ACS Chemistry for Life®

Agricultural and Food Chemistry Division

Spring 2026

# CORNUCOPIA

**including the AGFD program and abstracts for the 271st American Chemical Society (digital & live) National Meeting on**

**March 22 - 26, 2026**

**in**

# ATLANTA

## Coralia Osorio
## Program Chair

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**Going to Atlanta?**
**Join the AGFD Chair's Reception at**
**STATS Brewpub**
**Tuesday, March 24 from 6:00-8:00 pm**

10 minute walking directions from the Convention Center: exit the Center and turn left onto Andrew Young International Blvd. Walk 0.2 mi. to Marietta St. NW. Turn left. Walk 0.4 mi. to STATS on your left (300 Marietta St. NW).

**Visit our website - www.agfoodchem.org - for a pdf of Cornucopia, job postings, awards and more.**
**Check out our Facebook page www.facebook.com/agandfood**
**We're a LinkedIn group & on Instagram, too →**

@AGFD_ACS

# MESSAGE FROM THE CHAIR

I am honored to be elected AGFD chair in 2026 and grateful to all EXCOM members for their guidance, especially to Liz Kreger, a very enthusiastic past chair, who gave me this responsibility and shared files and tips. The experience and generous support of Kathryn Deibler, Mike Morello, Alyson Mitchell, Carl Frey, Michael Tunick, Michael Appell, and Stephen Toth allowed me to successfully carry out this role from Bogotá, Colombia. I thank the Divisional Activities Committee and the Abstract Team (Ryckera and Sarah) for constant support in coordinating the scheduling of symposia and non-technical events. I am also grateful to AGFD for the opportunity to participate in the 2026 ACS Leadership Institute—an enriching experience that allowed me to exchange ideas and perspectives with ACS members from the United States and abroad. From my international perspective, and in my role as Deputy Editor of ACS Food Science & Technology journal, I believe these interactions help strengthen connections and serve as a bridge between different scientific communities.

We are at the point of achieving the goals and strategies proposed for AGFD during a 5-year period: share division impact & value to our stakeholders, connect divisions and the greater ACS community, and provide support and recognition. We are on our way, organizing joint symposia with other divisions such as AGRO, ANYL, CARB, ENVR, PMSE and POLY, among others. Some webinars have been held on topics relevant to AGFD, and the communication with our members and community has flowed since Elyse Doria and Poll Zhang, UC Davis students, started managing social media. Engaging the next generation of scientists is essential to strengthening and advancing AGFD activities.

The ACS Fall 2025 organization was challenging due to external factors affecting attendance of several presenters leading to a higher number of speaker withdrawals compared with previous years. Nevertheless, these challenges were successfully managed, resulting in 18 well-executed symposia comprising 38 sessions, including six jointly programmed with other divisions and three offered in a digital-only format. Topics were related to ACS Microbiome Consortium, Advances in Allergen Detection and Quantification, Innovations in Natural Polymer Science for Sustainable Agriculture and Food Security, Chemistry of Alcoholic Beverages, Chemistry of Flavor Compounds in Quality, Safety, and Sensory Properties of Foods and Food Products, Nutraceutical and Functional Food: Emerging Techniques for Characterization and Bioavailability Analysis, Sustainable Agriceuticals, Tackling World Hunger & Food Security Reducing Food Waste - Food Security CCC, Using Artificial Intelligence to Improve Agriculture and Food Systems, and Whole Grains Bioactives & Human Health. AGFD awarded retired USDA scientist Dr. H.N. Cheng with the 2025 Award for the Advancement of Application of Agricultural and Food Chemistry and University of British Columbia Assistant Professor Dr. Tianxi Yang, as the 2025 AGFD Young Scientist Award. Our challenge is to share quality results that foster "*trust in science*" as a target.

For ACS Spring 2026, we are hosting 10 symposia (1 digital) and more than 140 abstracts. Topics include: Advances in Food Ingredients: Bridging Innovation to Traditional Technologies, Advances in Agricultural and Food Chemistry (Food Analysis & Technology, Food Analysis & Technology and Food Analysis & Sensory Evaluation), Agri-Derived Bioactives and Their Therapeutic Potential, Artificial Intelligence in Food and Agricultural Chemistry: From Molecular Insights to Field Applications, Food Ingredients: Sustainability and Natural Alternatives, Artificial Intelligence and Advanced Sensing for Enhancing Food Safety, and The Chemistry of Nonalcoholic and Alcoholic Beverages. Among them, we will give for the first time the Thomas H. Parliment Award in Flavor Chemistry to Prof Dr. Terry Acree from Cornell University. Congratulations, Terry. I was delighted to meet you and to host you at the First International Flavor and Fragrance Conference in 2017 in Cartagena, Colombia.

The American Chemical Society (ACS) is celebrating its 150$^{th}$ anniversary throughout 2026 with a global campaign highlighting the history, community, and future of chemistry. "*Experience the legacy and future of chemistry - told through the voices and breakthroughs that define it*". I invite you to participate in all of the activities on the framework of this celebration (https://www.acs.org/acs-150th-anniversary.html), taking into account the 12 anniversary themes: leadership, integrity, interdisciplinary collaboration, sustainability, partnership, safety, celebration, innovation, lifelong learning, community, gratitude and progress. I hope you can include all of them in your chemistry research activities. Thus, science continues answering the community's requests as a tool for solving problems.

Some key milestones in Agricultural and Food Chemistry over the past century across the seven subdivisions include:
In **Food Bioengineering**, major advances encompass the industrialization of microbial fermentation for production

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of enzymes, amino acids, and antibiotics; the emergence of recombinant DNA technology and metabolic engineering enabling microorganisms to synthesize food ingredients; and more recently, the development of precision fermentation, synthetic biology, genome editing technologies (e.g., CRISPR), and systems-based bioprocess engineering for the production of sustainable proteins, flavors, and nutraceutical compounds as well as the development of resilient crops.

In **Flavor Science**, milestones include the structural elucidation of key aroma compounds through advanced analytical techniques (e.g., GC–MS, GC–olfactometry) and development of biotechnological and enzymatic processes for natural flavor production and the integration of molecular sensory science and flavoromics to understand flavor perception.

In **Food Safety**, transformative developments include the implementation of Hazard Analysis and Critical Control Point (HACCP) preventive systems, advances in microbial detection and quantitative risk assessment and the adoption of molecular diagnostic tools such as PCR and whole-genome sequencing for rapid pathogen identification, surveillance, and traceability in food systems.

In **Functional Foods and Natural Products**, major milestones include the identification and characterization of bioactive phytochemicals, the development of nutraceuticals and probiotic-based foods and the application of metabolomics and other omics technologies to elucidate the mechanisms linking dietary bioactive compounds with human health outcomes.

In **Nutrition and the Gut Microbiome**, important progress includes recognition of the fundamental role of the intestinal microbiota in host metabolism and immunity, the development of probiotic and prebiotic concepts and the application of high-throughput sequencing and multi-omics approaches to characterize diet–microbiome–host interactions.

In **Sustainability and Green Technologies**, milestones include the application of green chemistry principles in food processing, the development of biorefinery concepts for biomass utilization, advances in sustainable agricultural intensification and the implementation of circular bioeconomy strategies including food waste valorization and precision agriculture technologies to reduce environmental impacts.

Finally, in **Agriceuticals**, progress has focused on the discovery and enhancement of health-promoting phytochemicals in crops, the development of biofortified agricultural products, and the integration of metabolomics, plant breeding and biotechnology to improve the nutraceutical value of agricultural commodities.

Together, these advances highlight the evolving role of the seven subdivisions in addressing emerging scientific challenges and underscore the importance of continued interdisciplinary efforts to support future symposia and research initiatives in Agricultural and Food Chemistry. Welcome to Atlanta—connect with colleagues, expand your professional network and enjoy the many activities of ACS Spring 2026. Let's celebrate that chemistry is both impactful and FUN.

**Coralia Osorio AGFD Chair 2026**

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## Honoring Black and African American Chemists Pioneers, Innovators and Trailblazers for Black History Month

(as featured on the ACS Publications Axial Blog)

Omowunmi (Wunmi) Sadik, AGFD Member and current chair of the Sustainability & Green Technology Subdivision serves as Vice Provost for Faculty Affairs and Distinguished Professor of Chemistry and Environmental Science at New Jersey Institute of Technology where she directs NJIT's BioSMART Center (BioSensor Materials for Advanced Research and Technology). Her work (>200 papers and 5 patents) ranges from sustainable chemistry, low-cost, paper-based biosensors farmers use to diagnose crop diseases, developing nanocatalytic methods to degrade persistent environmental pollutants, detect explosives and turn industrial waste into valuable resources. She co-founded the non-profit Sustainable Nanotechnology Organization and established the ACS Sustainability and Green Technology subdivision.

# FUTURE PROGRAMS

## CHICAGO August 23-27, 2026 ACS THEME - Chemistry Making History. Be Part of It.

**ACS Microbiome Consortium: The Gut Microbiome and Its Relationship to Diet and Human Health** Coralia Osorio cosorior@unal.edu.co Jaime Amengual Terrasa jaume6@illinois.edu Tom Wang tom.wang@usda.gov Christopher Courtney cleathe3@vols.utk.edu Jenni Firrman jenni.firrman@usda.gov

**Advances in Agricultural and Food Chemistry (General Papers)** Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org Coralia Osorio cosorior@unal.edu.co

**Advancement of Application of Agricultural and Food Chemistry Award Symposium in Honor of Michael Appell** Coralia Osorio cosorior@unal.edu.co Mike Morello mjmorello226@gmail.com Gary List grlist@telstar-online.net

**AGFD Awards: Young Scientist, Young Industrial Scientist, JAFC Best Paper Award, and Sterling B Hendricks Memorial Lecture** Youngmok Kim youngmok.kim@finlays.net Bhimanagouda Patil Bhimanagouda.Patil@ag.tamu.edu Thomas Hofmann jafc@jafc.acs.org William King WKing@acs-i.org Michael Appell Michael.appell@gmail.com Booson Park bosoon.park@ars.usda.gov Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org

**Agnes Rimando International Student Symposium** Roberta Tardugno roberta.tardugno@uniba.it Michael Tunick mhtunick@gmail.com

**Bioproducts from Biomass** Majher I. Sarker majher.sarker@usda.gov Brajendra Sharma brajendra.sharma@usda.gov Yadav Madhav madhav.yadav@usda.gov Helen Ngo helen.ngo@usda.gov

**Chemistry of Aroma and Taste Modification** Robert McGorrin robert.mcgorrin@oregonstate.edu Elizabeth Kreger elizabeth.kreger@sensient.com

**Climate-Resilient Agriculture: Chemistry at the Food–Environment Interface** Hamidreza Sharifan hsharifan@utep.edu Weilan Zhang wzhang4@albany.edu Jason White Jason.white@ct.gov

**General Posters** Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org

**Feeding the World Through Chemistry** Michael Tunick mhtunick@gmail.com Roger Egolf rae4@psu.edu Beth Lorsbach beth.lorsbach@nufarm.com Dena Barrett dbarrett@agrodiv.org Sara Whiting sara.whiting@bayer.com

**Nutraceuticals, Food Bioactives, and Functional Foods: From AI and Emerging Analytical Techniques to Personalized Nutrition** Jianping Wu jwu3@ualberta.ca Xiaohong Sun xiaohong.sun@dal.ca

**Spencer Award Symposium** Mike Morello mjmorello226@gmail.com

**Strategies for Advancing Food Packaging Technology and Safety** John Koontz John.Koontz@fda.hhs.gov Timothy Duncan Timothy.Duncan@fda.hhs.gov

**Sustainable Agriceuticals** Linshu Liu Linshu.liu@usda.gov Yuzhu Zhang Yuzhu.zhang@usda.gov Ying Wu ywu@Tnstate.edu Wally Yokoyama wally.yokoyama@usda.gov Hyunsook Kim Hyunsk15@hanyang.ae.kr

**Sustainable Chemistry for Circular Bioeconomy Systems** Shu-Yuan (Sean) Pan sypan@ntu.edu.tw Ellen Caixia Wan wanca@missouri.edu Daeseung Kyung dkyung@ulsan.ac.kr Qiangu Yan Qiangu.yan@usda.gov

**Transformative Natural Polymers of 21st Century ACS Series Symposia IV** Wei Gao weigaoacs@gmail.com Jun Wang junwang@acs-np-ccc.org Feng Jiang feng.jiang@ubc.ca Charlie Fehl charlie.fehl@wayne.edu Lingyun Chen lingyun1@ualberta.ca

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**Virtual Graduate Students Symposium in Asia-Pacific Region on Agricultural and Food Chemistry** Daxi Ren dxren@zju.edu.cn Chunxiao Zheng czheng@acs-i.org

**Whole Grain Bioactives and their Health Effects** Shengmin Sang ssang@ncat.edu Dmitriy Smolensky dmitriy.smolensky@usda.gov

**150 Years of Biopolymer Chemistry Toward a Sustainable Future** Feng Jiang feng.jiang@ubc.ca Lingyun Chen lingyun1@ualberta.ca Charlie Fehl charlie.fehl@wayne.edu

## NEW ORLEANS **March 21–25, 2027**

**Advances in Agricultural and Food Chemistry (General Papers)** Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org

**Biopolymers From Sustainable Resources and Their Emerging Applications in Agriculture, Food, Nutraceuticals and Other Industrial Sectors** Linguyn Chen lingyun1@ualberta.ca Lucy Yu lyu5@umd.edu Michael Appell Michael.appell@gmail.com

**Chemistry of the Bar** Nick Flynn nflynn@wtamu.edu Neil DaCosta neil.dacosta@iff.com

**Dynamic Flavor Analysis** Jonathan Beauchamp jonathan.beauchamp@ivv.fraunhofer.de

**Food Flavor - Innovation, Analysis, Application, Generation** Keith Cadwallader cadwlldr@illinois.edu Steven Toth Steven.Toth@iff.com Mike Morello mjmorello226@gmail.com Xiaofen Du xdu@twu.edu Kathryn Deibler kdd3@cornell.edu

**General Posters and Undergraduate Poster Competition** Kathryn Diebler kdd3@cornell.edu Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org

**Withycombe-Charalambous Graduate Student Symposium** Kathryn Diebler kdd3@cornell.edu Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org

## SAN DIEGO **August 22-26, 2027**

**Advances in Agricultural and Food Chemistry (General Papers)** Karley Mahalak Karley.mahalak@usda.gov Kenny Xie kyx@usp.org

**Chemistry of Alcoholic Beverages** Nick Flynn nflynn@wtamu.edu Neil DaCosta neil.dacosta@iff.com

**Climate-smart Foods: Boosting Nutrition, Flavor, Resilience and Consumer Acceptance** Bhimu Patil b-patil@tamu.edu Deepak Kumar Jha deepakkumar.jha@ag.tamu.edu Vikas Dadwal Vikas.dadwal@tamu.edu

**Emerging Challenges of Contaminants in Cannabis and Phytocannabinoid Products** Navindra Seeram nseeram@uri.edu Hang Ma Hang_ma@uri.edu

**Food Polymers** Lingyun Chen lingyun1@ualberta.ca

**Heat-Induced Compounds in Foods: Balancing Risks and Benefits of Thermal Processing** Coralia Osorio cosorior@unal.edu.co Edisson Tello tellocamacho.1@osu.edu Devin Peterson peterson.892@osu.edu

**Sulphur Containing Compounds: Bioactivity and Flavor** Lucy Yu lyu5@umd.edu Dejian Huang dejian@nus.edu.sg

**Tackling World Hunger & Food Security Reducing Food Waste** Kenny Xie kyx@usp.org Mike Morello mjmorello226@gmail.com

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**OTHER SYMPOSIA OF INTEREST**

**ABCChem Atlantic Basin Conference on Chemistry**, **Chemistry for Global Impact: Strategic Partnerships for Sustainable Innovation** Barra da Tijuca, Rio de Janeiro, Brazil 6–9 December 2026 **https://abcchem.org/**
**Sustainable Food and Agricultural Chemistry Transformation for a Circular Future** Coralia Osorio cosorior@unal.edu.co Laura McConnell laura.mcconnell@bayer.com Leonardo Fraceto leonardo.fraceto@unesp.br Roselena Faez faez@ufscar.br

**International Flavor Conference** Lima, Peru 2027



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## Executive Committee Meeting Minutes

Sunday August 17, 2025 Washington D.C.

