(TVP) were analyzed according to the degree of mixing of isolated soybean protein. The raw material mix was 50% soybean protein, 30% gluten, and 20% corn starch, and soybean protein was mixed with isolated soybean protein(ISP) and defatted soybean flour(DSF) at a ratio of 0:50, 10:40, 20:30, 30:20, 40:10, and 50:0%. Extrusion was performed using an extruder equipped with a cooling die, maintaining a barrel temperature of 190°C and screw speed of 250 rpm, water was injected at a rate of 10 rpm using a metering pump. TVP mixed with 30% ISP had a dense appearance and the highest hardness and cutting strength. Springiness, Gumminess, Chewiness, and cohesiveness were significantly lower in TVP mixed with 0–40% ISP, and higher at 50%. The moisture content ranged from 43.24 ± 0.50 to $45.94 \pm 0.97\%$, and TVP mixed with 30% ISP had the highest moisture content. The moisture absorption capacity was significantly lower at 11.36 ± 2.30 – $12.00 \pm 0.59\%$ for TVP mixed with 0–30% ISP, significantly higher at 15.50 ± 2.73 – $16.69 \pm 0.65\%$ for 40–50% ISP, and lowest at 30% ISP. Solids dissolution and turbidity showed a significant tendency to decrease in TVP mixed with 30–50% ISP. This study confirmed that degree of mixing of isolated soybean protein, has a positive effect on the organization of TVP.

P2-41

Storage characteristics of defatted soybean flour texturized vegetable protein (TVP) with rice flour and pH adjusting agent

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The storage characteristics of defatted soybean flour TVP were examined by substituting rice flour for isolated starch and incorporating baking soda, an alkaline agent. The raw material comprised a mixed powder containing defatted soybean flour, gluten, and rice flour in a ratio of 5:3:2. Baking soda was added at a concentration of 1.5% based on the weight of the mixed powder. Extrusion molding was conducted using an extruder equipped with a cooling die, with a barrel temperature set at 190°C, a screw rotation speed of 250 rpm, and water injected at a metering pump speed of 10 rpm. The TVP sample treated with rice flour and baking soda produced good overall results in terms of appearance, beany flavor(odor), and texture. Even throughout the 9th day storage period at -20°C, the appearance, texture, and turbidity analysis of TVP treated with rice flour and baking soda showed the least quality changes. The rice flour treatment group also showed good quality. These results suggest that the retrogradation delay effect of baking soda on starch and water absorption capacity of rice flour positively impact the quality of TVP during storage.

P2-42

Development of a color model and colorimetric analysis of different rice varieties using machine visionDong-Gwan Shin^{1,2*}, Hoon Kim¹, Hong-Sik Kim¹, Jae-Woong Han²¹*Korea Food Research Institute*²*Division of smart farm Engineering, Kongju National University*

Inconsistent rice milling can result in a deterioration of rice quality, increased residual broken rice, and decreased head rice yield. whiteness meter is used to measure the milling degree during the milling process, but this has the disadvantage of requiring sampling. Additionally, developing a L,a,b model using images from various cultivars can enhance the model's applicability and validation effectiveness. Therefore, in this study, to monitor the degree of milling in real-time, domestic Samkwang, Chucheong and Goldqueen varieties were processed at milling degrees ranging from 20 to 44 degrees, and the appearance of the rice was photographed using a camera(BFLY-PGE-12a2c-cs, Pointgray). Raw images were processed using Python(v. 3.11.7) to extract rice grains, and a whiteness model was developed using R (v. 4.3.3, R Foundation). We conducted a comparative analysis of the L, a, and b values for each variety

P2-43

Comparison of quality and flavor characteristics of imported, domestically produced, and developed brandy

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In a previous study, we developed a brandy that was distilled from higher alcoholic content wine and aged with medium oak chips to simplify and reduce the brandy making process. The physicochemical and flavor properties of five imported, three domestic, and developed brandies were tested. In imported brandies, the pH, acidity, and volatile acidity remained stable, whereas in domestic brandies, these parameters varied significantly by products. Regarding chromaticity, the color index were similar between imported and developed brandies, while domestic brandies exhibited lower overall values except for L*. Electronic tongue analysis revealed that both imported and developed brandies had relatively balanced overall taste profiles. In contrast, domestic brandies displayed a stronger sourness and umami taste. The flavor profile analysis indicated that imported brandies had a high intensity of isoamyl alcohol (banana), while local brandies had a high intensity of ethyl acetate (paint). These results provide information about the quality characteristics of imported and domestic brandies and suggest that the brandy making process used in this study can potentially be useful for the brandy industry.

P2-44

Physicochemical and flavor characteristics of wine depending on persimmon varieties.

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The quality of wine can be highly determined by the selection of the brewing variety. In this study, the Japanese persimmon variety 'Buyu', which is grown over 80% in Korea, was used as a control. Additionally, three domestically grown varieties—'Gampung', 'Yeonsu', and 'Romang'—were also tested for wine making potential. In terms of wine quality, volatile acid contents was higher in *Buyu* and *Romang*, measuring 781 mg/L and 1,025 mg/L respectively, which could be negatively impact in wine quality. The *Yeonsu* exhibited higher concentrations of alcohol, tannin, and glycerol, potentially enhancing the flavor of the wine. The organic acid composition of *Buyu* and *Romang* contains higher amounts of acetic acid, which may result in a detectable vinegary aroma. For volatile compounds, *Buyu* and *Romang* had higher concentrations of ethyl acetate, whereas *Yeonsu* and *Romang* showed higher levels of 3-methyl-1-propanol, indicating a banana flavor. The taste profile showed that *Yeonsu* had the highest sweetness and bitterness, which are important wine indicators, while *Gampung* displayed excessive sourness and umami. Antioxidant activities that persimmon wine made from *Yeonsu* showed significantly higher values in all analysis. These results provide information of persimmon wine properties and suggest that *Yeonsu* may be a suitable variety for wine making.

P2-45

가공 후 남은 매실 부산물의 식품 소재로서 활용성

정민영

주식회사 케이에프

매실은 대부분 술, 엑기스, 청, 장아찌 등 가공용으로 활용되고 있다. 가공 제품 생산 후 매실 부산물은 많은 양이 발생하고 있으며 이를 처리하기 위한 비용 또한 발생하고 있어 이에 대한 대책이 필요한 실정이다. 그동안 농산물을 이용한 식품 제조 후 발생하는 부산물을 비료, 사료, 첨가제 등으로 활용하는 것에 대한 연구개발이 다양하게 이루어져 왔다. 본 연구에서는 매실 엑기스 제조 후 발생하는 부산물의 식품 원료 활용 가능성을 확인하고자 하였다.

본 실험에 사용한 매실은 경남 하동군에서 5월 말 수확한 청매실이며, 혼합비율 1(매실):1(설탕)로 하여 100일 동안 숙성·제조한 엑기스의 매실 부산물과 생매실을 영양분석 하였다. 그 결과 생매실의 열량은 100g 당 36.7kcal, 나트륨 6.9mg, 탄수화물 7.0g, 당류 0.3g, 지방 0.3g, 트랜스지방 0.0g, 포화지방 0.0g, 콜레스테롤 0.0mg, 단백질 1.5 g 으로 나타났으며, 매실부산물의 경우 열량은 100g 당 268.7kcal, 나트륨 10.7mg, 탄수화물 65.0g, 당류 32.5g, 지방 0.3g, 트랜스지방 0.0g, 포화지방 0.0g, 콜레스테롤 0.0mg, 단백질 1.5g 으로 생매실에 비해 열량, 나트륨, 탄수화물, 당류가 높은 것으로 나타났다. 특히 당류의 경우 100배 이상 증가한 것으로 이는 매실 엑기스를 제조할 때 사용되는 설탕의 영향이 큰 것으로 사료된다. 매실부산물을 식품 신소재로 활용하기 위해서는 매실 엑기스 제조 시 당류를 저감할 수 있는 천연당 활용 등 이에 대한 연구가 필요할 것으로 사료된다.

P2-46

Jack bean-based upcycled candies: roasting optimization and antioxidant analysisRheeno Lee*, Do-Yeon Go^{2,3}, Yong-Suk Kim*Department of Food Science & Technology, Jeonbuk National University,**²Department of FoodTech, Jeonbuk National University,**³Green Road corp.*

Jack beans (*Canavalia ensiformis*) are rich in flavonoids, which are known for their potent antioxidant properties. This study aimed to optimize the roasting process of jack bean powder, a byproduct of tea production, combined with xylitol for the creation of upcycled food candies. Additionally, the antioxidant compounds in the jack bean extracts were measured. The jack beans were roasted at temperatures of 250°C, 270°C, and 290°C, with roasting durations of 35, 40, and 45 minutes at 270°C, respectively. The optimal roasting condition was determined to be 270°C for 40 minutes. To assess antioxidant properties, the ABTS and DPPH radical scavenging activities of four types of jack bean extracts were evaluated. The ABTS radical scavenging activities of jack bean concentrate (JBC), jack bean organic acid concentrate (JBOC), jack bean distillate (JBD), and jack bean organic acid distillate (JBOD) were $20.06 \pm 0.00\%$, $34.25 \pm 0.00\%$, $44.25 \pm 0.00\%$, and $47.10 \pm 0.00\%$, respectively. The DPPH radical scavenging activities for the respective extracts were $90.47 \pm 0.17\%$, $97.31 \pm 0.05\%$, $45.55 \pm 0.20\%$, and $49.13 \pm 0.47\%$. Preference evaluation was conducted using three different recipes, varying the ratios of jack beans, xylitol, and flavoring agents. Among these, Recipe A, consisting of 95% jack beans and 5% xylitol, received the highest overall preference. Consequently, this formulation ratio was selected for the production of the upcycled food candy.

P2-47

나주배를 활용한 젤리스틱형 숙취해소제 개발

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나주배는 유기질이 많고, 배수가 양호한 영산강 유역의 양질의 토양여건이 뒷받침되고 있기 때문에 당도가 높고, 살이 연하고,즙이 많은 것으로 알려져 있다. 허나 우리나라 과실 가공률은 10% 미만이며, 배의 경우 전체 생산량의 1.5% 수준만이 가공품 형태로 소비되는 실정이다. 따라서 본 연구의 목적은 지역 특산품인 나주배를 활용하여 고부가가치 숙취해소 제품 “꿀배스틱”의 개발을 하고자 하였다. 특히 2040세대들의 숙취해소를 도와 건강한 라이프 스타일을 찾을 수 있는 젤리스틱형 숙취해소제를 개발하고자 하였다. 나주배 농축액의 알코올 분해능을 증진하기 위하여 Cellulase 및 Protease 계열의 효소 4종을 활용하여 나주배 농축액의 효소 분해를 진행하였다. 그 결과 Cellulase T^{Am}ano⁴를 6h 처리한 것의 ADH 활성 촉진율이 효소처리하지 않은 나주배 농축액 대비 191.8%로 유의미한 결과를 도출하였다. 이를 활용하여 본 시제품을 제조하여 타사 스틱형 숙취해소제 s사, c사와 ADH 활성 촉진율에 대한 비교실험을 하였다. 그 결과 꿀배스틱의 경우 Average 324.1%의 결과값을 도출하였다. Average 362.4%로 결과값이 제일 높은 c사 제품과 비교하였을 때 유의미한 차이를 보이지 않았으며, 이는 술깨조의 시제품인 꿀배스틱이 시중에 판매되고 있는 타 숙취해소제품만큼의 알코올 분해능이 있음을 알 수 있다.

9대 영양소 분석결과 100g당 함량 기준으로 열량 104.76kcal, 나트륨 37.86mg(2%), 탄수화물 25.44g(8%), 당류 7.29g(7%), 단백질 0.66g(1%) 지방 0.04g(%) 콜레스테롤 0.00g(%)을 나타냈다. 이중 당류는 타사 숙취해소 제품보다 적게 도출되었으며, 이는 당류 저감화 숙취해소제로 활용이 가능할 것으로 보인다. 이러한 결과를 바탕으로 지역특산품인 나주배를 활용하여 2040세대 소비층의 선호도가 높은 고부가가치 식품의 개발이 될 것으로 판단된다.

P2-48

Comparison of physicochemical properties of wheat flour and *Makgeolli* for selecting suitable wheat varieties for brewing

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The purpose of this study was to analyze the physicochemical properties of *Makgeolli* made from various wheat varieties. The wheat varieties used for brewing analysis were *Guemgang*, *Wooju*, *Saeguemgang*, *Hojoong*, *Baekchal*, *Joa*, *Goso*, *Baekgang*, *Jogyung*, *Arijinheuk*, *Hwanggeum*, and a new cultivar distributed by the National Institute of Crop Science, except for imported wheat (control). The results indicated that the wheat flours of *Saeguemgang* and *Goso* were deemed suitable for brewing due to their low crude protein and crude fat contents, and high carbohydrate content. The physicochemical properties of *Makgeolli* showed that the total acid content, soluble solids, and reducing sugar content ranged from 0.58 to 0.90%, 14.17 to 17.67 Brix, and 0.19 to 3.31%, respectively. The sugar–acid ratio, which significantly impacts *Makgeolli* preference, ranged from 0.26 to 6.52. The sugar–acid ratio was highest in the *Makgeolli* made from *Baekchal*, *Saeguemgang* and *Joa*. In terms of free sugar content, glucose was identified as the predominant free sugar and was present in higher concentrations in the *Makgeolli* made from wheat varieties with a higher sugar–acid ratio. Lactic acid imparts a refreshing acidity, was detected as the primary organic acid. Therefore, it is expected that this study will be helpful in evaluating the quality of *Makgeolli* production and selecting suitable wheat varieties for making *Makgeolli*.

Comparative physicochemical and sensory properties of *Yakju* made from different rice varieties for selecting suitable for brewingBo-Ram Kim^{1*}, Hyun-Ho Kang^{1,2}, Chan-Woo Kim¹, Ji-Eun Kang¹, Ji-Ho Choi¹¹*Fermented and Processed Food Science Division,
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In this study, we aimed to analyze the physicochemical and sensory properties of *Yakju* made from various rice varieties. The rice used for brewing included *Geumgang-1*, *Hanareum-4*, *Chohong*, *Saemimyeon*, *Mirchal*, *Irumi*, and *Migam*, which were distributed by the National Institute of Crop Science. The results showed that the alcohol content, soluble solid content, pH, total acid content, reducing sugar, and sugar-acid ratio of the *Yakju* made from each rice variety were 16.00~17.33%, 13.03~17.23 brix, 4.13~4.30, 0.35~0.41%, 2.99~6.40%, and 7.59~18.25, respectively. The *Yakju* made from *Chohong* and *Migam* showed a high sugar-acid ratio (18.25 and 17.81). The free sugar content was detected at the highest concentrations in the *Yakju* made from *Irumi* and *Migam*. The volatile analysis showed that the total ester compounds, associated with fruity and floral aroma notes, were higher in the *Yakju* made from *Geumgang-1* and *Migam*, indicating a higher potential for producing aromatic *Yakju*. Furthermore, the sensory evaluation results showed that the *Yakju* made from *Chohong* and *Migam* received higher scores for taste and overall liking. This finding was consistent with the results observed for varieties with a higher sugar-acid ratio. Overall, *Migam* appears to be suitable for *Yakju*. However, further investigation into the physicochemical characteristics of these rice varieties and their association with other quality attributes of the *Yakju* are necessary to provide a more comprehensive understanding.

P2-50

Comparative analysis of physicochemical and sensory characteristics for selecting suitable rice varieties for distilled *Soju*

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This study aimed to investigate the physicochemical and sensory characteristics of distilled *Soju* made from various rice varieties. The rice used for brewing included *Geumgang-1*, *Hanareum-4*, *Chohong*, *Saemimyeon*, *Mirchal*, *Irumi*, and *Migam*, which were distributed by the National Institute of Crop Science. The alcohol content ranged from 32.07 to 38.80%. In particular, the alcohol content was more than 35%, except for *Soju* made from *Saemimyeon*. The pH ranged from 4.59 to 5.53, and the total acid content was very low, 0.002 to 0.018%. Among the volatile components of distilled *Soju*, the sum of the higher alcohols 1-propanol (P), isobutanol (B), and isoamyl alcohol (A) ranged from 556.70 to 699.87 mg/L, with *Soju* made from *Irumi* having the lowest and *Soju* made from *Mirchal* having the highest values. The total ester compounds, which positively influence the quality of *Soju*, ranged from 16.66 to 30.46 mg/L, with *Soju* made from *Geumgang-1*, *Hanareum-4*, and *Irumi* exhibiting high concentrations. Furfural was detected at the highest value in *Soju* made from *Irumi* at 2.13 mg/L. In the sensory evaluation, although no significant differences were observed in the overall acceptability scores, *Soju* made from *Irumi* exhibited the highest score. Furthermore, in the attribute intensity evaluation, only the *Irumi* showed significantly higher scores for burnt and nutty aromas. Overall, the *Irumi* variety was deemed the most suitable for *Soju* production.

P2-51

Growth and volatile compounds of sweet basil from different cultivation conditionsSeoyoung Jeon^{1*}, Ahna kim², Kihyun Kwon^{1,2}¹*Food safety and distribution research group, Korea Food Research Institute*²*Research group of digital factory, Korea Food Research Institute*

The use of smart farms for the hydroponic cultivation of herbal plants has been the subject of many research. This study aimed to analyze the growth changes and main volatile compounds of sweet basil from different cultivation conditions. Sweet basil (*Ocimum basilicum* L.) cultivated in smart farm and the seeds were planted in the plastic tray for 30 days and growth samples were observed for 28 days. Control (CON) was grown in soil + LED (9h/day), B-9: hydroponics + LED (9h/day) and B-24: hydroponics + LED (1h on-off/day). The growth changes and main volatile compounds were measured every 7 days. CON showed no significant growth change until 14 days, but showed rapid growth after 21 days. B-9 showed higher results in height, leaf length and width, while B-24 showed higher results in leaf number and diameter. The SPAD value tended to decrease in all samples as the growth date increased. The content of methyl chavicol (Estragole), the main volatile compounds of basil, was 15.01% in basil seedlings (100% conversion), with CON 18.17%, B-9 18.14% and B-24 28.92% at 14 days. CON 15.78%, B-9 22.03% and B-24 19.60% at 21 days. CON 25.02%, B-9 19.41% and B-24 21.92% at 28 days of growth.



P2-52

Analysis of the growth and functional compounds of hydroponic sprout barley with different light conditions

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This study analyzed the growth and functional compounds of sprout barley through seed disinfection and light treatment. Hyemi (the covered barley produced in 2022) was cultivated in a container farm and the seeds were sanitized using hypochlorous acid water (HOCl) and plasma discharge water (PDW). This process was conducted for 12 days at $18 \pm 2^\circ\text{C}$, $70 \pm 10\%$ humidity and 9-hour irradiation time. The light treatments were B1: 405 nm LED (white) (PPFD1):343), B2: 100% LED (red+blue) (PPFD:254), B3: 66% LED (red+blue) (PPFD:208) and B4: fluorescent light (white) (PPFD:160). Germination (%) and growth changes were measured and analyzed for policosanol (1-Hexacosanol) and saponarin. Germination rate (day 1, dark room), PDW-treated seeds had 91.7–98.3%, HOCl-treated seeds had 16.7–23.3%. PDW treatment showing the highest germination rate. On growth days 6 and 9, PDW-treated seeds were 0.5–1cm longer than HOCl-treated seeds. The B1 and B2 light-treated samples showed greater length on 12 days. The contents of policosanol and saponarin (mg/100mg) tended to be slightly higher in the PDW treatment, with higher contents of policosanol and saponarin in white light B1 and B4.

1)PPFD: Photosynthetic photon flux density ($\mu\text{mol}/\text{m}^2/\text{s}$)

P2-53

Effect of different salt types on the fermentation of kimchiYun-Jeong Choi^{1*}, Hee Eun Kim^{1,2}, Sung Hee Park¹, Mi-Ai Lee¹¹Kimchi Industry Promotion Division, World Institute of Kimchi²Department of Integrative Food, Bioscience, and Biotechnology,
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To investigate the influence of salt types on the fermentation characteristics of kimchi, three types of kimchi were prepared using refined salt (RS), solar salt (SS), and pink salt (PS) and stored at 6°C for 4 weeks. The characteristics of each kimchi samples, including pH, acidity, salinity, microbial community, texture, and metabolites were analyzed during kimchi fermentation. The salinity of kimchi was similar levels (2.03~2.06%). RS quickly reached the optimal ripening stage of kimchi. During fermentation, yeast and mold were detected at the lowest levels in RS. At the beginning of fermentation, the dominant microorganism was *Aerosakkonema funiforme* in all sample, but *Latilactobacillus* spp. became the dominant species as fermentation progressed, with the highest levels observed in PS. *Leuconostoc* spp. showed high levels primarily in RS. Hardness was the highest in PS during fermentation. Additionally, 39 metabolites were identified using GC-MS-based metabolite analysis, and we confirmed the production of metabolites in kimchi differed depending on the type of salt used. In particular, the production of mannitol was rapid in RS, and the production of lactic acid was slow in PS. These results suggest that salt type used in salting process affects fermentation pattern and the texture of kimchi. Therefore, this study provides important basic data for salt selection in kimchi production and is expected to contribute to the improvement of kimchi quality.

P2-54

Physicochemical properties of edible insect oil affected by drying method

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Edible insects are considered an alternative source of protein and one of the sustainable food sources for future food materials. Research has primarily focused on protein extraction and processing, with proteins being produced through degreasing processes. To utilize the lipids generated during the degreasing process as a new food source, the physicochemical properties of edible insect oil were compared according to different drying methods. Three types of edible insects were pretreated with hot air drying and lyophilization, and oil was obtained by solvent extraction. The difference in yield by drying method was notable in *Alomyrina dichotoma*. Additionally, the hot air-dried samples showed higher chromaticity than those dried by lyophilization, and yellowness was particularly high in *A. dichotoma*. The iodine value tended to increase with hot air drying. The peaks found in DSC were affected by the drying method. This study evaluated the potential of insect oil as a food source by examining its physicochemical properties according to different drying methods.

P2-55

갯 시래기 건조조건에 따른 품질특성

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갯(leaf mustard, *Brassica juncea*)은 십자화과에 속하는 엽경 채소류 중의 하나로 갯김치의 주재료나 각종 김치의 부재료로 널리 이용되고 있다. 특히, 전남 여수 돌산갯은 재배 환경 때문에 다른 지역의 갯에 비해 매운맛이 적고, 특유의 향과 섬유질이 적어 부드러운 장점이 있어 소비자들에게 각광을 받고 있는 지역특산품이나 갯김치 이외 가공제품이 다양하지 않다. 따라서 연중 소비할 수 있는 가공제품으로 갯 시래기 제조를 위해 열풍, 천일 및 동결건조를 하여 시간과 품질을 서로 비교하였다. 열풍건조의 경우 40℃ 건조시 7시간이 소요되었으며 천일건조와 동결건조는 각각 93시간과 77시간의 장시간이 요구되었다. 건조방법에 따른 갯 시래기의 녹색도는 동결건조에서 가장 높았으며, 열풍건조, 천일건조 순으로 동결건조 색상이 가장 좋았으나 과도한 건조로 인해 조직감이 낮아 상품성이 떨어지는 문제점이 있었다. 건조 조건에 따른 기능성 성분 함량은 열풍건조가 천일건조 및 동결건조 대비 시니그린 및 총플라보노이드 함량이 높았으며, 온도에 따라서는 40℃에서 건조시 가장 높았다. 따라서 갯 시래기를 제조하는 경우 기능성 성분, 관능 특성 및 경제성을 고려하였을 때는 40℃ 열풍건조가 가장 적합한 것으로 판단되었다.

P2-56

Deep learning-based prediction of consumer preference for pre-packaged shrimp (Gambas) meal kitsUi Jin Kim^{2*}, Bo Young Jeon², Hyun Sub Kim², Mi Jeong Kim^{1,2}¹*Department of Food and Nutrition, Changwon National University*²*Interdisciplinary Program in Senior Human Ecology,
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This study investigates the physical and sensory characteristics of each of the five commercial Gambas meal kits (Peacock, Food assemble, Entree, Fresheasy, Mealpang) to predict consumer preference employing a deep learning algorithm. The physical characteristics of Gambas meal kits were volume, density, weight, length, diameter, and color of the four ingredients (shrimp, bread, garlic, and pepper). Sensory characteristics were determined through evaluation process including preference testing, intensity assessment, visual evaluation of appearance and composition, and MaxDiff choice modeling. Food Assemble showed the highest weight of shrimp and garlic among five meal kits, while showing the highest weight of pepper in Milpang meal kit. Regarding the color of shrimp, Milpang showed the lowest L^* and b^* values. The color of the bread was lightest in the Entree meal kit, showing the highest L^* value and the lowest a^* and b^* values. According to the MaxDiff survey, shrimp was the most important ingredient to be included in the meal kit while lemon was the least important. Fresheasy was the most preferred brand in terms of composition, and Peacock was the highest preference for the appearance of Gambas packaging. Consumer preference for Mealpang was the high across all sensory attributes (appearance, taste, aroma, texture, and overall preference). Consumers' preference increased with the intensity of spicy aroma, spicy taste, and tingling sensation, in contrast, it decreased with higher intensity of bitterness and blandness. This finding provides valuable insights into sensory characteristics and consumer preferences of Gambas meal kits for the development of meal kits to meet the consumer expectations.

P2-57

가루쌀 로스팅 조건에 따른 품질특성 및 가공적성 비교

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최근 정부에서는 쌀 과잉생산과 수급문제 해결을 위해 건식제분 전용품종 ‘바로미2’ 재배면적을 전국적으로 확대하고 있으며 특히, 전남은 3,264ha로 전국의 40%의 면적을 차지하고 있다. 확대 생산되고 있는 가루쌀의 다양한 소비처 마련을 위해 가루쌀의 로스팅 처리로 가공적성을 향상시키고자 하였다. 가루쌀의 구수한 맛 향상을 위해 로스팅 온도, 시간을 검토하였고 콘 과자를 제조하여 가공적성을 검토하였다. 가루쌀을 로스팅 하였을때 시간이 증가할수록 명도(L)는 감소하고 a와 b 값이 증가하였다. 또한, 230℃ 이상의 온도와 30분 이상의 시간에서는 명도가 너무 낮으며 탄맛으로 인해 기호도가 떨어지는 문제점이 있어 가루쌀을 로스팅 하는 경우 230℃의 온도에서 30분 로스팅이 적합할 것으로 판단되었다. 이렇게 전처리된 가루쌀을 0~50% 첨가하여 아이스크림 콘 과자를 제조하여 품질특성을 조사한 결과 20%까지 가루쌀을 첨가하여 제조가능 할 것으로 보였다. 로스팅 가루쌀을 첨가하여 콘 과자를 제조하는 경우 반죽의 점성이 증가하여 밀가루만 사용한 대조군 대비 정제수를 1.1배 첨가하는 것이 성형과 관능평가 측면에서 적합하였다.

P2-58

아린 맛 성분을 저감한 토란 반가공소재 비교

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토란(*Colocasia esculenta*)은 주로 괴경을 알토란으로 이용하고 있는 식량작물로 대부분 전분질이지만 필수아미노산, 무기질,식이섬유가 풍부하고 갈락탄, 뮤신 성분을 함유하여 혈압조절, 소화촉진, 변비개선 등에 효능이 있다. 하지만 아린 맛이 강하여 모든 연령대가 소비하기에 한계가 있고 추석 집중출하로 연중 소비에 한계가 있다. 따라서 본 연구에서는 상온보관용 아린 맛 성분을 저감하는 토란 소재화 방법과 상온 및 냉동 보관용 토란 소재의 아린 맛 성분을 비교하였다. 6가지 침지수 중 소금물에서 아린 맛 성분이 가장 낮았으며, 1~3% 소금물 농도는 2%에서 증가, 3%는 감소하였으나 1%에서 아린 맛 성분이 가장 낮았다. 침지시간 역시 4시간 이후 6시간까지 감소하다 7시간 침지 시 증가하였고 5시간과 6시간이 유의적 차이가 없어 5시간에서 아린 맛 성분이 가장 낮았다. 또한, 건조, 볶음, 찌기, 숙성, 데치기의 열처리 결과 3분 데친 후 열풍건조 시 아린 맛 성분이 가장 낮았고, 아린 맛을 낼 수 있는 잠재적 성분인 Ca 함량도 가장 낮은 함량을 보였다. 이렇게 제조한 토란 분말은 열풍건조만 한 무처리 대비 30%, 쌀뜨물에 침지 후 삶아서 페이스트로 제조한 기존의 소재 대비 14% 아린 맛 성분을 줄일 수 있었다.

P2-59

수산물 단백질 활용 유자 음료의 첨가물에 따른 비린맛 저감 효과 비교

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최근 소득수준의 향상과 인구구조의 변화로 식품 소비 패턴이 탄수화물 소비는 줄고, 단백질 소비는 높아지는 질적변화가 이루어지고 있다. 이에 따라 단백질 식품 시장이 지속적으로 성장하고 있는 가운데 수산물 단백질과 식물성 단백질이 축산물 단백질의 대체 선택지로 부상하고 있고, 특히 RTD 형태의 단백질 음료 시장이 확대되고 있다. 따라서, 본 연구에서는 수산물 단백질을 활용하여 건강 음료를 개발하기 위해 비타민C 함유량이 높은 유자와 수산물의 비린맛을 저감할 수 있는 부재료의 혼합, 식품첨가물 처리 조건에 따른 주요 성분 및 품질특성, 관능적 기호도를 조사하였다. 해삼 단백질은 비린 맛이 없어 부재료를 혼합하지 않아도 되었으며, 홍합 단백질은 녹차 추출액, 유자향과 녹차향을 첨가하고, 굴 단백질은 비파 농축액, 감귤향과 비파향을 첨가하는 것이 비린맛에 대한 관능적 기호도가 좋았다. 또한, 수산물 단백질 첨가 후 비린맛 저감을 위한 부형제 첨가시, 사이클로덱스트린과 녹차추출분말의 단일처리 보다 혼합처리 시 비린맛에 대한 관능적 기호도가 가장 좋았으며, 이때 향산화활성 및 루틴 함량 또한 높았다.

P2-60

양파 전처리 조건에 따른 양파당의 품질특성 및 주요 성분 비교

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최근 건강지향적인 트렌드에 따라 타가토스, 올리고당류, 스테비오사이드 같은 저열량 감미소재 등 다양한 설탕 대체감미료를 선호하며 zero sugar 제품이 열풍이다. 이에 본 연구에서는 원물 자체에 많은 당을 함유하고 있는 양파를 이용하여 설탕 대체용 천연당을 개발하기 위해 양파의 마쇄, 착즙, 증숙 전처리 및 가열조건에 따른 품질특성 및 당 특성, 플라보노이드화합물 함량을 비교하였다. 그 결과, 양파를 증숙 후 마쇄하는 경우 비가열 및 착즙보다 양파당의 수율은 5.4~11.4%, 명도는 6.5~17.3% 높았고, quercetin은 33~56.4%, spiraeoside는 4.2~37.5%, isorhamnetin은 13.8~38.8% 함량이 더 높았다. 또한, 당화도 더 잘되어 감미도는 122%로 5~25% 더 높았으며, 맥아당 함량은 21635 mg/100 g으로 10.1~23.2% 더 높았고, 양파맛과 양파향이 크지 않아 관능적 기호도도 높은 결과를 얻었다. 양파의 증숙 조건은 온도(80℃, 100℃)와 시간(30분, 1시간)별로 검토한 결과, 100℃에서 30분 동안 증숙하는 것이 양파당의 맥아당 함량은 1.2~4.4%, 감미도는 1.8~3.6%, quercetin은 5.5~3.5%, spiraeoside는 11~31.7%, isorhamnetin은 29.6~44.4% 함량이 더 높았다.

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건조 방법 및 온도에 따른 양배추 분말의 품질특성 변화

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양배추는 분말로 제조했을 때 아린 맛이나 풋내로 인해 기호성이 떨어진다. 본 연구에서는 양배추의 아린 맛과 풋내를 줄이기 위하여 전처리 방법으로 찌기(3분) 공정을 추가하였고, 방법(동결, 열풍, 원적외선)과 온도(40~60℃)를 달리하여 건조한 후 분쇄하여 양배추 분말을 제조하였으며, 이화학적 및 관능적 특성을 조사하였다. 건조 방법별 수분 흡수·용해 지수는 유의적인 차이를 보이지 않았다. 수율은 열풍, 원적외선, 동결 순으로 나타났고, 당도와 식이섬유 함량은 동결건조가 높았으며 열풍, 원적외선 건조는 큰 차이를 보이지 않았다. 색도에서는 동결건조가 명도는 높고 적색도, 황색도는 낮아 갈변 현상이 적었다. 관능 평가 결과 원적외선과 열풍건조가 이취가 적고 전체적 기호도가 높은 것을 확인하였다. 건조 온도별 당도는 50℃까지 유의적인 차이가 없었으나 60℃ 건조했을 때 낮아졌으며 식이섬유 함량은 40℃ 건조가 50, 60℃보다 낮은 것으로 나타났다. 따라서 양배추 분말 제조할 때 건조 방법은 원적외선과 열풍건조로 하는 것이 이취를 줄이면서 기호도를 높일 수 있었고, 건조 온도는 50℃로 하는 것이 당도와 식이섬유 함량이 높아 적합할 것으로 생각된다.

P2-62

데치기 시간을 달리한 건 취, 곤드레의 복원 방법별 품질특성

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대부분 나물은 저장할 수 있는 기한이 짧아서 원물이 생산되는 기간 이후에는 데친 후 건조하여 건나물 형태로 제조하여 소비되고 있다. 그러나 기존의 건나물은 복원하는 데 장시간 불리거나 가열하여 섭취해야 하므로 쉽고 빠르게 섭취할 수 있는 제품을 원하는 소비자 요구에 맞지 않는다. 본 연구에서는 취와 곤드레의 데치기 시간(3~13분)을 달리하고 세절(0.5~1cm) 후 열풍 건조(50℃)하여 건나물을 제조하였으며 복원 방법별(80℃ 온수, 전자레인지, 끓는 물) 이화학적 특성을 조사하였다. 건조된 취, 곤드레의 수분함량은 2.75~3.59%로 조사되었고 데치기 시간이 늘어날수록 감소하는 경향을 보였다. 총 페놀과 총 플라보노이드 함량은 데치기 시간이 늘어날수록 소폭 증가하는 경향을 보였는데, 이는 데치기 시간이 증가함에 따라 조직이 물러지고, 건조물의 수분함량이 감소한 영향으로 생각된다. 색도에서는 취와 곤드레 모두 데치기 시간에 큰 영향을 받지 않았다. 복원 방법별 소요 시간은 취와 곤드레가 각각 1~3.8분, 3.33~6.5분으로 나타났으며 끓는 물, 전자레인지, 80℃ 온수 순으로 짧았다. 데치기 시간이 늘어날수록 복원 시간이 줄어드는 경향을 보였다. 복원 후 수분함량과 흡수량은 전자레인지와 끓는 물이 비슷한 경향을 보였고, 80℃ 온수가 약간 낮았다. 따라서 데치기 시간을 조절하고 세절하여 건조하면 즉석 섭취가 가능한 건나물을 제조할 수 있을 것으로 판단되며, 나물을 활용한 즉석식품 개발에 활용할 수 있을 것으로 보인다.

P2-63

Changes of antioxidant activity and lignan contents in schisandra extract by enzymatic processing

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We investigated antioxidant activity and lignan contents by enzymatic processing to expand use of Schisandra Extract. The total polyphenol content and flavonoid content of Schisandra Extract differed depending on the type and content of enzymes (C150P, AC). In particular, when C150P and AC were used together, the total polyphenol content and flavonoid content increased, 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical in thus it showed a high antioxidant activity. In both types of enzyme treatment, the lignan content was higher than without treatment, and the content of high-micin A increased. The cysandrin content of Schisandra extract differed according to the type of enzyme, and the content of gomicin A differed according to the enzyme content.



P2-64

Development of novel sericin bigel beads for co-encapsulation of L-ascorbic acid and β -carotene: Evaluation of stability and *in-vitro* gastrointestinal release profileThinzar Aung^{1*}, Nayab², Egwumah Ojochenemi Rebecca², Mi Jeong Kim^{1,2}¹Department of Food and Nutrition, Changwon National University²Interdisciplinary Program in Senior Human Ecology, Changwon National University

This study aims to develop a novel bigel bead using sericin, a protein from silkworm, for co-encapsulation of lipophilic and hydrophilic bioactives. Bigel beads were formulated with different ratios (1:1, 1:4, and 1:8) of oleogel and sericin hydrogel encapsulating β -carotene and L-ascorbic acid simultaneously. Physical characteristics, stability, and release profile through *in vitro* gastrointestinal digestion (GI) were determined. The hardness of bigel beads decreased with lower incorporation of oleogel. Bigel beads with an equal ratio of oleogel and hydrogel exhibited the highest water-retention capacity. Fourier transform-infrared (FTIR) spectroscopy revealed no evidence of new peak formation or peak shifts, suggesting no interaction between oleogel and hydrogel. Differential scanning calorimetry analysis suggests that bigel beads with higher sericin hydrogel content exhibit a stronger and more stable gel network structure. Encapsulation efficiency (EE) of β -carotene in bigel beads with higher oleogel content showed the higher stability, while the beads with higher hydrogel content had a higher EE of L-ascorbic acid. A similar stability was exhibited in bigel beads stored at 4 °C and 25 °C, retaining ~40% of bioactives after a 15-day storage period. Simulated GI digestion of bigel beads evidenced the higher release of encapsulated bioactives during the intestinal phase. This study offers the formulation of novel sericin bigel beads for co-encapsulation of lipophilic and hydrophilic bioactives simultaneously, holding promise for the creation of functional food with controlled nutrient delivery.

P2-65

Upcycling coffee grounds in extruded snacks for enhanced functionality and sustainability

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In this study, extruded snacks were prepared using the extrusion process with a particular focus on upcycling coffee grounds. Corn starch was used to prepare the coffee grounds snacks, with coffee grounds content formulated at 0, 10, and 20%. The extrusion parameters were set to 35% moisture content, 150°C barrel temperature, and 250 rpm screw speed.

Compared to the pre-extrusion sample, the chromaticity of the post-extrusion snacks was higher due to the heat-induced browning reaction during the extrusion process. In terms of expansion ratio, there was no significant difference between the 0% and 10% coffee grounds snacks, but the 20% snacks had a relatively lower expansion ratio and higher piece density than the 0% and 10% coffee grounds snacks. The hardness test showed the highest values at 20%, followed by 10% and 0% content. In the water solubility index, the post-extruded snacks showed higher values compared to the pre-extruded samples. The water absorption index decreased as the coffee grounds content increased in the extruded snacks. Antioxidant activity, measured by ABTS and DPPH radical scavenging capacity tests, increased with higher coffee grounds content. This study highlights the potential of upcycling coffee grounds into functional food products, suggesting a sustainable approach to food production.

P2-66

동물성 지방을 모방하기 위한 곤약 글루코만난, 알긴산나트륨 및 라드 기반 에멀션 겔의 개발

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최근 육류와 동물성 지방의 섭취가 증가함에 따라 건강과 환경에 미치는 부정적 영향이 커지고 있다. 이러한 문제의 해결책으로 지방 유사체가 주목받고 있으며, 에멀션 겔 기반 지방 유사체에는 주로 다당류와 식물성 오일 등이 사용되고 있다. 그러나 곤약 글루코만난(KGM)은 단독 사용하면 고온 조리 시에 동물성 지방의 조직감을 모방할 수 없다. 또한, 식물성 오일은 약한 조직감과 오일 누출의 원인이 되어 실온에서 고체 상태를 유지하기 어렵게 한다. 따라서 본 연구에서는 KGM과 알긴산나트륨(SA)의 복합 겔 구조와 실온에서 고체인 라드를 활용한 에멀션 겔을 개발하여 동물성 지방의 모방 가능성을 조사하였다. 에멀션 겔은 SA 함량을 0%, 0.1%, 0.2%, 0.3%, 0.4%, 0.5%로 달리하여 제조하였다. pH는 SA 함량이 증가함에 따라 상승하는 경향을 보였으며, 수분 함량은 감소하는 경향을 나타냈다. 또한, 조리 전 색도는 SA 함량이 증가함에 따라 L* 값과 b* 값이 증가하고 a* 값은 감소했으며, 조리 후에는 L* 값이 증가하고 a* 값과 b* 값은 감소했다. 조리된 에멀션 겔의 조직감 실험 결과 SA 함량이 증가할수록 경도는 증가했으며, 탄력성과 응집성은 감소하였다. 그리고 씹힘성은 SA 함량 0-0.4%까지는 증가하는 경향을 보이다가 0.5%에서는 감소했다. 조리 손실은 SA 함량이 증가할수록 감소하는 경향을 나타냈다. 이러한 연구 결과는 SA가 포함된 에멀션 겔이 포함되지 않은 에멀션 겔보다 동물성 지방의 품질 특성을 효과적으로 모방할 수 있으며, 육류 제품의 지방을 대체할 수 있는 잠재력이 있을 것으로 사료된다.

P2-67

초음파 전력과 처리 시간을 달리하여 제조한 홍삼 전분의 품질 특성 비교서유민^{1*}, 김지윤, 김정수¹, 성진수¹, 김수현¹, 임정호², 문광덕^{1,3}¹경북대학교 식품공학부, ²한국식품연구원, ³경북대학교 식품생물산업연구소

홍삼 전분은 홍삼농축액의 제조 과정에서 다량 생성되는 불용성 성분으로, 높은 점성 때문에 대부분 정제 과정을 거쳐 제거하고 있다. 본 연구에서는 홍삼 전분의 활용 가능성을 높이기 위해 다양한 초음파 전력(200W, 400W)과 처리 시간(20분, 60분)에 따라 초음파 처리된 홍삼 전분을 제조하여 품질 특성을 비교하였다. 전분 추출은 홍삼의 추출 과정에서 얻은 부산물인 홍삼박에서 추출하였으며, 홍삼박의 건조 및 분말화를 거쳐 알칼리 추출법으로 추출하였다. 실험 결과 보수력(WHC)은 초음파 처리를 하지 않은 홍삼 전분(CONT)에서 805.32%의 WHC를 보였으며 초음파의 전력과 시간이 증가할수록 증가하는 경향을 보였다. 보유력은 초음파 전력에 비해 처리 시간에 더 큰 영향을 받았고, 60분간 초음파 처리된 홍삼 전분이 733.53%로 가장 높았다. 홍삼 전분의 용해도는 초음파 전력과 처리 시간이 증가할수록 낮아지는 경향을 보였으며, 팽윤력은 초음파 전력에서는 유의적인 차이가 보이지 않았으나 처리 시간을 달리하여 초음파 처리한 홍삼 전분의 값은 CONT에 비해 증가하였다. 점도는 초음파 전력과 처리 시간이 증가할수록 높은 값을 보였고 shear rate가 증가할수록 전체적으로 감소하였다. 겔 강도는 WHC와 비슷하게 초음파 전력과 처리 시간이 증가할수록 CONT에 비해 높은 겔 강도를 나타냈다. 이러한 결과는 초음파 처리가 전분 분자에 더 많은 물을 가두게 하여 전반적인 홍삼 전분의 물리적 성질에 영향을 준 것으로 판단된다. 따라서 이 연구는 홍삼 전분의 활용 가능성뿐만 아니라 홍삼 전분의 초음파 효과의 기초 자료로 활용될 수 있을 것으로 사료된다.

P2-68

Observation of physicochemical properties of radish by various drying method**Seong Hun Oh^{1*}, Un Ha Mun², Seung Hyun Bae³,
Change Gyu Go³, Gye Hwa Shin¹**¹*Department of Food and Nutrition, Kunsan National University,*²*Sane Food,*³*FOODPOLIS, Korea national food cluster*

The upcycling method utilizing biomass from recently discarded agricultural by products after processing can significantly reduce environmental pollution by reusing waste materials to increase their value. Converting food by-products into valuable products also yields substantial economic benefits. Meanwhile, radishes contain various nutrients such as high levels of calcium, plant-based dietary fiber, and significant amounts of vitamin C. Radishes are particularly rich in digestive enzymes, notably amylase, an enzyme responsible for starch hydrolysis. In this study, dried radish slices were produced using three different drying methods: freeze-drying, hot-air drying, and microwave vacuum drying, utilizing radishes discarded after food processing. Physicochemical properties of these dried radish slices were analyzed, including color changes, antioxidant activities based on DPPH and ABTS assays, moisture content measurement, and textural observations of the radish slices. Furthermore, structural differences in the dried radish slices were observed using a Scanning Electron Microscope (SEM).

Effects of pH-shifting and ultrasound power on the functional properties of co-treatment extracted *Locusta migratoria* proteinSoo Hyun Kim^{1*}, Jung Soo Kim¹, Jiyeon Kim¹, Kwang-Deog Moon^{1,2}¹*School of Food Science and Biotechnology, Kyungpook National University*²*Food and Bio-Industry Research Institute, Kyungpook National University*

Locusta migratoria (LM) is a domestic food-acceptable insect recently gaining attention for its high productivity and rich protein source. However, due to its repulsive appearance, processing is essential, with protein alkaline extraction being the most common. To improve the yield and functionality of protein, assisted techniques including ultrasonication are used. In this study, proteins were extracted from LM at different pH (8, 10, and 12) and ultrasound power (100, 300, and 500 W), and the effects of each variable on the physicochemical properties and function of isolated LM protein (ILP) were investigated. For protein solubility, pH-shifting was the highest at 10 with 5.98 mg/mL, while ultrasound showed the lowest value at 300 W with 5.58 mg/mL ($p < 0.05$). Least gelation concentration was lowest at pH 10 and highest at 300 W. Water holding capacity decreased with increasing pH, but oil holding capacity increased with increasing power. Foaming and emulsifying capacity increased with increasing pH and ultrasonic power, respectively. DPPH antioxidant capacity was the minimum at 36.50% at pH 10 and the maximum at 45.09% at 300 W ($p < 0.05$). These results suggest that the combined treatment of pH-shifting and ultrasound power can improve protein functionality, thereby promoting the use of edible insects in the food industry.

P2-70

Chemical composition and physicochemical properties of dried laver (*Pyropia* spp.) in Korea

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Laver is a major seaweed cultivated and consumed worldwide, particularly in South Korea, Japan, and China. Known for its high protein and low lipid content laver, it is rich in essential amino acids and minerals. Porphyrin and phycobiliproteins, the characteristic carbohydrates and proteins in the laver exhibit antioxidant properties. These health benefits have led to a global increase in laver consumption. The price of Korean dried laver is relatively undervalued in overseas markets due to the lack of quality control standards.

This study analyzed the chemical composition and physicochemical properties of dried laver for quality classification. The physicochemical components (approximate composition, total amino acids, organic acids, ATP-related compounds, and cutting stress) of 25 types of dried laver were analyzed. Using PLS-DA models based on Tukey's ANOVA with 34 components, accuracy and R^2 values ranged from 81% to 100%, and 62 to 99%. Moisture, protein, and cutting stress were selected as representative quality indices for dried laver.

Moisture content ranged from 6.07 ± 0.04 to 12.04 ± 0.03 g/100g, crude protein content ranged from 32.27 ± 0.28 to 44.99 ± 0.06 g/100g, and cutting stress ranged from 136.63 ± 91.67 to 362.10 ± 164.09 kg/cm². Moisture and crude protein were separated into three groups, while cutting stress showed significant deviations across samples. This variability is attributed to the features of raw laver and porosity occurring during processing. However, cutting stress was classified according to PLS-DA based on Tukey's ANOVA with 100% predict accuracy.

P2-71

Development of nutrient-rich fish cakes using fish oil and egg yolk emulsion

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The consumption of seafood in South Korea is around 72.3kg per capita as of 2023, and the demand for seafood is growing every year. Consequently, the amount of by-products is also expected to increase annually, as there are many inedible parts such as heads, bones, skin/scales, intestines, and shells. These marine by-products contain various useful compounds such as proteins, lipids, and minerals. Therefore, developing a method for utilizing marine by-products is necessary.

This study was conducted to confirm the optimal emulsification conditions for fish oil extracted from fish by-products and to determine the nutritional improvement.

Egg yolk, a natural emulsifier, was used for effective emulsification of fish oil and surimi. The optimal ratio of egg yolk to fish oil was found to be 1:0.75 (fish oil:yolk). To achieve the recommended daily intake (2,000mg, Food Code) of EPA and DHA, 200g of fish oil and 150g of egg yolk were added to 1 kg of surimi. The oil-emulsified surimi exhibited 99–100% of the properties compared with the control in the creep-recovery test and texture profile analysis (TPA). The content of vitamins E and D was 132.44mg/100g and 1.18μg/100g, respectively. DHA and EPA content was 1021.98mg/100g and 934.21mg/100g, respectively. Therefore, the total amount of DHA and EPA in the oil-emulsified surimi met the recommended daily intake.

P2-72

Physicochemical analysis and sensory evaluation of Chungtaejeon according to *Camellia sinensis* cultivars

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Chungtaejeon is a unique microbial fermented tea in Korea that has been passed down through generations. The microbial fermentation process contributes to its distinctive flavor. In this study, we conducted a physicochemical analysis and sensory evaluation of Chungtaejeon produced using three tea plants [*Camellia sinensis* (L.) O. Kuntze] cultivars “Sangmok” (SM), “Geumda” (GD), “Chin-shin oolong” (CS) and one traditional cultivar (DY) in Korea. Additionally, we investigated whether the physicochemical components of Chungtaejeon were related to its preference. Theanine, a major compound in Chungtaejeon, was found to be highest in the GD cultivar. The preference for Chungtaejeon was ranked as follows: GD, SM, CS, and DY. Moreover, the association between tea components and preference was found to be low. However, it was noted that Chungtaejeon made from single-cultivar leaves exhibited superior preference. This study demonstrates that the flavor characteristics of Chungtaejeon vary according to the *Camellia sinensis* cultivar, underscoring the need for continued research on cultivar characteristics to produce high-quality tea.

[This study was carried out with the support “Cooperative Research Program for Agriculture Science and Technology Development (RS-2020-RD009414)” and the RDA Fellowship Program of NIHHS, Rural Development Administration, Republic of Korea]

P2-73

Physicochemical characteristic of marinated abalone (*Haliotis discus hannai*) in seasoned soy sauce for the elderly using texture Modification TechnologySuk Kyung Sohn*, Jong Bong Lee, Ga Yeon Kwon, Hyo Rim Lee,
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This study was conducted to develop and commercialize abalone marinated in seasoned soy sauce (AM-S) for the elderly by adjusting the texture (hardness) and strengthening nutritional components. The number of pounding [X_1 , 2–14 times] and heating time in a retort [X_2 , 5–19 min] were selected as independent variables, and hardness (Y_1) and overall acceptance (Y_2) were chosen as dependent variables. The optimum conditions of X_1 and X_2 were 12 pounding and heating for 17 min in a retort. The hardness values of the AM-S for the elderly were $209.2 \times 103 \text{ N/m}^2$ for the third method and $259.1 \times 103 \text{ N/m}^2$ for the first method. The nutritional values of the AM-S for the elderly were crude protein 13.1g/100 g, vitamin A, vitamin D, and vitamin C were not detected. The mineral content of the AM-S for the elderly was calcium 33.2mg/100 g and potassium 258.7mg/100 g. Coliform group was not detected. Accordingly, the AM-S for the elderly was classified as a hardness-controlled product and nutrient-controlled product by the standards and specifications of the senior-friendly foods offered in the MFDS and classified as the first step of senior-friendly foods by the standards and specifications of the senior-friendly foods offered in the KS.

P2-74

The inhibitory effect of cordycepin isolated from *Cordyceps militaris* cultivated with *Tenebrio molitor* larvae on PC-9 cell

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Cordyceps militaris is one of the entomogenous fungi that form a fruiting body mainly on pupae or larvae. It has been traditionally used as an herbal medicine in Korea and China to enhance longevity and vitality, and contains many types of biologically active compounds such as cordycepin, adenosine, cordycepic acid, sterols, nucleosides, and polysaccharides. Among them, cordycepin (3'-deoxyadenosine), a derivative of adenosine, was the first compound to be isolated from *C. militaris*. Cordycepin has been reported to have antitumor, antiangiogenic, anti-metastatic, and antiproliferative effects and it induces apoptosis in cancer cells. This study was performed to produce high content cordycepin using *Tenebrio molitor* larvae and *C. militaris* mycelia. In addition, we isolated the cordycepin in *C. militaris* cultivated with *T. molitor* larvae and confirm anti-cancer activity as food and drug sources. As a result, the cordycepin content in *T. molitor* larvae was increased according to cultivated with *C. militaris* (13.75 mg/g). We isolated cordycepin in the *C. militaris* cultivated with *T. molitor* larvae using semi-HPLC and gained the 46.5 mg of dried cordycepin peak fraction. We used the human lung cancer cell line PC-9 to investigate the anti-cancer effect of the isolated cordycepin produced in *T. molitor* larvae. The CCK-8 assay showed a dose-dependent decrease in the growth of PC-9 cells. In short, *C. militaris* cultivated with *T. molitor* larvae provide resource developing new functional food or medicine product.

Acknowledgement : This research outcome is part of the results of the Jeonnam Techno Park One-Stop Support Project. We are grateful for this.

P2-75

Quality characteristics of sauces using fermented *Lentinula edodes* by plantal lactic acid bacteria

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As interest in vegetarianism increases, interest in plant-based seasonings and sauces is also increasing. *Lentinula edodes* contain a lot of guanylic acid, related with umami taste, and contains various nutrients such as vitamin B and vitamin D, which have anticancer and blood pressure lowering effects. It is also used by flavors and functional materials of various foods.

In this study, fermented products (combined fermentation A, B, C) were produced by fermentation of *L. edodes* with three types of plantal lactic acid bacteris. And vegetable sauce was prepared using fermentation product B, which had the highest content as a result of analysis of useful ingredients.

The results of analyzing the components of *L. edodes* vegetable lactic acid bacteria fermentation broth and vegetable sauce showed that mixed fermentation broth B and vegetable sauce had similar contents in the general ingredients β -glucan, free sugars, ergothioneine, ergosterol, nucleic acids, and amino acids. Therefore, *L. edodes* vegetable lactic acid bacteria complex fermentation product is 100% vegetable material and is expected to be used as a main ingredient in health foods including sauces.



P2-76

Establishment of optimal folic acid extraction condition from *Pleurotus ostreatus* according to the useful components

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Recently, with aging and improvement of interest in health, preference for natural products containing useful components is increasing. Folic acid was well known for helps the body make healthy new red blood cells and had potentials for antioxidant. Also, the demand for natural folic acid products is increasing contiously, but most of the natural raw materials are currently depending on imports in Korea. Accordingly, this study aimed to contribute to the stable supply of natural folic acid raw materials from domestic *Pleurotus ostreatus*. We compared the folic acid content in *P. ostreatus* according to drying methods, extraction conditions, and harvest time. We investigated the solid yield and folic acid content with different extraction solvent quantities, temperatures, and heating time for the determination of optimal folic acid extraction conditions were 10-fold volumes of water addition. The highest solid content was obtained at 70°C extraction temperature, 8 hours extraction time. The folic acid content was highest when 7% citric acid concentration, but decreased when it was added more than 10% citric acid concentration. The folic acid content showed no significantly differences between citric acid concentrations and harvest time. As a result, it is expected that mass production of natural folic acid using *P. ostreatus* by this extraction method will contribute to the domestically produced of raw folic acid materials.

Acknowledgement : This research was supported by the Ministry of Trade, Industry & Energy(P0020990)

P2-77

Production a high solid concentration of microfibrillated cellulose derived from *Gelidium amansii* through introduction of fed-batch millingHye Jee Kang*, Nur Istianah, Jeong Hwa Jang,
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Producing high concentrations of microfibrillated cellulose (MFC) can broaden its industrial applications. So far, because of MFC's high specific surface area, commercial MFC is usually provided at a concentration of around 1%. In this study, we employed a fed-batch process to achieve a high solid concentration of MFC. *Gelidium Amansii* (GA) was initially pretreated with a microwave system at 150°C for 15 min. The pretreated GA (PGA) was then fibrillated using a high speed blender at 37,000 rpm with varying solid loadings for 120 min. Sequential feeding strategies were applied with an initial 1% solid loading, labeled as FBX1X2X3 (where Xn represents the concentration at the nth fed-batch feeding). FB112 and FB121 showed lowest gel concentration points of 0.0053 and 0.0051, respectively, with typical MFC sizes of 16.46 nm in width and 14.9 μm in length. Additionally, the power consumption model indicated that F112 and FB121 demonstrated power reduction of 92.25% and 84.67%, respectively, compared to B5 (i.e. 5% batch loading; 12.0 kW/m³). In conclusion, the fed-batch milling process is effective for achieving high concentrations of MFC.

P2-78

Quality characteristics of vegan cookies using defatted rice bran

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Rice bran is a byproduct of polishing rice, but it is nutritionally superior to white rice and contains various nutrients, attracting attention in the food industry. In a previous study, we investigated the physicochemical characteristics of extracts manufactured using different extraction methods to increase industrial utilization value using defatted rice bran, and in this study, we developed vegan cookies using enzymatic hydrolysis and autoclave extract (AE) and verified their confectionery suitability and quality characteristics. The essential amino acid content of AE was 6.69%, and protein digestibility was 0.91, and protein digestibility corrected amino acid (PDCAAS) was 0.86, which were high values. As a result of manufacturing cookies using AE, the spreadability was the highest in the cookie with 7% added (3.56%), and decreased as the amount of AE added increased, and there was no significant difference in the loss rate and expansion rate between the control and AE-added cookies ($p>0.05$). As the amount of AE added increased, the lightness(L) and yellowness(b) decreased, and the redness(a) increased. The hardness of the cookie with AE powder added was higher than that of the control (C0), and the elasticity decreased as the AE content increased. As a result of the sensory evaluation of the AE-added cookies, the cookie with 20% of the extracted powder AE added was confirmed to be the most suitable because it had the highest preference in terms of taste (5.20), appearance (5.47), and texture (5.43). This is expected to increase the utilization value of defatted rice bran, a by-product left after the manufacturing of rice bran oil, and to confirm its applicability in the vegan food industry, and to be used as basic data for the food industry.

P2-79

Evaluation of deep eutectic solvents for the sustainable production of levulinic acid from biomass

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Deep eutectic solvents (DES) are emerging as promising alternatives to traditional organic solvents like acids and alkalis because of their non-toxicity, low cost, and biodegradability. This study explores the conversion of brewer's spent grains into levulinic acid (LA), a key industrial precursor, through DES pretreatment. After synthesizing five types of DES (choline chloride:lactic acid (ChCl:La), ChCl:acetic acid, ChCl:glycerol, ChCl:urea, and betaine:La), their conductivity, viscosity, acidity, and microwave absorbing ability were measured to confirm their suitability used as a pretreatment solvent. Among the five DES, ChCl:La with a 1:2 molar ratio showed the highest lignin removal rate of 28.0% in the pretreated solids. For optimal production of LA in the pretreated hydrolysates, various conditions such as molar ratio (2:1 to 1:8), temperature (80–140 °C), and reaction time (30–90 min) were evaluated. The maximal LA production was achieved with 1:8 molar ratio of ChCl:La under 120 °C for 60 min, yielding 41.09% based on conversion yield of glucose and xylose in untreated brewer's spent grains. Under these conditions, glucose had a faster conversion rate of 1.06×10^{-3} M/s and a higher yield of 28% compared to xylose (0.75×10^{-3} M/s, 12%). These findings suggest that DES have significant potential for effectively breaking down lignocellulosic structures and converting them into levulinic acid.

P2-80

Useful ingredients of processed foods using *Mycoleptodonoides aitchisonii*

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Mycoleptodonoides aitchisonii are known to have immunomodulatory functions, hypoglycemic effects, and have anti-tumor effects. However, according to the Ministry of Food and Drug Safety, *M. aitchisonii* are listed as temporary raw materials, causing difficulties in developing food materials and commercializing them. Therefore, in this study, we intend to develop high value-added foods to increase the utilization of *M. aitchisonii*. As a result of analyzing the useful ingredients of *M. aitchisonii* and test product, the contents of beta-glucan, ergosterol and vitamin D2 were found to be high in dried *M. aitchisonii*. And the contents of total free sugars and organic acids were high in the test product. The main amino acids were glutamic acid, arginine, cystine, and lysine. Therefore, it is believed that *M. aitchisonii* can be used not only in the foods but also as a material for other industries such as cosmetics and pharmaceutical materials.

Acknowledgement : This study was carried out with the support of 'Project No. 2021298A00-2121-AD02 provided by Korea Forest Service(Korea Forestry Promotion Institute).

P2-81

Evaluation of physicochemical properties in rendered animal fats: insights from chicken fat, lard, and tallowJiyeon Kim^{1*}, Jung Soo Kim¹, Jinsu Sung¹, Soo Hyun Kim¹,
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Animal fat is essential for sensory properties, influencing texture, flavor, and juiciness. However, research on its quality characteristics and physical properties is limited. This study examined the physicochemical properties of animal fat rendered under the same conditions. Chicken fat, lard, and tallow showed crude fat contents between 99.84% and 99.87%, with significant differences in yellowness. Firmness was higher in tallow at 4°C, but no differences were found at 25°C. The fatty acid composition was oleic acid > palmitic acid > linoleic acid. Major volatiles included hexanal, glycerin, and 1-ethynyl-2-methyl-3-methylene-1-cyclobutene, with various volatiles in chicken fat and lard. Oxidation increased in the order: lard > chicken fat > tallow, as indicated by peroxide and TBARS values. Melting and crystallization properties were assessed through slip melting point, differential scanning calorimetry, viscosity, and viscoelasticity, showing lard > chicken fat > tallow in sensitivity to temperature changes. As a result, these physicochemical properties are likely influenced by the differences in the composition of saturated and monounsaturated fatty acids among different animal species. This result can serve as foundational data for the development and research of animal fat-based food products.

P2-82

The suitability of surimi ink for food 3D printing based on the type and content of sugars**Da-Sol Jeong^{1*}, So-Hee Park², Yun-Seo Han³, Ga-Won Kim³,
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While numerous studies have been conducted on the suitability of surimi ink for food 3D printing, most have focused primarily on the salt content. However, commercially available fish cakes typically contain about 2–5% sugar for flavor and texture enhancement. Therefore, this study investigated the suitability of surimi ink for food 3D printing not only in relation to salt but also with respect to sugar content. Furthermore, to optimize food 3D printing for personalized dietary needs, we explored the suitability of surimi with alternative sweeteners for individuals who are adversely affected by sugar. The surimi ink was prepared using 50g of white fish flesh, along with water, salt, sugar, and alternative sweeteners. The alternative sweeteners included stevia at 2.1%, and erythritol at 97.9% combined alternative sweeteners, as well as allulose. The assessment of the printed structures using food 3D printing included evaluating the layer stability, as well as measuring the hardness, whiteness difference using a texture analyzer and colorimeter. The surface of the surimi structures was examined using scanning electron microscopy (SEM). Through sensory evaluation, it was determined that the optimal surimi ink for food 3D printing is achieved by adding 3% salt and 3% sugar, or by incorporating 3% salt with 1% stevia, or 3% salt with 4% allulose into the dough.

Effect of drying condition to physicochemical properties of bee pollen

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This study was conducted to investigate the changes in physicochemical properties of bee pollen, a popular Korean functional food, under changes in different drying conditions (30℃, 40℃, 50℃, 80℃ and freeze drying). The content of reducing sugar, which is the major sugar in bee pollen, is highest when dried at 50℃, 30.69%, and lowest when freeze-dried. In terms of crude protein content, sample dried at 80℃ yielded a highest value of 19.80% crude protein, and a lowest of crude protein, 17.35% was found at sample dried at 30℃. Similar results were found for crude fiber., the highest content was measured at 80℃, 3.99%, the lowest content was measured at 50℃, 1.53%. The crude ash content was highest in the freeze-dried sample, 2.15%, and lowest at sample dried at 50℃, 1.78%. Phosphorus and potassium content were found the highest in pollen. The highest content of Phosphorus and Potassium was in the sample dried at 80℃, 5019.82ppm, 4312.63ppm, respectively. The color of the pollen also gradually darkens from yellow to dark yellow as the drying temperature increases.

P2-84

Effect of cooking methods on physicochemical properties of beef round

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Quality changes in beef during heating occur due to transformations in connective tissue and myofibrillar proteins. The quality of beef after cooking by type of meat cut is an important attribute affecting consumer acceptance. Therefore, it is necessary to optimize the cooking method according to the muscle. In this work, we compared the physicochemical properties of beef round during various cooking methods (boiling, sous-vide, and oven) in two different cooking devices. All cooking processes were completed when the round reached an internal temperature at 65°C. The cooking loss was the lowest in the sous-vide cooked round, followed by boiling and oven cooking. The water holding capacity showed opposite results. The shrinkage rate was significantly lower in the sous-vide cooking. As a result of texture analysis, sous-vide cooked round was confirmed to have the softest texture. We optimized the cooking protocol to obtain tender cooked beef round, and also intent to use is as a reference for recombinant meat using 3D food printing.