Attendees: Coralia Osorio Liz Kreger, Karley Mahalak, Alyson Mitchell, Steve Toth, Michael Appell, Lucy Yu, Neil Da Costa, Robert McGorrin, Michael Morello, Jane Leland, Michael Qian, Changping Wu, Stephen Toth, Jianping Wu, Kenny Xie, Keith Cadwallader, Kathryn Deibler, Jinwen Zhang, Poll Zhang, Mike Tunick, Carl Frey, Yixiang Wang, Xiaohong Sun, Jason Soares, Jiayi Hang, Lingyun Chen, Yi-Shu Tu, Jane Tseng, Yu Fang, Clare Jiang, Jinwen Zhang

Elizabeth Kreger called the meeting to order at 4:11PM (EDT). The minutes of the previous Executive Committee meeting were approved with no changes and are published in the Fall 2025 Cornucopia.

In the **Program Report**, Elizabeth Kreger indicated that there were 10 technical symposia at the Spring 2025 National Meeting, four of which were jointly programmed with other divisions. Coralia Osorio indicated that there where a total of 18 symposia were held at the Fall 2025 meeting, including six jointly programmed with other divisions and three offered as digital-only. AGFD experienced a significant number of speaker withdrawals (AGFD submitted abstract numbers: 387; AGFD withdrawn abstract numbers: 53, 13.7%) due to the federal government's unexpected travel freeze and visa restrictions, as well as ACS's decision to condense programming to Monday through Thursday. This change required converting several oral presentations into posters. In total, AGFD faced an unprecedented 53 withdrawals. Concerns were raised regarding member engagement, particularly the impact on networking with multiple poster sessions compared to the traditional single general poster session. To address this issue, Mike Morello proposed forming a task force (including himself, Coralia Osorio, and Kathryn Deibler) to evaluate poster programming for future ACS meetings. This concern was heightened by the fact that the DAC/ACS abstract team implemented these programming changes without consulting the Division. As a result of these shifts, AGFD was also forced to move the annual Awards Dinner from Tuesday to Wednesday, which came as an unexpected change for AGFD members. Mike Morello reminded members of the importance of filling out the post-meeting survey. Members can highlight how difficult the on-line app and meeting program tools are to use.

**In New Business** the Division is expanding its online presence. A recently launched Instagram account has already attracted more than 100 followers. In addition, the Division's Instagram, Facebook, and LinkedIn pages are now linked directly to the Division's webpage, making it easier than ever for members to stay connected. Mike Tunick shared that DAC now has 'Communication Grants' providing up to $7500 to a Division to improve their communications. AGFD may want to consider applying for one of these grants. To further boost visibility, Elizabeth Kreger suggested encouraging some of AGFD's high-profile members to follow and engage with the Division's accounts. These members will be contacted individually to help amplify the Division's outreach and networking potential.

In **Subdivision Reports,** Jason Soares, on behalf of Chair Yuzhu Zhang, indicated that the **Agriceutical Subdivision** has one symposium planned for Spring 2025, and Qinchun Rao has been appointed as the new Secretary. The **Flavor Subdivision**, led by Joonhyuk Suh, reported a very successful symposium at the Fall 2025 meeting co-organized with Jeehye Sung and featured two sessions with 20 oral presentations and seven posters. Looking ahead, the subdivision is preparing four symposia for Spring 2026. Topics will include artificial intelligence in food and agricultural chemistry,
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advances in food systems, sustainable citrus and sustainable food ingredients. Each symposium will be led by different members, reflecting strong leadership and collaboration within the subdivision. Additionally, nominations for subdivision leadership include Liyun Ye as Secretary in 2026 and Jeehye Sung as Secretary in 2027. The **Food Bioengineering Subdivision** report was delivered by Changping Wu. Two sessions focused on micro/nanoplastics were organized for the Fall 2025 meeting, featuring a total of 16 talks. Professor Kwang-Geun Lee of Dongguk University (Seoul, Korea) has been appointed as the subdivision's incoming Secretary for 2026. The **Food Safety Subdivision**, chaired by Boyan Gao, did not submit a report or nominations this cycle. The **Functional Foods & Natural Products Subdivision** report was presented by Yingdong Zhu. The subdivision organized three oral presentations and one poster session at the Fall 2025 meeting. Raliat Abioye was appointed as the new Secretary. For the **Nutrition & Gut Microbiome Subdivision**, Karley Mahalak delivered the report on behalf of Chair Ida Pantoja-Feliciano. One session was held at the Fall 2025 meeting and Cortney Christopher has been nominated as the incoming Secretary. The **Sustainable & Green Technology Subdivision** report was given by Chair Lingyun Chen. This group co-organized a symposium with the ACS POLY Division at the Fall 2025 ACS Meeting, titled *Innovations in Natural Polymer Science for Sustainable Agriculture and Food Security*. The symposium included three half-day sessions with 33 oral presentations and 17 posters. Building on this success, the subdivision plans to continue collaborating with POLY at the 2026 ACS Fall Meeting in Chicago. In addition, Mike Appell suggested developing a future session focused on regulatory issues related to green chemistry.

The **Awards Committee Report** was given by Michael Morello. All awards are listed in the Fall 2025 Cornucopia, and awardees will be recognized at the award's dinner to be held on Wednesday. The Advancement of Application of Agricultural and Food Chemistry Award (AAAC) was awarded to H.N. Cheng, collaborator USDA, ARS, SRRC., and a symposium in his honor was organized for Monday afternoon. Mike Morello asked the committee to consider a motion to allow giving the Exemplary Leadership Award through the mail to accommodate senior members who are frequently targets for this award but for whom travel is difficult. The motion passed unanimously.

The **Student Activities Report** was given by Ethan Lee. A tour of Compass Coffee is organized for Monday at 2:30 PM. Ethan pointed out that lack of Sunday programming had a negative effect on our hospitality table. Members had nowhere to convene, network and obtain meeting information. A brief discussion was held on how the changes ACS is making without consultation of Divisions is impacting members in ways not understood. For the next student event, Elizabeth Kreger suggested a tour of Coca Cola in conjunction with the Atlanta meeting.

The **Councilors Report** was given by Mike Tunick and Alyson Mitchell. Council is voting on amending and names to two committees, realigning the committee on Publications and establishing a LGBTQ+ committee. The 150th anniversary is coming up, and ACS is going to change the logo to commemorate the anniversary.

The **Nominations Report** was given by Jason Soares. Kenny Xie was nominated as the 2026 Vice-Chair, which will be finalized by vote at the Business meeting on Tuesday. There are no current vacancies in the Councilor, Alternate Councilor or At-large Executive Committee positions. All other positions that require a nomination and vote are also filled until 2026 or beyond. All sub-divisions have a 2026 secretary except Food Safety and Functional Food & Natural Products. Liz will transition from Chair to the Nomination Chair role and will have 2 Councilor, one Alternate Councilor and two At-large Executive Committee member positions for coordination/nomination. The At-large position can be appointed through the Chair and/or EXCOM but those interested in any of these nominated positions should reach out to Liz prior to the Spring meeting.

Stephen Toth gave the **Treasurer's Report**. Revenue for the year was $60,491 and expenditures were $66,221. The Division has $1,265,429 in total assets and is financially healthy. A budget of $35,000 was set and approved for the 2026 spring meeting in Atlanta. Mike Morello asked that we double the allocation for the Thomas Parliment award to which all agreed. A motion was made to approve a budget of $1,500 for a camera and microphone for collecting social media content. The motion passed.

The **Cornucopia Report** was given by Carl Frey. An electronic version of the Cornucopia was sent out to members via email and 100 hard copies of the short (no abstracts) version were printed for distribution at the Washington D.C. meeting. The Instagram QR code and ACS logo have been added to the cover of the Cornucopia.

The **Hospitality/Public Relations Report** was given by Alyson Mitchell who indicated that 50 tickets were made

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available for the Division Awards Dinner being held Wednesday, August 20 from 6:00-8:00 PM at Zatinya. A dinner for the Executive Committee was organized at Yard House after the Executive Committee meeting.

The **Membership Report** was given by Alyson Mitchell on behalf of Michael Qian. Membership stands at 2262, increased from low 1924 back in 2022-2023, but still much lower than the highest 3110 in 2020. The US has 1475 members (accounting for 65.21% of the total), followed by China (111 members, 4.91%), Nigeria (82 members, 3.63%) and India (81 members, 3.58%). Compared with 2022, the division had a net increase of 339 members, an 18% increased from 2022. The major increase was from China (+83 members, +296%), followed by Nigeria (+72, +720%), India (45, +125%), and Colombia (+26, +433%). More than 50% of new members were recruited by Michael Qian through the 4th International Flavor Fragrances Conference. The drivers for increases from other countries are unknown. Japan had the largest membership drop (-11, -22%), whereas US membership remained unchanged.

Coralia Osorio gave the **Journal Report**. The ACS Agricultural and Food portfolio continues strong growth in 2025. Manuscript submissions are rising across *Journal of Agricultural and Food Chemistry (JAFC)*, *ACS Food Science & Technology*, and *ACS Agricultural Science & Technology*, with all three seeing higher Journal Impact Factors; JAFC reaching a record 6.2. ACS welcomed a new addition to the portfolio: *ACS Nutrition Science*, led by Editor-in-Chief Prof. Thomas Hofmann and Deputy Editor Dr. Jaume Amengual (University of Illinois Urbana-Champaign). The journal opened for submissions in June and will publish its first issue in early 2026. The JAFC-AGFD Research Article of the Year Award was awarded to Dr. Hanna Lang and co-authors for their work on the DNA reactivity of 3-Acetylacrolein. Dr. Lang will present on Tuesday, 2:00–2:35 pm, in Convention Center Room 143B. Finally, ACS Publications is continuing to offer AGFD members $1,000 Open Access discount tokens for publishing in ACS Agriculture and Food journals in 2025. To date, participation has been modest, and we greatly appreciate your support in spreading the word to help make this pilot program a success. Thank you to AGFD for ongoing partnership and support of the ACS Agriculture and Food journals!

The **Communications, Website, and Social Media Updates** were presented by Michael Appell and Alyson Mitchell. Michael will also give a presentation on *Social Media Best Practices for Technical Divisions* on Monday at 12:30 PM in the ChemSpark Theater (#2807), Expo Hall B. Our Wix website platform is currently managed by a team of webmasters and communications directors, including Michael Appell, Lingyun Chen, Alyson Mitchell, and Poll Zhang. The team is working to refresh AGFD's social media presence and improve the website interface for members. Best practices recommend using a single shared email for all AGFD social media accounts (LinkedIn, Facebook, Instagram, and X), allowing the communications team to coordinate posts and share updates more effectively. The Division will benefit from having someone fluent in social media to lead timely postings across platforms, especially prior to and during meetings. Overall, AGFD's communications, through newsletters, websites, and email, are comparable in frequency and style to other ACS divisions. However, AGFD has historically had limited social media activity beyond member-generated content, our LinkedIn account, and the newly launched Instagram account.

In **Old Business**, Coralia Osorio suggested that the next IFF meeting should occur in the Americas and also indicated that Kanjana Mahanatawee, from Thailand, offered the possibility of holding it there. Mike Qian stated that he is currently working with contacts in Peru for the next IFF meeting (2027). Coralia suggested Universidad Agraria La Molina as host in Peru, since she has some contacts there.

The meeting adjourned at 7:00 PM *Submitted by Elizabeth Kreger*

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## Business Meeting Minutes

Sunday August 17, 2025 Washington D.C.

Attendance: Coralia Osorio, Liz Kreger, Karley Mahalak, Alyson Mitchell, Steve Toth, Michael Appell, Neil Da Costa, Robert McGorrin, Michael Morello, Michael Qian, Jane Leland, Jason Soares, LinShu Liu, Changping Wu, Stephen Toth, Jinwen Zhang, Mike Tunick, Carl Frey, Roberta Tardugno.

Elizabeth Kreger called the hybrid meeting to order at 12:06 PM (EST). A vote was held to approve the nomination of **Kenny Xie** as **Vice-Chair.** The nomination passed unanimously. With this vote, the 2026 AGFD Officers and Committee leadership slate is complete.

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The members discussed the need for a formal process to address **non-responsive sub-divisions** and options for adjusting their leadership. The discussion focused on the **Food Safety Sub-division**, which did not provide either a report or a secretary nomination at the Spring or Fall meetings. Lucy Yu noted that the current chair, Boyan Gao, has been unable to travel to the U.S., which may have negatively impacted the subdivision's activities. Considering the absence of a secretary nomination, Alyson Mitchell nominated **Roberta Tardugno for Food Safety Sub-division Secretary**. Jason seconded the motion, and the nomination was approved. Jason Soares indicated that although he frequently sent information to subdivision leaders regarding responsibilities and AGFD Bylaws, he largely did not receive much feedback. Alyson Mitchell suggested having the past leadership committee host a bi-monthly Zoom meeting with subdivision leadership to mentor subdivision officers. Mike Appell and Mike Morello agreed to address this through the Past Leaders Committee, and will report back to the Executive Committee in the next month with a plan for mentoring the subdivision leadership.

A robust discussion was held on the potential for perceived bias in AGFD Fellow awards. While many ideas were raised, no resolution was reached. A Canvassing Committee had been established at the Fall meeting. Mike Morello proposed maintaining the current nomination process for this year to assess the effectiveness of the Canvassing Committee. The issue will be revisited at the next meeting.

Elizabeth Kreger noted the lack of a central repository for AGFD documents and reported that she has set up a Gmail account to serve this purpose.

LinShu Liu announced that the Sustainable Agricultural Symposium will award $100 for the best presentation, selected by the committee and funded through the symposium.

A recommendation was made to add meeting agenda outlines for all AGFD meetings to the *Cornucopia*.

The meeting adjourned at 1:10 PM *Submitted by Elizabeth Kreger*

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## Strategic Planning by the Divisional Activities Committee (DAC)

Report by Michael Tunick, AGFD Councilor

In February, I participated in a strategic planning session (SPS) for the DAC. SPS are held by ACS committees every five or six years to make sure they are moving forward. AGFD had a SPS in October 2023. Three goals, each with three strategies, were established for DAC.

Goal 1 - Promote: Share Division Impact & Value to Our Stakeholders. Strategies -
--pilot a standardized value proposition template for divisions to quantify member benefits/report impactful successes
--develop a branding toolkit for divisions
--create two communication forums for sharing divisional success stories within divisions and to ACS leadership.

Goal 2 - Connect: Connect Divisions and the greater ACS Community. Strategies -
--build a divisional platform for discussions and connections
--create a quarterly forum component for committees to expand programming
--develop engagement activities connecting divisional leaders with regional meetings.

Goal 3 - Support: Provide support and recognition. Strategies –
--implement technologies to maximize and harmonize capabilities with and within divisions
--recognize exemplary division activities
--build and strengthen networking opportunities for Divisions, DAC,and committees.

Every strategy has two or three champions who make sure the work is completed. I am on the 'recognize exemplary division activities' part. The tasks are to assemble a rubric for new ChemLuminary awards, get approval from DAC, have outreach to divisions to identify outstanding items in their annual reports, compile data, determine the winners and present the awards - all by the Fall 2027 Meeting.

# AGFD DIVISION MEMBERSHIP APPLICATION

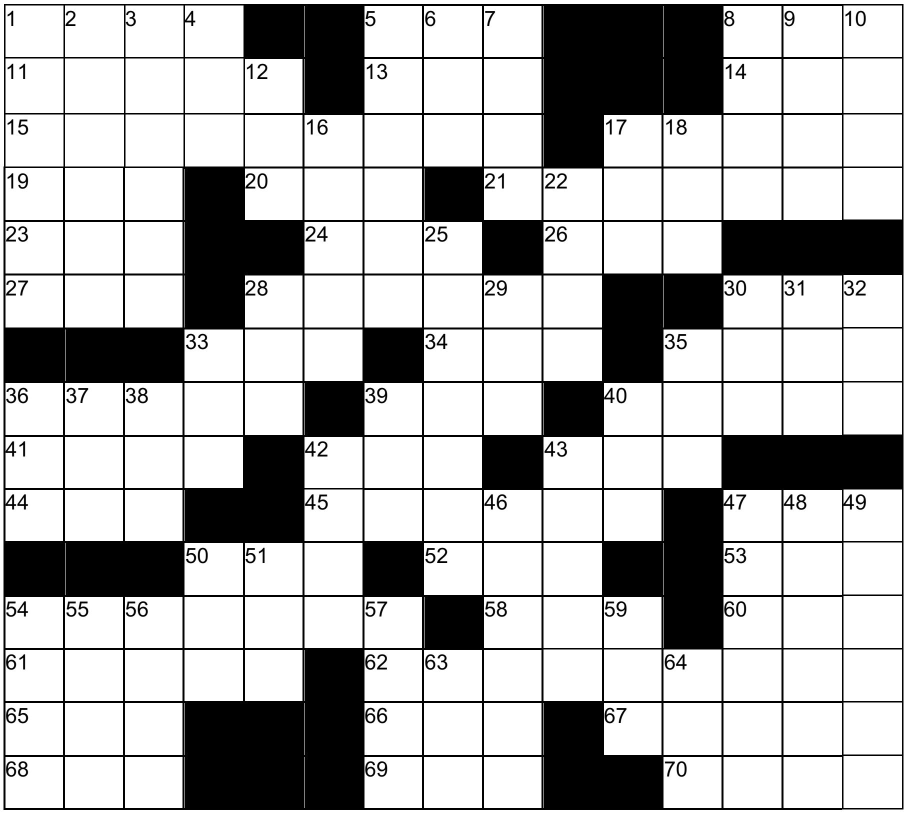
The Agricultural and Food Chemistry Division (AGFD) of the American Chemical Society (ACS) is a non-profit organization dedicated to the technical advancement of all aspects of agricultural and food chemistry. AGFD encourages technical advancement in the field by -
- organizing symposia/workshops on agricultural/food chemistry at ACS national meetings and other venues
- publishing proceedings of AGFD symposia
- publishing the *Cornucopia* newsletter
- updating members several times a year via e-mail blasts
- hosting social and networking gatherings at ACS national meetings
- providing cash awards and recognition to leading undergraduate and graduate students, young scientists and established scientists in the field of agricultural and food chemistry

At ACS National Meetings you can discuss division activities at the AGFD information table located near the AGFD technical session rooms. Join ~2300 AGFD members via the application form (below) or on-line at www.agfoodchem.org or www.acs.org (click on Communities, Technical Divisions, Technical Division List) or call ACS (800)333-9511 (in US) or 616-447-3776 (outside US). Payment by Visa/MasterCard or AmEx.

Check out AGFD on You Tube: https://www.youtube.com/watch?v=CyBMAnOuFKE

| | **APPLICATION FOR AGFD DIVISION MEMBERSHIP (7623P)** |
|---|---|
| Title | |
| Name | |
| 1st address line | |
| 2nd address line | |
| City | |
| State | |
| Zip code | |
| Country | |
| e-mail address | |
| Phone | |
| | |
| check one | **MEMBERSHIP FEE** |
| [ ] | I am an ACS member and wish to join AGFD ($10.00) |
| [ ] | I am not an ACS member and wish to join AGFD ($15.00) |
| [ ] | I am a full-time student and wish to join AGFD ($10.00) |
| | |
| **Be cool JOIN AGFD** | Return application, with payment (payable to American Chemical Society), to AGFD Membership Chair: Michael Qian, Professor, Department of Food Science and Technology, Oregon State University, Corvallis OR 97330 |

## ACROSS & DOWN IN ATLANTA TOWN




**A prize to the first send a correct solution to Carl Frey (via smartphone photo/e-mail) to - cfreyenterprise@gmail.com**

**ACROSS**

1 Daybook meeting abbrev.
5 'Green' prefix
8 Queen, king, __
11 Trumpeter Armstrong
13 2000 pounds
14 Deface, make imperfect
15 Atlanta men's HBCU
17 A most refreshing drink
19 Big player in the nail biz
20 Amt. amassed since Jan.1
21 Atlanta women's HBCU
23 Ready, __, go!
24 Skirt lower edge
26 UFO pilots
27 Attempt, make an effort
28 Halvah & bagel seed
30 __, Humbug!
33 Source of 2x4s
34 __ soda or __ Mineo
35 Periodic table info.__
36 *Wonder Woman* Gal __
39 Hog heaven
40 It should be God's honest
41 'Tickle me' Muppet
42 Common ship reference
43 Egoist's repeated refrain
44 __ Taylor or __ Cheney
45 Kit __ or Johnny __
47 *To __ is human*
50 Wanted poster abbrev.
52 Daytime illuminator
53 Born with the name
54 Atlanta NFL franchise
58 Cambridge school of note
60 Recipe unit abbrev.
61 Photo session illuminator
62 Atlanta's 'main' street
65 '97-'06 SNL Tina __
66 Violent '*Rings*' creature
67 Free from dirt
68 Iron(II) sulfide
69 Many college instructors
70 Ancient inhabitant of Central Europe & Britain

**DOWN**

1 Not quite
2 Party __ or __ scooper
3 Degree of being free of contaminants
4 Situation leading to overtime
5 Piano practice pieces
6 Adj. side / hypotenuse
7 A cash register slot
8 Digital clock switch setting
9 Tijuana home
10 __ go bragh!
12 Once bitten, twice __
16 This, that and the __
17 Toto, Dino or Snoopy
18 Chicago, IL. transports
22 Orange zest or rind
25 Major golf tournament in Augusta, Georgia
28 Don't stand there!
29 April showers bring __ flowers
30 Heat energy unit
31 Picnic intruder
32 Lab water
33 What Dave Grohl fights
35 Jackie's second
36 __ electrophoresis
37 'The Greatest'
38 Once N/S Vietnam divider
39 Doo-wop group __ Na Na
40 Stannous element
42 Skim, digitize, monitor
43 Like H+, Cl- or NH4+
46 Trees of genus Rhus with leaves that turn red in the fall
47 Menu course before dessert
48 What a Zip-Loc bag can do
49 Best recourse for a sinner
50 AGFD parent
51 Potassium hydroxide
54 A really lousy report card
55 Where to shelter in a storm
56 Chip powerhouse
57 Note, observe, recognize
59 Cannabis active component
63 Historic period
64 RN's specialty

# AGFD OFFICER & COMMITTEE LEADERSHIP ROSTER

**Chair -** Serves 1 year. Presides over Division meetings/appoints committees
Coralia Osorio UNAL
cosorior@unal.edu.co

**Chair-Elect -** Serves 1 year. Substitutes for Chair as needed. Organizes technical programs at national meetings.
Karley Mahalak USDA-ARS
karley.mahalak@usda.gov

**Vice-Chair -** Serves 1 year. Assists Chair-elect. Develops future technical programs. Kenny Xie
U.S. Pharmacopeia KYX@usp.org

**Secretary -** Responsible for Division correspondence and meeting minutes.
Alyson Mitchell
University of California, Davis
aemitchell@ucdavis.edu

**Treasurer -** Responsible for Division finances.
Stephen Toth III
International Flavors & Fragrances, Inc.
R&D Union Beach NJ
stephen.toth@iff.com

**Cornucopia Editor -** Edits newsletter.
Carl Frey cfreyenterprise@gmail.com

**Councilors -** Represent Division for 3 years on ACS council.
Alyson Mitchell (thru '26)
aemitchell@ucdavis.edu
Lauren Jackson (thru '26)
lauren.jackson@fda.hhs.gov
Michael Tunick (thru '27)
mhtunick@gmail.com

**Website Editor -** Maintains web site.
Michael Appell
michael.appell@ars.usda.gov

**Student Activities –** Attract/retain graduate/undergraduate student membs.
Ethan Lee (thru '27) elee1212@umd.edu
Jiayi Hang (thru '26) jhang1@ualberta.ca

**Nominations -** Develops officer slate. Served by immediate past chair. Liz Kreger Elizabeth.Kreger@sensient.com

**Finance -** Monitors Div. finances. Served by immediate past chair. Liz Kreger Elizabeth.Kreger@sensient.com

**Hospitality -** Organizes receptions and banquets. Alyson Mitchell
aemitchell@ucdavis.edu

**Alternate Councilors -** Substitute for Councilors. Serve 3 years.
Kathryn Deibler (thru '27)
kdd3@cornell.edu
Michael Qian (thru '27)
Michael.qian@oregonstate.edu
Brian Guthrie (thru '26)
Brian_Guthrie@cargill.com

**At-Large Executive Committee Members -** Assist in Div. management. Serve 3 years.
Jane Leland (thru '26)
JLelandEnterprises@gmail.com
Robert McGorrin (thru '26)
robert.mcgorrin@oregonstate.edu
Keith Cadwallader
cadwlldr@illinois.edu (thru '27)
Jonathan Beauchamp (thru '27)
jonathan.beauchamp@ivv.fraunhofer.de

**Awards –** Oversee awards process.
Chair Michael Morello
mjmorello226@gmail.com
AGFD Fellow Awards
Fereidoon Shahidi fshahidi@mun.ca
Young Scientist Award
Youngmok Kim
youngmok.kim@finlays.net
Young Industrial Scientist Award
Bhimanagouda (Bhimu) Patil
b-patil@tamu.edu
AGFD Distinguished Service Award
Michael Tunick mht39@drexel.edu
Roy Teranishi Graduate Fellowship
Liangli (Lucy) Yu lyu5@umd.edu
Grad/Undergrad Student Awards
Kathryn Deibler kdd3@cornell.edu

**Multidisciplinary Program Planner**
Helps coordinate nat'l mtg programs
Neil Da Costa International Flavors & Fragrances, Inc. neil.dacosta@iff.com

**Membership –** Recruits/retains members. Michael Qian
michael.qian@oregonstate.edu

**Agriceutical Sub.Div.**
Chair Yuzhu Zhang
yuzhu.zhang@usda.gov
Chair-elect Ying Wu ywu@Tnstate.edu
Vice-chair Bailiang Li
15846092362@163.com
Secretary
Songtao Li lisongtao@vip.126.com

**Food Bioengineering Sub.Div.**
Chair Hongsik Hwang
hongsik.hwang@usda.gov
Chair-elect Changqing Wu,
changwu@udel.edu
Vice-chair Jinwen Zhang
jwzhang@wsu.edu
Secretary Hye-Seon Kim
hyeseon.kim@usda.gov

**Flavor Sub.Div.**
Chair Joonhyuk Suh J.Suh@uga.edu
Chair-elect Yun Yin yunyin2@vt.edu
Vice-chair Yu Fang
yufang@coca-cola.com
Secretary Clare Jiang
clare.y.jianf@gmail.com

**Food Safety Sub.Div.**
Chair Boyan Gao gaoboyan@sjtu.edu.cn
Chair-elect Vivian Wu
vivian.wu@usda.gov
Vice-chair Yanhong Liu
Yanhong.liu@usda.gov
Secretary Roberta Tardugno
Roberta.tardugno@gmail.com

**Functional Food/Nat Product SubDiv**
Chair Yingdong Zhu yzhu1@ncat.edu
Chair-elect Khizar Hayat
khizaraura@gmail.com
Vice-chair Xiaohong Sun
Xiaohong.sun@dal.ca
Secretary Yanfang Li yanfang.li@usda.gov

**Nutrition & Gut Microbiome Sub.Div.**
Chair Ida Pantoja-Feliciano
ida.g.pantojafeliciano.civ@mail.mil
Chair-elect Tom Wang
Tom.wang@usda.gov
Vice-chair Jenni Firrman
Jenni.firrman@usda.gov
Secretary Jianghao Sun
jianghao.sun@usda.gov

**Sustainability/Green Tech. Sub.Div.**
Chair Lingyun Chen
lingyun.chen@ualberta.ca
Chair-elect Omowunmi "Wunmi" Sadik
sadik@njit.edu
Vice-chair Yi-Shu Tu
georgetu@gmail.com
Secretary Yixiang Wang
yixiang.wang.mcgill.ca

**Public Relations –** Publicizes Division.
Alyson Mitchell aemitchell@ucdavis.edu

## Recognize an AGFD Colleague with an Award

AGFD and ACS awards programs, summarized below, provide many opportunities to recognize a colleague for technical and organizational excellence. Find more details regarding each award – purpose, eligibility, prize, nomination deadline, application form - on the Division's awards webpage - https://www.agfoodchem.org/programs-1

Awards described on the web-page and in the final pages of this *Cornucopia*:

**Advancement of Application of Agricultural and Food Chemistry** (sponsored by International Flavors & Fragrances, Inc.) - recognizes and encourages outstanding contributions to pure and/or applied agricultural and food chemistry. The winner receives $3000 and traveling expenses to the ACS Fall Meeting.