Vitamin B6 profiles in leafy vegetables affected by heat treatmentHui-jin Lee^{1*}, Seo-Eun Park, Jiyeon Chun^{1,2}¹*Department of Food Science and Technology,
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Vitamin B6 is a water-soluble vitamin that acts as a coenzyme involved in the metabolism of about 100 amino acids. It plays an important role in the immune system and neurotransmitter synthesis. Vitamin B6 can be found in various forms and is mainly present in foods in the form of pyridoxine (PN), pyridoxal (PL), and pyridoxamine (PM). It is distributed in various food groups such as meat, legumes, grains, and vegetables, but there is almost no information on the PN, PL, and PM profiles until now. In this study, the vitamin B6 analysis method (HPLC-FLD) was verified and the vitamin B6 profiles (PN, PL, PM) of four leafy vegetables (mustard, water parsley, green cabbage, red cabbage) affected by heat treatment methods (raw, steamed, boiled) was analyzed to establish a reliable national food nutrient composition database. The vitamin B6 analysis method using HPLC-FLD coupled with acidic extraction showed excellent linearity with a correlation coefficient value of $R^2=0.9999$ for all PN, PL, and PM. The limits of detection were PN 0.002 $\mu\text{g}/100\text{ g}$, PL 0.042 $\mu\text{g}/100\text{ g}$, and PM 0.031 $\mu\text{g}/100\text{ g}$. In addition, the vitamin B6 analysis method showed excellent accuracy (recovery rate 100.6% or higher) and precision (repeatability <0.9% RSD and reproducibility <2.9% RSD). In all leafy vegetables, a significant difference in the vitamin B6 content compared to the raw material was confirmed between steaming and boiling treatments. The total vitamin B6 content of the four kinds of leafy vegetables decreased from raw to boiled by 83.0% to 94.8% and from steamed to 76.5% to 88.2%. The PL, PM, and total vitamin B6 contents of the four kinds of leafy vegetables were higher in the order of raw > steamed > boiled. In the case of PN, higher values was in the order of raw > steamed = boiled for mustard and water parsley, raw > boiled > steamed for red cabbage, and raw > steamed > boiled for green cabbage. The results of this study show that the type and heat treatment method of leafy vegetables affect the vitamin B6 profile, and can be used in the personalized nutrition and precision nutrition service industries in the future.

P2-86

Current status of Korean sauces and dressings that lead K-food exports**Do-Kyung Kim¹, Hyun-Jung Ko¹, Wha-young Choei¹, Kwontack Hwang^{1*}***¹Department of Food and Nutrition, Nambu University*

The recent record-breaking exports of Korean food products are led by spicy sauces such as Bulgak and Gochujang. As of 2023, seasoning sauces such as Bulgak and Bulgogi sauce were the most exported, followed by sauces such as Gochujang and Doenjang, and sauces such as Ketchup and Mayonnaise. By exporting country, the United States accounted for 21.8% of total exports. It was followed by China, Japan, Russia, and Vietnam. Exports to 54 countries including the United States reached an all-time high last year, and the number of export destinations also reached an all-time high of 139. Seasoning sauces such as Bulgak and Tteokbokki were first exported to six countries including Luxembourg, Iceland, and Croatia. In anticipation of establishing Korean food as a global food trend, we will look at the overseas status of Korean sauces and learn about the Korean food craze.

Key words: K-food, bulgogi sauce, Seasoning sauces, Korean food wave, Tteokbokki

P2-87

Effects of *Sardinops melanostictus* powder on the quality of fermented soybean paste during storage

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This research aimed to investigate the characteristics of soybean paste with sardine powder content. The study established optimal conditions for producing sardine powder by using hot air drying at 70°C for 48 hours. Sardine powder was added to commercial Doenjang at concentrations of 0%, 2%, 5%, 7%, and 10%, and the mixtures were stored at 10°C for 0, 30, and 60 days. The impact of sardine powder addition on soybean paste was assessed by analyzing general ingredients, salinity, pH, acidity, color, bacterial count, and amino acid nitrogen content, which influence the taste of soybean paste. Results showed that Doenjang with 10% sardine powder (D5) had the highest amino acid nitrogen level (472.58 ± 2.90 mg/100g) on the 30th day, surpassing the commercial soybean paste (431.96 ± 1.63 mg/100g). Moreover, D5 exhibited the highest protein content, ranging from 17.75 ± 0.25 to 18.46 ± 0.26 g/100g. Salinity decreased over the storage period in all samples.

In conclusion, the addition of sardine powder to soybean paste positively affected its quality by increasing amino acid nitrogen and protein content while reducing salinity.

PART III

화학/분석

P3-01

발효균주에 따른 발효 마페이스트 이화학적 특성

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경상북도농업기술원 생물자원연구소

마는 위와 장을 보호하고 자양강장의 효과가 탁월하며 한방약재로 사용될 때는 산약이라고 불리는데 예전부터 식품과 약재로 사용되어 있다. 이러한 마는 주로 생으로 소비되며 건조 및 분말로 가공되기도 한다. 마를 분쇄하고 미생물로 발효 시킨 후 가열하고 이의 이화학적 특성을 조사하여 발효 마 페이스트의 특성을 살펴보았다. 발효에 사용한 균주는 *aspergillus oryzae*, *monascus purpureus*, *saccharomyces cerevisiae*, *lactobacillus* spp., *leuconostoc mesenteroides*의 5종이며 발효 후 특성을 조사하였다. 조직감 측정을 위하여 TX-700(LAMY Rheology, France)를 사용하였다. 발효 후 마 페이스트의 경도, 점착성, 탄성, 검성, 저작성은 모두 감소하였으며 특히 유산균에서 감소폭이 가장 컸다. 색도 변화를 측정하기 위해 Spectrophotometer CM-5(KONICA MINOLTA, Japan)를 사용하였다. 발효 균주에 따른 마 페이스트의 색도는 무처리에 비해 L-value가 낮아지며 갈변이 많이 진행되었다. 이는 분해가 진행될수록 폴리페놀물질이 산소에 많이 노출되고 이로인해 갈변이 진행 되는 것으로 나타났다. 발효 후 동결 건조 하여 수율을 측정하였는데, 무처리 22.0%, *monascus purpureus* 21.0, *saccharomyces cerevisiae* 20.0, *leuconostoc mesenteroides* 19.3, *lactobacillus* spp. 19.8로 유산균류에서 액화가 많이 이루어진 것을 알 수 있었다. 마 페이스의 diosgenin 함량은 무처리에서 0.11ug/g, *monascus purpureus* 0.12, *saccharomyces cerevisiae* 0.14, *leuconostoc mesenteroides* 0.14, *lactobacillus* spp. 0.16으로 유산균에서 소량 증가하였다. 이를 통하여 마를 잘 분해 할수 있는 균주는 유산균류로 판단되었다.

P3-02

Metabolomic discrimination of safflower leaves according to growth period

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Safflower (*Carthamus tinctorius* L.), a Compositae family, is widely cultivated in East Asia. Our previous research demonstrated that safflower leaves identified various bioactive compounds, including flavonoids, phenylpropanoids, and nitroethylphenols. Therefore, this study was undertaken to document changes in the metabolites of safflower leaves according to growth period using LC-MS based metabolite analysis. UPLC-ESI-QToF-MS results showed 28 main compounds were detected in safflower leaves. PCA score plot exhibited that safflower leaves harvested by different growth period clearly distinguished. Fifteen metabolites with a high VIP score (>1.0) were apigenin glycosides, quercetin derivatives, and luteolin derivatives. A heatmap plot indicated that numerous metabolites, including phenylpropanoid, apigenin glycosides, quercetin derivatives, and luteolin derivatives, increased during the growth period of safflower leaves. However, several metabolites, including sugars and nitroethylphenols decreased during the growth period of safflower leaves.

P3-03

국내산 및 일본산 마른김의 UPLC-QTOF-MS 기반 대사체 분석

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본 연구에서는 국내산 및 일본산 마른김의 저분자 유용성분 특성을 파악하고자, UPLC-QTOF-MS 기반 대사체 분석을 실시한 다음 주요 화합물들을 대상으로 정량 분석을 수행하였다. 그 결과, 마른김에서는 총 49종의 화합물이 동정되었으며, 이 중 아미노산류, mycosporine-like amino acid류 (MAA), 핵산, 그리고 인지질이 주요 화합물로 확인되었다. 국내산 마른김의 총 구성아미노산 함량은 345.97-441.66mg/g로, 동일한 원산지일지라도 차이를 나타냈으나 일본산 마른김(373.54-489.76mg/g)에 비해 상대적으로 약간 낮은 경향이였다. LPC(20:5), LPC(16:0), LPC(20:4), 그리고 LPE(20:5)는 마른김의 주요 인지질류로 확인되었다. 총 MAA의 함량은 1431.41-2639.35mg/100g으로 국내산 마른김이 일본산 마른김에 비해 높은 경향을 보였다. 또한 개별 MAA류인 shinorine과 porphyra-334의 함량도 국내산 마른김이 더 높은 경향을 보였다. 핵산 함량은 nucleoside류 0.16-191.52mg/100g, monophosphate nucleotide류 58.54-255.14mg/100g이었으며, 국내산 마른김보다 일본산 마른김에서 더 높은 경향을 보였다. PLS-DA 결과에서는 국내산 및 일본산 마른김과 뚜렷하게 구별되었으며, inosine, guanosine, uridine, adenosine, LPE(16:1), LPC(14:0) 등의 화합물들이 마른김을 구별하는 주요 인자로 확인되었다.

P3-04

Cyanidin and pelargonidin malonylglucosides in corncoobs of *Zea mays* L.

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Blackberry corn is cultivated in many countries, including Latin America, China and Korea and consumed as food ingredients such as beverage, snack, and foods. The corn has been reported to exert health-beneficial effects, including antidiabetic, anti-carcinogenic and anti-angiogenic activities. In our preliminary experiments, several acylated anthocyanins were detected in the corncoobs of blackberry corn by LC-MS analyses. However, studies to identify the chemical structure of acylated anthocyanins in the corncoobs are required. In this study, we isolated and identified six acylated anthocyanins from the corncoobs of blackberry corn. The BuOH fraction obtained by solvent fractionation of purple corncob 70% methanol. Six anthocyanins were purified and isolated by ODS and silica gel column chromatography. The isolated anthocyanins were determined as cyanidin-glucoside, cyanidin-malonylglucoside, cyanidin-dimalonylglucoside, pelargonidin-succinylglucoside, pelargonidin-dimalonylglucoside and peonidin-dimalonylglucoside by LC-ESI-QTOF-MS experiments. The structure of these compounds are elucidated by NMR experiment.



P3-05

Comparative study of phospholipid and fatty acid composition in pork by different cuts and boiling

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To establish a functional ingredient database for pork, qualitative and quantitative analysis of phospholipids(PLs) and fatty acids were conducted for different cuts(16 types) and boiling (before and after). For PLs phosphatidylcholine(PC) content was significantly the highest, followed by phosphatidylethanolamine(PE) and sphingomyelin(SM), with trace amounts of lyso-phosphatidylethanolamine(LPE) and lyso-phosphatidylcholine(LPC) ($p < 0.05$). The total PLs content was highest in boiled tenderloin(515.38 ± 4.13 mg/100g), with PC being the highest (429.17 ± 6.64 mg/100g) among the pork samples($p < 0.05$). After boiling, the total PLs content increased in eight different cuts including tenderloin($p < 0.05$), with significant increases in the content of PC, SM, LPE, and LPC($p < 0.05$). The major fatty acids were oleic($38.2 \sim 49.9\%$), palmitic($22.4 \sim 27.7\%$), linoleic($6.7 \sim 17.4\%$), and stearic acid($6.1 \sim 12.8\%$) and after boiling the concentrations of oleic and palmitic acids remained similar while stearic and linoleic acids decreased by $1.1 \sim 4.8\%$ and $0.4 \sim 1.1\%$, respectively. This study confirmed that the phospholipid content and fatty acid composition of pork were affected by different cuts and boiling.

P3-06

Investigation of sulfur dioxide(SO₂) in domestically distributed and sold dried fruits and vegetables

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This study investigated the sulfur dioxide(SO₂) content in dried fruits and vegetables available in the domestic market without labeled food additives. A total of 52 dry products were classified into six categories: pome fruits(5 persimmons, 5 pears), root vegetables(5 sweet potatoes, 4 konjac powder), gourd and vegetable crops(5 gourds, 5 pumpkins), tropical fruits(5 mangoes, 4 bananas), berry fruits(3 grapes, 3 figs), and stone fruits(3 apricots, 5 dates). SO₂ content was analyzed using the Monnier–Williams method, revealing levels ranging from 1.28 to 1042.69mg/kg. The average sulfur dioxide content by category was highest in gourd(651.48mg/kg), followed by apricot(164.89mg/kg), konjac powder(133.90 mg/kg), and persimmon(49.64mg/kg). Although all samples complied with regulatory limits, there is a pressing need to enhance investigations into the artificial addition of sulfites and sulfur compounds to ensure the continued safety of the food supply to the public.



P3-07

Qualitative and quantitative analysis of cholesterol in domestic pork

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The cholesterol content of pork cuts(16 types) was analyzed gas chromatography–mass spectrometry(GC–MS), GC–flame ionization detector(FID), and liquid chromatography–Tandem Mass Spectrometry(LC–MS/MS). The cholesterol in pork was confirmed by standard cholesterol through the fragment ions of mass spectrum obtained with GC–MS, and the fragmentation pattern of multiple reaction monitoring (MRM) mode with LC–MS/MS analysis. The lipid and cholesterol content in 16 different cuts of pork ranged from 3.02 to 43.57g/100g and 47.68 to 178.05mg/100g, respectively, showing significant variation. The contents of lipid and cholesterol were highest in duhangeongsal with 43.57g/100g and 178.05mg/100g, respectively, and lowest in shank with 3.02g/100g and 47.68mg/100g, respectively. The analysis method was verified with specificity(GC–FID), linearity($R^2 > 0.99$), sensitivity(a limit of detection, 0.26 μ g/mL; a limit of quantification, 1.17 μ g/mL), accuracy(recovery rate, 98.02~103.03%), and precision(relative standard deviation, 0.20~14.81%). The cholesterol content was varied by different cuts of pork, and the result would be utilized to establish a database for food composition of domestic agricultural food resources.

P3-08

Investigation for unripe and ripe chili peppers across pericarp, placenta, and seeds through NMR-based metabolomics approach

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This study investigates the metabolic diversity between unripe and ripe chili peppers (*Capsicum annuum* L.) through the profiling of 25 metabolites using proton nuclear magnetic resonance (¹H NMR). A comprehensive analysis was conducted on the pericarp, placenta, and seed components from both unripe and ripe stages. The collected metabolic data were subjected to pairwise orthogonal partial least squares discriminant analysis (OPLS-DA) and SIMCA in order to identify and characterize the distinct metabolic profiles associated with each component type and ripening stage. Our findings reveal significant metabolic variations that correlate with specific functions and developmental stages, thereby providing deeper insights into the biochemical pathways influencing chili pepper ripening and parts differentiation. This research not only enhances our understanding of the metabolic complexity of chili peppers but also has potential applications in improving quality traits and stress resistance. Furthermore, the results offer valuable information for the food industry, contributing to the development of high-quality, sustainable chili pepper products.



P3-09

Analysis of polycyclic aromatic hydrocarbons (PAHs) in food samples using the QuEChERS method

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Polycyclic aromatic hydrocarbons (PAHs) are hazardous compounds with carcinogenic and mutagenic properties. PAHs in food are primarily formed through cooking methods that involve high temperatures, such as grilling, smoking, and frying. The incomplete combustion of fats and oils during these processes leads to the formation of PAHs, which can then contaminate the food.

Efficient detection of PAHs in food is essential for assessing pollution and health risks. This study presents a streamlined method using QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) for extracting and quantifying PAHs.

Samples were homogenized and extracted with acetonitrile. Salts (NaCl and MgSO_4) were added to enhance extraction efficiency. After centrifugation, purify the supernatant using dispersive solid-phase extraction (d-SPE) with PSA, C18, and Zirconia sorbents. The extracts were then concentrated and analyzed using gas chromatography–mass spectrometry (GC–MS).

The method showed excellent recovery rates ($>80\%$) and low limits of detection (LOD), demonstrating robustness and sensitivity. QuEChERS is highlighted as a simple, cost-effective technique for PAHs monitoring, aiding in food risk assessments and regulatory compliance.

P3-10

High purity phosphatidylcholines: synthesis and application to liposome formulation

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High pure 1,2-dimyristoyl-3-phosphatidylcholine (DMPC, Purity: 100.91%) and 1,2-distearoyl-3-phosphatidylcholine (DSPC, Purity: 102.53%) were synthesized using myristic acid (MA) and stearic acid (SA), respectively, as tailor-made phosphatidylcholines (PCs). The DMPC and DSPC were qualified by confirming $[M+H]^+$ peaks at m/z 679 and 791, respectively using ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS). The fatty acids of DMPC and DSPC were composed of 99.45% MA and 99.57% SA, respectively. The transition temperature (T_m) of PCs, which indicates the phase transition (gel \rightarrow liquid), was determined using differential scanning calorimetry (DSC). The T_m values for DMPC and DSPC were 37.87°C and 61.59°C, respectively. When DMPC was formulated into liposomes using the thin-film and hydration methods, the T_m s decreased and ranged 23.93°C~26.03°C. The digestibility of PCs, measured as the percentage of free fatty acid released (%) with in vitro gastrointestinal digestion method, was relatively higher in DMPC (35.22%) compared to DSPC (22.74%). this indicated that PCs with shorter carbon chain length of incorporated fatty acids and lower T_m tend to have relatively higher digestibility. The synthesized high-purity tailor-made PCs, characterized with specific phase transition and lower digestibility, can be utilized as high-value core materials in various industries of food, pharmaceuticals, and cosmetics.

P3-11

사료 중 멜라민 및 대사산물 다성분 시험법 정립

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멜라민은 식품의 제조나 가공에 사용할 수 없는 합성수지 원료로 인위적으로 동물 사료에 첨가하는 경우 체내에 영향을 줄 수 있는 유해 물질이다. 멜라민의 제조과정 중에는 아멜린, 아멜라이드, 시아누르산과 같은 멜라민 유사체가 불순물로 생성되어, 사료 중 멜라민 및 멜라민 유사체의 독성, 모니터링 자료 확보 등 연구의 필요성이 제기 되고 있다.

본 연구의 목적은 사료 중 멜라민 및 대사산물(아멜린, 아멜라이드, 시아누르산)의 다성분 시험법을 정립하는 것이다. 멜라민 및 대사산물은 회수율 및 매질효과를 최소화하기 위하여 내부 표준물질을 사용하였다. 직선성을 확인한 결과, 0.005 ~ 0.5mg/L 농도 범위에서 검량선의 결정계수 (r^2)는 0.98 이상으로 높은 직선성을 보여주었다. 정확도와 재현성, 효율성을 평가하기 위하여 정량한계, 허용기준의 5배 수준인 0.8, 2.5, 12.5mg/kg의 처리농도로 회수율을 확인하였을 때, 각 농도에서 대상 성분의 평균 회수율은 70~110%를 보였으며, 상대표준편차도 모두 14% 이하로 나타나 사료표준분석법에서 요구하는 기준을 만족하였다.

내부표준물질을 사용하여 회수율 보정 및 매질 보정 결과 기존 사료 표준분석방법의 멜라민 분석법에 비해 분석 시간을 단축할 수 있었다. 또한 멜라민 모화합물만 분석이 가능했던 사료표준분석방법과 달리, 본 연구방법은 멜라민 및 대사산물을 동시에 분석이 가능하다.

P3-12

호박씨유 첨가가 대두유 및 카놀라유의 산화 안정성에 미치는 영향이우진^{1,2*}, 장신¹, 원예선³, 채승훈³, 조정용^{2,3}¹유맥, ²전남대학교 푸드테크학과, ³전남대학교 융합식품바이오공학과

호박씨유는 불포화지방산 함량이 매우 높고, 토코페롤, 스테로이드, 페놀성 화합물을 비롯한 유용성분을 함유하고 있다. 또한 호박씨유는 항산화 활성이 우수하고 전립선, 고혈압 및 신장 결석 예방에 효과가 있다고 알려져 있다. 불포화지방산 함량이 높음에도 불구하고 항산화 활성이 우수한 호박씨유 첨가는 대두유나 카놀라유와 같은 식물성 유지의 산화 안정성 향상에 도움을 줄 것으로 기대된다. 그러므로, 본 연구에서는 압착추출한 호박씨유의 성분 특성을 조사하고, 이를 첨가한 대두유 및 카놀라유의 산화 안정성 향상에 미치는 영향을 이해하고자 하였다. 호박씨유는 굴절률 1.470, 발연점 213℃, 산가 0.2mg KOH/g, 요오드가 104.35를 나타내었다. 호박씨유 지방산 조성은 linoleic acid 41.47%, oleic acid 33.06%, palmitic acid 14.95%, stearic acid 9.13%이었다. 호박씨유를 일반적으로 널리 이용되고 있는 대두유와 카놀라유에 각각 혼합한 다음, Oxitest 기기를 이용하여 AOCS Cd 12c-16(2017) 지침에 따라 과산화물 값 및 산화 안정성 지수(OSI)를 측정하여 산화 안정성을 평가하였다. 그 결과, 호박씨유 첨가는 대두유와 카놀라유의 산화 안정성 지수(OSI)를 향상시켰으며, 특히 대두유에서 더 우수하였다. 이러한 결과들로부터 호박씨유는 식물성 유지의 산화 안정성을 높여 소비기한을 늘리는데 유용한 소재로의 활용이 기대된다. 현재, LC-MS 분석을 통해 호박씨유에 함유된 산화방지에 관여하는 유용성분들을 탐색 중에 있다.

P3-13

Trichlorobenzenes quantification in food: method development and validation

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Trichlorobenzene is a colorless liquid or amorphous solid with an aromatic odor. It is primarily utilized as a solvent in the production of chemicals, dyes, intermediates, and pesticides. Exposure can occur through ingestion, skin contact, or eye contact. This synthetic chemical does not naturally occur in the environment. According to the Material Safety Data Sheet (MSDS), it is classified as a pyrophoric substance, acutely toxic substance, specific target organ toxicant, and hazardous to the aquatic environment. Short-term exposure can cause skin irritation and anesthetic effects, while long-term exposure can impact the liver, thyroid, and kidneys.

In this study, performance parameters were obtained to develop an analytical method using GC-MS for the measurement of TCBs in food. Representative foods include pork, mackerel and canadian oil. Samples have limits of detection (LOD) and limits of quantification (LOQ) ranging from 0.14 to 0.19 ppb, with accuracy ranging from 87.86% to 110.38%, and precision under 19.29%.

P3-14

Feasibility of substituting a platinum crucible in purity test for alkaline or magnesium in nutrient fortifiers(calcium oxide)

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Calcium oxide, a food additive, is one of the 159 nutrient fortifiers designated as food additives in Korea. To ensure proper distribution and management, food additives must undergo purity testing to evaluate their standards. The purity test method for calcium oxide, specifically for 'alkaline or magnesium' content, requires the use of a platinum crucible. However, platinum crucibles are expensive and less accessible. Therefore, this study aimed to evaluate the feasibility of substituting platinum crucibles with commonly used alternatives such as nickel or quartz crucibles in the purity test method for calcium oxide. As a result, the purity test (alkali or magnesium) using a platinum crucible and a quartz crucible showed $1.47 \pm 0.46\%$ and $1.60 \pm 1.06\%$, respectively. However, a purity test using a nickel crucible showed that it was $17.99 \pm 1.15\%$, which is not acceptable under the food additive standards ($\leq 3.6\%$, MFDS). Therefore, in the purity test (alkaline or magnesium) for calcium oxide, the equipment specification can be changed from 'platinum crucible' to 'platinum or quartz crucible' to improve the accessibility of the test method.

P3-15

**Development and validation of analytical method for sarmentosin in
Sedum sarmentosum extract**

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Sedum sarmentosum(SS) is a medicinal plant with various physiological activities, and product development requires standardization of raw materials. We selected sarmentosin as a marker compound for SS and aimed to develop a method for analyzing sarmentosin in SS extract. As a result of the test method validation, the calibration curve of sarmentosin showed linearity with a correlation coefficient (R²) value of 0.999. Precision and accuracy ranged from 1.55~2.11% and 97.32~104.68%, respectively, showing excellent precision and accuracy. The detection limit of Sarmentosin was 0.76 µg/mL and the quantification limit was 2.31 µg/mL. The analysis results were suitable for the ICH guideline, and the analysis method was verified. As a result of analysis according to the extraction temperature and extraction time, the sarmentosin content was measured to be 5.39~6.68 mg/g. It was confirmed that extraction at 90°C is for 8 hours the optimal extraction condition. The content was significantly higher in SS from Namyangju compared to those from Gwangju. The sarmentosin analysis method presented in this study can be used for quality control of SS and can be used to increase the utility value of SS.

P3-16

SWCNT/Graphite/cobalt/chitosan based nanobiosensor for metabolite detection**Dong Sup Kim¹, Jiwon Park², Gyeongrim Jeong², Jinyoung Lee^{1*}**¹*Department of Green Chemical Engineering, Sangmyung University,*²*Department of Plant and Food Sciences, Sangmyung University*

In recent years, the development of nanobiosensors for detecting components in the human body has become an attractive fourth-generation innovation due to their high capability for accuracy, sensitivity, stability, and real-time monitoring. In this study, a nanobiosensor based on single-walled carbon nanotubes (SWCNTs) composited with graphite oxide, cobalt, and chitosan (GCC), was successfully developed, demonstrating remarkable sensitivity for detecting metabolites such as D-glucose (Glu), L-lactate (Lac), and urea (Ure). The nanobiosensor was composed of the immobilized glucose oxidase (Gox), lactate oxidase (Lox), and urease (Urs) on the SWCNTs-GCC composite. A nanobiosensors was designed with the modification of Gox, Lox, and Urs on the SWCNTs-GOC composite by utilizing a simple drop-casting and functionalization process. The nanobiosensor features a compact size and an impressive detection range, making it a potential candidate for in vivo applications. Additionally, the three enzymes (Gox, Lox, and Urs) were performed as catalysts in the biosensor's construction. This experimental results clearly demonstrate that the developed biosensor can proficiently detect the targeted Glu and Lac present in food components. Consequently, we anticipate that this study will serve as a foundational stepping stone for advancing food assessment within the broader industrial context.



P3-17

대파 건조 조건에 따른 indoxacarb의 잔류량 변화

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본 연구는 대파 건조 조건에 따른 indoxacarb 농약의 잔류량 변화를 비교하기 위하여 수행하였다. 대파에 indoxacarb 농약(10%, WP)을 0.3kg a.i/ha 비율로 수확 7일 전 3회 살포하여 수확하였다. 수확한 대파는 손질하여 세척한 뒤 8mm 간격으로 절단하였으며, 열풍건조기를 이용하여 향온 건조와 단계별 건조로 나누어 가공하였다. 향온 건조는 60, 65, 70, 75 및 80℃로 각각 1, 2 및 3시간 동안 건조하였다. 단계별 건조는 건조 온도와 시간을 달리하여 1, 2 및 3차 건조하였으며, 80-75-70℃(60-50-90분), 75-70-65℃(70-50-90분), 70-65-60℃(80-50-90분), 80-70-60℃(70-50-90분) 4가지 조건으로 건조하여 LC-MS/MS로 분석하였다. 대파와 건조 대파 중 indoxacarb의 정량한계는 0.01mg/kg이었다. 정량한계, 정량한계 10배 및 50배 수준으로 회수율 시험한 결과, 대파는 101.2-102.0%, 건조 대파는 88.1-97.5%로 나타났다. 대파 중 indoxacarb의 초기 잔류량은 0.72mg/kg이었으며, 60, 65, 70, 75 및 80℃로 향온 건조한 후 농약의 잔류량은 각각 0.49-1.29, 0.66-1.52, 1.02-1.62, 1.14-1.66 및 1.23-1.67mg/kg으로 나타났다. 단계별 건조의 경우 80-75-70℃, 75-70-65℃, 70-65-60℃, 80-70-60℃의 조건으로 건조한 후 잔류량은 1.36-1.40, 0.87-1.25, 0.99-1.31 및 1.12-1.26mg/kg으로 나타났다. 대파를 건조하는 시간이 증가함에 따라 indoxacarb의 잔류량이 증가하였으며, 향온 건조보다 단계별로 건조했을 때 잔류량이 더 낮게 나타났다.

P3-18

Establishing an HPLC analysis method of Cheonma active ingredients and harvest time comparisonHyun Jin Choi^{1,2*}, Ye Seul Kwon^{1,2}, Han-Seok Choi¹¹*Department of Agriculture and Fisheries FoodTech, Korea National University of Agriculture and Fisheries,*²*Department of Food Science and Technology, Jeonbuk National University*

In this study, as a pretreatment to compare active ingredients based on the Cheonma harvest time, 50 g of Cheonma obtained during spring and autumn was machined, 5 g was collected for each sample, dissolved in 25 mL of methanol, extracted for 20 min with shaking, filtered through a membrane filter (0.45 µm), and analyzed using high performance liquid chromatography. A Gemini® Phenomenex C18 column and a photo diode array (220 nm) detector was used. The solvents were 5% ACN in 0.1% H₃PO₄ (A solvent) and 30% ACN in 0.1% H₃PO₄ (B solvent). The gradient conditions were 100% (A) (0–5 minutes), 70% (A), 30% (B) (5–20 minutes), 50% (A · B) (20–40 minutes), 100% (B) (40–60 minutes), and 100% (A) (60–90 minutes), and the flow rate was 0.8 mL/min. For each component, a calibration curve was created using the absolute calibration curve method using a standard product. The coefficient of determination (R²) of the calibration curve showed a high linearity of 0.9998 or more. Gastrodin content was found to be 24,070 ppm and 1,536 ppm, and the 4-hydroxybenzyl alcohol content was 62,144 ppm and 217,551 ppm, in spring and autumn, respectively, showing a higher value in autumn. Parishin C was not detected in spring Cheonma, but showed a difference of 264,719 ppm in autumn Cheonma. In addition, 3,4-dihydroxybenzoic acid, vanillin alcohol, parishin A, B, E, 4-hydroxybenzoic acid, 4-hydroxybenzaldehyde, vanillin, and *p*-cresol were compared and analyzed as active ingredients; however, they were not detected.

P3-19

Shortwave infrared hyperspectral imaging for rapid detection of spoiled red pepper powder

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This study aimed to rapidly discriminate the spoiled red pepper powder (*Capsicum annuum* var. *annuum* L.) using shortwave infrared hyperspectral imaging (HSI) techniques. The experiment involved preparing samples of healthy and spoiled red peppers, which were subsequently dried, ground, and mixed in various ratios (0, 5, 10, 15, and 20%) to simulate different levels of spoilage. Hyperspectral images were acquired in the 900 to 1700 nm range, and several preprocessing techniques, including standard normal variate (SNV), multiplicative scatter correction (MSC), and Savitzky–Golay derivative (SG), were applied to the spectral data to enhance the accuracy of the discrimination models. The partial least squares discriminant analysis (PLS–DA) model, preprocessed with SNV and MSC methods, demonstrated the highest discriminant accuracy of 87.5% in identifying the spoiled red pepper powder. This study highlights the potential of HSI combined with machine learning as a non-destructive, rapid, and accurate method for detecting spoilage in red pepper powder, ensuring better food safety and quality control.

P3-20

Validation of test methods for 2-chloroethanol in livestock and fishery products using QuEChERS and GC-MS/MS

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2-Chloroethanol(2-CE) is a reaction product of ethylene oxide. It may be unintentionally produced during the production process of food or may be contaminated by transformants of various chemical reactions.

The Ministry of Food and Drug Safety (MFDS) has established the standardized test methods for 2-CE, but these primarily focus on matrices of agricultural products and processed foods.

This study aimed to validate these test methods for representative commodities among livestock and fishery products.

The "Quick Easy, Cheap, Effective, Rugged, and Safe" (QuEChERS) method was used for sample pre-treatment and GC-MS/MS was used as the analytical instrument. The validation of the test methods was carried out in accordance with the guidelines of the National Institute of Food and Drug Safety Evaluation(NIFDS).

The validation results demonstrated high linearity with a coefficient of correlation (R^2) of 0.998 or higher for the calibration curves. The limits of detection (LOD) were 0.003 to 0.009mg/kg, and the limits of quantitation (LOQ) were 0.008 to 0.028 mg/kg. The accuracy with 2-CE concentration of 0.025, 0.25 and 0.50 mg/kg was revealed 79.3% to 109.3%, 92.8% to 108.5% and 96.8% to 103.7%, respectively. Precision measurement showed RSD of 1.1% to 12.5%, 1.1% to 5.3%, and 0.1% to 4.3%, respectively.

These results indicate that the test methods are effectively applicable to matrices of livestock and fishery products. Consequently, these methods can be utilized to assess the risk of 2-CE and establish monitoring systems in the future.