**Young Scientist** - recognizes outstanding scientific contributions of scientists early in their careers to the field of agricultural and food chemistry. The winner receives $1000 and traveling expenses to the ACS Fall Meeting.

**Young Industrial Scientist** – recognizes contributions of junior industrial scientists to commercial fields of agricultural and food chemistry. The winner receives up to $1000 in traveling expenses to the ACS Fall Meeting.

**AGFD Fellow** - recognizes outstanding scientific contributions of AGFD members (w/>10 years of service) to the field of agricultural and food chemistry.

**Roy Teranishi Graduate Fellowship in Food Chemistry** – provides $2500 for research expenses to a student with an outstanding grade point average and showing promise of an excellent graduate research career.

**Withycombe–Charalambous Excellence in Graduate Research in Agricultural or Food Chemistry** – a competition designed to showcase the research talents of up to 6 graduate degree candidates to prospective employers. Participants receive up to $1000 in travel expenses and a chance to win an award of $500, $250 or $100.

**Undergraduate Poster Competition** - showcases the research talents of undergraduate students in a professional forum and promotes their continuance of education in food and agricultural chemistry. Participants receive up to $1000 in travel expenses and a chance to win an award of $500, $250 or $100.

**Distinguished Service to AGFD** - recognizes substantial and sustained service to the Division.

**Exemplary Leadership** - recognizes substantial and extended (>25 years) service to AGFD.

**Books** – recognizes editors whose books (published under division auspices) achieve high sales volume, providing a royalty income to subsidize future Division Symposia.

**Sterling B. Hendricks Memorial Lectureship** - recognizes scientists who have made outstanding contributions to the chemical science of agriculture. The winner presents a lecture at the ACS Fall Meeting and receives an honorarium of $2000, a bronze medallion and travel expenses.

**Kenneth A. Spencer** - recognizes work in education, industry or research that meritoriously contributed to the advancement of agricultural and food chemistry. The award consists of a medal and an honorarium of $6,000.

**ACS Fellow** - recognizes ACS members for their outstanding achievements in and contributions to science, the profession and the Society.

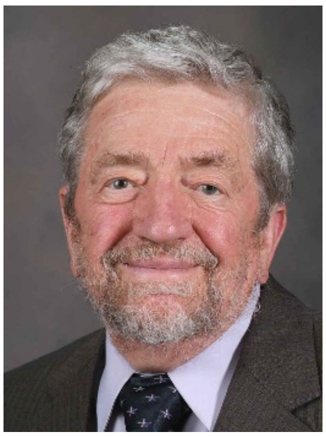
**JAFC Research Article of the Year Lectureship** – recognizes authors of a particularly impactful JAFC article published within the last year.

**Thomas H. Parliament Advances in Flavor Chemistry** – recognizes significant contributions to the advancement of flavor chemistry with an emphasis on the aroma aspects. The winner receives a $20,000 cash award.

# AWARD NEWS

Congratulations to AGFD members **LinShu Liu** (USDA ARS-ERRC), **Jerry Wayne King** (retired) and **Katherine N. Malone**y (Point Loma Nazarene University) for being named **ACS Fellows** - recognizing their significant achievements in chemistry and for their extensive volunteer efforts supporting ACS.

## John W. Finley



**recipient of a 2025 AGFD Exemplary Leadership Award**

recognizing his substantial and extended service to AGFD, including -

--Member since 1976 and Division Chair 1988
--Chair: Food Bioengineering Subdivision: 2019-2020
--Chair: Food & Nutritional Biochemistry Subdivision 1997
--Alternate Councilor: 2003-2010
--National Meeting Symposia (since 1996): 22
--AGFD Councilor: 1997 - 2020
--Symposium Series Books: 8
--JAFC Editorial Advisory Board: 1989-1998
--JAFC Associate Editor: 1999 – 2017
--AGFD Fellow: 1990
--AGFD Distinguished Service Award: 1990
--Sterling B. Hendricks Memorial Lectureship: 2019
--ACS Fellow: 2011

**AGFD congratulates all awardees and looks forward to their continued successes and contributions.**

See the final pages of this Cornucopia for more information on all AGFD awards.

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The ACS AGFD Division
Student Activities team
invites you to join them in a
tour of

**The WORLD OF
COCA – COLA**

Noon, Tuesday, March 24
121 Baker Street NW
Atlanta

Contact
Elee1212@umd.edu
Jhang1@ualberta.ca

(advance registration required)

All are welcome!

Student tix = $15 + tax

Gen. Admission tix = $25 + tax

# AGFD TECHNICAL PROGRAM

Find abstracts of these presentations in the ‘with abstracts’ version of Cornucopia posted on the AGFD website.

******** **CORRECTION** ******** The abstract (ID 4338286) referencing a presentation given on Monday 8/19/2025 at the D.C. ACS National Meeting did not reference all contributing authors. The correct listing follows: *Effect of bioconverted postbiotics on sarcopenia*
Hyunsook Kim, Dept. of Food & Nutrition, College of Human Ecology, Hanyang Univ., Seoul, South Korea hyunsk15@hanyang.ac.kr
Seung Hyeon Jung, Dept. of Food and Nutrition, College of Human Ecology, Hanyang Univ., Seoul, South Korea
j0721sh@hanyang.ac.kr Subin Hwang, Dept. of Food & Nutrition, College of Human Ecology, Hanyang Univ., Seoul, South Korea
subin0719@hanyang.ac.kr Kun Ho Seo, KU Center for Food Safety, College of Veterinary Medicine, Konkuk Univ., Seoul, South Korea

**SUNDAY MORNING March 22** World Congress Center A301

**Advances in Food Ingredients - Bridging Innovation to Traditional Technologies** Z. Xie, L. Ye, *Organizers* Y. Yin, *Organizer, Presiding*

**8:00** Introductory Remarks.
**8:05 .** Ensuring safety and quality in natural food colors: New guidelines toward standardization. **Z. Xie**
**8:25 .** Effect of two:step ultrasound treatment on emulsifying properties of polyphenol:protein complex from spent coffee ground and brewer's spent grain. **N. Woojin**, K.G. Lee
**8:45 .** From structure to function: SAXS-based modeling of phycocyanin dissociation. **Q. Li**, A. Abbaspourrad
**9:05 .** Decoding preservation dynamics: Benchmarking polysaccharides and lipids in mushroom coatings. **M. Salim**, B. Tardy
**9:25** Intermission.
**9:45 .** Single-atom catalysts as novel antibacterial agents in catfish packaging: Impacts on flavor and quality. W. Wei, M. Ponder, Y. Kim, D. Shuai, H. Huang, **Y. Yin**
**10:05 .** Deep learning-assisted analysis of co-electrospinning starch with plant-based proteins for the fabrication of fibrous Pickering emulsifiers. **J. Li**
**10:25 .** Using low-pressure air plasma to improve chickpea (*Cicer arietinum* L.) seed germination by altering the seed coat surface. **P. Aguilera**, M.J. Hawker
**10:45 .** Top-down fabricated potato starch nanoparticles for delivery of bioactive compounds. **Q. Wu**, P. Li, A. Abbaspourrad

World Congress Center A302

**Advances on Agricultural and Food Chemistry - General Papers - Food Analysis & Technology** K. Mahalak, *Org.* C. Osorio, *Org./Pres.*

**8:00** Opening Remarks.
**8:05 .** Acrylamide formation and mitigation in fried sweet potato products. **M. Allan**, S. Johanningsmeier, V. Truong, B. Stickley, J. Schultheis, K. Pecota, C. Yencho
**8:25 .** Effects of ultrasound-assisted extraction on the physicochemical properties of legume extracts. **K.G. Lee**
**8:45 .** Endophytic microbiome of maca (*Lepidium meyenii*) and its influence on glucosinolate catabolism leading to macamide and benzenoid formation during traditional Andean postharvest drying. **G. Guerrero**, E. Esparza, G. Mormontoy, N. Salinas, E. Cosio
**9:05 .** Statistical assessment of sodium nitrite variability in Costa Rican curing salts: A two-year study on food safety and regulatory compliance. **J. Ramírez**, J.A. Rodriguez Corrales, K. Hernandez Ugalde
**9:25 .** Dietary fish oil intervention mitigates metabolic dysregulation triggered by a potato chip diet through the Gut–Liver axis. **X. Wan**, D. Meng, Y. Zhang
**9:45** Break.
**10:00 .** Techno-economic analysis of microbial losses during sugarcane and sugar beet processing and raw sugar manufacturing. **E. Terrell**, G.O. Bruni, T. Zimmerman
**10:20 .** Breaking down cell walls: Arabinoxylan remodeling in cool-season forages during fermentation with fibrolytic rumen bacteria. **P.R. Pandeya**, S.D. Newhuis, B.E. Davis, M. Flythe, I.A. Kagan, **R.R. Schendel**
**10:40 .** Impact of carbon composite on the germination of *Trifolium pratense* in two different soil types. **D. Alabi**, V. Paul
**11:00** Conclusion Remarks.

**DIGITAL SESSION**

**Global Virtual Symposium: Agri-Derived Bioactives and Their Therapeutic Potential** P. Garg, N. Jha, K. Raghav Chaturvedi, *Org.* A. Girija, V. Krishnan, S. Thandapilly, *Org., Pres.*

**8:00 .** Agri-derived essential oil bioactives as functional ingredients to reduce parasitic infections through food-based delivery systems. **J.E. Andrade Laborde**
**8:20 .** Toward sustainable carotenoid extraction using green solvents. **A. Focsan**, G. Sreenilayam, L. Kispert
**8:30 .** GC-MS analysis of *Justicia secunda* and *Pelargonium hortorum* plants: In silico evaluation against SARS-CoV-II proteins. **J. Patiño Rivera**, C. Gomez, F. Cassasola Jiménez, K. Ramírez Adan, G. Borja Meza, G. Tejada Melo
**8:40 .** Food protein-derived peptides as potential therapeutic agents against hypertension and hypercholesterolemia. **R. Aluko**
**9:10 .** Harnessing agri-derived bioactives for anti-fibrotic Therapeutics: A translational framework bridging ai-driven molecular modeling and clinical dermatology. **T. Wilson-Rawlins**, K. Madison, M. Rabiu, A. Anderson, J. Trevino
**9:20 .** From individual fibers to designed mixtures: A new paradigm for microbiota modulation. **T. Cantu-Jungles**, B. Hamaker
**9:50 .** Transforming spent coffee grounds into microrobots for sustainable water purification. **A.K. Singh**, T. Basireddy, J.L. Moran
**10:00 .** Bag to bottle®: Transforming scientific discovery into scalable, market-ready industrial impact. **R. Raliya**
**10:20 .** Engineered plant viral particles for targeted delivery into solid tumors: applications in medicine and beyond. **K. Hefferon**
**10:40 .** Influence of berry polyphenols on gut and vaginal microbiota and metabolic health through in vitro, animal and human dietary interventions. A. Kirkendall, C. Teets, S. Arbizu, H. Shakoor, J. Minj, C. Jarrett, P. Solverson, **F. Carbonero**
**11:00 .** Farming in the final frontier: Exploring agriculture in microgravity. **A. Bhutey**

**SUNDAY AFTERNOON** World Congress Center A302

**Advances on Agricultural and Food Chemistry - General Papers - Food Analysis & Sensory Evaluation**
K. Mahalak, *Organizer* C. Osorio, *Organizer, Presiding*

**2:00** Opening Remarks.
**2:05 .** Effect of barrel aging on a straight rye whiskey produced in Tennessee. **T. Nguyen**, J.P. Munafo
**2:25 .** Identification of bitter and astringent tastants in chardonnay marc fractions. **N. Nguyen**, J.P. Munafo
**2:45 .** Using grape volatilome as a way to understand and track grape maturity. **K. Kent**, A. Rumbaugh
**3:05 .** Identification of odor-active compounds in sharp-leaf galangal (*Alpinia oxyphylla*) rhizomes. **K. Jha**, T. Nguyen, N. Nguyen, J.P. Munafo
**3:25 .** Chemical and sensory effects of fruit protease from pineapple and kiwifruit on robusta coffee via pulsed electric field-assisted vacuum impregnation. **J. Yun**, K.G. Lee
**3:45** Break.
**4:00 .** Evaluation of orange peel extract as a natural fortifier in dairy and plant-based yogurt: Antioxidant properties, cytotoxicity, and sensory acceptability. **O.E. Ogunjinmi**, O.M. Banwo, B.T. Fayoyin
**4:20 .** Carbon dots as a dual-action platform for next-generation food packaging. **K. Ahmad**

**4:40 .** Organogels derived from eugenol-related agro-based materials. A. Biswas, **H. Cheng**, B. Chisholm, R. Beni, Z. Liu, K. Vermillion, M. Appell, K. Forson
**5:00 .** Fully portable smartphone-integrated device coupled with nanozyme-based assay for rapid detection of TBHQ. **Q. Wu**, M. Kamruzzaman
**5:20 .** Behavior of hydrophilic particles in oil droplets: From interfacial trapping via microfluidics to spontaneous double-emulsion transition. **P. Li**
**5:40 .** Concluding remarks

World Congress Center A301
## Withycombe-Charalambous Graduate Student Symposium
K. Deibler, *Organizer, Presiding*
**2:00** Introduction.
**2:25 .** Impact of post-harvest treatments on the micronutrient availability of spinach (*Spinacia oleracea* L.). **E. Lee**, X. Wu, L. Yu
**2:50 .** Peptide directed immobilization of PETase for microplastic bioremediation. **S. Su**, J.M. Goddard
**3:15 .** Key flavor compounds in various *Vanilla* species and their biosynthetic pathways before harvest. **D. Kim**, Y. Wang
**3:40** Intermission.
**3:50 .** Low temperature gelation of hemp protein for co-encapsulation of resveratrol and epigallocatechin gallate. **T. Dissanayake**, R. Rodriguez, F. Koksel, J. Bonilla, N. Bandara
**4:15 .** On-site detection of thiram on apple surfaces using a flexible bacterial cellulose-based SERS substrate. **L. Xiao**, X. Lu
**4:40 .** Estimation of brewers' spent grains' proximate composition using NIR sensor and multivariate analysis. **V. Karuppuchamy**, L. Rodriguez-Saona, O. Campanella

World Congress Center B3/B4 exhibit hall
## Posters – NOON - Artificial Intelligence and Advanced Sensing for Enhancing Food Safety
Cospons. AGRO, ANYL, ENVR B. Park, J. Yi, *Organizers*
**12:00 .** Development of fluorometric 3D PCL-PEO electrospun nanofiber scaffolds loaded with lysozyme for biosensing *Escherichia coli* in foods. **R. Wang**
**12:00 .** Qualitative analysis of pulegone in mint plants across the fourteen (14) parishes of Jamaica by gas chromatography-mass spectrometry. J. Thomas, R. Reid, D. Davis, **A. Goldson-Barnaby**
**12:00 .** Biodegradable & functional packaging films via coaxial electrospinning of micellar casein, pullulan, and thymol-based emulsions. **E. Peker**, U. Yucel, V. Trinetta
**12:00 .** Geometrical and numerical analysis for crop growth effect on pesticide residue dynamics. **K. Iijima**, K. Kondo, **F. Iwasaki**, T. Watanabe

World Congress Center B3/B4 exhibit hall
## Posters – NOON - Undergraduate Poster Competition
**12:00 .** Resveratrol-enhanced oat straw cellulose films for food packaging applications. **K. Rosenau**, S. Regmi, S. Paudel, S. Bhattarai, S. Janaswamy
**12:00 .** Parameterization of the fermentation process of pineapple juice (*Ananas comosus*). **M.S. Rodriguez**, A. Castro
**12:00 .** Color transformations in sunflower seed butter: A natural colorant source?. **B. Bragg**, S.C. Habibi, K.L. Kuntz
**12:00 .** Leveraging local water composition: A practical toolkit for consistent microbrewery beer quality. **C. Walesch**, J. Guerrero, D.J. Lecaptain
**12:00 .** Visualizing plant stress: Hyperspectral imaging of invasive weeds in Monterey County. **E.W. Brunnengraeber**, A.K. Sharma, T. Cassidy
**12:00 .** Evaluation of phosphate-solubilizing capacity of rhizobacteria from rice fields in Guanacaste, Costa Rica: A step toward biofertilizer development. **S.P. Castro**, E. Potoy Requene, M.B. Gómez Bogantes, I. Hilje Rodriguez, S. Hernandez Villalobos, M. Madriz Martínez, J.Á. Rodríguez Corrales
**12:00 .** Development of a computational tool for kombucha titration analysis. **C. Pearson**, J. Kegerreis, J.N. Richardson, L. Melara

## General Posters – NOON
Congress Ctr B3/B4 exhibit hall
K. Deibler, K. Mahalak, C. Osorio, *Organizers, Presiding*
**12:00 .** Fermentation of artichoke by-products for the sustainable production of bioactive cosmetic molecules. **N. Cicero**, L. DeMaria, R. De Pasquale, E. Di Salvo, R. Vadala, R. Costa, G. Lo Vecchio
**12:00 .** Enhancing functional properties of pea protein through glycation with hydroxypropyl methyl cellulose. **B. Castellanos**
**12:00 .** Using alphafold to engineer transient tertiary structure (TTS) tags for enhanced expression and phosphorylation of casein proteins. **S. Murrell**, M. Bartolovich, C. Liu, J. Zhao, J.J. Love
**12:00 .** Optimization of chemical and physical conditioning of distillers' dried grains (DDGS) with solubles for biodegradable film production. **E. Peker**, U. Yucel, V. Trinetta, H. Dogan
**12:00 .** 3D food printing enhances lutein delivery. **O. Amusat**, S. Ahmadzadeh, S. Barekat, A. Ubeyitogullari, S. Lee
**12:00 .** Managing the malolactic fermentation to drive stylistic differences in Pinot Noir wines. **N.C. Mannino**
**12:00 .** Valorisation of rice husk biosilica for cereal and legume seeds preservation. **Z. Bertrand**
**12:00 .** Comparative exposure and risk assessment of heavy metals, nutrients, and organochlorine pesticides in cow and plant-based milks. **T. Phan**, S.C. Good, C. Anakwue
**12:00 .** Molecular dynamics simulation of ovalbumin at a triolein-water interface. **J. Fetrow**, C. Bilgrien, J. Zhao, S. Hong, L. Hwang, **C. Liu**
**12:00 .** Integrated processing effects of high pressure homogenization and gellan gum on soymilk's physical stability and physicochemical properties. **J. Janahar**, **S.K. Chang**, **Y. Zhang**, **L. Bi**
**12:00 .** Extraction, encapsulation, and antioxidant capacity of anthocyanins from Peruvian purple corn (*Zea mays L.*). **D.V. Alvino Garcia**, M. Rabanal
**12:00 .** Changes in digestibility, viscosity, and microstructural properties of waxy and non- waxy rice starches after microwave heat-moisture treatment. **A. Anderson**
**12:00 .** Analysis of vitamin K content in traditional Korean soy-based fermented foods. K. Kim, M. Ju, **J. Sung**
**12:00 .** Salicylic acid enhances the muscle-protective effects of garlic sprouts. **S. Hong**, J. Lee
**12:00 .** Green extraction and quantitative analysis of Polyphenols. **P. Acharya**, E. Hilderbrand, B. Gardner, A. Seamans
**12:00 .** Tharsis AeroFarm Project - Agricultural chemistry innovation: Development and design of a hermetically sealed aeroponic cultivation system for operation in extreme terrestrial and space environments. **S.M. Quintero Blanco**
**12:00 .** Impact of roasting temperature on lignan content and antioxidant activity of safflower seeds. **Y. Kim**, G. Kim, J. Lee, Y. Kim
**12:00 .** Biological potentials of Citrus unshiu flower extracts in metabolic diseases. **J. Lee**, S. Hong, H. Lee
**12:00 .** Enhancement of bioactive compound accumulation and muscle-protective activity in *Gynura procumbens* leaves by ultrasound treatment. **H. Lee**, T. Jeong, J. Lee
**12:00 .** Enhancing biological control of bacterial pathogens in fruit tree crops using a probiotic targeted delivery system. **M.M. Deinys**, J. Pereira, E. Luis Vieira Aguilar De Souza, S. Santra
**12:00 .** Antimicrobial activity of a biobased polymer produced from a phenolic compound and lipids. **X. Fan**, H. Ngo, K. Wagner
**12:00 .** Environmentally friendly CNCs as nanocarriers for copper-based antimicrobial treatments. B. Sharma, **R. Apsingekar**, J. Pereira, S. Santra
**12:00 .** Analysis of toxic heavy metals in processed consumables. **T. Phan**, S.C. Good, V. Tran, V. Tran, K. Hadnot, S. Jackson, T. Nguyen, T. Gin, C. de la Cerda, K. Anthony
**12:00 .** Development of chemical-based reference standards for Korean distilled soju aroma wheel. S. Park, **S. Lee**
**12:00 .** Reducing peanut allergenicity via magnetic nanoparticles for immunotherapeutic use. **M. Harris**, **B. Lozano**, A.I. Omoike
**12:00 .** HPLC-based characterization of phenolic pigments in *Thespesia grandiflora*. **K. Lassala**, J.L. Vera
**12:00 .** Molecular dynamics simulation of heat-induced denaturation of ovalbumin. **C. Bilgrien**, J. Zhao, S. Hong, L. Hwang, **C. Liu**
**12:00 .** Molecular dynamics simulation of ovalbumin behavior at the air-water interface. **E. Ortiz**, A. Hernandez, C. Bilgrien, J. Zhao, S. Hong, L. Hwang, **C. Liu**
**12:00 .** Protein language model-based prediction of allergens in *Arthrospira platensis*. **L. Feng**, S. Daley, Z. Du, Y. Li, J.J. Love, C. Zuñiga, J. Zhao, **C. Liu**
**12:00 .** Structural dynamics of casein isoforms in water. **R. Roni**, S. Iller, C. Bilgrien, J.J. Love, J. Zhao, S. Hong, L. Hwang, **C. Liu**
**12:00 .** Molecular and structural signatures of predicted allergens in *Chlorella vulgaris*. **S. Daley**, Z. Du, Y. Li, J.J. Love, C. Zuñiga, J. Zhao, **C. Liu**

**12:00 .** Advancing eco-friendly latex production: Tissue culture and agronomic studies of Dandelion (*Taraxacum officinale*). **R. Bharadwaj**, **T. Harish**, **N. Kumar**, **S. Devarakonda**, **A. Menezes**, B.K. Poudyal
**12:00 .** Integrated analysis of sugars, organic acids, and volatile compounds for flavor characterization in Korean strawberry cultivars. Y. Jeon, Y. Oh, **J. Sung**
**12:00 .** Growth effects of fluorescent, biopolymer-coated gold nanoparticles on hydroponically grown basil. **M. Johnson**, D. Kirby
**12:00 .** Combining soybean-induced carbonate precipitation and methylcellulose for dust suppression in semi-arid agricultural environments. **A.M. Orenstein**, S.C. Wright, N.K. Knowlton
**12:00 .** Hepatoprotective potential of *Citrus maxima* (pomelo) peel extracts against drug-induced liver injury. **Z. Su**, S. Huang, P. Lin, P. Lin, Y. Tung
**12:00 .** Crop-specific microbial biofertilizer for Indian ricegrass: A sustainable strategy to supplement alfalfa cultivation. **C. Hyman**, **D. Johnson de Lacy**, N.K. Knowlton
**12:00 .** Yeast-Mediated biotransformation of polyphenolics in grape pomace. **A. Chandran Matheyambath**, H. Brown
**12:00 .** Mycorrhizal fungi as a biofertilizer: A pot experiment with legumes under natural conditions. B.K. Poudyal, **A. Vijayant**, **R. Thayil**
**12:00 .** Improved quality control testing of saffron botanicals using NMR. **B. Hayes**, S.M. Lamos

## DIGITAL SESSION
## MONDAY MORNING March 23
### Global Virtual Symposium: Agri-Derived Bioactives and Their Therapeutic Potential

P. Garg, N. Jha, K. Raghav Chaturvedi, *Org.* A. Girija, V. Krishnan, S. Thandapilly, *Orgs, Pres.*
**6:30 .** Improvement of cognitive function by a blood-brain barrier-transportable dipeptide. **T. Matsui**
**6:50 .** Exploring the mechanism of ?-glucan in alleviating colitis. **S. Nie**
**7:10 .** Constituent-taste relationship of Monascus-fermented cheese: Unveiling taste characteristics through untargeted metabolomics. **Y. Wang**, **Y. Wang**, **X. Wang**, B. Wang
**7:20 .** Potential bioactives from Himalayan bioresources for food and pharma applications. **S. Yadav**
**7:50 .** Green extraction of bioactive compounds from *Thuja orientalis* leaves and cones using microwave- and ultrasound-assisted techniques optimized by response surface methodology. **R. Abdullah**
**8:00 .** Translating plant science into agri-derived bioactives and functional foods: Lessons from durian and beyond. **S. Sirikantaramas**
**8:20 .** Essential oil profiling of the novel cardamom variety "Ranweli Yasas Sri" by gc-ms and raman spectroscopy. **H. De Zoysa**, H. Perera, N. Abeyasinghe, J. Weerasena, N. Fernando, S. Handunnetti, I. De Silva
**8:30 .** Non-enzymatic amperometric determination of hydrogen peroxide in cassava using chitosan-nano-silver/graphene oxide sensors. **A. Akitoye**, **I.A. Akinbulu**, **W. Okiei**, T.A. Silva
**8:40 .** Phytochemical profiling and antimicrobial potentials of *Opuntia ficus-indica* Cladodes: A promising pharmaceutical resource. **O.O. Onawumi**, A. Abubarka, O.A. Adewusi, **J.A. Olaniyan**, **S.S. Ojo**
**8:50 .** Polyphenols from Brazilian biodiversity and its health benefits. **M. Junior**
**9:00 .** Oat protein processing, functionality and allergenicity: New insights from Canadian oat lines. **M. Malalgoda**
**9:30 .** Cottonseed bioactive materials regulate glucose transport gene expression in mouse macrophages. **H. Cao**, K. Sethumadhavan, H. Cheng

World Congress Center A301
**Food Ingredients - Sustainability and Natural Alternatives**
K. R. Cadwallader, Y. Fang, *Organizers* X. Du, *Organizer, Presiding*
**8:00** Opening Remarks.
**8:05 .** Innovations in natural functional food ingredients for enhancing food safety and performance in clean label food products. **P. Soma**, S. Lineback
**8:30 .** Evolution of food products *via* new ingredients: Product taste and meeting consumer expectations. **S. Nadathur**
**8:55 .** Cyclodextrin-assisted extraction and electrospun biodegradable nanofibers for valorization of grape pomace bioactives. **Z.I. Yildiz**, E.I. Gulamov, M. Aboelkheir, T. Uyar
**9:20 .** Metabolic dynamics of kojic acid and other compounds in solid-state fermentation of two white grape pomaces by *Aspergillus oryzae* And *A. Tamarii*. D. Salta, D. Wang, **X. Du**
**9:45** Break.
**10:00 .** Turning plants into nanoparticles: Advancing sustainable natural colorants for foods. **H. Zhou**
**10:25 .** Physicochemical characteristics of different fermented legume protein and flour by lactic acid bacteria. T. Parveen, **D. Wang**
**10:50 .** Unlocking the value of fruit and vegetable by-products: Validating texturizing and shelf-life extension functionality in real-world food systems. **A. Grygorczyk**, A. Jenkins, A. Blake, C. Kempthorne, T. Wu
**11:15 .** Extraction, characterization, and efficacy of rosmarinic and carnosic acids as natural preservatives in enhancing the shelf life of food models and nephroprotective potential. **S.N. Olatunji**, M. Adebanji, V. Eze, I.S. Salako

### The Chemistry of Nonalcoholic and Alcoholic Beverages

S. Lafontaine, *Organizer, Presiding* World Congress Center A303
**8:00** Introductions.
**8:05 .** Industrial hemp as a hop alternative: Chemical, volatile, and cannabinoid profiles in dry-hemp beer. K. Kawachika, S. Keene, D. Budner, J. Reyes De-Corcuera, S. Verma, A. Sharma, M. Zhang, B.J. Pearson, A.J. MacIntosh, **K. Witrick**
**8:35 .** Impact of different commercially available SCOBY compositions on the fermentation of kombucha. **D. Budner**, V. Jordan, B. Di Pillo, B. Normandin, A. Morisset, R. Maley, P.J. Yeboah, B. Zhang, K. Witrick
**9:05 .** Targeted analysis of purine derivatives in beer and fermented beverages using HPLC-QDA with single ion recording. **R. Sen**, H. Rani, C. Schubert, S. Lafontaine
**9:35** Break .
**10:05 .** Chemical composition vs. sensory reality: Investigating smoke phenol interactions in wine matrices. J. Thrall, C. Sartori, **E. Tomasino**
**10:35 .** Mechanistic control of polyfunctional thiols in fermentations: Wine-informed sulfur-aldehyde pathways in beer. **S. Chatterjee**, R. Elias, M.T. Kwasniewski
**11:05 .** HS-SPME-GC-MS metabolomic profiling of flavor variation in Utah whiskey: Effects of charring and yeast strain. **I. Wixom**, J.T. Flood, R. Kochambilli
**11:35** Wrap up and final discussion.