P3-21

Estimation of lycopene, beta-carotene, and lutein contents in freeze-dried tomato powder using sWIR and Vis-NIR spectroscopy with machine learning and 1D-CNN models

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In this study, we investigated the estimation of lycopene, beta-carotene, and lutein contents in freeze-dried tomato powder using short-wave infrared (SWIR) and visible-near infrared (Vis-NIR) spectroscopy. The spectral data obtained were analyzed using various machine learning techniques, including Partial Least Squares Regression (PLSR), Support Vector Regression (SVR), Gradient Boosting, Random Forest, and a one-dimensional convolutional neural network (1D-CNN) model to predict the concentrations of these important carotenoids. The SWIR and Vis-NIR spectra provided a comprehensive dataset, capturing the unique absorption features of lycopene, beta-carotene, and lutein. The machine learning models were trained and validated with this spectral data to develop a robust predictive framework. The results demonstrated that the combination of SWIR and Vis-NIR spectroscopy with advanced machine learning algorithms, particularly 1D-CNN, PLSR, SVR, Gradient Boosting, and Random Forest, can effectively estimate the contents of these key nutritional components in freeze-dried tomato powder. This approach offers a promising method for rapid and non-destructive analysis in food quality control and nutritional assessment.

P3-22

**Comparison of useful chemical properties of mycelium and fruit body
from *Tuber borchii***

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The increasing demand for mushrooms, related to containing health and nutritional components, and, their use extends to various field including food and cosmetics. Mushrooms are consist of fruiting bodies, and mycelium, the vegetative growth of fungi that forms a thread-like network. Additionally, mushroom mycelium contains amino acids, vitamins, and minerals. It offers the advantages of easy extraction of active compounds, long-term storage, and had lower environmental growth stress, also, the mushroom mycelium cultivations are suitable for home cultivation.

This study were performed with the chemical properties analyzed, such as amino acids, minerals, and other beneficial compounds to evaluate the industrialization uses of both fruiting bodies and mycelium of *Tuber borchii*. The findings revealed that mycelium and fruiting bodies showed similar content of total amino acids and free amino acids, particularly glutamic acid, which influences umami taste. Mycelium of *T. borchii* showed significantly higher content of sodium and potassium among the minerals. Additionally, useful components including β -glucan, vitamin D2, and ergosterol have been detected in the mycelium of *T. borchii*. Especially, the content of ergosterol showed the higher than fruiting body. These results confirm the *T. borchii* mycelium had potentials for using valuable ingredient in food processing.

Acknowledgement : This work was supported by the Agri-Bio industry Technology Development Program by the Ministry of Agriculture, Food and Rural Affairs (MAFRA)

P3-23

Temporal trends in polychlorinated dibenzo-*p*-dioxins and dibenzofurans (dioxins) in shellfish from Korean Coastal areas

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Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/DFs, Dioxins) are organic compounds that are resistant to marine environmental degradation through chemical, biologicals and further more bioaccumulate in organisms. In this monitoring was planned with the intent of following seafood (especially, shellfish) with either a high content of residues or high consumption. Archived shellfish samples collected over the period 2021–2023 from six different categories in Korea Coastal areas were analyzed to assess temporal trends in the concentrations of dioxins. The analysis comprised over 300 samples. The results showed that 28% of the sample had detectable levels of dioxins, with an average contamination level (total PCDD/DFs) was N.D.~1.725 pg TEQ/g. Therefore, it is expected that it will be provide as a basic data for concentrations of PCDD/DFs in seafood throughout Korean Coastal areas were elevated relative to background environment and to guidelines for the protection of human health.

Keywords: Marine environment, persistent organic pollutants (POPs), Dioxin, Shellfish

PART IV

미생물/발효/안전성

P4-01

Selection of *Bacillus amyloliquefaciens* MYR1-3 for traditional jang production and comparison with commercial jang manufacturing strains in meju productionJu-Ho Yeom¹, Jong-Sik Kim², Ho-Yong Sohn^{1*}¹Dept. of Food and Nutrition,²Dept. of Life Science, AndongNational University

Jang refers to products made by fermenting and aging animal or plant-based raw materials with mold, such as meju, as the main ingredient, mixed with salt, etc. Including doenjang and other jangryu, they are considered soul food for Koreans, embodying the sentiments of the nation and signifying community harmony. This study aims to select fermentation strains with excellent soybean fermentation ability and sensory properties from various fermented foods as a basic study for the manufacture of high-quality jang. The study involved pre-culturing *Bacillus* and lactic acid bacteria isolated from commercial meju, kimchi, sikhye, makjang, and doenjang, along with commercial fermentation strains (*Bacillus subtilis*, *B. amyloliquefaciens*, *Aspergillus oryzae*) and alcohol fermentation yeast (*Saccharomyces cerevisiae*). These were then inoculated into steamed soybeans and fermented at room temperature for 24–48 hours, after which their sensory properties and soybean fermentation abilities were analyzed. The results showed that not only *Bacillus* sp. but also some lactic acid bacteria (*Lactobacillus lactis*) and yeast (*S. cerevisiae*) demonstrated excellent growth and sensory properties in the steamed soybeans. However, the best soybean fermentation ability and sensory properties were observed in the *Bacillus* sp. MYR1–3 fermentation group. *Bacillus* sp. MYR1–3 produced and secreted very strong protease, lipase, and carbohydrate-degrading enzymes, and showed excellent antioxidant capacity. 16S rDNA sequence analysis of *Bacillus* sp. MYR1–3 identified it as *B. amyloliquefaciens*. Based on the results of this study, rapid and large-scale fermentation using steamed and roasted soybeans is currently in progress, and a convenient stick product using fermented soybean powder is being developed.

P4-02

Pepper-leaves of Salicho(*Capsicum annuum* L. qhxhdcp) as noble fermentation additive

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Hot peppers (*Capsicum annuum* L.) are annual plants belonging to the Solanaceae family, and various cultivars are grown worldwide. Both the fruit and leaves of chili peppers are edible. Recently, new hot pepper varieties such as Wongi1ho, Wongi2ho, and WongiSaengsaeng, developed and marketed for their enhanced anti-diabetic activity, have included hot pepper leaves as a key component. Our research team explored new uses for hot pepper leaves by applying them to yeast fermentation and confirmed that the addition of hot pepper leaves promotes yeast growth and enhances fermentation efficiency. In this study, we used Wongi2ho leaves, known for their excellent anti-diabetic activity, in yeast fermentation for alcohol production. The results showed that even with a 0.05% addition of Wongi2ho leaf powder, there was a 23% increase in fermentation efficiency, improved sensory qualities, and enhanced antioxidant activity compared to the control group without hot pepper leaves. Gas chromatography analysis of the fermented broth revealed the generation of a diverse range of aromatic compounds compared to the control group, which contributed to improved sensory qualities. Analysis of the free amino acid content in Wongi2ho leaves showed 1.09 times higher levels compared to Cheongyangleaves, with relatively high contents of aspartic acid, glutamic acid, methionine, GABA, and arginine. Future research should focus on identifying the key substances responsible for the growth-promoting and fermentation-enhancing effects of Wongi2ho leaves. The results of this study suggest that Wongi2ho leaves, with their excellent anti-diabetic activity, can serve as a high-value alternative to yeast extracts.

P4-03

Microbiological quality and microbial community profile of salted shrimp (*Saeu-jeot*) fermented in underground tunnelYeongsil Lim¹, Hyungjin Cho¹, Heeyeong Lee², Jeeyeon Lee^{1*}¹Department of Food & Nutrition, Dong-Eui University,²Food Standard Research Center, Korea Food Research Institute

Production and consumption of salted shrimp are constantly occurring, and the quality and price of the final product can be influenced by the raw shrimp grade. This study was performed to determine if there were any microbiological quality differences based on the raw shrimp grade. We analyzed the microbiological hygiene status and established the microbial community profile of two types of salted shrimp made using regular and special grade of raw shrimp. The samples were analyzed a total of 11 times at weekly intervals. We analyzed total aerobic bacteria (TAB), halophilic bacteria, *Escherichia coli*, *coliform*, *Staphylococcus aureus* and *Vibrio* spp., In both types of samples, TAB were observed at an average of 3.4 Log CFU/g and halophilic bacteria at an average of 3.8 Log CFU/g during the fermentation period. *E.coli*, *coliform*, *S. aureus* and *Vibrio* spp. were observed to below the detection limit. The changes in microbial communities of TAB and halophilic bacteria during the fermentation period of salted shrimp were analyzed through 16s rRNA sequencing data. The top three genera of TAB found in both special and regular salted shrimp were *Psychrobacter* spp., *Salinicoccus* spp., and *Staphylococcus* spp. The top three genera of halophilic bacteria in both special and regular products were *Psychrobacter* spp., *Halomonas* spp., and *Salinicoccus* spp. In conclusion, we found that the raw shrimp grade had weak effect on microbiological hygiene status or microbial communities of salted shrimp.

P4-04

Antibacterial activity of *Vaccinium oldhamii* fruit against *Helicobacter pylori*

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Vaccinium oldhamii (*V. oldhamii*) is mainly grown in the west coast area south of the central part of the Korea. In this study, we investigated the inhibitory effect of *Helicobacter pylori* (*H. pylori*) gastric mucosa infection of *V. oldhamii* fruit extract using a mouse model. As a result of observing the administration of a drug to mice after *H. pylori* infection, no difference in body weight change or clinical symptoms was observed depending on whether the drug was administered or the type of drug. Afterwards, as a result of quantitatively analyzing the colony forming unit (CFU) in the mouse gastric mucosa by extracting gastric tissue from the mouse, a small number of *H. pylori* was detected in only one patient in the case of the antibiotic-administered group, which was a positive control group, and in the test group, the CFU values were high in the order of drug non-administered group, *V. oldhamii* fruit hot water extract, ethanol extract, and concentrated hot water extract. As a result of statistical analysis, all drug-administered groups showed a statistically significant decrease in CFU compared to the non-drug-administered group.

P4-05

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

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



P4-06

Correlation of functional components by microbial community of fermentants (Nuruk)

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This study derived the correlation between the results of microbial community and functional components analysis for 21 types of commercial *Nuruk* and 3 types of *Nuruk* manufactured by the research team. For microbial community analysis, shotgun metagenom analysis was used to analyze microbial diversity and metabolic pathways. Functional component analyses measured organic acid content and total polyphenol and total flavonoid content. As a result, functional profiles for the average CPM values of the top 20 pathways were presented by analyzing the pathway of related functional genes based on samples rich in eumycetes community. According to the results of measuring the organic acid content, it was confirmed that the citric acid measured high in *Nuruk* (BK>GG>NR, 4,513~5,877 ppm) was used in the TCA cycle among metabolites and was consistent with the detection intensity of the fatty acid produced. In addition, *Aspergillus* sp., which appeared as the dominant microorganism of *Nuruk* (JN, Total polyphenol 16 mg/10 g; Total flavonoid 8.1 mg/10 g), where phenolic compounds were the highest measured, is known to be a supplier that contributes to the production of phenolic compounds by stimulating various hydrolase during fermentation, so these results could be estimated for the significance of microbial community and functional components. Therefore, these results are intended to contribute to the investigation of useful functional ingredients of fermentants as basic data.

P4-07

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

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

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

P4-08

산업용 유산균 starter(10종)를 이용한 갈색거저리 유충(*Tenebrio molitor* larva)의 발효적성 탐색 및 선별

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갈색거저리 유충은 영양학적, 산업적 및 환경적 측면의 장점으로 식량 수요를 해결하는데 중요한 식량 공급원이 될 수 있다. 그러나 곤충 특유의 외형과 향 등의 특징은 소비자에게 부정적인 요소로 작용되므로 부정적인 인식을 줄이기 위한 연구가 필요하다. 발효는 미생물의 다양한 대사를 통해 풍부한 풍미와 물성을 향상시켜 소비자 기호도를 증진시킬 수 있다. 이에 본 연구는 갈색거저리 유충에 산업용 유산균 starter(ABY-3, CH-1, CHN-11, FLORA DANICA, LH-B02, R-707, ST-BODY-1, TCC-4, YC-380 및 YF-L812)를 각각 접종하여 3일간 발효 후 발효적성을 탐색하였다. 발효 3일차에 대조구 대비 모든 시료구의 pH와 당도는 감소하였으며, 적정산도와 조단백 함량은 증가하는 경향을 보였다. 유산균수는 CHN-11, TCC-4 및 YC-380 발효물이 7.00 log CFU/g 이상, ABY-3과 R-707 발효물이 6.00 log CFU/g 이상의 유산균수를 나타내었다. 가수분해도는 LH-B02, ST-BODY-1, TCC-4 및 YC-380 발효물이 대조구 보다 높은 함량을 나타내었다. 총 폴리페놀 함량은 ST-BODY-1과 TCC-4 발효물이 각각 3.21과 3.39 GAE mg/g으로 증가하였으나, 이외 발효물은 감소하였다. 총 플라보노이드 함량은 FLORA DANICA, ST-BODY-1, TCC-4 및 YC-380 발효물에서 함량이 증가하였으나, 그 외 발효물은 유의적인 차이가 없거나 감소하였다. DPPH 자유 라디칼 소거활성은 CH-1과 CHN-11 발효물은 감소하였으나, 그 외 발효물은 증가하였다. ABTS 라디칼 소거활성은 모든 발효물이 감소하는 것으로 나타났다. 따라서 갈색거저리 유충 발효물 제조를 위해 생육이 우수하며, 기능성 및 관능적 증진을 도모할 수 있는 starter로 ABY-3, CH-1, FLORA DANICA, ST-BODY-1, TCC-4 및 YC-380을 선별하여, 발효기간에 따른 특성비교를 통해 갈색거저리 발효물 제조에 적합한 유산균 starter를 도출하고자 한다.

감사의 글 : 본 연구는 전라남도 (재)전남테크노파크에서 시행한 지역수요맞춤형 연구개발사업의 결과임.

P4-09

Comparison of quality characteristics based on the fermentation period of mealworms fermented with an industrial lactic acid bacteria starter (5 types)

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Mealworms, the larvae of *Tenebrio molitor*, have various values and are being studied for their potential as food and animal feed. Research focuses on incorporating mealworms into various foods to address consumer perceptions. Lactic acid fermentation can improve flavor and physical properties using lactic acid bacteria. This study fermented mealworms for 5 days with industrial lactic acid bacteria starters (ABY-3, CH-1, FLORA DANICA, TCC-4, and YC-380) to enhance quality and compared fermentation characteristics over the period. The pH of fermented products decreased during fermentation, while titratable acidity and sugar content initially decreased and then increased. The cell count of lactic acid bacteria increased to 6.52–8.12 log CFU/g on the 2nd day of fermentation but declined afterward. Hydrolysis degree increased over time, reaching its peak on the 5th day of fermentation. The total polyphenol and flavonoid contents of the TCC-4 fermented product were relatively highest on the 4th day of fermentation at 8.49 GAE mg/g and 1.75 QE mg/g, respectively. SOD-like activity increased as fermentation progressed, reaching 50.60–56.16% on the 5th day of fermentation. As a result of this study, the TCC-4 fermented product exhibited a lactic acid bacteria count exceeding 7 log CFU/g and demonstrated excellent hydrolysis degree, total polyphenol, flavonoid content, and DPPH free radical scavenging activity.

Acknowledgment : This study is the result of a region-specific R&D project carried out by JEONNAM TECHNOPARK in Jeollanam-do.

P4-10

경기도내 유통 와인의 잔류농약 실태조사

신상운*, 김재관, 이현경, 이유헌, 김지은, 백은진, 김병태, 최종철, 이성남, 박명기

경기도보건환경연구원 농수산물검사부 서부농산물검사소

포도는 와인제조시 세척과정을 거치지 않기 때문에 포도에 농약이 잔류할 경우 최종 산물인 와인으로 이행될 수 있으며, 이는 소비자의 건강에도 영향을 줄 가능성이 있다. 따라서 본 연구에서는 경기도내 유통 중인 외국산 와인 40건, 국내산 와인 10건을 대상으로 잔류농약 471종에 대해 조사하였다. 분석결과 총 18종의 농약 성분이 0.006mg/kg~0.066mg/kg 수준으로 검출 되었으며, 이는 포도의 잔류농약 허용기준 1.0mg/kg ~5.0mg/kg 이내였다. 2021년 국민영양통계 식품별 섭취량 포도주의 1.61g(일일평균 섭취량)과 2022년 20대이상 대한민국 평균체중 65.3kg을 적용하여 위해성 평가를 수행한 결과 검출된 농약의 위해지수(%ADI)는 0.010~0.066으로 매우 낮은 수준이었다.

P4-11

Characterization of potential probiotics isolated from fermented foods from an island region

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Probiotics, including Lactic acid-producing bacteria, are known to provide metabolic products possibly improving host health. In particular, probiotic LAB is recognized as a generally safe (GRAS) organism and has been studied for the development of probiotics for humans and animals due to the secretion of various bioactive compounds. To explore potential probiotics in the traditional foods of island region, fermented food produced in island in Korea was investigated in this study. To assess their probiotic ability, enzyme production ability, antioxidation ativity, antibacterial activity, tolerance of low pH, bile salts, artificial gastrointestinal fluids, and adhesion properties, were examined. 16S rDNA sequencing were performed to identify isolated lactic acid bacteria. Among a total of 96 strains, 5 types of LAB with different genues were selected among the LABs with excellent digestive enzyme production ability, antioxidant activity, and antibacterial activity. Next, we evaluated the anti-aging effects of the four isolated strains using *Caenorhabditis elegans*. Similar to LGG, we identified four LAB strains that extend *C. elegnas lifespan*. In conclusion, these strains are expected to have the potential to be used as probiotics due to their intestinal health and anti-aging effects.

P4-12

친환경 및 저탄소 농산물의 잔류농약 실태조사

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경기도에서 유통되고 있는 친환경농산물 및 저탄소 인증 농산물에 대한 잔류농약 실태를 조사하였다. 친환경농산물은 유기농산물 151건과 무농약 농산물 624건을 포함한 총 775건을 분석하였다. 농약이 검출된 농산물은 3건이었으며, 모두 무농약 채소류였다. 무농약 미나리 1건에서 bifenthrin이 0.0450mg/kg, 무농약 고추 1건에서 fluxametamide가 0.1212mg/kg 검출되었고, 무농약 무(뿌리) 1건에서 dinotefuran과 phorate가 각각 0.0236, 0.0819mg/kg 검출되었다. 일반 농산물의 잔류허용기준과 비교하였을 때 무(뿌리)에서 검출된 phorate는 잔류허용기준인 0.05 mg/kg을 초과하여 검출되었다. 저탄소 인증 농산물 총 74건에 대한 분석 결과 33건에서 잔류농약이 검출되었다. 유기농 인증을 취득한 저탄소 인증 농산물은 11건이었으며 모두 잔류농약이 검출되지 않았다. 그 외 저탄소 인증 농산물에서 검출된 잔류농약은 모두 해당 품목에 사용 가능한 농약이었고, 잔류허용기준 이내로 검출되었다.

P4-13

Comparison of the thermal resistance between *Bacillus* strains and sterilization indicator microorganism

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In this study, we analyze the thermal resistance of *Ureibacillus suwonensis* and *Geobacillus thermodenitrificans* subsp. *calidus* spore to propose as a sterilization indicator microorganism for retort food. We also evaluated antibiotic susceptibility and hemolysis to determine pathogenicity. *U. suwonensis* and *G. thermodenitrificans* subsp. *calidus* were provided by the Nakdonggang National Institute of Biological Resources(NNIBR). As a result of thermal resistance test, the D-value of *U. suwonensis* at 121°C was 1.17 ± 0.02 minutes, with a Z-value of $31.09 \pm 0.48^\circ\text{C}$. The D-value of *G. thermodenitrificans* subsp. *calidus* at 121°C was 1.58 ± 0.03 minutes, with a Z-value of $31.23 \pm 1.49^\circ\text{C}$. Antibiotic susceptibility tests revealed that *U. suwonensis* was susceptible to all antibiotics except Ampicillin, while *G. thermodenitrificans* subsp. *calidus* was susceptible to all antibiotics except Ampicillin, Cefepime, and Clindamycin. Both strains exhibited hemolytic activity. The D-value of *Clostridium botulinum* spores at 121°C is reported as 0.21 minutes, with a Z-value of 10°C. These results suggest that the NNIBR strains could be considered as a sterilization indicator microorganism in retort food.

P4-14

머신러닝기반 음성인식 의도 분석 시스템을 통한 수입 식품 정보 전달 기법

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많은 소비자들은 국내로 유통되는 수입 식품들을 구입하여 섭취하고 있으며 이로 인한 소비자들의 수요는 꾸준하다. 수입 식품의 안전성과 품질을 보장하기 위해 정확한 정보 조회는 필수적이다. 이를 통해, 소비자들은 믿을 수 있는 식품을 선택할 수 있으며 건강에 대한 우려를 줄일 수 있기 때문이다. 그리고, 소비자들이 수입 식품에 대한 정보 조회를 수행하는 과정은 간단해야만 많은 사람들이 손 쉽게 정보를 획득할 수 있다. 본 연구에서는 머신러닝기반 음성인식 기술을 활용하여 의도를 분석하는 방법을 제안하고, 이를 활용한 수입식품 정보 전달 시스템을 설명한다. 수입 식품을 구입하는 일반 소비자들은 스마트폰 사용에 익숙하여, 스마트폰에 탑재된 마이크와 음성 모듈을 자주 활용한다. 이를 위해 Google API를 채택하여 음성인식(STT, Speech to Text) 기술을 적용하고, 도출된 텍스트 결과를 바탕으로 식품에 대한 문장을 분석하는 기법을 통해 소비자의 의도를 파악한다. 의도 분석에는 'OneVsRestClassifier' 알고리즘을 사용하여, 수입 식품과 관련된 주제를 '부적합'과 '판매중지(회수)'로 분류한다. 이를 위해 총 232개의 관련 문장 데이터를 생성하여 학습시켰으며 문장 의도 방식을 알고리즘을 구현하였다. 결과적으로 시스템에 기법을 적용하여 총 300회의 테스트를 진행하였다. 각 테스트는 1종당 3번씩 진행하였으며, 성공 횟수를 총 시도 횟수로 나누어 성공 확률을 산출한 결과 98%의 성공률을 확인하였다.

Acknowledgement : 본 연구는 식품의약품안전처 출연연구사업의 지원으로 수행되었습니다. (no. 21163MFDS518).

P4-15

IoT기반 수입 식품 정보 조회 및 전달을 위한 스마트 TV 어플리케이션 개발

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수입 식품의 안전성과 품질에 대한 소비자들의 관심이 증가하고 있다. 많은 소비자들이 수입 식품 정보를 보다 쉽게 조회할 수 있는 방법을 요구하고 있으며, IoT 기술을 활용한 스마트 TV 어플리케이션을 통해 신속하고 정확한 수입 식품 정보를 제공하는 시스템의 필요성이 대두되고 있다. 이러한 시스템은 소비자 신뢰를 높이고 건강과 안전을 보장하는데 큰 역할을 할 수 있다. 본 연구에서는 스마트 TV를 활용하여 소비자들이 수입 식품 정보를 보다 쉽고 효율적으로 조회할 수 있는 방법을 제안한다. 일반 소비자들이 스마트폰을 많이 사용하기 때문에 스마트 기기에 탑재된 모듈을 활용한 영상 및 음성 기술을 통해 수입 식품을 검출하고 그 결과를 IoT통신을 이용하여 TV로 송신하는 방법을 설명한다. 또한, 해당 결과와 관련된 플랫폼 (e.g. 동영상스트리밍, 인터넷쇼핑몰, 포털사이트 등)을 자동으로 검색하는 기능을 부여하여 소비자들이 조회한 식품에 대한 정보를 좀 더 활용하고 새로운 정보를 획득할 수 있는 기능을 연구하였다. 개발된 IoT기술의 성능평가와 관련하여, 영상 및 음성 인식 정확도는 95%이상이며, Wi-Fi기반의 패킷전송률은 98% 이상으로 우수하였다.

Acknowledgement : 본 연구는 식품의약품안전처 출연연구사업의 지원으로 수행되었습니다. (no. 21163MFDS518).

P4-16

Enhanced control efficacy of *Bacillus subtilis* NM4 via integration of chlorothalonil on potato early blight caused by *Alternaria solani*

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Early blight caused by *Alternaria solani* is a common foliar disease of potato around the world. The major aim of this study is to figure out the synergistic effect between microorganism and fungicides and to evaluate the effectiveness of *Bacillus subtilis* NM4 in the control of early blight in potato. Based on its colonial morphology and a 16S rRNA analysis, a bacterial antagonist isolated from kimchi was identified as *B. subtilis* NM4. The culture filtrate of strain NM4 with the fungicide effectively suppressed the mycelial growth of *A. solani*, with the highest growth inhibition rate of 83.48%. Surfactins and fengycins, two lipopeptide groups, were isolated and identified as the main compounds in two fractions using LC-ESI-MS. Although the surfactin-containing fraction failed to inhibit growth, the fengycin-containing fraction, alone and in combination with chlorothalonil, restricted mycelial development, producing severe hyphal deformations with formation of chlamydospores. A pot experiment combining strain NM4, applied as a broth culture, with fungicide, at half the recommended concentration, resulted in a significant reduction in potato early blight severity. Our results indicate the feasibility of an integrated approach for the management of early blight in potato that can reduce fungicide application rates, promoting a healthy ecosystem in agriculture.

P4-17

발효기반 국산 곡물원료를 사용한 비건 제과·제빵류 개발

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세계 베이커리 제품 시장 규모는 4,802억 3천만 달러에서 2032년까지 7,316억 9천만 달러로 연평균 성장률 5.40%로 성장할 것으로 예상되고, 국내 베이커리 시장도 2021년 이후 3조 원 후반으로 성장하였으며, 2026년에는 4조 원 규모가 예상된다. 전세계 비건 버터 시장 규모도 최근 몇 년 동안 강력한 성장세를 보이고 있다.

본 연구는 글루텐 생성을 억제하는 신규 유용 미생물을 발굴, 동정하여 발효곡물 제조 및 우유와 버터 등 동물성 원료를 대체한 식물성 원료를 개발하여 저장성 및 영양학적으로 우수한 빵류 및 비건 디저트류 제품 개발을 목표로 하고 있다.

비건 제과제빵 시제품 개발을 목적으로 국산 쌀, 호라산밀, 보리 세가지 곡물을 신규 종균과 함께 발효시켜 만든 발효곡물 및 캐슈넛과 식물성 오일을 활용해 개발한 비건버터를 이용해 에그타르트의 파이지를 제조해 관능평가를 시행하였다. 이처럼 기존 수입 밀 위주의 제과제빵 시장에 국산 발효곡물 및 식물성 원료를 활용한 제과·제빵류의 제품 개발을 통하여 사용률을 높여 농가의 고부가가치화 및 커져가는 비건 시장에 맞춘 지역 기업의 경쟁력 강화에 기여하고자 한다.

P4-18

Characterization of acid production and aroma profiles in four *Acetobacter pasteurianus* strains isolated from Korean traditional vinegar

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A fermentation starter is required to enhance the quality of fermented foods such as vinegar. In this study, we tested four *Acetobacter pasteurianus* strains (B7, JGB20-11, GHR1, and GSB26) isolated from traditional Korean fermented vinegar, which can be applied to produce improve quality of vinegar. First, the acid production ability of each strain was confirmed by culturing them in *Acetobacter* medium containing 6% ethanol, resulting 5.91~6.39% of total acid was produced within 96 hours. It was confirmed that most of the produced total acid was acetic acid through HPLC analysis. Additionally, these strains were able to efficiently produce a higher concentration (6.75~7.74%) of acetic acid under 9% ethanol. In the sniffing test, all panels described the aroma as fruity, rose-like, and rice-like, which are favorable to human, while no negative aroma characteristics were observed. To further investigate the differences in aroma, an Electronic-Nose analysis was employed. The B7 and JGB20-11 strains showed a relatively strong intensity of methyl isobutyrate (floral and fruity), while also strongly presented Propanal (cocoa and nutty). On the other hand, JGB20-11 showed a relatively strong intensity of methyl acetate, indicating fruity characteristics. In conclusion, this study demonstrated that isolated *A. pasteurianus* strains can enhance vinegar quality through higher acid and aroma production.

P4-19

흰점박이꽃무지 유충 세척수 및 열수 데침 시간에 따른 미생물 분석

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식용곤충은 필수아미노산의 조성이 우수한 양질의 고단백 자원이며, 불포화지방산, 식이성섬유 등 영양학적 측면에서 가치가 높은 식품이다. 또한, 크기가 작고 좁은 사육 공간에서 생산할 수 있으며, 일반 가축사육과 비교하였을 때 온실가스와 암모니아 배출량이 적기 때문에 친환경적이라는 장점이 있어 미래 먹거리로서 주목받고 있다. 국내에서 식품 원료로 사용가능한 식용곤충은 총 10종으로 등록되어있으며, 중금속(납, 카드뮴, 무기비소 등), 미생물(세균수, 대장균, 대장균군 등) 등에 대한 규격 기준을 충족해야 한다. 따라서 본 연구에서 흰점박이꽃무지 수확 후 안전관리를 위해 세척, 데침 가공 공정별 일반세균, 대장균군 분석을 수행하였다. 실험 공시재료 흰점박이꽃무지 유충은 전북 김제시 농가에서 사육 후 절식 과정을 거친 것을 구매하여 사용하였다. 세척 전, 수돗물 세척 후, 구연산수(pH3) 세척 후, 세척 후 열수데침 1, 5, 10분 처리한 것 등 9가지 처리 조건에서 시료를 채취하였다. 세척 공정은 35℃ 미온수 5L에 흰점박이꽃무지 유충 약 1,000마리를 침지 하여 수세하였고, 수돗물에서는 2분간 3회, 구연산수에서는 15분 세척 후 깨끗한 물로 3회 추가 세척하였다. 데침 공정은 각 세척수로 세척한 시료를 끓는 물에 1, 5, 10분 처리하였다. 시료는 각 처리조건별 20g씩 취해 생리 식염수로 희석한 액을 일반세균, 대장균군 배지에 접종한 후 배양하였다. 분석 결과 일반세균은 세척 전 9.06 logCFU/g, 수돗물 세척 후 9.31, 구연산수 세척 후 9.37로 세척조건에 따른 일반세균수의 변화는 없는 것으로 나타났다. 대장균군은 세척 전 6.50 logCFU/g, 수돗물 세척 5.82, 구연산수 세척 5.62로 세척 조건에 영향을 받는 것으로 나타났다. 데침공정에서는 처리시간이 경과함에 따라 일반세균수가 5.54, 4.93, 4.80 logCFU/g으로 감소하는 것으로 나타나 열수 데침과 스팀처리의 미생물 살균효과를 비교 분석하는 실험이 필요한 것으로 판단된다.

P4-20

The effects of high-temperature treatment on the quality of *makgeolli*

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The purpose of the study is to produce low-alcohol *makgeolli* without adding sweeteners. *Makgeolli* was made by adding rice, water, enzymes (glucoamylase), and yeast (La Parisienne, YM56). After mixing the above ingredients, it was fermented at 25°C for 6 days and then fermented at 25°C, 35°C, and 45°C for 3 days respectively. It was confirmed that the pH of low-alcohol *makgeolli* decreased as fermentation progressed. Total acidity tended to increase at 25°C, but tended to decrease at 35°C and 45°C. Amino acids showed higher content in high-temperature fermentation. YM56 showed higher sugar content and reducing sugar content than La Parisienne (LP). However, LP showed a higher alcohol content. But it was confirmed that the alcohol content decreased during high-temperature fermentation. Volatile acidity showed a higher content in YM56. Acetobacteria and lactic acid bacteria tended to decrease during high-temperature fermentation. It is anticipated that this study will enable the production of low-alcohol *makgeolli* without adding sweeteners.

P4-21

Monitoring result of mycotoxins from foods distributed in Daegu

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Results of analysis of mycotoxins (aflatoxin B1, aflatoxin B2, fumonisin B1, fumonisin B2, ochratoxin A, and zearalenone) in 700 foods (agricultural, livestock, and marine products and processed foods) distributed in Daegu. Mycotoxins were detected in 23 cases, with a detection rate of 3.3%. The main food types in which mycotoxins were detected were processed grains (34%), leached tea (13%), processed nuts (13%), and curry (13%), and the mycotoxins detected were aflatoxin B1 (1.34~17.64 µg/kg), aflatoxin B2 (0.67~4.35 µg/kg), fumonisin B1 (12.16~299.70 µg/kg), fumonisin B2 (5.70~279.50 µg/kg), and zearalenone (19.64~79.69 µg/kg). One case of processed grain product was confirmed to have exceeded the aflatoxin B1 limitation presented by the Ministry of Food and Drug Safety (10 µg/kg or less). Aflatoxin G1, aflatoxin G2 and ochratoxin A were not detected.