## MONDAY AFTERNOON World Congress Center A301
### Food Ingredients - Sustainability and Natural Alternatives

K. R. Cadwallader, Y. Fang, *Organizers* X. Du, *Organizer, Presiding*
**2:00** Opening Remarks.
**2:05 .** From by-product to breakthrough: Antineurodegenerative promise of coffee pulp procyanidins. **M.B. Bamikale**, C. Noe, Aguila, S. Jose
**2:30 .** Gastrointestinal fate of turmeric-derived nanoparticles and its enhanced bioavailability of curcumin. **M. Wang**, X. Gong, H. Zhou
**2:55 .** Atmospheric plasma treatment for meat curing: A comparison with conventional and plant-based systems. **S.P. Vanare**, R.B. Pegg
**3:20** Break.
**4:00 .** Disease tolerance with sweet orange flavor. **Y. Wang**, **D. Kim**
**4:25 .** Potential solutions for citrus greening disease. **W. Johnson**
**4:50 .** Evaluation of citrus juices in the era of citrus greening. **S.Allmon**

Georgia World Congress Center A303
### The Chemistry of Nonalcoholic and Alcoholic Beverages

S. Lafontaine, *Organizer, Presiding*
**2:00** Introductions.
**2:05 .** Exploring aroma-taste interactions in alcohol-free beers: Effects on sweetness and bitterness perception. **J.A. Piornos**, A. Claret, J. Meléndrez-Ruiz, C. Sinding
**2:35 .** Interactions between aroma compounds and ethanol: implications for aroma release in hydroalcoholic solutions. **L. Joubert-Laurencin**, C. Salles, T. Thomas-Danguin, J.A. Piornos
**3:05 .** Understanding rice traits that drive extract efficiency in brewing. M. Aitkens, C. Schubert, H. Rani, **S. Lafontaine**
**3:35** Break.
**4:05 .** Exploring malting and brewing properties of diverse rice germplasm. **H. Rani**, M. Aitkens, R. Sen, B. Guimaraes, M. Shults, C. Peace Onwuchekwa, S. Lafontaine
**4:35 .** Making chemistry accessible: Formal and informal education using beverage alcohol. **L. Demoranville**
**5:05** Wrap up and final discussion.

**MONDAY EVENING – 8:00PM** Congress Ctr B3/B4 exhibit hall
**AGFD SCI-MIX**
**8:00 .** HS-SPME-GC-MS metabolomic profiling of flavor variation in Utah whiskey: Effects of charring and yeast strain. **I. Wixom**, J.T. Flood, R. Kochambilli
**8:00 .** Physicochemical and protein characterization of Canadian winter wheat for food applications. **S. Rivera Alba**, N. Muhandiram, C. McCartney, M. Malalgoda
**8:00 .** 3D food printing enhances lutein delivery. **O. Amusat**, S. Ahmadzadeh, S. Barekat, A. Ubeyitogullari, S. Lee
**8:00 .** Chemical composition vs. sensory reality: Investigating smoke phenol interactions in wine matrices. J. Thrall, C. Sartori, **E. Tomasino**
**8:00 .** Evaluation of orange peel extract as a natural fortifier in dairy and plant-based yogurt: Antioxidant properties, cytotoxicity, and sensory acceptability. **O.E. Ogunjinmi**, O.M. Banwo, B.T. Fayoyin
**8:00 .** Metabolic dynamics of kojic acid and other compounds in solid-state fermentation of two white grape pomaces by *Aspergillus oryzae* And *A. Tamarii*. D. Salta, D. Wang, **X. Du**
**8:00 .** Targeted analysis of purine derivatives in beer and fermented beverages using HPLC-QDA with single ion recording. **R. Sen**, H. Rani, C. Schubert, S. Lafontaine
**8:00 .** Using grape volatilome as a way to understand and track grape maturity. **K. Kent**, A. Rumbaugh
**8:00 .** Development of fluorometric 3D PCL-PEO electrospun nanofiber scaffolds loaded with lysozyme for biosensing *Escherichia coli* in foods. **R. Wang**
**8:00 .** Dietary fish oil intervention mitigates metabolic dysregulation triggered by a potato chip diet through the Gut–Liver axis. **X. Wan**, D. Meng, Y. Zhang
**8:00 .** Development of chemical-based reference standards for Korean distilled soju aroma wheel. S. Park, **S. Lee**
**8:00 .** Low temperature gelation of hemp protein for co-encapsulation of resveratrol and epigallocatechin gallate. **T. Dissanayake**, R. Rodriguez, F. Koksel, J. Bonilla, N. Bandara
**8:00 .** Growth effects of fluorescent, biopolymer-coated gold nanoparticles on hydroponically grown basil. **M. Johnson**, D. Kirby
**8:00 .** Biodegradable & functional packaging films via coaxial electrospinning of micellar casein, pullulan, and thymol-based emulsions. **E. Peker**, U. Yucel, V. Trinetta
**8:00 .** Improved quality control testing of saffron botanicals using NMR. **B. Hayes**, S.M. Lamos

**TUESDAY MORNING March 24, 2026** World Congress Ctr A301
**Advances on Agricultural and Food Chemistry - General Papers - Functional Ingredients and Food Processing**
K. Mahalak, C. Osorio, R. Tardugno, *Organizers, Presiding*
**8:00** Opening Remarks.
**8:05 .** Tandem mass spectrometry-based characterization of celiac antigenicity in Canadian oat cultivars. **S.C. Senarathna**, M. Malalgoda
**8:25 .** Carbohydrate and whey protein-based microcapsules for stabilizing β-carotene and Vitamin B12 in fortified foods. **Y. Weng**, A. Baldelli, K. Magallanes, K. Liu, H. Oguzlu
**8:45 .** Physicochemical and protein characterization of Canadian winter wheat for food applications. **S. Rivera Alba**, N. Muhandiram, C. McCartney, M. Malalgoda
**9:05 .** Differential zinc speciation modulates pfoa bioavailability and ecotoxicological responses in alfalfa:soil systems. N. Easmin, **H. Sharifan**
**9:25 .** Impact of UV-A light dehydration on sensory properties, volatile profiles, enzyme activity, and nutritional quality of fruits and mushrooms. **S. Karami**, L.J. Bastarrachea
**9:45** Break.
**10:00 .** Pyrroloquinoline quinone and hydrolyzed collagen: Bioenergetic synergy and pro-collagen effects in human dermal fibroblasts. **G. Scapagnini**, A. Medoro, S. Davinelli, E. Iorio, A. Mazzucco
**10:20 .** Edible oil-based extraction of hemp roots: Effect of solvent and temperature on bioactive yield and antioxidant activity for cosmetic applications. **J.A. Guerrero Amaya**, W. Xu, P. Charpentier
**10:40 .** Phytochemical characterization and bioactivities of buckwheat seeds (*Fagopyrum esculentum*) polyphenols: Linking extraction, profiling and *in vitro* effects. **R. Tardugno**, G. Caggiano, A. Spano, M. Clodoveo, A. Stasi, P. Pontrelli, L. Gesualdo, F. Corbo
**11:00 .** Analysis of prebiotics using *in vitro* model systems. **K. Mahalak**, A.B. Narrowe, J. Firrman, J. Lemons, L. Liu
**11:20** Conclusion Remarks.

World Congress Center A302
**Thomas H. Parliment ACS Award Symposium for Advances in Flavor Chemistry: honoring Terry E. Acree**
K. Deibler, X. Du, M. J. Morello, *Organizers, Presiding*
**8:00** Opening remarks.
**8:05 .** From cells to smells and back. **N. Rawson**
**8:35 .** Dynamics of chemosensory consumption and perception. **L.M. Kay**
**9:05 .** Taste and flavor. **L.M. Bartoshuk**, P. Rozin, K. Beicke
**9:35** Intermission.
**10:00 .** Subconscious processing of tastes, smells, and flavors. **P. Breslin**
**10:30 .** Rapid methods of trace volatile analysis: Practical Considerations for chromatography and Chromatography-Free techniques. **A.P. Kalenak**, G.L. Sacks

**TUESDAY AFTERNOON** Georgia World Congress Center A301
**Artificial Intelligence in Food and Agricultural Chemistry - From Molecular Insights to Field Applications**
B. Park, J. Suh, J. Sung, J. Yi, *Organizers* N. Lee, *Presiding*
**2:00** Opening remark.
**2:05 .** Identification of multi-target anti-alzheimer's compounds from Korean citrus peel flavonoids using deep neural networks. **S. Park**, J. Sung
**2:25 .** Novel approach for the discovery of bioactive peptides from corn gluten meal: Artificial intelligence-assisted *in silico* screening to selective peptide purification and bioactivity confirmation. **S.O. Ogundipe**, R.B. Pegg, J. Suh
**2:45 .** Machine learning-assisted prediction of fragmentation patterns in GC-MS/MS for volatile compound identification without authentic standards. M. Vasconez, **D. Kim**, Y. Wang
**3:05 .** Scalable molecular featurizer pipeline: From quantum/chemoinformatic descriptors to machine-learned odor profiles. **Z.T. Gardner**, N.C. Lok, Q. Ai, C. Risko
**3:25 .** Redefining food safety and authenticity through aptasensors, nanotechnology, and AI-driven approaches. **M. Shoaib**, L. Xiaoli
**3:45** Intermission (break).
**4:05 .** Precision-controlled environment agriculture with AI-driven nutrient sensing and 3D phenotyping. **Y. Huang**
**4:25 .** A joint metabolomics and machine learning approach: A new direction in food chemistry and agriculture. M. Kang, **J. Suh**
**4:45 .** Integrating artificial intelligence and chemical validation for multiplex detection of agrichemical stress in citrus leaves. **M.M. Deinys**, G. Diracca, W. Bu, J. Pereira, S. Santra
**5:05 .** Machine learning-driven insights into the chemical basis of apple flavor perception. **K. Kim**, J. Suh, J. Sung
**5:25 .** Non-volatile precursors as predictors of roasted peanut flavor: A metabolomics and machine-learning approach. **N. Lee**, K. Adhikari, A. Mishra, N. Brown, J. Suh
**5:45 .** Concluding remarks

Georgia World Congress Center A302
**Thomas H. Parliment ACS Award Symposium for Advances in Flavor Chemistry: honoring Terry E. Acree**
K. Deibler, X. Du, *Organizers* M. J. Morello, *Organizer, Presiding*
**2:00 .** Odor mixtures: A chord with silent notes. **S. Firestein**
**2:30 .** Teaching mice to speak: Investigating olfactory perception using a mouse model. **D. Rinberg**
**3:00 .** From smoke to signal: Human olfactory ERPs at millisecond resolution. **A. Barwich**
**3:30** intermission.
**3:50 . Award Address** (Thomas H. Parliment Award for Advances in Flavor Chemistry supported by an endowed fund established by Thomas H. Parliment). Flavor psychophysics. **T.E. Acree**, T. Hsu, Y. Jiang, Q. Wu, H. Zheng, H. Chen
**4:35** Panel Discussion.

# ABSTRACTS
# for the 2026 Spring
# AGFD Technical Program

**SUNDAY MORNING   March 22, 2026**

**Advances in Food Ingredients - Bridging Innovation to Traditional Technologies**

**Ensuring safety and quality in natural food colors: New guidelines toward standardization**   Zhuohong Xie, kyx@usp.org. *The US Pharmacopeial Convention, Rockville, Maryland*   The growing trend toward adopting food colors derived from natural sources, such as plants, insects, organisms, and minerals) has created both exciting opportunities and significant challenges for the food industry. These natural food colors are produced through various processes such as juicing, grinding, water extraction, and solvent extraction. While the shift to natural food colors responds to consumer demand for clean-label ingredients, the novel nature of many colorants, combined with supply and demand imbalances, has potential to compromise the quality and safety of food products. Currently, requirements for food colors labeled as "natural" lack consistent definitions and universally accepted quality control and product specifications, which are typically part of a harmonized regulatory framework. This inconsistency leads to a lack of agreement on standard testing methods that could help to ensure the safety, quality, and purity of natural food colors. A single product safety incident involving a natural food color could adversely impact consumer confidence and disturb the marketplace. Historical cases, such as the public response to the use of cochineal extract and carmine—both insect-derived food colors—underscore the importance of transparency, as concerns about allergenicity prompted FDA rule changes for ingredient labeling. To help address these issues, the Food Chemicals Codex (FCC) published Appendix XXI: Guidelines for the Control of Contaminants in Food Colors from Natural Sources, informed by the perspectives of manufacturers, importers, and end-users of food colors derived from natural sources. These guidelines emerged from multidisciplinary discussions among experts in plant biology, food chemistry, toxicology, product development, quality assurance, and regulatory affairs. This presentation introduces the guidelines to emphasize the importance of establishing consistent standards for natural food colors, especially as the industry navigates the challenges and opportunities presented by new color ingredients and market dynamics. The presentation will also discuss FCC's pipeline of effort on modernization and development of color ingredients.