P4-22

그린바이오기술을 활용한 바이오양액 제조 및 천연물 소재화

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미생물을 활용한 그린바이오 산업 시장이 상승세를 이루고 있으며 식품·식품첨가물 외 바이오 비료 분야가 큰 비중을 차지하고 있다. 자연 생태계 보호와 지속 가능한 생산성을 확보할 수 있도록 하는 친환경 비료 중 미생물 비료는 미생물 함유로 뿌리 생육, 토양개량 및 염류 피해 경감에 도움을 주며 수확량을 증가시켜주는 비료로 이미 우수성을 인정받은 바 있다. 글로벌 바이오 비료 시장은 환경에 대한 관심 증가, 기술 발전에 힘입어 최근 몇 년 동안 급속한 성장을 보이며 꾸준히 상승해 나갈 것으로 보인다. 본 연구에서 사용한 허브류 레몬밤과 페퍼민트는 스트레스 완화 효과와 치매 예방 성분이 있으며 항산화물질인 폴리페놀과 플라보노이드가 함유되어있다. 비타민C 또한 풍부해 면역력 증진에 탁월한 효과를 보인다. 글로벌 허브 시장은 2024년부터 2030년까지 연평균 8.2%의 성장률 예상 화장품, 의약품, 식음료 산업에서 허브 추출물의 활용 증가 추세로 주목받고 있다. 허브는 고부가가치 산업인 향장품 산업 및 식품산업의 필수 원료로 활용도가 다양해지며 소비자 선호도가 높아 시장 성장을 촉진하는 추세이다. AI 기반 첨단농장으로 생산 및 표준화된 천연물 소재용 원료로 폴리페놀, 플라보노이드, 비타민C, 로즈마리산을 기능성 지표로 설정하여 재배하였다. 생산한 허브 천연물 발효추출물 제조를 위하여 맞춤형 유용 종균을 발굴 이를 활용해 미생물비료(양액)를 개발하였다. 이를 통해 그린바이오 기반 천연물 바이오 추출 공정 및 첨단농장으로 재배한 천연물 소재화 기술 개발을 통하여 K-뷰티 산업에 기여하고 한다.

P4-23

Analysis of quality characteristics of black barley makgeolli according to production and fermentation periods

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In this study, to develop high-quality fermentation technology using agricultural products, black barley makgeolli was produced using a self-developed fermentation starters, and its quality characteristics were analyzed. For this purpose, samples were fermented for 12 days, with quality analysis conducted every 3 days. As the fermentation period progressed, the pH increased slightly from 4.0 to 4.2, while the total acidity did not show significant changes, remaining within the range of 0.3% to 0.5%. Amino acids increased, and reducing sugars decreased significantly. Alcohol content surged from 0.2% to 11.8% after 3 days. Lactic acid and citric acid were the major organic acids, with citric acid levels notably rising and malic acid decreasing due to microbial consumption. Free amino acid analysis indicated a gradual increase. High levels of glutamic acid, lysine, and leucine likely influenced the makgeolli's flavor profile, contributing umami, sweetness, and bitterness, respectively. Electronic nose analysis revealed propanal dominance on day 0, shifting to dimethyl sulfide from day 3 onwards. These results can be used as reference material to establish optimal fermentation conditions and improve the quality when developing fermented foods using agricultural products.

P4-24

Optimization of culture conditions for *Acetobacter pasteurianus* strains for fermentation starter production

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Acetobacter pasteurianus is a species of *Acetobacter* used worldwide for vinegar production. In this study, we optimized the culture conditions for four strains of *A. pasteurianus* (B7, JGB20-11, CHR1, and GSB26) isolated from fermented vinegar in Korea to achieve higher cell biomass for use in fermentation starters. Various fermentation conditions were tested, including medium composition, temperature, and aeration. The medium used were GYE (glucose 5%–yeast extract–ethanol 1%), AE1 (acetic acid 3%–ethanol 3%), and AE2 (acetic acid 1%–ethanol 6%). The highest growth and recovery rates of resting cells were observed with GYE medium. However, considering both growth and acid production, the AE2 medium was found to be optimal. All strains exhibited the highest growth rate at 30°C, with B7 and JGB20-11 strains also growing well at 20°C and 35°C. For aeration conditions, higher RPM resulted in better efficiency in terms of cell growth and acid production. These findings provide a basis for the effective production of isolated *A. pasteurianus* fermentation starters, which can be applied to the fermented vinegar industry.

P4-25

Production of γ -aminobutyric acid by batch fermentation of *Lactobacillus brevis* FBL-4 from agricultural wastes such as rice bran and wheat branHyun-Gyu Lee^{1*}, Jong-Hun Jang², Ji-In Kim¹, Young-Jung Wee¹¹Department of Food Science and Technology, Yeungnam University²R&D Institute, MSC Co., LTD.

As a statistically calculation through the central composite rotatable design experiment, the production of γ -aminobutyric acid (GABA) was predicted to 13,1639g/L and 10,6762 g/L under the experimental conditions using 42,10g/L rice bran and 0.11% H₂SO₄, and 45,69g/L wheat bran and 0.19% H₂SO₄, respectively. It was difficult to produce sufficient amount of GABA by only sulfuric acid treatment, but liquefaction and saccharification using enzymes resulted in a relatively high amount of GABA. When four enzymes such as Termamyl 120L, AMG 300L, Celluclast 1.5 LFG, and Novozyme 188 were used, the rice bran and wheat bran resulted in 12.9g/L and 13.3g/L of GABA, respectively, showing the highest production. However, the more enzymes are used, the worse the economics of the process are obtained. Therefore, this study could recommend only one enzyme such as Novozyme 188 for the enzymatic hydrolysis of rice bran and wheat bran as the main substrate for GABA production. Among the two agricultural by-products used in the experiments, wheat bran seemed to be better for GABA production. However, rice bran might be also good bioresource for GABA production because it is relatively easy to obtain from rice industry in Korea.

P4-26

Rebaudioside A and rebaudioside E with α -1,6-glucosylated derivatives were simultaneously produced from the *Leuconostoc citreum*

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Stevioside is becoming popular as a sugar alternative due to its intense sweetness even in minimal quantities. However, stevioside has the drawbacks of astringency, a bitter aftertaste and poor solubility in water. In this study, the aim is to overcome these disadvantages by introducing a glucose moiety to stevioside using dextransucrase. A total of 48 strains were screened from five different types of kimchi. Out of these, six strains were identified as having dextransucrase activity. The 16S rRNA sequencing results identified two strains as *Leuconostoc* spp. and four strains as *Weissella* spp. *Leuconostoc citreum* produced novel products at concentrations of 11.88 mg/mL and 2.4mg/mL, with retention times identical to those of rebaudioside E and rebaudioside A with α -1,6-glucosylated derivatives, respectively. The structural properties of these products were determined through LC-MS and ¹H, ¹³C-NMR analysis. The structural properties of the two novel products were identified as rebaudioside E and rebaudioside A with α -1,6-glucosylated. Additionally, dextransucrase activity enhanced enzyme performance compared to the 24.2% activity observed in wild-type strains, following UV-induced mutations. This study indicates that using dextransucrase to produce rebaudioside E and A can enhance sweetness and overcome the limitations of stevioside, offering a valuable alternative.

P4-27

Enterotype-specific changes in the intake soybean paste and their effects on the human gut microbiota

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The gut microbiota is closely associated with human health, and particularly, numerous studies have indicated that there are significant changes in gut microbiota based on the food consumed by humans. In this study, we classified 56 participants into three types of entero-types (Bacteroides, Prevotella, and Ruminococcus type) and analyzed the changes in entero-types and gut microbiota by intake soybean paste. The analysis of gut microbiota after the consumption of soybean paste revealed that the proportion of Firmicutes decreased and the proportion of Bacteroidetes increased in all entero-types. Especially, in the Prevotella type, the F/B ratio, known as an obesity indicator, showed a significantly decrease. The alpha-diversity analysis results indicated that there was no significant change in diversity indices (Shannon and Simpson) after the consumption of soybean paste in the Bacteroides and Ruminococcus types while there was a statistically significant decrease in diversity indices in the Prevotella type. To statistically analyze the changes in microbial structures before and after soybean paste consumption in entero-types, beta-diversity analysis was conducted. The results showed no significant differences in microbial structures in Bacteroides and Ruminococcus types, while in the Prevotella type, there was a significant change in microbial structure after soybean consumption. Especially in the Prevotella type, after soybean paste consumption, Firmicutes and Clostridia known to be closely associate with obesity were significantly decreased. [This work was supported by “Traditional food safety monitoring program” under the Ministry of Agriculture, Food and Rural Affairs and partly Korea Agro-Fisheries and Food trade corporation in 2024].

P4-28

Microbial biomarker discovery and comparative microbiome analysis in Cheonggukjang supplied *Bacillus subtilis* SRCM102751, using next generation sequencing

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To compare the microbial compositions of Cheonggukjang before and after application of the *Bacillus subtilis* SRCM102751 as a starter strain, we analyzed V3–V4 region of 16S rRNA of four different Cheonggukjang by using next generation sequencing. Linear discriminant (LDA) effect size (LEfSe) analysis was performed to reveal the significant ranking of abundant taxa in different fermented foods. A size–effect threshold of 2.0 on the logarithmic LDA score was used for discriminative functional biomarkers. After application of the *B. subtilis* SRCM102751, on the genus level, the genus *Bacillus* composition is increased as well as on the species level, *Bacillus subtilis* composition is increased and *Bacillus licheniformis*, *Kosakonta* sp. composition are reduced. This results showed that GRAS bacterial such as *B. subtilis*, community composition increased whereas non–GRAS bacterial such as *B. licheniformis*, *Kosakonta* sp., reduced in Cheonggukjang after application of the *B. subtilis* SRCM102751. Permutational multivariate analysis of variance (PERMANOVA) showed that statistical difference in microbial clusters between two groups was significant at confidence level ($p=0.001$). This research could be used as basic research to identify the correlation between the biochemical characteristics of Korean fermented foods and distribution of microbial communities. [This work was supported by “Traditional food safety monitoring program” under the Ministry of Agriculture, Food and Rural Affairs and partly Korea Agro–Fisheries and Food trade corporation in 2024].

P4-29

Quality analysis of cheonggukjang using complex microbial starters isolated from traditional cheonggukjang

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Cheonggukjang is a traditional fermented food made by rapidly fermenting soybeans with straw. Rapid climate change and other environmental shifts have led to changing microbial communities, altering the dominant fermentation microorganisms in traditional fermented foods. Consequently, the dominant microorganisms in traditionally made cheonggukjang vary slightly with each batch, affecting its quality and taste. This study aimed to identify combinations that maintain traditional taste and quality by applying microorganisms isolated from traditional cheonggukjang and comparing them with traditional cheonggukjang. Three types of complex microbial cheonggukjang were produced: S1 (one superior strain), S2 (one superior strain and one dominant strain), and S7 (three superior strains and four dominant strains), along with traditional cheonggukjang. The produced cheonggukjangs were analyzed for viable cell count, moisture content, pH, amino nitrogen content, free amino acid content and biogenic amine content to compare their quality. The traditional cheonggukjang had the highest amino nitrogen content, with S2 cheonggukjang showing similar levels. Free amino acid content was highest in S1, with S2 and traditional cheonggukjang showing similar levels. In terms of biogenic amine content, with S1 showing a reduction in total biogenic amine content post-fermentation. The microbial communities after fermentation were similar in S1, S2, and S7, with an increase in the probiotic microorganism *Bacillus coagulans* when using starter cultures compared to the traditional method. This study suggests potential for developing starter culture cheonggukjang products that preserve the characteristics of traditional cheonggukjang. [This work was supported by “Traditional food safety monitoring program” under the Ministry of Agriculture, Food and Rural Affairs and partly Korea Agro-Fisheries and Food trade corporation in 2024].

P4-30

Enhancement of microbial safety and quality maintenance of fresh produce by using caprylic acid and mild heat

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This study aimed to develop a novel method to control *Escherichia coli* O157:H7 on fresh produce. For this, antibacterial activities of various concentrations of caprylic acid (CA) was examined when combined with mild heat (50°C) treatment. Interestingly, the combined treatment showed enhanced antibacterial effects compared to individual treatments. Further analysis has revealed that the enhanced antibacterial efficiency was mainly due to the increment damage on the cell membrane. When the combined treatment was applied to fresh produce (green onion, onion, red chili pepper, and Korean zucchini), it also showed effective *E. coli* O157:H7 inactivation in all tested groups. In addition, the combined treatment did not affect the color of all fresh produce while the color values of Korean zucchini were slightly affected. However, no significant changes in hardness were observed in all fresh produce. Consequently, the combined CA and mild heat treatment developed in this study have potential to reduce *E. coli* O157:H7 contamination in fresh produce.

P4-31

Effect of disinfectant on microbial reduction of vegetables

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This study aimed to analyze the effect of disinfectant type and concentration on reducing microorganisms contaminated in vegetables and suggest efficient disinfection conditions. The types of disinfectants were sodium hypochlorite 100mg/L (S100), sodium hypochlorite 200mg/L (S200), hypochlorous acid water 10mg/L (H10), hypochlorous acid water 20mg/L (H20) and hypochlorous acid water 30mg/L (H30). Sterilized water (D) was used as a control. When immersed in disinfectant for 1 minute and then tap water washing, *Escherichia coli* was decreased 0.8 ± 0.2 , 1.4 ± 0.0 , 2.6 ± 0.0 , 1.6 ± 0.0 , 1.6 ± 0.0 and 1.7 ± 0.0 Log CFU/g in D, S100, S200, H10, H20 and H30, respectively. When immersed in disinfectant for 3 minute and then tap water washing, *Escherichia coli* was decreased 0.8 ± 0.0 , 1.5 ± 0.0 , 2.5 ± 0.1 , 1.4 ± 0.0 , 2.0 ± 0.0 and 2.0 ± 0.1 Log CFU/g in D, S100, S200, H10, H20 and H30, respectively. When immersed in disinfectant for 5 minute and then tap water washing, *Escherichia coli* was decreased 0.6 ± 0.1 , 1.5 ± 0.1 , 2.8 ± 0.1 , 1.8 ± 0.0 , 1.7 ± 0.0 and 1.9 ± 0.1 Log CFU/g in D, S100, S200, H10, H20 and H30, respectively. When sodium hypochlorite at a concentration of 200mg/L was immersed for 5minutes, *Escherichia coli* reduction effect was highest. But the vegetables softened, indicating limitations in its use. Taking these results together, it was determined that sterilizing for 100mg/L for 1 minute is efficient when using sodium hypochlorite, and 10mg/L for 1 minute when using hypochlorous acid water.

P4-32

**Complete genome sequences of acetic acid-producing
Acetobacter pasteurianus GHA7**

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Acetobacter pasteurianus is widely used in vinegar production. We sequenced and analyzed the complete genome of *A. pasteurianus* GHA7, isolated from apple vinegar in Hongcheon, Gangwon Province, South Korea, to understand its valuable characteristics. The final assembly included a circular chromosome of 2,927,634 bp and six plasmids ranging from 3,955 bp to 195,115 bp. Using GenDB software, we identified 3,308 protein-coding sequences (CDS) on the chromosome and 308 CDS on the plasmids, as well as 57 tRNA genes and 15 rRNA genes. Genome-level phylogenetic analysis provides the evolutionary position of *A. pasteurianus* among related taxa. This sequence data was also used for the metabolic analysis of biotechnological substrates. Genome analysis revealed cooperative mechanisms for acetic acid resistance in *A. pasteurianus*, along with clustered regularly interspaced short palindromic repeats (CRISPRs) and components like the endonucleases (Cas 1, Cas2 and Cas3). This genomic data offers a valuable platform for enhancing acetic acid production of *A. pasteurianus* GHA7.

P4-33

Identification of the antibacterial substances from a fermented extract from green tea leaves with *Saccharomyces cerevisiae*Jong-Woong Nam*, Ga-Yang Lee, Min-Jeong Jung, Jin Lee,
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In recent, consumers are increasingly interested in food safety and food additives, there is a tendency to avoid foods containing synthetic preservatives. For this reason, researches for discovering natural antibacterial compounds are being actively conducted. In our previous study, a fermented extract from green tea leaves with *Saccharomyces cerevisiae* exhibited excellent antibacterial activities against a various food-borne pathogenic bacteria; the fermented extract possessed a broad antibacterial spectrum with the minimum inhibitory concentrations of 0.63–5.00 mg/mL against 11 species of typical food-borne pathogenic bacteria. In the present study, the major antibacterial compounds were isolated by a bio-autography and analyzed using GC-MS. *Bacillus cereus* and *Staphylococcus aureus* were used as the test bacteria for the bio-autography. A antibacterial spot with Rf values ranging from 0.88 to 0.97 was found on the TLC plate overlayed with the agar medium containing the test bacteria. The antibacterial spot was found at the same location for both bacteria and showed positive for the presence of phenolic compounds. In the results of GC-MS analysis with silylation, 11 substances were detected in the spot, of which caffeine, gallic acid, catechin, epigallocatechin were expected as the major antibacterial substances.

Funding: Main Research Program (E0242401-01) of the Korea Food Research Institute funded by the Ministry of Science and ICT

P4-34

Quality characteristics of mash depending on quantity of barley added for developing barley-distilled sojuYe Seul Kwon^{1,2*}, Jisu Lee^{1,2}, Han-Seok Choi¹¹*Department of Agriculture and Fisheries FoodTech, Korea National University of Agriculture and Fisheries,*²*Department of Food Science and Technology, Jeonbuk National University*

Distilled *soju* has its own unique aroma and flavor depending on the grains, fermentation agent, distillation method, etc.; however, most domestic distilled *soju* is made from rice and the fermentation agent. The ingredients are simple, because of which the overall taste and aroma tend to be similar. Barley is characterized by having a higher protein, lipid, and fiber content than in rice, and is believed to be able to impart a different aroma.

In this study, the possibility of producing distilled barley *soju* was confirmed via manufacturing mash from non-steamed barley content using commercial enzyme products. The saccharification solution pH was 5.18–6.10, total acidity (% acetic acid) was 0.05–0.15, amino acid content (% glycine) was 0.04–0.14, soluble solid (°Brix) was 26.60–29.37, reducing sugar (%) was 16.06–20.72, FAN (free amino nitrogen) content (mg/L) was 67.31–290.83. As the quantity of barley added was increased, total acidity and FAN content significantly increased, which was determined to be influenced by the protein and fat content of barley ($p < 0.05$). The alcohol content (%) of the mash depending on the barley quantity added ranged from 15.91 to 18.26, and showed a significant increase when the barley content was lower ($p < 0.05$).

The vacuum-distilled spirits alcohol content (%) was between 34.97–39.5; hence, alcohol productivity was secured even when making *soju* using unsteamed barley distillation via adding enzymes. Principal component analysis was performed to visually chart the aroma preference characteristics based on barley quantity added and aroma content. PC1 and PC2 explained 61.246%, 26.556%, totaling 87.802%. PCA results indicate that barley-added distilled liquor with a high content of isoamyl acetate has a positive effect on aroma preference.

P4-35

Cyclodextran synthesis from starch utilizing TtCITase from *Thermoanaerobacter thermocopriae*Seong-Jin Hong^{1,2*}, Chang Hee Park², Young-Min Kim²¹Research Institute of Agricultural Science and Technology,
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Cyclodextran (CI) possesses a cyclic structure linked through α -1,6 linkages, similar to cyclodextrin (CD), which is structured through α -1,4 linkages. Many studies were reported dextran was an inducer and a substrate for CITase. However, there are no reports on CITase using starch. In this study, Citase derived from *Thermoanaerobacter thermocopriae* was used to determine whether CIs was produced from starch. When reacted with various substrates, starch produced the highest amount of CI, followed by maltodextrin. When comparing the amount of CIs produced according to substrate concentration, soluble starch showed the highest amount produced at a concentration of 10%. Additionally, when the reaction was carried out for 48 h, water-soluble starch was measured to produce a higher amount of CIs compared to other substrates. This suggests that the CITase enzyme was able to successfully generate CIs from starch, which could be considered fundamental research that can contribute to the efficient production of CIs.



P4-36

Physicochemical properties of Doenjang fermented with *Monascus Koji* and *Aspergillus Koji*

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Doenjang, a Korean traditional fermented food, is made from soybeans and Nuruk. During fermentation, proteins and carbohydrates of soybean are hydrolyzed into peptides, amino acids, sugars, and organic acids, contributing to the unique taste and flavor of Doenjang. Recently, it is simply manufactured using *Aspergillus Koji* which is a key microorganism in the fermentation of Doenjang. *Monascus* sp. is a red-colored fungus whose representative metabolite, Monacolin K, is known to have functional properties such as anti-hyperlipidemia, anti-hypertension, anti-diabetes, anti-cancer, and anti-inflammation. In this study, we attempted to manufacture Doenjang with the improved functional properties by adding *Monascus Koji* to *Aspergillus Koji*. Fermentation proceeded for 20 days. Physicochemical properties such as color, pH, acidity, salinity, amino type nitrogen content, reducing sugar content, and Monacolin K content, and functionality such as antioxidant activity and ACE inhibitory activity, were evaluated.

P4-37

Analysis of the setomimycin biosynthetic gene cluster from *Streptomycesnojiriensis* JCM3382 and evaluation of its α -glucosidase inhibitory activity using molecular docking and molecular dynamics simulations

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Nonaketide-derived biaryl polyketides have attracted significant attention for their efficacy in human health. Setomimycin is produced by *Streptomycesnojiriensis* JCM 3382, *S. aurantiacus* JA4570, and *S. justiciae* RA-WS2, and its antimicrobial and a nti-cancer activities have been reported, and recently, an industrial *Streptomyces* sp. RA-WS2 has been developed with a 16.8-fold improvement in setomimycin production through Taguchi orthogonal array design.

Setomimycin resulted into 1.4 folds higher inhibitory activity against α -glucosidase with IC₅₀ values $231.26 \pm 0.41 \mu\text{M}$, when compared with the available marked drug acarbose (IC₅₀ = $331.32 \pm 1.35 \mu\text{M}$). Lineweaver-Burk plot analysis revealed the inhibition behavior of setomimycin was a competitive inhibitor with a K_i value of $0.931 \pm 0.031 \text{ mM}$, which was the same as that of acarbose.

The molecular dynamics simulation results indicate that the binding affinity of Setomimycin to the MGAM protein is lower compared to the co-crystallized ligand, yet its binding stability is comparable. Therefore, it is speculated that Setomimycin may exhibit pharmacological effects similar to those of the co-crystallized ligand, potentially influencing the structure, function, and biological activity of the MGAM protein.

P4-38

고춧가루 조제 과정 중 이산화염소를 활용한 농약의 저감화 효과 검증

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고춧가루는 약 378백만불(23, 농식품수출정보)을 기록할 정도로 주요 국내 수출 품목 중 하나이다. 농식품 수출 무역에서 안전성은 중요한 요인 중 하나이다. 농약은 생산단계에서 농약안전관리기준에 따라 안전하게 관리되고 있지만, 수확 후 과정에서의 농약의 저감기술까지 패키지로 관리하면 수출 활성화에 도움이 될 것이다. 본 연구에서는 세척 기술에 사용할 물질로 이산화염소를 선택하였다. 이산화염소는 강한 산화력을 가지고 있어 농산물 중 농약의 저감화에 효과가 있고 염소계 물질과 달리 trihalomethane 같은 유해 물질을 생성하지 않는다는 장점이 있다. 실험방법은 thiamethoxam 등 4종 농약을 침지한 고추 각 700g을 이산화염소수 농도 0, 10, 25, 50mg/L와 처리시간 1, 3, 5분의 조건으로 처리했다. 처리 후 200g은 생고추로 나머지 500 g은 건조하여 잔류농약을 분석하였다. 고추의 잔류농약 분석은 QuEChERS 전처리법을 이용해 LC-MS/MS로 진행하였다. 또한, 이산화염소 사용에 필요한 안전성 연구도 함께 실시했다. 이산화염소수는 농도와 처리 시간 증가에 따라 농약의 저감 효과를 보였고, 고추의 수확 후 처리 과정에 활용 가능성이 있는 기술임을 확인하였다.

P4-39

고추 중 이산화염소를 이용한 Indoxacarb 등 5종 농약의 저감화 효과 검증

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농산물 안전에 대한 관심이 높아지면서 생산단계를 넘어 수확 후 과정에서의 저감화 기술의 중요성이 커지고 있다. 본 연구는 고추에서 이산화염소수의 농도와 처리시간에 따른 indoxacarb 등 5종의 저감 효과를 확인하기 위해서 수행되었다. 이산화염소는 강한 산화력을 가지고 있어 농산물의 농약 저감에 효과적이며, 다른 염소계 물질과 달리 trihalomethane 같은 유해 물질을 생성하지 않는다는 장점이 있다. 실험방법으로는 농약에 침지한 고추 각 700g을 이산화염소수 농도 0, 10, 25, 50mg/L과 처리시간 1, 3, 5분의 조건으로 처리하였다. 처리 후 200 g은 생고추로 나머지 500 g은 건조하여 잔류농약을 분석하였다. 고추의 잔류농약 분석은 QuEChERS 전처리법을 이용하여 GC-MS/MS로 진행하였다. 또한, 이산화염소의 농산물과 농작업자 안전을 검증하기 위해 DPD (N,N-diethyl-p-phenylenediamine) 측정법을 사용해 고추 표면의 이산화염소 잔류농도를 측정했고, 이산화염소 가스는 측정기를 이용해 발생 농도를 확인하였다. 실험결과, 이산화염소수 세척 농도와 시간에 따라 indoxacarb 등 5종의 농약의 저감 효과가 증가하는 경향을 나타냈다. 이산화염소의 농산물 및 농작업자 안전은 100 mg/L, 25mg/L에서 안전한 수준으로 확인되었다. 이산화염소수 세척은 농약 저감화 효과가 있는 것으로 판단된다.

P4-40

A novel encapsulation system using sodium alginate/cellulose nanofiber for increasing the stability of probiotic *Lactiplantibacillus plantarum* CJLP 133

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This study explored a new encapsulation material combining sodium alginate (SA) and cellulose nanofiber (CNF) to protect the probiotic *Lactiplantibacillus plantarum* CJLP 133 from harsh processing conditions and a simulated gastrointestinal (GI) environment. Capsules made from a 3% SA and 1% CNF mixture showed a diameter of $2.25 \text{ cm} \pm 0.04$ and a growth rate of $0.168 / \text{h} \pm 0.054$ for the probiotics, which were significantly higher than other concentrations. Fourier transform infrared (FT-IR) spectroscopy confirmed the interaction between SA and CNF through O-H stretching and C-H stretching vibrations. The 2% SA/1% CNF capsules exhibited the highest survival rate of $88.18\% \pm 1.32$, compared to lower rates for single-material capsules or uncoated bacteria after freeze-drying and heat shock. These capsules also showed 1.4-fold increased acid tolerance and 1.1-fold improved adhesion to intestinal epithelial cells. They inhibited the release of *L. plantarum* CJLP 133 in simulated gastric fluid (SGF), but facilitated the release in simulated intestinal fluid (SIF). In addition, *L. plantarum* CJLP 133 utilized SA and CNF as prebiotics more effectively than a typical intestinal strain, *Escherichia coli* KCTC 2571, producing $23.34 \text{ g/L} \pm 0.29$ of lactic acid. Consequently, SA/CNF capsules offer robust protection for probiotics and potential as prebiotics.

P4-41

Anti-diabetic and anti-inflammatory effects of heat-killed *Lactococcus lactis* subsp. cremoris IMCCL013 in LPS-stimulated RAW 264.7 Macrophages

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Probiotic bacteria can interact with the gut microbiome to strengthen the immune system, principally due to their role in immune system modulation and the anti-inflammatory response. Recent studies have reported that probiotics improve the symptoms of diabetes by regulating the intestinal microbiota composition, increasing insulin sensitivity, and mitigating autoimmune responses. Also, the use of heat-killed cells, which still maintain their bio-functionality, can elongate the shelf-life and simplify the food-processing steps of probiotic foods, given their high stability. Thus, the present study aimed to investigate the anti-diabetic and anti-inflammatory effects of heat-killed *Lactococcus lactis* subsp. cremoris IMCCL013 isolated from cheese aging cave in Imsil. Our results showed that treatment with heat-killed IMCCL013 showed the highest rate of inhibition of α -glucosidase activity. In addition, treatment with heat-killed IMCCL013 decreased nitric oxide (NO) and suppressed the expression of pro-inflammatory cytokines, interleukin- 1β (IL- 1β), interleukin-6 (IL-6), and tumor necrosis factor- α (TNF- α). Therefore, these data suggest that heat-killed IMCCL013 could be a good candidate for development as a functional food supplement manufacturing in the improve the anti-diabetic and anti-inflammatory effect.

P4-42

Synthesis and characterization of alpha-glucosylated rebaudioside D using glucosyltransferases

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

Production of caffeine-reduced kombucha and measurement of fermentation characteristics

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

P4-44

참외의 스마트 세척기술 개발 및 현장검증 연구

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참외는 수확 후 세척하여 유통되는 농산물이다. 세척 단계에서 안전성, 품질을 개선할 수 있는 세척기술을 도입한다면 참외 농가의 생산성 향상에 기여할 수 있다. 본 연구에서는 이산화염소를 활용하여 농산물의 안전성, 품질, 농작업자 안전을 종합적으로 고려한 스마트 세척기술을 개발하였다. 연구에서는 이산화염소수를 이용해 ① 농산물의 안전성(잔류농약, 미생물, 진균, 이산화염소) ② 품질 검사(색도, 경도, 중량, 당도, 관능평가) ③ 농작업자 안전을 평가했다. 실험 결과, 모든 요인을 종합적으로 고려할 때 적합한 이산화염소수 농도는 25mg/L로 선정되었다. 이산화염소 농도를 자동으로 유지하고, 농작업자 안전을 고려한 세척장치를 현장 참외 산지유통센터(APC)에 설치하여 실증한 결과 농약 6종의 잔류가 22-69% 감소하였고, 미생물과 진균은 1.0-1.5 Log CFU/g 저감 효과를 보였다 ($p < 0.05$). 다른 품질평가 결과에는 차이가 없었으나, 관능평가에서 외관과 색도가 개선된 것으로 나타났다($p < 0.05$). 따라서 개발된 스마트 세척기술은 참외 농가의 생산성 향상에 도움이 될 것으로 판단된다.

P4-45

Evaluation of anti-inflammatory effects of *Lactisacibacillus rhamnosus* L22-FR28 (KACC 92513P) isolated from infant feces in an animal model

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Our study aims to verify the anti-inflammatory effects of *Lactisacibacillus* (L.) *rhamnosus* L22-FR28 (L28) strain and OJ(*Oenanthe javanica*) + L28 ferment *in vivo*, which have demonstrated similar effects in LPS-stimulated macrophages, by comparing them with *L. rhamnosus* ATCC 53103, a well-known immunomodulatory strain. Both the L28 strain and the water parsley extract inhibited nitric oxide and cytokine production in RAW cells stimulated by lipid polymorphism *in vitro* and in the Balb/c mouse model, NO production and IL-6 cytokine levels were reduced by 1,4-fold and 1,3-fold, respectively. Notably, the L28 strain alone showed IL-6 levels with 1,15 times greater anti-inflammatory efficacy than *L. rhamnosus* ATCC 53103 (positive control). Additionally, TNF- α levels were reduced by 1,2-fold in the L28 strain experimental group compared to the LPS-stimulated group. Protein expression analysis of mouse spleen tissue showed a significant decrease in inflammatory factors in the positive control (PC) and LPS-stimulated (S1) groups compared to group C. Furthermore, COX-2 expression significantly decreased in all groups except S4-2 compared to group P. Histopathological analysis of stained spleen tissue revealed that the experimental groups (S1 and S2) exhibited reduced mucosal erosion and inflammation compared to the LPS treatment group. In conclusion, the L28 strain, selected for its potent anti-inflammatory effect *in vitro*, is expected to demonstrate similar efficacy *in vivo*. Further research will validate its potential for use in health functional applications.

P4-46

임실산 복숭아 와인의 품질 특성 연구

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복숭아(*Prunus persica* (L.) Batsch)는 장미과에 속하며 사과와 배 다음으로 상업적 가치가 높은 과일이다. 임실에서는 2023년 4580톤의 복숭아를 생산하였으며, 복숭아의 품질과 맛이 뛰어나 상품성을 인정받고 있다.

복숭아는 뛰어난 향과 맛을 가지며, 여러 생리활성 성분들을 함유하고 있으나, 저장수명이 대체로 짧아 상온 보관 시 품질이 급격하게 손실되는 문제가 있어, 이에 대한 대책이 필요하다. 따라서, 임실산 복숭아의 소비 확대 차원에서 복숭아의 맛과 향을 보존하면서도 보관 및 유통이 자유로운 복숭아 와인 개발을 하고자 하였다.

본 연구에서는 임실산 복숭아에 부원료(사과, 배)를 달리하여 품질 특성을 비교하고, 복숭아 와인은 25℃에서 30일간 발효하면서 10일 간격으로 특성을 분석하였다. 분석 방법으로는 pH, 가용성 고형분(% Brix), 총산, 유기산, 유리당, 알콜함량, 향기성분 등이 사용되었다.

P4-47

Development of a phage cocktail as a novel antibacterial strategy against pathogenic *Escherichia coli*Gahyeon Nam^{1*}, Wonjae Lee¹, Hakdong Shin², Bokyoung Son¹¹Department of Food biotechnology, Dong-A University,²Department of Food Science and Biotechnology, Sejong University

Enteroaggregative Escherichia coli (EAEC) and Enterohemorrhagic *Escherichia coli* (EHEC) are pathogenic serotypes of *E. coli* that cause intestinal diseases in humans. They are typically transmitted through the consumption of contaminated food items like undercooked beef or vegetables. The emergence of antibiotic resistance in these pathogens has created an urgent need for the development of new antibacterial strategies. To address this, we isolated phages EA4, EH11, EP26, and EP27, as an alternative to antibiotics. Phage EA4, isolated using Eco_004 (EAEC) as the host, showed strong host specificity by forming plaques only on its own host bacterial lawn. The latent period and burst size of EA4 were 10 min and 157 plaque-forming units (PFU), respectively. The other three phages, EH11, EP26 and EP27 each has different host ranges, covering relatively broad host range against the tested EHEC and EPEC strains. Thus, they were utilized as components of a phage cocktail. We observed that the development of resistance was delayed when using the cocktail of three phages compared to single-phage treatment. These findings suggest the promising potential of phages EA4 and a phage cocktail containing EH11, EP26 and EP27 as biocontrol agents against EAEC and EHEC.

P4-48

Isolation and characterization of novel bacteriophages as biological control agents against *Bacillus licheniformis* in dairy products

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Bacillus licheniformis is a major food spoilage bacterium capable of surviving in high-temperature environments and forming endospores. Particularly, it contaminates dairy products, leading to a deterioration in food quality. To address this issue, we newly isolated phages PS1, BD5-S, and BM2-A, which infect *B. licheniformis*. PS1, BD5-S, and BM2-A efficiently lysed bacteria for 24 h post-phage infection at multiplicity of infection (MOI) of 1 and 0.1, and these phages exhibited a narrow host range, specifically targeting *B. licheniformis* among 45 strains tested. Among them, phage PS1, with a broad host range, was selected for further research. Almost all the phage PS1 were adsorbed to host cells within 5 min. The latent and eclipse period were 20 min and 10 min, respectively, and the burst size was approximately 64 plaque-forming units (PFU) per infected cell. The isolated phage showed excellent stability in a wide range of pHs (pH4–10), temperatures (4–65°C), and NaCl concentrations (0–1M). Moreover, this phage inhibited the growth of *B. licheniformis* in milk for 48 h at room temperature. These results suggest that the novel phage PS1 could serve as an effective biological control agent and antibiotic alternative against *B. licheniformis* in dairy products.

P4-49

Antibacterial activity and physiological characteristics of lactic acid bacteria isolated from pet dogs**Hwa Seol Ryu, Chun Pyo Jeon, Seung Hun Han****Department of Bio Vaccine and Pharmaceutical, Andong Science College*

Recently, maintaining the health of pets is one of the major concerns of modern people. Nevertheless, we lack an understanding of the status of intestinal microorganisms, which are an important factor in the health of pets. Accordingly, in this study, lactic acid bacteria were isolated from pet feces to improve the intestinal health of pets, and probiotics were selected by measuring antibacterial activity and physiological characteristics. As a result, a total 53 types of lactic acid bacteria were isolated. As a result of measuring the antibacterial activity using the disk diffusion method, among the isolated lactic acid bacteria, Cap2024-15 strain showed the highest antibacterial effect against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Salmonella typhimurium*. In addition, as a result of confirming the physiological characteristics of the Cap2024-15 strain, it was found to have excellent acid resistance, bile resistance, and superior antibiotic resistance. These results suggest that the selected strain, the Cap2024-15, can be usefully used in the probiotic industry.

P4-50

Development and validation of a strain-specific genome marker for monitoring *Bacillus velezensis* NY12-2 among *Bacillus* Species

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Bacillus (*B.*) *velezensis*, an edible microorganism, is frequently detected in fermented foods, environmental, and soil samples. This species is valued as a starter culture due to its known functionalities, including protein degradation, antibacterial activity, and plant growth promotion. Meanwhile, it is essential to monitor whether the strain effectively performs its role as a starter culture by distinguishing it from naturally occurring species in various fermented foods. We developed a strain-specific genomic marker for monitoring *B. velezensis* NY12-2 based on whole-genome sequencing (WGS) data obtained from the Illumina platform. The assembled contig sequences were divided and compared with NCBI RefSeq using BLAST to identify target-specific regions. Strain-specific primers were designed and evaluated in silico using NCBI Primer-BLAST. The ability of marker was validated using qPCR analysis to distinguish the target strain from similar *Bacillus* species. Consequently, the strain-specific marker is a powerful tool for monitoring starter cultures in fermented foods and can aid in developing markers for other strains.

P4-51

**Intake of major microorganisms in *Meju* and *Cheonggukjang*:
analysis using KNHANES data**

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Traditional Korean fermented soybean products, such as *Meju* and *Cheonggukjang*, are enriched with various microorganisms that enhance their nutrition, palatability, and shelf-life through the production of metabolites during the fermentation process. In this study, eight samples each of traditionally manufactured *Meju* and *Cheonggukjang* were analyzed. The analysis of viable cell counts revealed fungal counts of 5.77 ± 1.57 and 0.31 ± 0.95 log CFU/g, aerobic bacterial counts of 7.28 ± 1.02 and 8.13 ± 0.60 log CFU/g, anaerobic bacterial counts of 6.92 ± 0.96 and 7.31 ± 1.14 log CFU/g, and lactic acid bacterial counts of 6.89 ± 1.22 and 5.93 ± 2.36 log CFU/g, respectively. Different colony morphologies were observed, leading to the isolation of 90 strains from *Meju* and 80 strains from *Cheonggukjang*, identified as the genera of *Aspergillus*, *Bacillus*, and *Lactobacillus* using the daily average consumption amounts of *Meju* (as Doenjang) and *Cheonggukjang* from the Korea National Health and Nutrition Examination Survey (2021), which are 3.95 g and 0.85 g, respectively, the daily intake of microorganisms was calculated as follows: *Aspergillus* sp., 6.68 ± 1.37 and 2.23 ± 1.50 log CFU/g/day; *Bacillus* sp., 8.19 ± 1.10 and 7.98 ± 0.42 log CFU/g/day; and *Lactobacillus* sp., 7.32 ± 1.51 and 6.31 ± 1.62 log CFU/g/day. This result calculates the intake of key microorganisms in fermented foods, offering scientific evidence for registering new microbial resources and understanding the correlation between microorganism distribution and product quality.

P4-52

Development of bacterial nanocellulose based core-shell gels as a novel encapsulant for target delivery of probiotics

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This study developed a novel core-shell gels system using bacterial nanocellulose (BNC) as the core and a pectin/microfibrillated cellulose (MFC) composite as the shell to enhance stability and intestinal adhesion of *Lactiplantibacillus plantarum* CJLP 133. The BNC core was produced under optimized conditions for loading *L. plantarum* which was then coated with pectin/MFC mixture to form the shell. In simulated gastrointestinal conditions, $60.03\% \pm 1.04\%$ of *L. plantarum* survived in simulated gastric fluid, and $87.02\% \pm 0.56\%$ was released in simulated intestinal fluid highlighting the pH-sensitive nature of the gels. In addition, $92.80\% \pm 1.05\%$ of the released *L. plantarum* adhered to HT-29 intestinal epithelial cells, probably because of the increased hydrophobicity, showing a $51.87\% \pm 0.97\%$ increase compared to free cells. Auto-aggregation of *L. plantarum* in the gels also increased by $75.26\% \pm 0.63\%$, which helps to build probiotic barriers against pathogenic bacteria. Furthermore, the core-shell gels showed a feasibility using as prebiotics, enhancing the production of short-chain fatty acid such as lactic acid and propionic acid. Overall, the BNC/pectin/MFC core-shell gels offer a promising new approach for synbiotic delivery systems.

P4-53

Quality assessment of fermentation agents (Koji and Nuruk) for the production of collagen Makgeolli

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For the purpose of producing collagen makgeolli, the saccharification power and proteolytic activity for the selection of fermenting agents (koji and nuruk) and the quality of makgeolli produced using them were evaluated. In this study, 8 types of fermented koji and nuruk products were selected and purchased from the manufacturer. The saccharification power and proteolytic activity of the fermentation agent were analyzed. As a result, the proteolytic activity ranged from 20 to 150ug/g.min (means 65ug/g.min), and the three nuruk products (B, D, E) had activities higher than the average. Makgeolli was manufactured using eight types of fermentation agents and its quality was evaluated. As a result, the yield of makgeolli ranged from 59 to 82% (means 68.7%), and high yields above the average were found in three nuruk products (C, D, E) and one koji product (H). The alcohol content of makgeolli ranged from 11.20 to 15.90% (means 13.38%), and alcohol content above the average was found in three nuruk products (A, D, E) and one koji product (F). The overall acceptance for makgeolli (5-point scale) ranged from 1.5 to 3.3 score (means 3.3 score), and overall acceptance above the average was found in two nuruk products (D, E) and two koji products (G, H). From the above results, the two nuruk products (D, E) were evaluated as the most suitable fermentation agents for the production of collagen makgeolli, and the manufacturing conditions and quality characteristics of makgeolli using collagen will be established in the future.

P4-54

Isolation and identification of proteolytic and acidogenic microorganisms from squid viscera

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South Korea is one of the country with a high consumption rate of seafood, averaging 69.9 kilograms per year, and this rate is increasing every year. Seafood by-products, such as bones and viscera, which are left over from seafood consumption, account for about one-third of seafood production. However, only 19.5% of these by-products are recycled. Consequently, research is underway to increase their utilization. Squid viscera, a by-product of the seafood industry, is often discarded despite its potential as a source of beneficial microorganisms and valuable components. The aim of this study was to isolate and identify useful strains from squid viscera with proteolytic or acidogenic activity. Squid viscera were collected from Maecheon market in Daegu, South Korea, and 299 strains were isolated. These isolates were subjected to PCR using 27F and 1492R primers and RFLP analysis using AluI, HaeIII and Sau3AI restriction enzymes. A total of 37 isolates were identified: 20 *Pseudomonas*, 7 *Staphylococcus*, 2 *Bacillus*, 2 *Priestia*, 2 *Heyndrickxia*, and 4 *Chryseobacterium*. This study provides valuable information on the microbial community in squid viscera. Further studies using these strains for the production of squid viscera fermentation could indicate the potential for recycling squid viscera, which has been considered a seafood by-product.

Quality characteristics and nutritional properties of high-oleic acid Doenjang

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Doenjang, a traditional Korean fermented food made by fermenting soybeans, is renowned for its health benefits, including anti-diabetes, anti-cancer, and anti-obesity effects. Recently, a high-oleic acid soybean cultivar named Hosim, which has an enhanced oleic acid content of approximately 79% and a balanced 1:1 ratio of ω -6 to ω -3 fatty acids, was developed. Diet rich in oleic acid have been reported to reduce the risk of cardiovascular disease (CVD). In this study, we prepared Doenjang using high-oleic acid soybeans and evaluated its quality characteristics, amino acid profile, fatty acid composition, and antioxidant activity to determine the processing suitability and nutritional properties of high-oleic acid Doenjang. Our results indicate the fermentation characteristics of high-oleic acid soybean Doenjang are not significantly different from those of regular soybean Doenjang, confirming its suitability for processing. These findings provide a basis for utilizing high-oleic acid soybeans in Doenjang production and highlight their potential functional benefits.

P4-56

Optimization of production conditions of microbial exopolysaccharide by *Mitsuaria chitosanitabida* for industrial applications**Ye-Na Lee^{1*}, Yeong-Jun Kim¹, Su-Hyun Lee¹, So-Yeon Sim¹,
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Microbial exopolysaccharides (EPS) are carbohydrate polymers with a mucilaginous coating that are produced on the cell walls of microorganisms during the fermentation process. Due to their characteristics, such as biocompatibility, biodegradability, gel-forming, and thickening ability, they have many industrial uses as eco-friendly materials, including encapsulation, food additives, 3D printing, and prebiotics. We previously investigated the production of EPS by *Mitsuaria chitosanitabida* KMBL 5781, revealing that it is highly viscous and has a high yield stress and water holding capacity. To utilize this EPS for commercial use, this study aimed to identify the optimal production conditions for EPS. Highly viscous polysaccharides produced by *M. chitosanitablida* KMBL 5781 were purified by sequential precipitation. The purified EPS appeared white and had a cotton-like texture, as mentioned in the previous study. To confirm the optimal conditions for producing a high-viscosity culture medium of EPS, the culture conditions were artificially manipulated during fermentation. This study aims to establish a fermentation process that enhances the production of EPS. Consequently, this research can provide foundational information for future research on this valuable polysaccharide as food additive.

P4-57

Optimization of Monacolin-K production and physiological activities for fermentation products of solid-stated fermentation with *Monascus ruber* KACC45308Jeong-Ha Lee, Jun-Tae Kim, Suyeon Gu, Seungwha Jo,
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Monacolin-K is a metabolite produced when the fungus in the genus *Monascus* sp. is inoculated into rice and solid-state fermented, and it is widely believed that this product is a health-beneficial substance for a long time. Along with antibacterial effects, monacolin-K is known to inhibit cholesterol biosynthesis, drop blood pressure, and relax blood vessels, and in particular, effects such as lowering blood lipids or preventing arteriosclerosis by free oxygen are reported. In particular, the need for research is also emerging as the demand for monacolin-K is expected to increase as the proportion of modern people with hyperlipidemia and hypertension continues to increase. Monacolin-K is a substance produced by fermentation by inoculating 100% white-rice with *Monascus* sp. and the amount of monacolin-K produced varies greatly depending on the type of strain. In this study, solid-state fermentation optimization was performed using *Monascus ruber* KACC45308 in which monacolin-K was produced, and the optimal conditions for monacolin-K production were to be established. According to the results of previous studies, the initial moisture, temperature, and yeast extract were set as the experimental conditions, and it is expected that the optimal conditions for monacolin-K production of *Monascus ruber* KACC 45308 were 44.05% initial moisture, 25 °C temperature, and yeast extract does not need to be included in the medium component. In addition, the physiological activities of α -glucosidase inhibition (AGI) activity and angiotensin converting enzyme I (ACE) inhibition activity were confirmed for product obtained by solid-state fermentation of *Monascus ruber* KACC45308.

P4-58

Enhanced quality characteristics of brandy aged with oak chips from domestic Grapes

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This study aimed to standardize the distillation process and oak chip aging techniques to improve the processability of various grape varieties. Brandy was distilled using a reduced pressure distillation method and aged with different oak chips (American, French, and Korean). The distillation conditions were: still pressure of 560 ± 20 mmHg, fermentation liquid temperature of 40–60°C, cooling water temperature of 10–12°C, and distillate outlet temperature of 15–20°C. During maturation, the pH was maintained at about 2.6 to 2.9, with low total acidity. In terms of organic acid content, Shine Muscat brandy aged with American oak chips showed a decrease in citric acid and tartaric acid, and an increase in succinic acid and acetic acid. Shine Muscat brandy aged with French oak chips showed a significant increase in total phenolic content and antioxidant capacity. The brandy aged with French oak chips exhibited the most notable darkening and highest turbidity, while the brandy aged with Korean oak chips retained the clearest appearance. The addition of French oak chips enhanced fruity, woody, and floral flavors, and received the highest scores in the overall sensory evaluation.

P4-59

Analysis of quality characteristics of *Meju* and *Doenjang* by type of mold starter with *Aspergillus oryzae*

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Microbial Institute for Fermentation Industry

This study was conducted to observe the quality changes of *Meju* and *Doenjang* according to the type of mold starter with *Aspergillus oryzae*. *Meju* was manufactured used 4 types(A: other company products , B: SRCM102487, C: SRCM101975, D: SRCM101989) of *Aspergillus oryzae*. The pH of *Meju* was 6.05 ± 0.04 – 6.98 ± 0.01 and there was no difference in the values. The acidity content was highest in sample A at $2.61 \pm 0.11\%$ and lowest in sample B at $1.28 \pm 0.07\%$. The AN content was highest in sample B at 709.63 ± 9.55 mg% and lowest in sample D at 431.83 ± 20.29 mg%. The moisture content of the *Meju* was 30.59 ± 0.64 – $24.75 \pm 0.57\%$. *Doenjang* was manufactured using 4 types of mold starters with *Aspergillus oryzae*. The pH of *Doenjang* was 6.38 ± 0.04 – 5.28 ± 0.03 in A–D samples. The moisture content was highest in sample A at $62.36 \pm 0.28\%$, and similar in samples B–D at 59.07 ± 0.31 – $59.76 \pm 0.35\%$. The salinity content was similar at 16.50 ± 0.26 – $17.87 \pm 0.15\%$. The AN content was lowest in sample A at 737.89 ± 3.10 mg% and highest in sample D at 930.55 ± 18.72 mg%. The mold starter made used sample D (SRCM101989) fermented well, so it is thought to have value as a commercial mold starter.

P4-60

Screening of citrinin-free *Monascus ruber* KACC45308 for Monacolin-K production and optimization of spore production in submerged culture

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Red yeast rice, which contains monacolin K, is a fermentation product of the *Monascus* strain. It has been widely used as a traditional food additive, particularly in Asia. In Europe and the United States, red yeast rice has been developed as a health functional food and sold as a product, and products continue to be released in Asia such as Korea, Japan, and China. *Monascus* strains is also increasing. Monacolin-K, a substance generated by fermenting white rice with *Monascus* sp., exhibits varying production levels across different species. In this study, we screened *Monascus ruber* KACC45308 that produce Monacolin-K without generating the toxic compound citrinin. Additionally optimization of spore production in submerged culture for obtaining abundant spores as an inoculum in large-scale solid-state fermentation. We investigated three food substrates maltose, soybean oil, and yeast extract Fa02 for their positive effects on spore production using a Plackett-Burman experimental design. Additionally, we explored optimal concentrations of these substrates using Box-Behnken design-based response surface methodology (RSM). inoculation with optimized culture medium, solid-state fermentation resulted in an increase in Monacolin-K content compared to the screening stage.

P4-61

Development of initial screening model for pesticide residues in agricultural fields using national and regional monitoring data

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This study aimed to improve pesticide management in agriculture at national and regional levels using the physical-chemical characteristics of selected pesticides and their field monitoring data, along with popular statistical tools. The Pesticide Properties Database (PPDB) provided a data set containing 9 different properties of 108 pesticides, which was analyzed using principal component analysis (PCA) to identify the most important pesticides responsible for increasing environmental risk. Cluster analysis (CA) was used to partition the monitoring data set, comprising concentrations of pesticides in soil samples from 300 paddy and orchard fields nationwide in 2019, into subgroups based on similarity. The risk quotient (RQ) was calculated to recommend alternative pesticides with low RQ. PCA accounted for 73.6% of the total variance in the data set of pesticide properties, identifying high-risk pesticides such as Boscalid, Difenoconazole, Fluquinconazole, and Tebuconazole. Cluster analysis divided the monitoring data set into five subgroups ranging from very high to very low environmental concern. Replacing Fluquinconazole with Azoxystrobin at a high-risk site reduced the RQ index by up to 40.2% in five years. The results of this study, serving as a preliminary investigation for predicting pesticide residues in food and safety assessment, are expected to provide a crucial link between the developed initial screening model for pesticides and the future development of models predicting pesticide residues in food based on soil residues.

P4-62

Fermentation characteristics of green and red kimchi cabbages (*Brassica rapa*, L. ssp. *pekinensis*) with WiKim0121Seung-Min Oh^{1*}, Jiyeon Chun^{1,2}¹Department of Food Science and Technology, Suncheon National University,²Kimchi Science and Industrialization Institute, Suncheon National University

In this study, the WiKim0121 (the World Institute of Kimchi) which was developed as a kimchi starter to improve kimchi quality, was applied for kimchi preparation using green kimchi cabbage (*Brassica rapa*, L. ssp. *pekinensis*, GC) and red kimchi cabbage (*Brassica rapa*, L. \times *Brassica oleracea*, L, RC). A total four types of kimchi (GC and RC without WiKim0121 (W), GC-W and RC-W with WiKim0121) were sampled during fermentation at 10°C, and their physicochemical and sensory properties were investigated. The decrease in pH varied depending on the type of kimchi. The time to reach pH 4.5 was shortest for GC-W and RC-W (7 days), followed by 12 days for RC and 17 days for KC. Lactic acid bacteria counts increased to the highest levels in GC-W and RC-W on day 7 of fermentation, and GC and RC showed the highest levels on day 12 of fermentation. Antioxidant activity was significantly higher in RC and RC-W than in GC, and DPPH and ABTS radical scavenging activities tended to be slightly higher in RC and RC-W. When the texture of the four kimchi samples (KC-17d, KC-W-7d, RC-12d, RC-W-7d) at optimum maturity (pH 4.5) was analyzed, KC-W-7d showed significantly lower hardness, and the other samples showed no significant differences. In sensory evaluation, KC-W had the highest values in overall taste and texture. This study shows that the use of WiKim0121 in kimchi manufacturing increases the growth rate of lactic acid bacteria, shortens the kimchi fermentation period, and significantly improves the sensory quality of kimchi. The results of this study can be used as basic data for process improvement in producing good-quality kimchi and control the fermentation speed when applying WiKim0121 starter in the kimchi industry.

PART V

생리활성/영양/기능성

P5-01

Comparison of physicochemical properties between pepper leaf and pepper fruit harvested from Korean native pepper variety

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Hot peppers (*Capsicum annuum* L.) are annual plants belonging to the Solanaceae family. Both the fruit and leaves are edible, with the ripe fruit being called "beoncho" in traditional medicine, where it is used to treat frostbite, beriberi, and dog bites. Hot peppers are also recognized as a health food ingredient due to their high vitamin C content, which boosts immunity, enhances physical strength, and suppresses obesity. While young pepper leaves are consumed as a vegetable, the rest are often discarded, leading to limited utilization. Research of pepper leaf on the composition, efficacy, processing, and storage of pepper leaves is in its rudimentary stages. This study aims to address the Nagoya Protocol and enhance the utilization of hot pepper leaves by evaluating the useful components, antioxidant activity, and digestive enzyme inhibition of pepper leaves from domestic traditional varieties (Subi-cho, Sumi-hyang, Yuwol-cho, Chilseong-cho, and Goun-bit). The results indicated that the color and composition of hot pepper leaves significantly change depending on the drying method, necessitating low-temperature drying in small quantities. Although the ethanol extracts of hot pepper leaves had lower polyphenol and total sugar content compared to pepper fruit extracts, they exhibited stronger DPPH radical scavenging activity, ABTS cation scavenging activity, nitrite scavenging activity, and reducing power. Additionally, no inhibition of protein, lipid, or carbohydrate-degrading enzymes of hot pepper leaves extract was observed. These findings suggest the potential for developing antioxidant materials using traditional chili leaves

P5-02

***Typha* sp., domestic freshwater aquatic plants could be developed as potent anti-thrombotic, anti-diabetic and anti-oxidant agent**Ju-Ho Yeom¹, Eun-Seo-Im¹, Jong-Sik Kim², Ho-Yong Sohn^{1*}¹Dept. of Food and Nutrition,²Dept. of Life Science, Andong National University

Typha sp. (bulrushes, cat-tail) belonging to the Typhaceae family of monocotyledonous perennial herbs, are commonly found in domestic wetlands. In Korea, there are four known species: *Typha orientalis* C. Presl., *Typha latifolia*, *Typha laxmannii* Lepech., and *Typha angustifolia*. Plants in the *Typha* genus are monoecious, with fruits that resemble brown hotdogs or sausages that swell and disperse seeds with attached hairs by wind. In traditional medicine, *Typha orientalis* C. Presl., known as Puhuang, Xiangpo, Puhua, or Gantong, is used to improve women's health (such as treating leucorrhea and excessive menstruation), enhance stomach health, boost immunity, and act as a hemostatic agent for uterine bleeding and external trauma. This study compared and evaluated the antithrombotic, antidiabetic, and antioxidant activities of extracts from 14 species of *Typha* plants provided by the FBCC. The results indicated that the 70% ethanol extracts of the aerial parts of *Typha orientalis* and the whole *Typha laxmannii* Lepech. exhibited strong inhibitory activity against blood coagulation factors. Additionally, the extract of the aerial parts of *Typha orientalis* demonstrated excellent α -glucosidase inhibitory activity. Various extracts from the *Typha* genus also showed excellent radical scavenging activity and reducing power. However, none of the 14 *Typha* extracts exhibited antibacterial or antifungal activity at a concentration of 100 μ g/disc, and no hemolytic activity against human red blood cells was observed up to a concentration of 1 mg/ml. These findings suggest the necessity for further research on the antithrombotic, antidiabetic, and antioxidant properties of native *Typha* plants

P5-03

Comparison of functional components and biological activities in domestic legumes of soybean and adzuki bean

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This study aimed to evaluate the potential use of domestically developed legumes as functional food materials. Two new cultivars each of each legume crops, soybean ('Soriheuk' and 'Soman') and adzuki bean ('Geomguseul' and 'Hongda') were investigated for their functional components and biological activities and were compared with those of check cultivars ('Cheongja5ho' and 'Arari'), respectively. Crude protein content of soybean cultivars was higher than that of adzuki bean. 'Soriheuk' and 'Hongda' showed higher crude protein content (42.24 and 24.64 g/100 g dry weight, respectively) than check cultivars (40.73 and 20.72 g/100 g dry weight). The new cultivars also tended to be higher than check cultivars in total polyphenol and flavonoid contents. Particularly, 'Soman' and 'Hongda' were highest in total polyphenol and flavonoid contents. The antioxidant activities of these legumes followed a similar trend to the total polyphenol contents. Anti-diabetic activity was also highest in 'Soman' and 'Hongda', with values of 16.05% and 12.45%, respectively. In soybean, 'Soriheuk' (11.93%) showed higher anti-diabetic activity than the check cultivar 'Cheongja5ho' (10.43%); in adzuki bean, 'Geomguseul' had a lower activity at 7.9% compared to the check cultivar 'Arari' (10.40%). Our results showed that 'Soman' soybean and 'Hongda' adzuki bean are considered to have potential as nutritional and functional food materials.

P5-04

***Catalpa bignonioides* extract improves exercise performance through regulation of growth and metabolism in skeletal muscles**

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Objective: To evaluate the effects of *Catalpa bignonioides* fruit extract on the promotion of muscle growth and muscular capacity *in vitro* and *in vivo*.

Methods: Cell viability was measured using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay. Cell proliferation was assessed using a 5-bromo-2'-deoxyuridine (BrdU) assay kit. Western blot analysis was performed to determine the protein expressions of related factors. The effects of *C. bignonioides* extract were investigated in mice using the treadmill exhaustion test and whole-limb grip strength assay. Chemical composition analysis was performed using high-performance liquid chromatography (HPLC).

Results: *C. bignonioides* extract increased the proliferation of C2C12 mouse myoblasts by activating the Akt/mTOR signaling pathway. It also induced metabolic changes, increasing the number of mitochondria and glucose metabolism by phosphorylating adenosine monophosphate-activated protein kinase. In an *in vivo* study, the extract-treated mice showed improved motor abilities, such as muscular endurance and grip strength. Additionally, HPLC analysis showed that vanillic acid may be the main component in the *C. bignonioides* extract that enhances muscle strength.

Conclusions: *C. bignonioides* improves exercise performance through regulation of growth and metabolism in skeletal muscles, suggesting its potential as an effective natural agent for improving muscular strength.

P5-05

**Anti-oxidant, whitening and anti-obesity effects of red fleshed pitaya
(*Hylocereus polyrhizus*) extract**Rina Lee*, Myunghyup Oh, Jungmin Lee, Hyunju Lee,
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Pitaya(Dragon fruit) belongs to the cactus family (*Selenicereus*). Recently, 'DaHong' pitaya variety with red flesh and peel was introduced from Taiwan and is also produced on Jeju island in Korea. This study was investigated the effects of red fleshed pitaya extracts on the antioxidant activity, whitening and anti-obesity effects. We aim to increase the financial value of red fleshed pitaya and reveal its applicability as a functional food material in the future. Total polyphenol content and antioxidant activity (ABTS, DDPH radical scavenging activity) for each extract obtained using 70% ethanol and water extraction conditions for flesh and peel were measured and 70% ethanol peel extract was the highest. Mushroom tyrosinase inhibitory activity to measure the whitening effect, the water extract of the flesh was the most effective. To investigate the anti-obesity effect, a 3T3-L1 preadipocyte differentiation experiment was performed at a non-cytotoxic concentration using 70% ethanol and water of the flesh extract. As a result, lipids accumulation using the flesh water extract and 70% ethanol extract at a concentration of 250 µg/ml was significantly low compared with control. People eat the flesh of pitaya, and discard inedible parts such as the peel. The antioxidant activity of the fruit peel, whereas whitening of the flesh, and anti-obesity effects are expected to make pitaya highly valuable as a variety of health functional food ingredients.

P5-06

LC-MS 기반 품종에 따른 자색무의 무와 무청의 유용성분 변화

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자색무는 플라보노이드류, 테르펜류, 글루코시네이트류의 유용성분과 더불어 안토시아닌류를 함유하고 있어 다양한 생리활성을 가지고 있으며, 그에 따른 자색무 소비가 증가하고 있다. 따라서 본 연구에서는 백색무 1종 (무병장수)과 자색무 3종 (스위트베이비, 정운무, 보라킹)의 무청과 무를 대상으로 항산화 활성, 항화합물 및 LC-MS 기반 대사체 분석을 통해 성분학적 특성을 파악하고자 하였다. 자색무의 ABTS+라디칼 소거능($257.5 \pm 88.1 \text{ mg AAE}/100\text{g}$)은 백색무($155.7 \pm 6.6 \text{ mg AAE}/100\text{g}$)보다 활성이 유의하게 높았다. 자색무의 총 플라보노이드 함량은 스위트 베이비($97.2 \pm 3.8 \text{ mg NAE}/100\text{g}$) > 정운무($89.3 \pm 2.3 \text{ mg NAE}/100\text{g}$) > 보라킹($63.9 \pm 2.8 \text{ mg NAE}/100\text{g}$) 순으로 함량이 유의하게 높았다. 또한, 보라킹의 총 안토시아닌 함량 ($420.1 \pm 6.5 \text{ mg C3G}/100\text{g}$)은 다른 품종의 자색무에 비하여 유의하게 높았다. 백색무와 자색무 품종의 항화합물(glucoraphasatin과 glucoraphein) 분석 결과, 보라킹의 glucoraphasatin 함량($0.76 \pm 0.00 \text{ mMole}/100 \text{ g}$)이 유의하게 낮았다. 백색무와 자색무의 품종에 따른 성분 변화를 확인하기 위해 LC-QToF-ESI-MS를 이용하여 무청과 무의 유용 성분을 분석하고, 다변량 통계를 이용하여 대사체 변화를 확인하였다. 위 연구를 통해 자색무의 품종에 따른 성분 데이터베이스가 구축되고 그에 따른 자색무에 적합한 재배 및 가공 개발에 기초 자료로 활용이 기대된다.

Keywords: *Raphanus sativus* L., metabolites, LC-QToF-MS

P5-07

Emodin-8- β -D-glucoside derived from *Reynoutria japonica* ameliorates *Dermatophagoides farinae* extract-induced atopic dermatitis-like skin inflammation in mice by inhibiting JAK/STAT signalingHyun-Kyung Song^{1*}, Ki-Shuk Shim², Musun Park³, Hye Jin Kim²,
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Reynoutria japonica, also known as Huzhang in traditional Chinese medicine, is recognized for its functional food properties, including enhancing blood circulation, eliminating wind pathogens, and relieving cough. However, its potential for treating atopic dermatitis (AD) has not been thoroughly investigated. This study examined the effects of *R. japonica* ethanol extract (RJE) on AD-like skin inflammation induced by *Dermatophagoides farinae* extract (DfE) in NC/Nga mice. The results demonstrated that RJE significantly alleviates DfE-induced AD symptoms and improves skin barrier function. Additionally, RJE reduced mast cell infiltration and lowered serum levels of inflammatory cytokines. It also inhibited IFN- γ /TNF- α -induced chemokines production and signal transducer and activator of transcription (STAT) 3 phosphorylation in skin cells. Virtual binding analysis suggested that emodin-8- β -D-glucoside, a component of RJE, binds to Janus kinase (JAK) 1/2, thereby inhibiting STAT signaling. This suggests that RJE mitigates skin inflammation by targeting the JAK/STAT pathway and suppressing proinflammatory immune responses. These findings highlight the potential of RJE as an effective therapeutic option for managing AD by addressing skin barrier dysfunction and chronic inflammation. Thus, beyond its traditional use as a functional food, RJE shows promise as a treatment for AD and potentially other inflammatory skin disorders.