**Effect of two:step ultrasound treatment on emulsifying properties of polyphenol:protein complex from spent coffee ground and brewer's spent grain**   Na Woojin, woojin0812@naver.com, Kwang G. Lee. *Food science and bio technology, Dongguk Univ., Jung-gu, Seoul, Korea (the Republic of)*   Brewer's spent grain (BSG) and spent coffee grounds (SCG) are abundant by-products of the food industry that contain functional proteins and polyphenols but are often discarded. Developing strategies to upgrade these resources is essential for creating sustainable food-grade emulsifiers with improved functionality. This study aimed to enhance the emulsifying performance of protein–polyphenol complexes through dual ultrasound treatment. Proteins were extracted from BSG and polyphenols were derived from SCG. A preliminary ultrasound treatment of BSG protein (450 W, 15 min) was performed to unfold protein structures and expose reactive groups. The unfolded proteins were then complexed with SCG polyphenols at a ratio of 0.15:1 (w/w), followed by a secondary ultrasound treatment (300 W, 10 min, pulse mode, 2-s intervals) to refine particle size and strengthen intermolecular interactions. The dual ultrasound-treated complexes showed significant improvements in physicochemical and functional properties. Particle size decreased to 380 nm with a polydispersity index of 0.365, indicating a uniform distribution, while zeta potential increased to –39.3 mV, reflecting enhanced electrostatic stabilization. FTIR spectra further revealed shifts in amide and phenolic bands, suggesting hydrogen bonding and $\pi$–$\pi$ interactions between proteins and polyphenols. Functionally, the complexes exhibited a 332% increase in emulsifying activity index (EAI) and a 604% increase in emulsion stability index (ESI) compared with untreated BSG protein. Overall, these findings demonstrate that dual ultrasound facilitates favorable structural modifications and strong protein–polyphenol interactions, resulting in superior emulsifying properties. This approach not only enhances the performance of natural emulsifiers but also provides a sustainable pathway to valorize food by-products, aligning with circular economy and ESG principles while supporting applications in functional foods and nutraceutical formulations.

**From structure to function: SAXS-based modeling of phycocyanin dissociation**   Qike Li, liqike1998@gmail.com, Alireza Abbaspourrad. *Food Science, Cornell Univ., Ithaca, New York*   Phycocyanin, a light-harvesting protein from algae, has recently gained attention as both a natural blue colorant and a potential bio-based emulsifier. While its intact polymeric form exhibits strong color, controlled disassembly and partial denaturation can tune its balance of hydrophilic and hydrophobic regions, thereby enhancing interfacial activity at the expense of some color intensity. To investigate this structure–function relationship, phycocyanin was dissolved in urea solutions with a concentration gradient to induce stepwise dissociation. Structural transitions were monitored using transmission electron microscopy (TEM), polyacrylamide gel electrophoresis (PAGE), and size-exclusion chromatography (SEC) coupled with small-angle X-ray scattering (SAXS). SAXS-based modeling with DAMMIN, GASBOR, and DENSS provided three-dimensional insights into the conformational changes, which were benchmarked against known crystal structures. Tensiometry and measurements of emulsifying and foaming capacities further evaluated interfacial properties. With the increase of urea concentration, phycocyanin transformed from uneven to small and uniform particles under the TEM. This shift was verified by PAGE and SEC. The chromatographic eluent was continuously irradiated with X-rays, producing integrated scattering intensity profiles. Phycocyanin converged to a smaller and more homogeneous structure, and the structure changed from intact globular to denatured non-globular, contributing to the boosted emulsifying capacity. Three modeling algorithms were applied to compare and align with the already-solved crystal structures, achieving good fitting scores. These conformational changes increased specific surface area and promoted a more balanced hydrophilic–lipophilic character, resulting in lower air–water and oil–water interfacial tensions and improved dynamic adsorption kinetics. Consequently, both emulsification and foaming performance were significantly enhanced. This work clarifies how chemical denaturation modulates the structural hierarchy of phycocyanin and links these changes to functional improvements at interfaces. It supports the use of dissociated phycocyanin in juices, low-temperature dairy products, and functional beverages, after the removal of urea by the urea-shifting method, as a clean-labeled blue colorant, a natural emulsifier, and an excellent antioxidant.

**Decoding preservation dynamics: Benchmarking polysaccharides and lipids in mushroom coatings** Mohamed Hamid Salim, mohamed.salim@ku.ac.ae, Blaise Tardy. *Khalifa Univ., Abu Dhabi, United Arab Emirates* The food sector is undergoing a significant transformation towards the reduction of packaging. An interesting approach is on the use of natural polymers, principally, polysaccharides as coatings to reinforce the natural barriers of produces. While widely explored, the lack of standardization across studies has prevented the establishment of guidelines for selection of matrices, which is stunting possible technology transfers. Herein, we evaluate and thoroughly benchmark polysaccharides as edible coatings. Mushrooms were chosen as a model due to their lack of natural protective layer and because they have been scarcely studied with limited benefits achieved to date. Seven natural polymers, including six polysaccharides and one polyphenol, and three unexplored lipids in the context of mushroom coatings were investigated. The framework includes an evaluation of the dynamics of weight loss and browning in three storage conditions (refrigerated, packaged, and unpackaged). Correlation between browning, weight loss and other key indicators enabled isolation of the impact of the coatings on the factors inducing spoilage of mushrooms. Film forming of the coating agents onto the mushrooms' porous chitinous network of fibers was established via scanning electron microscopy. The resulting property relationships are expected to be key in fast-tracking developments of highly efficient edible coatings' formulations.

**Single-atom catalysts as novel antibacterial agents in catfish packaging: Impacts on flavor and quality** Wangyi Wei[1], Monica Ponder[1], Young-Teck Kim[3], Danmeng Shuai[2], Haibo Huang[1], Yun Yin[1], yunyin2@vt.edu. *(1) Food Science and Technology, Virginia Polytechnic Institute and State Univ., Blacksburg(2) Dept. of Civil & Environmental Engineering, The George Washington Univ., Washington, District of Columbia(3) Dept. of Sustainable Biomaterials, Virginia Polytechnic Institute and State Univ., Blacksburg* The rapid spoilage of fresh fish products, such as wild and farm-raised catfish (*Ictalurus punctatus*), poses significant challenges to quality preservation. Single-atom catalysts (SACs) offer an alternative, mimicking enzymatic actions to generate reactive oxygen species (ROS) that can broadly inactivate microorganisms. This study integrated cobalt-based SACs (Co-SACs) into polylactic acid (PLA) films to provide continuous, in situ antimicrobial activity. The characterization of successful synthesis of Co-SACs was validated by transmission electron microscopes (TEM). The production of reactive oxygen species (ROS), including singlet oxygen and hydroxyl radical was quantified by high-performance liquid chromatography (HPLC). The shelf-life assessment was evaluated using primary aerobic plate count (APC) and specific spoilage organism (SSO). The volatile profiles of catfish packaged with and without SAC-integrated films were extracted through solvent assisted-flavor evaporation (SAFE), followed by gas chromatography-mass spectrometry (GC-MS) analysis to characterize volatile compounds. Our results indicated SAC-incorporated film successfully extended shelf-life with reduced production of 2,3-butanediol and acetoin, 2 volatile compounds tightly associated with spoilage. Our findings showed promise of using SAC as an effective antimicrobial agent for food packaging.

**Deep learning-assisted analysis of co-electrospinning starch with plant-based proteins for the fabrication of fibrous Pickering emulsifiers** Jieying Li, jl3986@cornell.edu. *Cornell Univ., Ithaca, New York* Starch faces limitations in being functionalized as emulsifiers due to its large particle size and poor amphiphilicity. Meanwhile, plant-based proteins are gaining attention as alternatives to animal-based proteins due to their affordability and reduced environment impact, although challenges persist regarding their functional effectiveness due to their poor solubility and hydrophobicity. To address these challenges, we used electrospinning to co-electrospin starch with plant-based proteins, aiming to tailor starch morphology and surface properties for enhanced emulsifying functionality. Specifically, cereal protein, zein, and pulse proteins, including chickpea protein and pea protein were examined for their co-electrospinnability with starch in formic acid. A deep-learning neural network is constructed and validated to quantitatively analyze the morphological behavior and electrospinnability of co-electrospinning. Chickpea protein and pea protein, due to their globular structure and high molecular weights, failed to effectively co-electrospin with starch. However, zein showed compatibility with starch, leading to synergistic effects between the two components. The introduction of zein into the electrospinning system enabled the generation of fibers without particle formation at lower total solid content. The resulting starch-zein composite fibers showed significantly enhanced surface and interfacial activity, enabling improved emulsion stabilization without the need for post-treatment, in contrast to co-electrospun starch with animal-based proteins. By leveraging plant-based edible biopolymers, this study develops strategies to tailor morphology and surface functionality for advanced emulsifier applications.

**Using low-pressure air plasma to improve chickpea (*Cicer arietinum* L.) seed germination by altering the seed coat surface** Paola Aguilera, paola1577@mail.fresnostate.edu, Morgan J. Hawker. *Chemistry and Biochemistry, California State Univ. Fresno* On the outermost layer of most seed coats sits a waxy hydrophobic cuticle layer - an essential protective barrier that regulates water absorption and gas exchange. The chemical composition and porosity of the seed coat control the seed's ability to germinate. The present study demonstrates the use of cold plasma as a method to alter the seed surface properties and study its effects on seed germination. Cold plasma is a non-equilibrium plasma that operates at low temperatures, and is an ideal method to modify thermally-sensitive biological plant tissues. Previous investigations of plasma modification on seed germination reveal conflicting results, possibly led by inconsistent variation of plasma treatment parameters, including power, pressure, time, plasma reactor geometry and processing gas. The vague correlations between surface alterations and seed development demonstrates the need for a structured plasma parameter investigation to illustrate the mechanism of how each plasma parameter impacts seed germination. The purpose of this study was to investigate the efficacy of chickpea seeds (Cicer arietinum L.) after low-pressure air plasma treatments as a method to improve seed germination. Several plasma parameter combinations were compared by systematically varying applied power, precursor pressure, and exposure time to attain the best outcomes of improved germination. Water contact angle measurements collected using goniometry revealed complete surface wettability of the seed coat surface after plasma treatments with all parameter variations, when compared to the untreated hydrophobic seed ($97.9 \pm 2.6°$). Furthermore, water imbibition (quantified by assessing a change in seed mass after soaking in water) increased most with seeds treated with the highest parameter extremes tested (211 mTorr, 100 W, 120 s). Surface chemistry analysis using x-ray photoelectron spectroscopy showed changes in elemental composition on the surface of the plasma treated seeds. Additionally, scanning electron microscopy revealed differences in surface morphology after plasma exposure. Laboratory germination experiments of unmodified and plasma-treated seeds were done using a sand medium over a time period of 7 days and germination time for each seed was established as visible protrusion of the radicle through the seed coat. The outcomes of this study further develop an understanding of how to most effectively employ plasma treatments to maximize seed germination.

**Top-down fabricated potato starch nanoparticles for delivery of bioactive compounds** Quanlin Wu, 2233618777@qq.com, Peilong Li, Alireza Abbaspourrad. *Food Science, Cornell Univ. College of Agriculture and Life Sciences, Ithaca, New York* Large granular size and semi-crystalline structure of native starch limit its application. In this study, granular starch is downsized into starch nanoparticles (SNPs). Using a top-down approach, starch was dissolved in water as free carbohydrate polymers via hydrothermal treatment and ultrasonication; polymers then spontaneously assemble as SNPs via a rapid antisolvent precipitation with the ethanol addition. The physicochemical properties of the fabricated SNPs were characterized, and their potential as versatile delivery systems for bioactive compounds was explored through physical and chemical modifications. Bioactive compounds including selected mineral ions, amino acids, and proteins were used as candidates for delivery. Loading capacity and in vitro delivery properties were measured. The glycemic response of such nanoparticles can also be fine-tuned. The modified SNPs also showed altered viscoelasticity and gelling behavior. Overall, SNPs demonstrated promising potential as a clean-label, plant-based carrier capable of protecting bioactives and improving their bioavailability, offering new strategies for food and nutraceutical applications.

## Advances on Agricultural and Food Chemistry General Papers - Food Analysis & Technology

**Acrylamide formation and mitigation in fried sweet potato products** Matthew Allan[1], matthew.allan@usda.gov, Suzanne Johanningsmeier[1], Van-Den Truong[1], Baker Stickley[2], Jonathan Schultheis[2], Kenneth Pecota[2], Craig Yencho[2]. *(1) Food Science and Market Quality and Handling Research Unit, USDA Agricultural Research Service, Raleigh, North Carolina (2) Horticultural Science, NC State Univ., Raleigh, North Carolina* Acrylamide is a probable carcinogen that forms as a byproduct of the Maillard reaction between free asparagine and reducing sugars in carbohydrate rich foods cooked at high temperatures. Fried sweet potato products are susceptible to elevated acrylamide levels because high quantities of acrylamide substrates are naturally present, thus acrylamide mitigation strategies are needed. This will be an overview of our recent developments in understanding acrylamide formation in fried sweet potatoes as well as strategies for reducing acrylamide content with horticultural and food science approaches. Using compositionally diverse sweet potatoes and model systems, free asparagine was identified as the limiting substrate for acrylamide formation, whereas reducing sugars were generally in excess. Other free amino acids could positively or negatively impact acrylamide formation in fried sweet potato products but to a much lesser extent. Therefore, free asparagine content of raw roots can be used as a target for mitigating acrylamide formation potential in sweet potatoes. Sweet potato variety (i.e., genetic factors), growing conditions, and nitrogen rates were found to greatly influence free asparagine levels. Fifteen varieties grown and handled with the same conditions varied in free asparagine from 17 to 133 μmol/g (db). Whereas single varieties grown with varying conditions (growing location and nitrogen rates) exhibited up to a 4-fold difference in free asparagine levels. Postharvest curing and storage for 2 months did not impact acrylamide formation; however, there was a gradual decline in chip acrylamide levels as the raw sweet potatoes were stored up to 10 months. Acrylamide formation could also be mitigated with processing treatments, such as rinsing and treating with asparaginase, which reduced acrylamide levels upwards of 99%. Therefore, acrylamide levels in fried sweet potato products can be managed with varietal selection, growing conditions, and processing mitigation strategies.

**Effects of ultrasound-assisted extraction on the physicochemical properties of legume extracts** Kwang G. Lee, kwglee@dongguk.edu. *Dept. of Food and Bioscience Integrative Technology, Dongguk Univ., Jung-gu, Seoul, Korea (the Republic of)* This study analyzed the effect of ultrasound treatment (up to 9 min, 20 kHz, 130 W) on the structural and physicochemical properties of various legumes. In the treatment of ultrasound on soymilk processed with microwave-roasted (700 W for 270 s) black soybean (*Glycine max* (L.) Merr.), 1-Hexanol and 1-octen-3-ol, unpleasant soybean flavors, were found to decrease by up to 96.13% and 93.04%, respectively, in ultrasound-treated soymilk compared to the control[(1)]. 2,3-Diethyl-5-methylpyrazine, a baked flavor, which exhibited the highest odor impact ratio in soymilk processed with microwave-roasted soybean, increased significantly during ultrasound treatment ($p < 0.05$). The content of total isoflavones, polyphenols, and flavonoids increased ($p < 0.05$) with the increase in ultrasound treatment time. Spearman's correlation analysis showed that browning was positively correlated ($p < 0.01$) with total phenols, total furans, total pyrazines, total polyphenols, and total isoflavones. In the study of aquafaba extracted from various legumes (chickpea [CH], yellow soybean [YSB], black soybean [BSB], small black bean [SBB]), the hydrophobic amino acids and protein secondary structures (α-helix, random coil) significantly increased with sonication time ($p < 0.05$). The particle size of aquafaba was reduced by ultrasound ($p < 0.05$). A total of 27 volatile compounds were identified. Most volatiles increased with sonication time, and beany flavor was lowest in CH and SBB. The EAI, ESI, adsorbed proteins, and zeta-potential increased, while emulsion droplet size decreased in all legumes by ultrasound. The overall emulsifying properties were the highest in SBB sonicated for 40 min. This study discusses the applicability of ultrasound to aquafaba and provides insights into the functional properties and potential of aquafaba as a plant-based natural emulsifier.