P5-08

Inhibitory effect of Quercetin of pro-inflammatory cytokines in *Pseudomonas aeruginosa* infected A549 cells

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The injectisome type III secretion system(T3SS) is a major virulence factor in *Pseudomonas aeruginosa*(*P. aeruginosa*). This bacterium is responsible for severe infections in cystic fibrosis patients and has become resistant to many antibiotics. Inhibitors of T3SS may therefore constitute an innovative therapeutic target. The effector protein Exotoxin S(ExoS) produced by *P. aeruginosa* is secreted into the host cells via the T3SS. From the initial screening, quercetin was selected because it has the prominent effect of ExoS inhibition and also is known to have anti-inflammatory and antioxidant effects on mammalian cells. Quercetin is a plant flavonol from the flavonoid group of polyphenols. It is found in many fruits, vegetables, leaves, seeds, and grains; capers, red onions, and kale are common foods containing appreciable amounts of it. In this study, we investigated the effects of quercetin on the expression and secretion of ExoS using the ELISA and Western blot analysis methods. The results showed that the secretion of ExoS was significantly decreased by 10, 20μM quercetin. Also, *popB*, *D*, *pscF*, and *pcrV* which are composed of the T3SS needle, are reduced by quercetin at the mRNA level, and we confirmed the inhibitory effect of quercetin on cytokines in *P. aeruginosa*-infected epithelial cells. Collectively, quercetin inhibits the secretion of ExoS by reducing both ExoS production and the expression of the needle protein of T3SS. Furthermore, these results suggest that has enrich the understanding of the properties of quercetin and promote its better application in clinical practice.

P5-09

A study on the metabolite profiling of traditional meju produced by region using GC-TOF

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Meju is a basic ingredient for making various types of sauces, and the quality of meju is very important. Therefore, in this study, we would analyze the metabolites of meju produced by region using traditional methods. Meju samples were collected for analysis in 9 regions: Gyeonggi, Gangwon, Chungbuk, Chungnam, Jeonbuk, Jeonnam, Gyeongbuk

Gyeongnam, and Jeju. For analysis, GC ToF-MS was used, and a pretreatment method for derivatization was used. The metabolites of the samples were profiled for a comprehensive comparative analysis. A total of 62 metabolites with an S/N ratio of 50 or more were identified, and the identified metabolites were 13 amino acids, 12 sugar and sugar alcohols, 4 fatty acids, and 4 organic acids. Through this study, it was found that meju manufactured using traditional methods has a richer.



P5-10

Evaluation of the usability of leaves of Korean tea cultivar ‘Sangnok’ as food additives

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Food additives can be classified into antioxidants, preservatives, colorants, sweeteners, etc. depending on usage purpose. Leaves of tea plants [*Camellia sinensis* (L). O. Kuntze] are rich in polyphenols and exhibit various functions such as antioxidant, antibacterial, antiviral, anticancer, and antiobesity effects. In this study, we tried to select Korean tea cultivars with high potential for use as a source of antioxidants. Leaves from two Korean tea cultivars, ‘Sangnok’ (SN), and ‘Myeongnok’ (MN) and Japanese tea cultivar ‘Yabukita’ (YB) cultivated in Jeju island were collected were freeze-dried and prepared as 70% ethanol extracts. The antioxidant effect of 70% extract was evaluated by DPPH radical scavenging assays, and the contents of total polyphenol were analyzed through colorimetric quantification. SN had higher DPPH radical scavenging effect and slightly lower total polyphenol contents compared with YB. But MN showed the lowest radical scavenging activity and total polyphenol content among the three tea cultivars. These results suggest that Korean tea cultivar ‘Sangnok’ may have higher utility as an antioxidant than ‘Yabukita’.

[This research was carried out with the support “Cooperative Research Program for Agriculture Science and Technology Development (RS-2020-RD009414) and the RDA Fellowship Program of NIHHS, Rural Development Administration, Republic of Korea]

P5-11

Antioxidant effect and total polyphenol contents of leaves of Korean tea cultivar 'Kumnok'

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Leaves of tea plants [*Camellia sinensis* (L), O. Kuntze] is rich in polyphenols and has various functions such as antioxidant, antibacterial, antiviral, anticancer, and antiobesity effects, so they are not only used as a main ingredient in tea, but also as various health functional foods and food additives. In this study, two Korean tea plants cultivars, 'Kemsull' (KS) and 'Kumnok' (KN), were evaluated to evaluate their utility as food additives by evaluating their antioxidant effect and polyphenol content. 'Yabukita' (YB), the Japanese tea cultivar most widely cultivated in Jeju, was used as a control. Tea leaves were collected in July 2022, freeze-dried and then used for 70% ethanol extraction. Total polyphenol content of 70% extract was measured using colorimetric analysis, and antioxidant effect was evaluated using DPPH and ABTS radical scavenging assays. Contents of total polyphenol was highest in the order of KN>YB>KS, and the DPPH and ABTS radical scavenging effects was also highest in KN and lowest in KS at the same concentration. These results show that the tea cultivar KN has a higher total polyphenol content and antioxidant effect than YB, indicating that Korean tea cultivar 'Kumnok' could be more efficient to use as materials for food additives with antioxidant effect.

[This research was carried out with the support "Cooperative Research Program for Agriculture Science and Technology Development (RS-2020-RD009414) and the RDA Fellowship Program of NIHHS, Rural Development Administration, Republic of Korea]



P5-12

해남산 참쑥의 수확시기별 항균활성 및 항산화활성

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참쑥(*Artemisia dubia* Wall)은 우리나라 자생생물로 제주, 강화도, 여수 등에서는 약용·식용으로 재배하여 소득 작물로 육성하고 있다. 해남 지역은 겨울철 온난한 기후로 쑥 재배시 조기 출하가 가능하여 새로운 소득 작물로 육성하기 좋은 조건이다. 보통 4월 중순까지 채취한 쑥은 생쑥으로, 4월말부터 7월초까지 채취한 쑥은 떡 가공용으로, 7월 중순부터 10월말까지는 색소용과 종자용으로 이용되고 있다. 실제로 6월이 지나면서 쑥의 식감이 뻣뻣하여 생으로 먹지 못해 농가에서는 유통 및 판매에 애로사항을 느끼고 있다. 본 연구는 전남 해남에서 재배한 참쑥의 부가가치 향상을 위하여 4월부터 8월까지 채취한 쑥의 항균활성과 항산화활성을 측정하였다. 항균활성은 식품유해균과 여드름균, 구강유해균에 대한 억제 효과를 측정하였고, 항산화활성은 DPPH와 ABTs를 측정하였다. 항균활성 측정 결과 6~8월 쑥 추출물에서 억제 효과가 나타났으며 특히 6월 50% 주정 추출물에서 여드름균 억제 효과가 뛰어났다. DPPH는 4~8월 쑥의 100% 주정 추출물에서 항산화효과가 낮았고 6~8월 쑥의 70%, 50%, 30% 주정 추출물과 100% 물 추출물에서 90% 이상의 항산화효과가 나타났다. ABTs는 6월 쑥의 항산화효과가 가장 높았고 7월, 8월 순으로 점차 낮아지는 경향을 보였으며 50% 주정 추출물의 효과가 가장 높았다. 6월의 해남 참쑥은 항산화 활성도 및 항균 활성이 높아 기능성 가공식품으로의 활용, 나아가 천연 약용자원으로서의 가능성까지 내다볼 수 있는 결과로 보인다.

P5-13

갈색거저리 발효산물을 이용한 장건강 기능성 펫푸드의 항산화 활성

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본 연구는 갈색거저리 유래 단백질의 발효 표준화를 통해 장건강 기능성 펫푸드의 항산화 활성을 확인하고자 진행하였다. 갈색거저리는 기존 동물성 단백질 식품에 비해 영양이 풍부하여 차세대 단백질 공급원으로 여겨지고 있을 뿐만 아니라 칼슘, 마그네슘과 같은 무기질과 불포화 지방산의 함량이 풍부하여 식품 소재화 가능성이 높다. 본 실험에 사용한 갈색거저리 발효산물은 *Lactobacillus delbrueckii subsp. bulgaricus*, *Streptococcus thermophilus* 균주를 100일간 사육한 갈색거저리 유충에 접종하여 43℃에서 3일 간 배양한 후 사용하였다. 갈색거저리 발효 산물을 첨가한 장건강 기능성 펫푸드의 일반성분과 항산화, 항염증 활성을 조사한 결과 발효산물의 첨가 비율이 증가할수록 조지방, 조섬유의 함량이 증가하였고, ABTS는 23~26%, DPPH는 52~57%로 나타났고, SOD는 19.6~34.9%, NO는 89.12~90.36%를 보였다. 따라서 갈색거저리 발효산물은 염증 예방에 도움이 될 수 있으며 고영양성 식용곤충을 이용한 기능성 펫푸드 개발로 곤충에 대한 인식변화와 곤충제품의 부가가치가 향상될 것으로 기대된다.

P5-14

Anti-oxidant and anti-inflammatory effect of beneficial bacteria and harmful components in ethanol extraction from traditional Korean *Cheonggukjang*

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This study was conducted to determine the effect of the content of beneficial bacteria and harmful components on the functionality of domestic traditional *Cheonggukjang*. The 8 types of traditional *Cheonggukjang* were freeze-dried and subjected to ethanol extraction. After removing the extraction solvent, the freeze-dried powder was evaluated for antioxidant activity(DPPH and ORAC) and anti-inflammatory effects(in Raw 264,7 cells). DPPH radical scavenging activity was 33.83%~53.22% at the highest concentration of 10 mg/mL, with TCC23-14 showing the highest activity at 57.90%. The oxygen radical absorbance capacity (ORAC) was expressed as mg Trolox equivalents (TE)/g, and at the highest treatment concentration of 10 mg/mL, the ORAC values 97.32 ~ 142.25 mg TE/g. Notably TCC23-14 exhibiting the highest value at 130.68 mg TE/g. Cell viability remained above 90% when treated with the *Cheonggukjang* extract up to 0.4 mg/mL on the Raw 264,7 cells. The amount of nitric oxide(NO) decreased in a concentration-dependent manner, showing 30.31~35.77 μ M at the highest concentration of 0.4 mg/mL. The production of IL-1 β and TNF- α at the highest concentration of 0.4 mg/mL 13.22~101.28 pg/mL and 37.32~66.93 ng/mL, respectively. These results confirm that beneficial microorganisms and harmful substances did not significantly impact the antioxidant activity and anti-inflammatory activity of the *Cheonggukjang* extract studied.

P5-15

Effect of beneficial bacteria and harmful components in traditional soybean paste on the anti-oxidant and anti-inflammatory activities

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This study analyzed the anti-oxidant and anti-inflammatory activities of 8 types of korean traditional soybean pastes selected based on the content of beneficial bacteria and harmful components. The 8 types of traditional soybean pastes (TSP) were freeze-dried and subjected to ethanol extraction. After removing the extraction solvent, the freeze-dried powder was evaluated for antioxidant activity(DPPH and ORAC) and anti-inflammatory(Raw 264.7 cells). DPPH radical scavenging activity was 26.82~39.15% at the highest concentration of 10 mg/mL. Oxygen radical absorbance capacity(ORAC) was expressed as mg Trolox equivalent (mg TE/g), with TCD23-42 was the highest at 70.70 mg TE/g. Cell viability remained above 90% when treated with the TSP extract up to 0.4 mg/mL on the Raw 264.7 cells. The amount of nitric oxide(NO) decreased in a concentration-dependent manner, showing 29.31~34.46 μ M at the highest concentration 0.4 mg/mL. The IL-1 β showed 19.61~56.56 pg/mL at the highest concentration of 0.4 mg/mL, while TCD23-42 and TCD23-39 were below the detection limit. The TNF- α showed 17.27~38.55 ng/mL at the highest concentration of 0.4 mg/mL. These results indicate that the beneficial bacteria and harmful substances contained in traditionally prepared soybean paste do not significantly affect the anti-oxidant and anti-inflammatory activities of TSP extract.

P5-16

Inhibitory activities of lignanamides on tyrosinase

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Tyrosinase is known to play an important role in the development and defense functions of insects. The goal of this study is to find the tyrosinase inhibitor from natural plants. Two compounds 1 and 2 were isolated from the hulls of hemp seeds. Their structures were elucidated by analyzing $^1\text{H}/^{13}\text{C}$ -NMR and Mass spectra. These compounds were evaluated, in dose-dependent manner, to have the inhibitory activity on tyrosinase. Cannabisin A (1) and cannabisin B (2) were operated as non-competitive and competitive with k_i values 1.6 μM and 1.9 μM to enzyme, respectively. Moreover, based on the molecular docking, the binding site of the potential inhibitors in tyrosinase were tracked by calculating the binding position. Finally, it has been confirmed that the potential inhibitors may be one of the compounds that can control insects as a tyrosinase inhibitor.

Keywords: Lignanamide, tyrosinase, insect, inhibitor

(Acknowledgement) This work was supported by the basic research program (PJ01514502) of National Institute of Horticultural and Herbal Science, Rural Development Administration.

P5-17

오디 속도에 따른 폴리페놀 화합물 함량 및 항염증 활성 비교

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오디는 뽕나무의 열매로 5-6월에 수확하며 안토시아닌의 함량이 높아 다양한 생리활성을 나타내는 것으로 보고되어 있다. 또한, 미숙과 오디는 상심자라 하여 생약원료로 사용되어 식품부터 기능성원료까지 적용가능한 특성을 보인다. 최근 연구에서는 오디가 위장관 운동을 촉진하는 것이 동물실험을 통해 구명되어 신규 식의약 재료로서의 가능성을 제시하였다. 이에 대한 활성물질 및 추가 장 건강에 관한 기능성 구명을 위해, 본 연구에서는 속도에 따른 오디를 활용하여 분획물을 제조하고 페놀성화합물 함량과 항염증 효능을 비교하였다. 총 폴리페놀 및 플라보노이드 함량은 오디 속도에 따라 달라졌으며, 추출용매인 주정의 함유량에 따라서도 차이를 나타냈다. 주정 함유량이 80% 이하인 추출물에서는 완숙오디의 폴리페놀함량이 높았으나, 주정 100% 추출물에서는 미숙과의 함량이 높아지는 특성을 보였다. 플라보노이드 함량에서도 주정 60% 이하에서 완숙오디의 함량이 높았으나, 100% 이상에서는 미숙과의 함량이 증가하였다. RAW 264.7 세포를 이용한 항염증실험을 통하여 추출물 원액에 비하여 디클로로메탄 등의 분획물에서 염증 억제 효과가 증가하는 경향을 보였다. 결론적으로 염증억제 효능이 높은 오디 분획물을 확보하여 기능성 소재로서의 가능성을 확인하였으며, 대장 세포주에서의 활성과 활성물질 구명 등을 추후 수행할 계획이다.

P5-18**Development of energy bars using apples, pomegranates, and beet wastes for elderly health, and their antioxidant activities**

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In this study, we manufactured the energy bars using the apple, pomegranate, and beet wastes for the health of the elderly and investigated their antioxidant activities. Peels of apple, peels and seeds of pomegranate, and roots of beet were used, and total polyphenol content (TPC), total flavonoid content (TFC), DPPH and ABTS radical scavenging activity, and ferric reducing antioxidant power (FRAP) were estimated. As a result of measuring the antioxidant activities by extracting with distilled water, ethanol, and methanol, TPC was highest in the methanol extract of the energy bars prepared using the pomegranate wastes (MEPW, 43.47mg GAE/g), and TFC was the highest in the distilled water extract of the energy bars prepared using the apple wastes (DEAW, 186.43mg QE/g). DPPH radical scavenging activity was increased in a dose-dependent manner (750–6,000ug/mL), and the ethanol and methanol extracts of pomegranate wastes (EEPW and MEPW) showed significantly higher activity at concentration of over 1,500ug/mL than ascorbic acid at a concentration of 100ug/mL ($p < 0.05$). ABTS radical scavenging activity was also increased in a dose-dependent manner (750–6,000ug/mL), and in particular, EEPW and MEPW exhibited significantly higher activity ($p < 0.05$). FRAP showed remarkable higher than Trolox (100 ug/mL) in all experimental groups at a concentration of 6,000ug/mL ($p < 0.05$). As a result of IC₅₀ measurement, it was confirmed that the EEPW and MEPW had the lowest values in all antioxidant experiments, showing the potential of pomegranate wastes. These results will usefully identify various food applications in the wastes of apple, pomegranate, and beet, and will provide as basic data for the development of snacks for nutrition of the elderly.

P5-19

약용식물 열수추출물의 기능성분 및 인체 폐암세포 항증식 활성

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사단법인 천수 산약초연구회

수종 약용식물 열수 추출물의 기능성분 및 항산화활성을 분석하고, 인체 정상 폐세포주인 MRC-5와 폐암세포주인 A549의 세포 증식에 미치는 영향을 조사하였다. 총 폴리페놀 함량은 전호 지상부, 갯실새삼 씨, 삼백초 뿌리, 천년초 잎, 천년초 열매 순으로 높았고, 총 플라보노이드 함량은 갯실새삼 씨, 전호 지상부, 삼백초 뿌리, 천년초 잎, 천년초 열매 순으로 높았다. 총 안토시아닌은 천년초 열매에서만 검출되었다. DPPH radical 소거능과 ABTS radical 소거능은 갯실새삼 씨와 전호 지상부에서 가장 높았고 이어 삼백초 뿌리, 천년초 열매, 천년초 잎 순으로 높았다. 인체 정상폐세포주인 MRC-5와 폐암세포주인 A549를 배양한 후 약용식물 추출물을 농도별로 투입하여 배양한 후 EZ-Cytox방법을 이용하여 세포 생존율을 조사하였다. 삼백초 뿌리와 전호 지상부의 열수 추출물을 세포증식 약 80% 증식기에 처리시 A549의 생존율은 H₂O 대비 각각 10.7% 및 6.5% 낮은 반면 천년초 열매, 천년초 잎, 갯실새삼 씨 추출물은 항증식 효과를 보이지 않았다. 세포 부착 직후 증식 초기에 추출물 처리시에는 천년초 열매, 삼백초 뿌리 및 전호 지상부에서 각각 62.9%, 69.6%, 72.2%의 생존율을 보여 세포 증식 초기에 처리하는 것이 세포 증식을 더 잘 억제할 수 있는 것으로 나타났다. 전호 지상부의 열수 추출물은 MRC-5의 세포 생존율을 H₂O 대비 약 5.3-7.5% 감소시켜 약간의 세포 독성을 보인 반면 그 이외의 시료들은 세포 독성을 보이지 않았다.

P5-20

Preparation of soy protein hydrolysate by enzymatic hydrolysis

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Soybean has the highest protein content among vegetable foods, but its digestive absorption rate is low, so various studies are needed. Therefore, this study was conducted to prepare a soybean protein hydrolysate (SPH) with a high digestive absorption rate using commercial enzymes; protamex and flavourzyme (complex enzyme A), alcalase and flavourzyme (complex enzyme B). Yellow soybeans (YSB), black soybeans (BSB), and Seomoktae (SMT) were used as samples for preparing the SPH. The water-soluble protein content was high in BSB and SMT treated with complex enzyme B, and the degree of hydrolysis was high in YSB and BSB treated with complex enzyme B.

As a result of electrophoresis, all enzyme-treated sample showed higher values in the low-molecular-weight band compared to the non-enzyme-treated sample, showing that high-molecular-weight proteins were converted to low-molecular-weight bands. Nitrogen solubility was higher in the enzyme-treated sample compared to the non-enzyme-treated sample, and, in particular, the nitrogen solubility of the enzyme B-treated sample was significantly highest. From the above results, complex enzyme B is very effective in soybean protein degradation and is expected to be used in the production of protein hydrolysates with high digestion absorption rates.

P5-21

α -Ionone alleviates chronic UVB exposure-induced skin photoaging in mice

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Photoaging is widely regarded as the most significant contributor to skin aging damage, and nutritional intervention is a viable strategy for preventing and treating skin photoaging. In previous studies, we demonstrated that α -ionone had ameliorating effects on photoaging. Dietary α -ionone alleviated wrinkle formation, skin dryness, and epidermal thickening in chronic UVB-exposed mice. α -Ionone accumulated in mouse skin after 14 weeks of dietary intake of α -ionone. α -Ionone increased collagen density and boosted the expression of collagen genes, while attenuating the UVB-induced increase of matrix metalloproteinase genes in the skin tissues. Furthermore, α -ionone suppressed the expression of senescence-associated secretory phenotypes and reduced the expression of the senescence marker p21 and DNA damage marker p53 in the skin of UVB-irradiated mice. Transcriptome sequencing results showed that α -ionone modifies gene expression profiles of skin. Multiple pathway enrichment analyses on both the differential genes and the entire genes revealed that α -ionone significantly affects multiple physiological processes and signaling pathways associated with skin health and diseases, of which the p53 signaling pathway may be the key signaling pathway. Taken together, our findings reveal that dietary α -ionone intervention holds promise in reducing the risks of skin photoaging, offering a potential strategy to address skin aging concerns.



P5-22

Optimization of enzyme-assisted extraction condition for producing soluble dietary fiber with antidiabetic activity from brewer's spent grain using response surface methodology

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Beer is one of the popular alcoholic beverages in the world, and is made by adding yeast and water and fermenting it using barley germinated malt and Hope as the main ingredients. When manufacturing beer, brewer's spent grain (BSG) is produced as a by-product. Brewer's spent grain contains a considerable amount of various useful nutrients and functional substances such as dietary fiber, protein, and fat. Among them, dietary fiber accounts for a high proportion of nearly 50% of the total BSG nutrients, which are not digested in the human body but have been reported to exhibit various physiological activity due to various physical properties. Therefore, in this study, BSG was fractionated into hemicellulose and cellulose, and enzyme-assisted extraction (EAE) conditions for producing soluble dietary fiber with antidiabetic activity were optimized using commercial enzyme for each fraction. For this purpose, a central composite design (CCD) was performed using extraction time, enzyme concentration, and liquid-to-solid ratio as independent variables, and the anti-diabetic activity of the extract obtained under each reaction condition was evaluated. The α -amylase inhibitory activity of the extract obtained from the hemicellulose fraction ranged from 35.41 to 63.54%, with a difference of about 28.13% depending on each extraction condition. The optimal EAE conditions for producing water-soluble dietary fiber from hemicellulose fraction derived from the above results were extraction time of 12 h, Viscozyme concentration of 30 unit, and liquid-to-solid ratio of 32.5:1; the predicted value for α -amylase inhibitory activity was 80.41%. Under the same conditions, the α -amylase inhibitory activity of the extract obtained from the cellulose fraction ranged from 16.14 to 62.04%. There was a difference of about 45.9% according to each extraction condition. The optimal UAE conditions for producing soluble dietary fiber from cellulose fraction were extraction time of 36 h, Celluclast concentration of 24,9091 unit, and liquid-to-solid ratio of 28.1061:1; the predicted value for the α -amylase inhibitory activity was about 66.62%.

P5-23

Molecular docking of the *Gardenia jaminoides* seed ingredients for tyrosinase and elastase inhibition

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Recent studies highlight the seed extract of *Gardenia jasminoides* for its various physiological activities, particularly its effects on skin health due to its natural phytochemicals like flavonoids and carotenoids. This study compares and analyzes the dual inhibitory effects of tyrosinase and elastase in *Gardenia jasminoides* seed extract using molecular docking simulations to identify bioactive compounds with high binding affinity. The highest tyrosinase inhibitory activity was observed with 3,4-dicaffeoylquinic acid, scoring -8.1 in Autodock Vina and -205.24 in another analysis. Rutin showed the highest elastase activity with scores of -8.2 and -241.02. Using Swiss ADME, we found that nine compounds violated Lipinski's rule of five. Among the 12 compounds that complied, jasminoside A was the most active for both tyrosinase and elastase inhibition. In silico analysis of jasminoside A showed no hepatotoxicity, neurotoxicity, immunotoxicity, mutagenicity, or cytotoxicity but indicated a 0.68 probability of potential cardiotoxicity. PASS Online confirmed jasminoside A's activities against inflammation and cardiovascular diseases. This study enhances understanding of the dual inhibitory effects of *Gardenia jasminoides* seed compounds on tyrosinase and elastase, providing a foundation for future research on jasminoside A.

P5-24

Fangchinoline, a major alkaloid of *Stephania tetrandra* S. Moore, inhibits adipogenesis of 3T3-L1 cells

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Recent studies have shown that Nur77 plays a vital role in regulating adipogenesis, and Nur77 antagonists inhibit adipogenesis. In this study, we hypothesized that fanchinoline (FCN), an antagonist of Nur77, might inhibit adipogenesis. Here, we found that FCN inhibited adipogenic differentiation of 3T3-L1 cells, accompanied by the decreased expression of adipocyte markers. Further mechanistic studies demonstrated that FCN shares mechanisms of action similar to other Nur77 antagonists that reduce mitotic clonal expansion (MCE) during the early phase of adipogenic differentiation and decrease the expression of cell cycle regulators. These results suggest that FCN represents a new class of anti-adipogenic agents and potential therapeutic options for obesity and related metabolic dysfunction.

P5-25

Fetal bovine serum substitution efficacy of mealworm (*Tenebrio molitor*) protein hydrolysates and its physicochemical properties

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Fetal bovine serum (FBS) is a widely used supplement in formulating cell culture media due to its low globulin and rich growth factor contents. However, as worldwide FBS application in cell culture grows annually, concerns have arisen over its unethical production process, high costs, and environmental issues. In the previous study, we demonstrated that mealworm (*Tenebrio molitor*) protein hydrolysates produced by alcalase (TAH) potentially serve as substitutes for FBS. Here, to investigate the raw material characteristics of TAH as a substitute for FBS, its physicochemical properties were analyzed. The addition of TAH did not significantly affect the pH, salinity, or color of the commercial medium. TAH contains hydrophobic amino acids, AAA and BCAA, which account for 46.35% of the total amino acids. TAH predominantly consists of low-molecular-weight substances (<2 kDa) and exhibits excellent thermal stability. Furthermore, TAH showed a high zeta potential and the smallest particle size in the pH range of a typical cell culture medium, indicating its excellent physical properties suitable for use as a substitute for FBS.

P5-26

Anti-oxidant and anti-proliferation effect of *Euonymus alatus* (Thunb.) Siebold. leaf extractSeong-mi Park^{1*}, Hye-ji Min¹, Won-joo Yoon², Kwon-il Seo¹¹Department of Food Biotechnology, Dong-A University,²Department of Bioscience and Biotechnology, Kyushu University, Japan

Euonymus alatus (Thunb.) Siebold, a deciduous shrub belonging to the Celastraceae family, is widely distributed throughout Korea, Japan, and China, where it has been utilized in traditional Chinese medicine. *E. alatus* exhibits various bioactivities, prompting extensive research on its different parts. The leaf of *E. alatus* is known for its beneficial effects on inflammation, cognitive impairment, immune enhancement, osteoporosis, and diabetes. In this study, we evaluated the antioxidant effects of extracts from *E. alatus* leaves using water, ethanol, and methanol as solvents. The ethanol extract of *E. alatus* leaves demonstrated the highest effectiveness in DPPH radical scavenging activity, ABTS · + radical scavenging activity, reducing power, hydroxyl radical scavenging activity, total polyphenol content, and total flavonoid content. Additionally, we investigated its antiproliferative effect on cancer cells by treating them with the ethanol extract of *E. alatus* leaves. The most significant antiproliferative effect was observed in LNCaP (prostate cancer cells). These findings suggest that *E. alatus* leaf extract could serve as a beneficial functional material with antioxidant and anti-cancer properties.

P5-27

**Antioxidative activities of various solvent extracts from leaves and fruits of fig
(*Ficus carica* L)**

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Fig (*Ficus carica* L) which belongs to Moraceae family has been used as digestion promoter, cure for ulcerative inflammation and eruption in Korea. Fig extracts were obtained from leaf and unripe fig using three kind of solvent (water, 30% ethanol, 80% ethanol). The yields were shown that Fig leaf extracts from 17.2% to 28.9% and unripe fig were ranged from 7.2% to 22.9%. Antioxidative activities were determined using DPPH as a free radical. The DPPH radical scavenging activity of leaf extracts was higher than that of unripe fig extracts. The DPPH radical scavenging activity of the water, 30% ethanol and 80% ethanol leaf extracts were 92.89% and 91.17% in the 0.2 mg/mL concentrations, respectively, which were higher than those of the other extracts. Therefore, leaf of *Ficus carica* L. deserve further study as natural antioxidants and nutraceuticals.



P5-28

청태전 농축액 가글이 구강 미생물에 미치는 영향

김은혜*, 안호섭, 김지영, 박현석, 정수진, 조혜성, 최정, 고숙주

전라남도농업기술원

본 연구는 청태전 농축액 가글 전과 후의 구강 마이크로바이옴(microbiome)의 변화 양상과 유효성을 비교분석하였다. 만 20세 이상 성인 남, 여 10명의 타액을 채취하여 청태전 농축액 가글 전의 시료로 사용하였으며, 점심, 저녁 식후 청태전 농축액으로 2개월 동안 가글 한 타액을 가글 후 시료로 채취하였다. 채취된 시료는 DNA에서 16S rRNA 유전자를 증폭하여 차세대 염기서열 분석법(Next Generation Sequencing, NGS)을 실시하여 구강 내 미생물 조성의 다양성과 상대적 풍부도를 비교하였다. 청태전 농축액 5% 가글 전과 후의 샘플 내의 분류학적 다양성(α -Diversity)은 Chao 1(풍부도 지수)과 OUTs(Operational Taxonomic Units)값이 유의하게 높게 나타났으며, 청태전 농축액 5% 가글 후 치주염 유발 원인균(*Tannerella forsythia*, *Prevotellaintermedia*)과 치주낭, 치근막 유발 원인균(*Campylobacter rectus*), 충치 유발 원인균(*Fusobacterium nucleatum*, *Streptococcus mutans*)의 감소 효과를 나타내었다. 구강 마이크로바이옴은 입안에 서식하는 다양한 미생물 군집과 이들의 유전 물질을 의미하는 것으로, 치우 우식증(충치), 치주염, 구강암과 같은 구강질환 진단에 활용할 수 있다는 연구 결과가 있다. 본 연구를 통해 청태전 농축액 가글이 주요 구강질환 원인균에 대해 감소 효과가 나타남에 따라 구강 관리 제품의 소재로 활용이 가능할 것으로 사료된다.

P5-29

**Polyphenol and flavonoid compound contents, and antioxidant activity
of *Carica papaya* seed water extract**

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Carica papaya is a popular tropical fruit that belongs to the Caricaceae family. The antioxidant activities of water extracts from seed part of *C. papaya* were examined using an in vitro system to explore their potential as natural antioxidant substances. The contents of total polyphenol and flavonoid compounds in water extract from *C. papaya* seed were 37.48 mg/g and 1.79mg/g, respectively. The water-soluble protein content was 7.00mg/g, and the reducing sugar content was 65.60mg/g. In the measurement of electron donating ability (EDA), the water extract showed the highest ability of 78.88% at concentration of 2.0 mg/mL. The ABTS radical scavenging activity of *C. papaya* seed water extract was the highest at 99.21% at a concentration of 1.0 mg/mL. The superoxide dismutase (SOD)-like activity was 12.01% in the 2.0 mg/mL. The nitrite scavenging ability (NSA) of the *C. papaya* seed water extract showed the highest activity of 69.81% at pH 1.2 and the highest activity of 43.23% at pH 3.0 at a concentration of 2.0 mg/mL.



P5-30

Useful ingredients and antioxidant activities of extracts from seeds of *Carica papaya*

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Papaya (*Carica papaya* L.) is a tropical fruit native to central and South America, cultivated worldwide. In this study, the physiological activities of reflux ethanol extracts from papaya seeds were evaluated for the development of valuable food and medicinal materials. The contents of total polyphenol and flavonoid compounds were 41.67mg/g and 2.92mg/g, respectively. The contents of soluble protein and reducing sugar were 10.85mg/g and 81.03mg/g, respectively. In the measurement of electron donating ability (EDA), the water extract showed the highest ability of 75.46% at a concentration of 2.0mg/mL. The ABTS radical scavenging activity of Papaya seeds ethanol extract was the highest at 99.21% at a concentration of 2.0mg/mL. In the results of the SOD-like activity test, the activity was highest at 39.86% at a concentration of 2.0mg/mL. The nitrate scavenging activity showed the highest effect of 69.26% at pH 1.2, while the highest activity at pH 3.0 was 40.48% at a concentration of 2.0mg/mL. These result confirmed that the extract from papaya seeds, obtained by reflux ethanol extraction, has strong antioxidant activity and can be used as an effective antioxidant substance for nutraceutical food and medicine.

P5-31

Changes in the functional ingredient content of *S. glabrescens* hot water extract according to the number of steaming times using makgeolli

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In Oriental medicine, the whole plant, *S. glabrescens* MAKINO, is called "Siegesbeckia(豨薟)" and is used to treat diseases such as arthritis, paralysis of the limbs, neuralgia, and as used to treat diseases such as arthritis, paralysis of the limbs, and neuralgia. It has vasodilation and blood pressure-lowering effects, making it effective for patients with hypertension. In this study, *S. glabrescens* were soaked in Makgeolli(Korean rice wine), steamed, and dried. This process was repeated 3(Sg3S), 6(Sg6S), and 9(Sg9S) times, and the changes in the contents of function ingredient substances in the unsteamed *S. glabrescens* (SgNS) hot water extract and at each steaming stage were measured. The results of the experiment showed that the total polyphenol compound contents were 52.40~99.68mg/g, and the SgNS contained the most polyphenol compounds. The content of water-soluble proteins showed a change of 11.20~23.87mg/g. The flavonoid compound contents were 9.10~13.03mg/g, and the highest contents of Sg3S. The reducing sugar was the highest in Sg3S at 88.08~147.26mg/g, and the reducing sugar decreased as the number of steaming times increased.



P5-32

Antioxidative activities of hot water extract from of *S. glabrescens* steaming using Makgeolli

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Siegesbeckia glabrescens, is a one-year-old herbaceous plant of the Asteraceae family that grows throughout Korea. It is used in oriental medicine to treat diseases such as arthritis, paralysis of the limbs, and neuralgia. *S. glabrescens*, a traditional Korean herbal medicine, was steamed and dried using alcohol for 0(SgNS), 3(Sg3S), 6(Sg6S), and 9(Sg9S) times, and then extracted with hot water to measure the antioxidant effect of each extraction. As a result of measuring SOD-like activity, it were 45.60~59.10% at concentration of 1.0 mg/mL. The DPPH radical scavenging activity were 71.58~78.27% at 1.0 mg/mL, and the extract of Sg3S was the highest activity. The inhibition rate of xanthine oxidase was 85.58% only in the SgNS at a concentration of 1.0 mg/mL, and here was no inhibition effect on xanthine oxidase when steamed and dried using Makgeolli. In the measurement of nitrite scavenging effect, SgNS was as the highest scavenging effect at 58.95% and 42.00% in the concentration 1.0mg/mL of pH 1.2 and pH 3.0. These results indicated that although there are differences depending on the experiment, the SgNS shows a better antioxidant effect than the steamed and dried using Makgeolli.

P5-33

Amino acid derivatives of monascus pigments with inhibitory activity against cholesterol biosynthesis

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Atherosclerosis, a condition often induced by diseases such as obesity, is commonly treated and prevented with statins. The statins inhibit the activity of HMG-CoA reductase, an enzyme crucial to cholesterol biosynthesis. However, these drugs have been reported to cause adverse effects including hepatotoxicity, myopathy, and diabetes. Therefore, the development of dietary supplements that can reduce the dosage of these drugs is required. In this study, seven monascus pigment derivatives were produced through fermentation and chemical synthesis, and their inhibitory effects on cholesterol biosynthesis were investigated. Computer simulations were used to analyze the potential of seven pigment derivatives to inhibit HMG-CoA reductase. Docking the seven pigment derivatives into the HMG-CoA site and NADPH site, respectively, and measuring the enthalpy revealed that the Glu derivative exhibited the highest value. Furthermore, the inhibitory activity of the seven pigment derivatives was evaluated by treating HMG-CoA reductase with the derivatives. Similarly, in vitro evaluation also showed the highest inhibitory activity for the Glu derivative. Interestingly, the Trp derivative, which did not show prominence in the computer simulation results, exhibited the second highest inhibitory activity in the in vitro evaluation. These results suggest the potential of monascus pigment derivatives as dietary supplements to inhibit cholesterol synthesis.



P5-34

Study on the antioxidant and anti-inflammatory efficacy of strawberries cultivated in Imsil from Korea in HaCaT keratinocytes

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This study investigates the antioxidant properties of domestic strawberries (*Fragaria ananassa* Duch.) and their inhibitory effects on skin inflammation and damage responses induced by $\text{TNF-}\alpha/\text{IFN-}\gamma$ in HaCaT keratinocytes.

HaCaT cells, known to secrete various cytokines like tumor necrosis factor and interferon-gamma ($\text{IFN-}\gamma$) under different stimuli, were exposed to concentrations ranging from 0 to 500 $\mu\text{g/mL}$ of strawberry extract alongside $\text{TNF-}\alpha/\text{IFN-}\gamma$ for 24 hours. The toxicity of the strawberry extract was assessed, along with its DPPH and OH radical scavenging activities.

Strawberry extract exhibited no cytotoxic effects and increased antioxidant activity in a dose-dependent manner. It significantly decreased lipid peroxidation and enhanced the activities of key antioxidant enzymes. Importantly, the extract effectively suppressed the expression of inflammatory cytokines and inhibited the phosphorylation of $\text{NF-}\kappa\text{B}$ pathway proteins, thereby attenuating the inflammatory response.

The findings demonstrate that strawberry extract can serve as a potent anti-inflammatory agent by augmenting antioxidant defense systems and inhibiting pro-inflammatory pathways in skin keratinocytes. These properties highlight the extract's potential as a therapeutic agent for treating inflammatory skin conditions.

P5-35

Development of a beverage with antibacterial, antioxidant, and anti-inflammatory activities from a mixture containing extracts of Omija (*Schizandra chinensis*), pear (*Pyrus pyrifolia*), and Doraji (*Platycodon gradiflourm*)

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This study developed respiratory inflammation disease prevention beverage (sample #1, #2, and #3) by selecting the mixing ratio of Omija, pear, and Doraji extracts and confirming their antibacterial, antioxidant, and anti-inflammatory effects. As a result of confirming the antibacterial activity against *Staphylococcus epidermidis*, methicillin-resistant *Staphylococcus aureus* (MRSA), *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhimurium*, *Bacillus cereus*, and *Candida albicans* using the disk diffusion method, sample #1 was showed the inhibition of 11.0 ± 1.0 mm, 10.5 ± 0.5 mm, 12.0 ± 1.0 mm, 13.5 ± 0.5 mm against MRSA, *S. aureus*, *S. typhimurium*, and *B. cereus*, respectively, and there was no effect in sample #2 and #3. Total polyphenol content was 20.13 ug/mL in sample #1, 18.18 ug/mL in sample #2, and 12.67 ug/mL in sample #3. The content in sample #1 was the highest, but there was no significant difference from sample #2 ($p > 0.05$). DPPH radical scavenging activity and SOD-like activity showed a dose-dependent manner, and there was no significant difference between each experimental group ($p > 0.05$). As a result of measuring NO production and inflammatory response-related gene mRNA (iNOS, COX-2) and protein (COX-2) expression using RAW 264.7 cells in which inflammation was induced with LPS, the effect was found in sample #2 and #3. In addition, it was confirmed that there was no cytotoxicity in all samples. As a result of investigating preferences based on color, scent, and taste, sample #2 had the highest preference. Accordingly, it is expected that a beverage to prevent respiratory inflammation diseases can be developed using the mixing ratio of sample #2.

P5-36

Development of herbal medicine complex composition effective for inflammation and insomnia

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In this study, hot water extracts of medicinal herbs such as ginseng root, safran (*Crocus sativus*), jujube (*Zizyphus jujuba*), pueraria root (*Pueraria radix*), Nakai root (*Angelica gigas Nakai*), citrus peels (*Citrus unshiu*), *Rehmanniae Radix*, licorice (*Glycyrrhiza uralensis*), sanjoin (*Zizyphus jujuba*), peppermint (*Mentha arvensis*), buckwheat (*Fagopyrum esculentum*), and *Phellinus linteus* mycelium were mixed and 3 samples (sample #1, #2, and #3) were prepared by mixing different ratios of each medicinal herb. Their antioxidant and sleep improvement effects were investigated, and the results are as follows. In the case of total polyphenol content, all experimental groups showed similar values of about 90 ug/mL at a concentration of 100%, and both the DPPH radical scavenging activity and SOD-like activity also showed similar effects. As a result of confirming the anti-inflammatory activity using RAW 264.7 cells in which inflammation was induced with lipopolysaccharide (LPS), it was confirmed that an inflammatory response occurred due to LPS stimulation, and NO production showed a similar inhibitory effect in all samples. However, the expression of iNOS and COX-2 in sample #2 had the lowest. Additionally, there was no cytotoxicity against RAW 264.7 cells in all samples. To confirm the sleep improvement effect of the sample, the protective effect against induced damage to nerve cells and cell growth rate were confirmed. As a result, it was shown that in sample #2, protection effect from damage induced by H₂O₂ and cell growth rate increased the most. Therefore, it is expected that functional foods with anti-inflammatory and sleep improvement effect can be developed using the ratio of sample #2.

P5-37

Comparative analysis of antioxidant and antimicrobial activities of wild berries from Mongolia

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Native berries are rich in sugars, organic acids, and vitamins. They are particularly abundant in gallic acid, caffeic acid, p-coumaric acid, ferulic acid, ellagic acid, catechin, and the flavonoid pigment anthocyanin compared to other fruits. They also contain phenolic acids and tannins, which provide various physiological activities such as antioxidant, anticancer and anti-inflammatory effects. Blueberries and lingonberries are well known for their various antioxidant, antimicrobial, and anti-inflammatory properties. However, there are only a few comparative studies on the antioxidant activity of extracts from the berries of the wild Mongolian dandelion. Therefore, the objectives of this study are to evaluate the stability, antioxidant activity and antimicrobial properties of components and pigments extracted from various berries. Ethanol (70%) extract and hot water extracts of wild blueberries (*Vaccinium Section cyanococcus*), lingonberries (*Vaccinium vitis-idaea* L.), and honeyberries (*Lonicera caerulea*) from Mongolia were used to analyze general components and pigment stability, antioxidant and antimicrobial activities. Total polyphenol and flavonoid contents, DPPH radical scavenging activity, FRAP (Ferric Reducing Antioxidant Power), total reducing power, nitric oxide (NO) radical scavenging activity, nitrite scavenging activity, and disc diffusion test. The effect of pH on pigment stability showed that the change in absorbance spectrum in water and ethanol extracts of berries showed maximum absorbance at pH 1. The antioxidant activity of the 70% ethanol extract and hot water extract of honeyberries showed high total polyphenol content (161.3 and 143.8mg GAE/g, respectively) and high total flavonoid content (119.1 and 97.74mg QE/g, respectively). The DPPH radical scavenging activity (84.75 and 80.29mg ACE/g) and FRAP (1,079 and 1,003mg FSE/g) also indicated good activity. Additionally, the total reducing power (0.173–2.224 and 0.102–2.142 O.D) was the highest among the berries, and the nitric oxide (NO) radical scavenging activity and nitrite scavenging activity were also the highest. The antimicrobial activity was measured and did not show any antimicrobial effect. Therefore, 70% ethanol extract of honeyberries demonstrates high antioxidant activity, suggesting its potential use as a natural antioxidant.

P5-38

Production and functional properties of phycocyanin obtained from *Galdieria sulphuraria* 074G2

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Phycocyanin (PC) is reported to have various health functions such as antioxidant and anticancer. *Galdieria sulphuraria* is capable of growing under the heterotrophic conditions, and there are few studies to evaluate the functionality of PC obtained by heterotrophically cultivated *Galdieria*. Therefore, this study was conducted to 1) establish an optimal culture method of *Galdieria sulphuraria* 074G2 and 2) evaluate the functional properties of PC extracted from *Galdieria*. The Sequential Heterotrophy Dilution Photoautotrophy (SHDP) method was used as an optimal cultivation method to produce high amount of PC, which include both heterotrophic and photoautotrophic cultivation steps. After cultivation, the PC was extracted from the alga in various solvents using a bead beater. Then the PC was 50% salt precipitation, dialysed (1.314 A620/A280) and purified by gel filtration. The biomass yields (7.68 DCW g/L), the concentrations (1.90 mg/mL) and purity (2.68 A620/A280) of PC were measured to optimize the cultivation method. The antioxidant (DPPH 45%) and anticancer (MDA-MB-231 IC50 8 mg/mL) properties were further characterized. This study suggests that the PC extracted from *Galdieria sulphuraria* may be used as a potential natural material with functional properties such as antioxidants and/or anticancer.

P5-39

**Enzymatic preparation and antioxidant activities of protein hydrolysates
from *Locusta migratoria***

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This study evaluated the physiological activities of protein-rich *Locusta migratoria*, recently recognized as an edible insect. Dried *Locusta migratoria* was subjected to enzymatic hydrolysis using five proteases (alcalase, bromelain, flavourzyme, neutrase, and papain). Among these, flavourzyme-treated *Locusta migratoria* showed significantly higher hydrolysis values than others. In contrast, papain treatment resulted in minimal protein hydrolysis. Results from the ABTS radical scavenging assay indicated that flavourzyme hydrolysates exhibited superior scavenging activity, whereas all hydrolysates demonstrated similar antioxidant activity in the DPPH radical scavenging assay. Currently, additional investigations are underway to explore further physiological activities of *Locusta migratoria* protein hydrolysates, aiming to confirm their potential as a functional ingredient.



P5-40

Development and refinement of a personalized health functional food recommendation algorithm based on the National Health and Nutrition Examination Survey(KNHANES)

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Recent developments in regulations for Personalized Health Functional Foods (PHFF) have established a foundation for their industrialization. However, research on standard recommendation algorithms for existing recommendation methods remains insufficient. This study developed an algorithm based on the 2018 Korean National Health and Nutrition Examination Survey (KNHANES) data and the Nutritional Quotient (NQ), considering individual nutritional characteristics.

In particular, the NQ and KNHANES result data were analyzed to derive nine key questions regarding essential nutrients, which were then systematized. For functional items, references from SCI journals and meta-analyses were cited to establish correlations. The developed algorithm is designed to recommend PHFF by considering the user's age, BMI, nutrient intake status, and functional needs. It particularly focuses on user needs and preferences while identifying existing diseases, current medication, and allergy information to prevent overlapping or harmful intake.

The results of this study can serve as essential foundational data for the PHFF industry by providing a standardized recommendation algorithm.

P5-41

Useful components and biological activity of *Houttuynia cordata* whole plant ethanol extract

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Houttuynia cordata is a perennial herb belonging to the Saururaceae family. It is known to have pharmacological effects such as diuresis, analgesia, and hemostasis, and contains antioxidant components such as quercetin and tannin. *H. cordata* used in this study was harvested in Songdong-myeon, Namwon-si, Jeollabuk-do and dried in the shade. The antioxidant effect of *H. cordata* was tested for DPPH free radical scavenging activity and SOD-like activity, and the contents of total polyphenol, free sugars, and organic acids were measured.

The total polyphenol content was found to be 5.89%, and the free sugars and organic acids content were found to be 1,562.25 mg% and 1,433.89 mg%, respectively. *H. cordata* extract was confirmed to have a very strong electron donating ability at a concentration of 50 µg/mL or higher, similar to that of the ascorbic acid. As a result of measuring SOD-like activity, it showed about 15% activity at a concentration of 500 µg/mL.

Polyphenolic compounds are one of the secondary metabolites widely distributed in the plant world and are known to be bioactive substances with antioxidant, anticancer and antibacterial activities.

As a result of this study, the ethanol extract of *H. cordata* contains a large amount of useful components with antioxidant effects, so it is expected to be useful as a pharmaceutical and food materials.

P5-42

Whitening activity of *Stachys sieboldii* tuber fermented with mushroom mycelia

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The growing interest in skin whitening has recently renewed attention on Chinese herbal medicines with whitening activity for esthetic applications. *Stachys sieboldii* has been used as herbal medicine since ancient times and has potential for development as a cosmetic material because of its astringent effect. In this study, with an aim to develop new functional materials with whitening effects, *Stachys sieboldii* tuber hot water extracts were fermented with four different mushroom mycelia (*Hericium erinaceus*, *Ganoderma lucidum*, *Lentinula edodes*, and *Wolfiporia extensa*). *Stachys sieboldii* hot water extract fermented with *H. erinaceus* mycelia showed the strongest tyrosinase inhibition effect, and treated cells had the lowest melanin content. Thus, *H. erinaceus* mycelia, the most potent inhibitor of melanogenesis, was used for large-scale fermentation and fractionated. The ethyl acetate fraction, which had the strongest whitening activity, was separated and purified using HPLC system. The compound present in the active fraction was isolated, and the chemical structure of the compound was determined based on NMR and LC-MS/MS spectrum analysis. The results showed that the single compound isolated from *Stachys sieboldii* hot water extract fermented with *H. erinaceus* mycelia was acteoside, which has promising whitening activity.

Acknowledgement : This study was carried out with the support of 'Industry-Academia-Research Collabo R&D' provided by the Korea Technology and Information Promotion Agency for SMEs.

P5-43

A 4-week, randomized, double-blind clinical trial to evaluate the efficacy and safety of red pepper paste (Gochujang powder) intake on intestinal microbiome and improved bowel movements

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Recent preclinical studies suggest that traditional Gochujang can positively impact gut health by improving beneficial gut microbiota and alleviating constipation. This study aimed to evaluate the efficacy and safety of Gochujang in individuals diagnosed with functional constipation according to Rome IV standards. Fifty participants were randomly assigned to three groups: traditional Gochujang with high beneficial bacterial (TMG22-7), traditional Gochujang with low beneficial bacterial (TCG22-25, or commercial Gochujang (TFG22-1). Participants consumed 19g of Gochujang powder daily for 4 weeks. Primary outcomes included colon transit time and gut microbiome; secondary outcomes included calprotectin, β -glucuronidase, pH, short-chain fatty acids and constipation-related questionnaires. The TMG22-7 group showed significant improvements in intestinal biomarkers, such as calprotectin, pH, and butyric acid of SCFA ($p=0.011$, $p=0.009$, $p=0.043$). No significant changes in gut microbiota, safety outcomes all types of Gochujang. These findings suggest that traditional Gochujang, particularly with high beneficial bacterial content, is a promising functional foods for improving functional constipation.

P5-44

Anti-inflammatory effect of fucoidan from *Saccharina japonica* on particulate matter (PM)-stimulated skin cells *in vitro* and TPA-induced ear edema in an *in vivo* mouse model

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Fucoidan from *Saccharina japonica* (SJF) contained $15.82 \pm 0.07\%$ sulfate and $29.82 \pm 0.86\%$ fucose. SJF treatment increased cell viability, reduced ROS production, and decreased the expression of inflammatory cytokines (IL-6, IL-8, IL-13, IL-25, IL-33, TNF- α , IFN γ , and TSLP) and chemokines (MDC and TARC) by modulating NF- κ B/MAPK signaling in PM-stimulated HaCaT keratinocytes. SJF-treated HaCaT media also reduced inflammation and ECM degeneration in human dermal fibroblasts by lowering the expression of TSLP, IL-6, IL-8, IL-13, TNF- α , TARC, and MDC, as well as MMPs, TIMPs, and elastase activities. In a TPA-induced ear edema model in BALB/c mice, topical application of SJF reduced ear thickness and decreased the expression of iNOS and COX-2. In summary, the study confirmed the efficacy of SJF in alleviating PM-induced skin inflammation, supported by the TPA-induced ear edema mouse model.

P5-45

Comparison of imputation models for missing data in food nutrient databases

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Various personalized services and products utilizing the Korean Food Nutrition Database (FNDB) integrated 2023 have been launched. For the personalized and precision nutrition information, it is essential to know the exact intake of minerals and vitamins. However, numerous minerals and vitamins is often missing in processed foods or dining out. This study aimed to predict missing nutrient values using the reported nutrients in the integrated FNDB.

From FNDB in the Ministry of Food and Drug Safety of the Republic of Korea, total of 12,142 food items were calculated the missing rates of nutrients. The highest missing rate was Magnesium (93.89 %) and Vitamin B₁₂ (94.11%). Six vitamins (Vitamin A, B₁₂, B₂, C, D, and Niacin) and four minerals (Iron, Potassium, Calcium, and Phosphorus) among high missing rates set as key variables. Correlation of minerals between the selected variables and protein content were higher than vitamins. In a simple regression analysis, all nutrients except vitamin C showed a significant increase trend with protein. Multiple regression models with protein as the independent variable, we predicted the unreported nutrient values. This study provides fundamental data for the utilization of personalized products in nutrient databases with missing values.

All statistics were performed using R (Version 4.3), and significance was determined at a p-value of 0.05.

P5-46

Antioxidant properties of 'Sangjudungsi' leaf extracts using different extraction methods and extraction time.

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The food industry is shifting focus to natural foods as a response to increasing consumer demand for products known for their healthy nutrients. Different drying methods such as hot air-drying and vacuum freeze-drying have been employed over the years as a form of preserving and extending the shelf-life of food products. This study explored the antioxidant properties of vacuum freeze-dried (VFD) and hot-air dried (HAD) 'Sangjudungsi' leaves through different extraction methods (control and sonication) and extraction times (5, 10, 20, 30, and 60 minutes). The antioxidant parameters were measured, which include DPPH, ABTS, TPC, Tannin, and TFC. Regarding DPPH, the concentration of the control and sonicated VFD samples increases as the extraction time increases. However, the sonicated VFD and HAD samples yielded a better result than their counterparts (control). The concentration of ABTS for both HAD and VFD sonicated samples shows a similar result when compared to the control samples. The concentrations for TPC, Tannin, and TFC for the VFD and HAD samples were recorded highest in the sonication-assisted extraction method. The VFD sample extracted for 60 minutes through sonication yielded the highest DPPH content, while the HAD sample extracted for 30 minutes through sonication yielded the highest value for DPPH. The VFD and HAD samples extracted through sonication for 30 minutes recorded the highest yield for tannin.

P5-47

Effect of *Saccharina japonica* ethanol extract on skin dryness in fine dust-stimulated HaCaT keratinocyte and its biological mechanism

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This study investigated the effect of *Saccharina japonica* ethanol extract (SJE) on skin dryness in fine dust (FD)-stimulated HaCaT keratinocytes and its biological mechanism. SJE increased cell viability as decreased ROS generation via Nrf-2/ HO-1 signaling activation in FD-stimulated HaCaT keratinocytes. SJE downregulated the expression of inflammatory cytokines (IL-25, IL-33, TSLP, IL-1 β , IL-6, IL-8, IL-13, IFN- γ , TNF- α) and chemokines (MDC, RANTES, TARC) via inhibiting the activation of NF- κ B and MAPK signaling. SJE increased hyaluronic acid by modulating the skin hydration molecules (LEKTI, involucrin, filaggrin, KLK-5, PAR-2, PLA-2) and tight junction molecules (occludin, ZO-1, claudin-1, claudin-4, claudin-7, claudin-23) in FD-stimulated HaCaT keratinocytes. These findings suggest that SJE improves skin dryness in FD-stimulated HaCaT keratinocytes.



P5-48

Protective effect of *Curcuma longa* L. leaves and pseudostems extract on IgE/BSA-stimulated mast cell activation and DNCB-induced atopic dermatitis in a BALB/c mouse model

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The present study investigated the effect of leaves and pseudostems extract of *Curcuma longa* L. (TLSWE-8510) against type I allergic reactions in IgE/BSA-stimulated bone marrow-derived cultured mast cells (BMCMCs) and atopic dermatitis (AD) in DNCB-induced BALB/c mice. The results showed that TLSWE-8510 suppressed the degranulation of IgE/BSA-stimulated BMCMCs. TLSWE-8510 downregulated the production of the cytokines by modulating NF- κ B and Syk-LAT-ERK-Gab2 signaling. TLSWE-8510 effectively attenuated the IgE/BSA-induced PCA reaction in BALB/c mice. TLSWE-8510 reduced AD symptoms, including skin dermatitis severity, transepidermal water loss, scratching, ear edema, and serum immunoglobulin levels in DNCB-induced mice. TLSWE-8510 inhibited the inflammatory cell infiltration and degranulation of mast cells in the dorsal skin tissues. These results revealed the therapeutic potential of TLSWE-8510 against abnormal immune responses.

P5-49

Effect of subcritical water extract from *Saccharina japonica* against skin dryness in fine dust-stimulated HaCaT keratinocytes

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This study assessed the effect of *Saccharina japonica* (SJS) subcritical water extract against skin dryness in fine dust (FD)-stimulated HaCaT keratinocytes. SJS increased cell viability while reducing ROS generation by activating Nrf2/HO-1 signaling. SJS downregulated the mRNA expression of inflammatory cytokines (IL-25, IL-33, TSLP, IL-1 β , IL-5, IL-6, IL-8, TNF- α) and chemokines (MDC, TARC, Eotaxin) via inhibiting NF- κ B and MAPK signaling. SJS increased the hyaluronic acid production while modulating the expression of skin moisturization proteins (involucrin, filaggrin, PAR-2, PLA-2, KLK5, LEKTI) and skin-tight junction proteins (occludin, ZO-1, claudin-1, claudin-4, claudin-7, claudin-23). Altogether, SJS improved skin dryness by enhancing skin moisturization and skin barrier function while suppressing inflammatory responses in FD-stimulated HaCaT keratinocytes.

P5-50

Antioxidant characteristics of green and black teas traditionally manufactured in the Jeonnam region of Korea

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In Korea, the leaves, roots, and fruits of the tea tree (*Camellia sinensis*) are usually dried and fermented, before consuming as green and black tea. The flavor and functionality of tea varies depending on the traditional tea-making methods of each region. In this study, the antioxidant properties of green and black tea which were manufactured in the Jeonnam region of Korea were investigated. A total of 15 types of tea (7 green tea and 8 black tea) provided by the manufacturer were extracted with water according to the commercial dripping method (green tea: 70°C, 2 min; black tea: 100°C, 10 sec), and the antioxidant activity, total polyphenol, and total flavonoid contents were analyzed. The DPPH radical scavenging activity of green and black tea leaves ranged from 27.91 to 89.07 mg GAE/g and 21.80 to 101.56 mg GAE/g, respectively, showing a difference of about 5 times depending on the manufacturing method. The ABTS radical scavenging activity also showed a wide range of values, 148.48–225.07 mg AEE/g for green tea and 15.02–191.99 mg AEE/g for black tea. Meanwhile, the total polyphenol content was 22.67–117.67 mg GAE/g for green tea leaves and 2.85–99.86 mg GAE/g for black tea leaves. This indicates that on average, green tea leaves (average 82.74 mg GAE/g) was approximately twice as high as black tea leaves (average 41.42 mg GAE/g). The total flavonoid content was approximately 1.8 times higher in green tea leaves (average 144.82 µg QE/g) than in black tea leaves (80.57 µg QE/g). On the other hand, the DPPH radical scavenging activity of 15 types of green tea and black tea water extracts (GE and BE, respectively) showed a wide range values, from 14.62 to 244.71 GAE/100 mL, while the averages of GE and BE were 171.00 and 152.76 GAE/100 mL, respectively, showing no remarkable difference. The total polyphenol content was twice as high in green tea leaves than in black tea leaves, but there was no significant difference between BE (101.37 GAE/100 mL) and GE (96.37 GAE/100 mL) in average. In addition, the total flavonoid content of GE and BE showed an average of 2473.73 and 2737.11 µg QE/100 mL, respectively, showing no significant difference. This study shows that the antioxidant properties of teas manufactured in the Jeonnam region varies greatly depending on the characteristics of tea leaves and manufacturing method. Results of this study can be used as basic data for improving the quality of teas, including sensory characteristics in the future.

P5-51

Anti-skin aging *centella asiatica*-meditated green synthesis with gold nanoparticles using deep eutectic solvents

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New natural solvents and metal nanoparticle synthesis were developed to enhance the effectiveness of *Centella asiatica* (CA) extracts. In an eco-friendly synthesis process, nanoparticles were synthesized at three temperature conditions (5, 25, 45°C). At the same concentration (100µg/mL), the elastase inhibition activity of the water extract was $25.13 \pm 0.17\%$, but when synthesized as gold nanoparticles, the inhibition activity increased to 57.88 ± 2.98 , 88.83 ± 1.3 , and $80.9 \pm 1.61\%$, over 2.3-fold higher. For the DESs extract, the inhibition activity was $12.98 \pm 1.82\%$, but with gold nanoparticles, it increased to $80.95 \pm 0.2\%$, 72.59 ± 0.55 , and $77.51 \pm 0.65\%$, over 5.5 times higher. Based on these results, a new cosmetic formulation using CA extract and gold nanoparticle synthesis was developed, proving to be a promising candidate for anti-aging cosmetics.



P5-52

Beyond conventional solvents: enhanced antioxidant effect of natural hydrogen bond solvents from *Dillenia indica* L. bark

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Conventional plant extraction methods use high-temperature aqueous or organic solvents. Aqueous extraction suits hydrophilic substances but can degrade thermolabile compounds, while organic solvents, suitable for lipophilic substances, have residual toxicity and require extra purification. Deep eutectic solvents (DES) offer a sustainable alternative with better solubility and lower toxicity. This study developed a Natural Hydrogen Bond Solvent (NHBS) from glucose, lactic acid, and 20% water. Using NHBS, phytochemical extraction from *Dillenia indica* L. bark (DIB) showed higher total phenolic content (115.51 ± 1.35 mg GAE/g) and flavonoid content (183.66 ± 2.99 mg CAE/g) compared to ethanol extract (27.425 ± 0.99 mg GAE/g and 3.13 ± 2.13 mg CAE/g, respectively). Antioxidant activities were also enhanced. ESI-MS/MS analysis identified 145 compounds with NHBS versus 100 with ethanol. These results suggest NHBS as an effective, sustainable extraction solvent for potential use in food, cosmetics, and pharmaceuticals.

P5-53

Natural Hydrogen Bond Solvents (NHBS): increasing antioxidant potential and marker compound content beyond traditional solvents

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This study explores the efficacy of natural hydrogen bond solvents (NHBS) for extracting bioactive compounds. A novel NHBS was formulated from glucose and lactic acid, both serving as hydrogen bond donors, differing from traditional deep eutectic solvents (DES). This system demonstrates superior extraction efficiency and significantly reduces toxic emissions and by-products. Antioxidant activity assays on NHBS and ethanol extracts, with varying glucose to lactic acid ratios (1:1, 1:2, 1:3, 1:4, 2:3), showed higher antioxidant activity in NHBS, especially at 1:1 and 1:2 ratios. Eight plant species (*Centella asiatica*, *Glycyrrhiza glabra*, *Schisandra chinensis*, *Scutellaria baicalensis*, *Panax ginseng*, *Camellia sinensis*, *Platycodon grandiflorum*, and *Angelica gigas*) were extracted using NHBS and analyzed via HPLC, revealing a 2 to 5-fold increase in marker compounds like asiaticoside, madecassoside, asiatic acid, glycyrrhizin, and others. Given its reduced toxicity and enhanced efficiency, NHBS has significant potential for sustainable applications in the food, pharmaceutical, and cosmetics industries.

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Antioxidant and tyrosinase and elastase inhibitory and UV protection effect of seaweed extracts(*Hizikia fusiformis*, *Laminaria japonica*, *Ulva lactuca*, and *Undaria pinnatifida*)

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In this study, there are many different kinds of seaweed in Korea, which is surrounded by sea on three sides. Among the major seaweeds, seaweed, kelp, sea lettuce, and hijiki were investigated for their polyphenol content and cosmetic functionality. The content of polyphenol compounds in the hijiki extract was the highest at $2,440 \pm 0.41$ mg GAE/g, followed by seaweed, and hijiki and seaweed had significantly higher content than kelp ($p > 0.05$). In terms of flavonoid content, seaweed had 2.34 ± 0.24 CE mg/g. It was the highest and was significantly higher than other seaweeds. ($p > 0.05$) Cytotoxicity was conducted to confirm the possibility of future use for cosmetic purposes, but the safety of the four seaweed extracts was confirmed up to 1,000 $\mu\text{g/mL}$. It was confirmed that the antioxidant activities, DPPH radical scavenging activity and ABTS caving activity, increased the most when the concentration of hijiki extract was increased. Meanwhile, in the Tyrosinase inhibition effect of seaweed, hijiki extract had 8% more inhibitory activity than kelp extract. However, tyrosinase inhibition activity and collagenase inhibition activity were higher in seaweed extract. Meanwhile, among seaweed extracts, hijiki extract shows a UV-blocking effect similar to DPD, so additional research is needed to research and produce whitening products in the future.

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Nutritional profile of proximate and fat-soluble composition content generally consumed imported fisheries in Korea

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Korea is known for its diverse consumption of seafood, which is considered a significant source of nutrition in the Korean diet. Despite its rich domestic seafood production, Korea also imports a considerable amount of fisheries. However, there is a lack of research specifically focusing on the database of nutritional content of imported seafood consumed in Korea. In this study, selected 19 imported seafood consumed in Korea, and their proximate composition, β -carotene, retinol, tocopherols and cholesterol contents were analyzed. As a result, fat-soluble nutrient contents were high in lobster viscera. Protein content was high in pacific saury, one of the most commonly eaten seafood in Korea. And Retinol content was high in scallop and large yellow croaker. β -carotene content was not detected in samples. This study provided reliable proximate composition, fat-soluble vitamin and cholesterol data in imported seafood, which are mostly consumed in Korea for the nutritional information and food composition database.