**Endophytic microbiome of maca (*Lepidium meyenii*) and its influence on glucosinolate catabolism leading to macamide and benzenoid formation during traditional andean postharvest drying** Guillermo Guerrero, g.guerrerop@pucp.edu.pe, Eliana Esparza, Gustavo Mormontoy, Norma Salinas, Eric Cosio. *Sciences, Pontificia Univ. Catolica del Peru, Lima* Maca (*Lepidium meyenii*, Brassicaceae) is an annual herbaceous plant native to the central Peruvian Andes. Since pre-Columbian times, its dried hypocotyls have been valued for nutritional and medicinal properties. Local farmers traditionally expose hypocotyls to high-altitude conditions (4200 m AMSL) for extended open-air drying, a postharvest process considered essential for the accumulation of macamides, which are characteristic bioactive metabolites reported to stimulate the central nervous system. Macamides are formed by the condensation of benzylamine, derived from glucosinolate catabolism, with free fatty acids released from lipid hydrolysis. However, benzylamine may follow an alternative dehydration-dependent pathway leading to benzaldehyde, benzyl alcohol, and benzoic acid. The latter is particularly relevant for maca export, as its concentration is regulated in certain international markets. While precursors and products of this process have been increasingly documented, the biochemical modulatory factors remain unclear. This study investigated the association between structural variation of endophytic microbial assemblages and hypocotyl metabolite profile changes during eight weeks of traditional postharvest drying in Junin, Peru. Metabolite kinetics were characterized using LC-MS and GC-MS, targeting benzyl glucosinolate, benzyl isothiocyanate, benzylamine, free fatty acids (palmitic, stearic, oleic, linoleic, and linolenic acids), their corresponding macamides (synthesized in-house), and both free and conjugated benzoic acid. Volatile compounds such as benzyl alcohol, benzyl nitrile, and benzaldehyde were also monitored. Endophytic microbial diversity was assessed through amplicon sequencing of bacterial 16S rRNA (V3–V4) and fungal ITS2 regions, using a customized DNA extraction protocol, optimized with α-amylase pretreatment of hypocotyl tissue. Our findings provide new insights on how endophytic communities may influence the phytochemical profile of maca, favoring macamide accumulation over undesirable byproducts. Finally, this work suggests that soil may serve as a reservoir of microorganisms contributing to the development of this culturally and commercially important Andean crop.

**Statistical assessment of sodium nitrite variability in Costa Rican curing salts: A two-year study on food safety and regulatory compliance** Joel Ramírez, joel.ramirez.alfaro@una.cr, Jose A. Rodriguez Corrales, Karina Hernandez Ugalde. *LASEQ, Escuela de Química, Univ. Nacional, Heredia, Heredia, Costa Rica* Sodium nitrite serves as a critical curing agent in processed meats, inhibiting *Clostridium botulinum* growth and preventing botulism. This comprehensive two-year study analyzed 115 commercial curing salt formulations in Costa Rica to assess sodium nitrite content variability and regulatory compliance. Samples were quantified using iodometric titration following Official Method 964.13, targeting standard concentrations of 6.5%, 7.5%, and 8.7% sodium nitrite, although additional concentration levels were evaluated. Statistical analysis encompassed normality testing, comparative evaluation between product types (pure sodium nitrite, curing salts, and commercial packs), and assessment of concentration level compliance against manufacturer-declared values. Results demonstrated significant variability with relative standard deviations (RSDs) consistently exceeding 10% across all tested concentration ranges, substantially surpassing the internationally recommended 8% RSD threshold. Comprehensive statistical evaluation of curing salt compositional data revealed systematic deviations from declared specifications, with notable differences between product categories and concentration levels. Non-compliance with manufacturer declarations was observed across multiple product types, indicating inadequate quality control in manufacturing processes. These deviations present dual safety concerns: insufficient concentrations may compromise microbial inhibition effectiveness, while excessive levels elevate carcinogenic risk potential. Findings underscore critical deficiencies in current regulatory oversight and manufacturing standards, highlighting the requirement for enhanced quality control protocols and stricter compliance monitoring for curing salt formulations to ensure consistent sodium nitrite delivery and consumer safety in Costa Rican processed meat production.

**Dietary fish oil intervention mitigates metabolic dysregulation triggered by a potato chip diet through the Gut–Liver axis** Xuzhi Wan[1], xuzhiwan@zju.edu.cn, Denghui Meng[2], Yu Zhang[1]. *(1) The First Affiliated Hospital of Zhejiang Univ. School of Medicine, Hangzhou, Zhejiang, China(2) Key Laboratory of Drug Prevention and Control Technology of Zhejiang Province, Hang zhou, China* Fried potato is associated with a global rise in metabolic diseases and raises substantial health concerns. This study investigated the detrimental effects of potato chips on glycolipid metabolism and evaluated the protective role of fish oil in a 13-week mouse model. Results revealed that potato chips significantly increased body weight, cholesterol, blood glucose, and insulin resistance, which was ameliorated by fish oil intervention. Transcriptional analysis revealed that fish oil ameliorated inflammation, gluconeogenesis, and lipid synthesis. Moreover, metagenomics and metabolomics uncovered that fish oil improved gut health by evaluating the abundances of probiotics *Bifidobacterium pseudolongum*, *Lactobacillus reuteri*, and *Lactobacillus johnsonii* and raising hepatic docosahexaenoic acid, while reducing hypoxanthine and xanthine. These beneficial effect are attributed to the modulative role of fish oil in microbiota-derived enzymes, such as L-lactate dehydrogenase and acetate kinase. In conclusion, fish oil attenuates glycolipid disorders by modulating the gut microbiome and hub metabolites linking gut to liver. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Techno-economic analysis of microbial losses during sugarcane and sugar beet processing and raw sugar manufacturing** Evan Terrell, evan.terrell@usda.gov, Gillian O. Bruni, Tia Zimmerman. *USDA-ARS Southern Regional Research Center, New Orleans, Louisiana* Raw sugar manufacturing through sugarcane and sugar beet processing in the US has economic impact of roughly 10 billion dollars (USD) annually. Sugarcane is grown and processed in the states of Louisiana and Florida, while sugar beets are grown and processed in several northern/midwestern and mountain states. Although production and handling of the crops pre-harvest has significant differences, the production process from juice to crystallized sugar is remarkably similar, with many overlapping and complementary sources of loss and inefficiencies. One of the primary sources of post-harvest loss is through microbial degradation of sugars in the crops, due to the presence of bacteria and yeast. In this work, microbial isolates collected directly from sugarcane and sugar beet processing facilities were tested for sensitivity to several industrial antimicrobial agents to determine optimal dosing. Based on laboratory experiments, biochemical factory losses of sucrose from a single microbial species in the absence of antimicrobials could range from roughly 0.1 to 1 kg of sucrose per metric ton of cane or beet. A cost analysis was conducted considering sucrose savings due to antimicrobial application to provide estimates for break-even costs, which ranged from approximately $0.50 to $2.00/L for a given antimicrobial agent. This techno-economic analysis relies on coupling laboratory-scale analyses of sugar loss with mass balance parameters at industry scale, estimating economic impact of losses due to microbial activity in sugar crop processing facilities. This information can be practically used by factory personnel to improve efficiency in mitigation strategies and optimize dosing of antimicrobial and enzymatic processing aids, thereby minimizing costs and maximizing crop processing productivity.

**Breaking down cell walls: Arabinoxylan remodeling in cool-season forages during fermentation with fibrolytic rumen bacteria** Prakash R. Pandeya[1], pandeya.prakash@uky.edu, Sophia D. Newhuis[1], Brittany E. Davis[2], Michael Flythe[2], Isabelle A. Kagan[2], Rachel R. Schendel[1], rachel.schendel@uky.edu. *(1) Animal & Food Sciences, Univ. of Kentucky, Lexington(2) Forage-Animal Production Research Unit, USDA Agricultural Research Service, Lexington, Kentucky* Arabinoxylan, the primary hemicellulose in grasses, constitutes 20–40% of the cell wall and serves as an energy source for ruminant microbes. Structurally, arabinoxylan is a 1,4-β-D-xylopyranose backbone substituted with side chains including monomeric arabinose, oligosaccharides, glucuronic acid, 4-*O*-methyl-glucuronic acid, and acetyl groups, with a portion of the arabinose residues esterified with hydroxycinnamic acids, especially ferulic acid. Each structural feature of arabinoxylan influences enzymatic digestibility. However, little is known about how structural patterns of grass arabinoxylans affect their degradation by fibrolytic ruminal bacteria, which solubilize arabinoxylans in order to access cellulose in the cell wall. In this study, insoluble cell walls from two cool-season forage grass species (timothy, *Phleum pratense* L., and perennial ryegrass, *Lolium perenne* L.) were fermented *in vitro* with pure cultures of ruminal fibrolytic bacteria (*Ruminococcus albus* and *Fibrobacter succinogenes*), while *Acetivibrio thermocellus* (a non-ruminal fibrolytic bacterium) was used as a positive control. Structural changes were investigated through monosaccharide composition analysis following acidic hydrolysis and HPAEC-PAD, ester-linked hydroxycinnamate quantification via HPLC-DAD after alkaline hydrolysis and organic solvent extraction, and HPAEC-PAD profiling of oligosaccharides. During incubation, bacterial species solubilized portions of the arabinoxylan, resulting in the accumulation of monomeric arabinose and xylose units, as well as arabinoxylan oligosaccharides in the fermentation supernatant. All bacterial species cleaved a significant portion of ester-linked ferulic acid from arabinoxylan, releasing it as free ferulic acid. The predominance of unsubstituted xylooligosaccharides (X2–X6) over substituted fragments (A2XX, A3X) following endoxylanase fingerprinting, together with the continued existence of ester-linked ferulate monomers in the post-fermentation insoluble residues, indicates that the remaining arabinoxylans contained both unsubstituted backbone regions and complex feruloylated regions that resisted degradation and remained unsolubilized over 5 days of fermentation. These findings enhance our understanding of how ruminants utilize forage cell wall carbohydrates and may inform strategies to optimize feed efficiency.

**Impact of carbon composite on the germination of *Trifolium pratense* in two different soil types** David Alabi[1,2], oludavidsj@gmail.com, Vimla Paul[1]. *(1) Chemistry, Durban Univ. of Technology, South Africa(2) Nature Conservation, Mangosuthu Univ. of Technology, Durban, KZN, South Africa* Agro-waste materials can be transformed into valuable soil conditioners that improve soil quality and crop establishment. This study evaluated eco-friendly composites prepared from eggshell and bagasse, pyrolyzed at 450 °C and 600 °C in fourteen blend ratios, with a heating rate of 20°C/min. Composites were then evaluated on two different soils to enhance plant growth, and improved soil quality. A standardized germination assay was conducted with *Trifolium pratense*, using 20 g of soil per petri dish and eight seeds per replicate in a complete randomized block system. The fourteen carbon composite green conditioners were added on each at the rates of 0 and 5%. Soil physicochemical properties and plant responses were analyzed using SPSS to juxtapose the effect of composite on seedling and control group. The result revealed that the ash content in eggshell: bagasse 4:1 at 600 °C was optimum at (84±0.20), while 100% eggshell had high levels of ash at both temperatures 20-23 $^{o}$C. Germination and shoot development were significantly enhanced by several treatments ($P < 0.05$), whereas root growth showed weaker responses. Multivariate analysis confirmed that soil and composite interactions strongly influenced seedling traits ($P < 0.001$). These findings demonstrate that eggshell–bagasse composites provide synergistic benefits by combining Ca-rich and C-rich waste properties, thereby enhancing early plant growth and improving soil quality. The study highlights a low-cost, sustainable strategy for recycling agricultural residues into effective soil amendments.

**DIGITAL SESSION**
**Global Virtual Symposium: Agri-Derived Bioactives and Their Therapeutic Potential**

**Agri-derived essential oil bioactives as functional ingredients to reduce parasitic infections through food-based delivery systems** Juan E. Andrade Laborde, jandrade2@ufl.edu. *Dept. of Food Science and Human Nutrition, Univ. of Florida, Gainesville* Parasitic protozoa such as *Cryptosporidium parvum* and *Giardia lamblia* disproportionately affect children in low-income regions, contributing to diarrheal disease, impaired nutrient absorption, and long-term growth and cognitive deficits. Conventional chemotherapeutics remain limited by resistance, contraindications, short half-lives, and the inability to prevent reinfection. There is an urgent need for complementary, food-compatible antiparasitic strategies that can be deployed safely, inexpensively, and at scale. Agri-derived essential oil (EO) constituents such as thymol, carvacrol, myrcene, and hops EO fractions have shown promising antiparasitic effects. Using HCT-8 cell infectivity models, our team and others have shown that these bioactives significantly reduce Cryptosporidium sporozoite invasion and replication in a dose-dependent manner at concentrations that remain non-toxic to host cells. Thymol, thymol-octanoate, and carvacrol achieve IC50 values of 19–60 μg/mL, outperforming/complementing benchmark antiparasitics. Similar activity is observed for hops EO and myrcene. These findings align with *in vivo* helminth reduction studies showing that EO-based formulations can reduce worm and egg counts in animal models. To translate these bioactives into food-delivery systems, our team has evaluated their digestive stability, release behavior, sensory attributes, and encapsulation requirements. Carvacrol and oregano EO exhibit high stability across simulated gastric and intestinal phases, and β-cyclodextrin encapsulation enables controlled intestinal release while masking aroma and flavor, aspects critical for integration into lipid-based nutrient supplements type ready-to-use foods. Sensory discrimination tests showed that encapsulated bioactives can be incorporated without affecting acceptability. Many of these EOs can be sourced from circular agricultural supply streams, enabling low-cost and sustainable ingredient pipelines. These findings suggest that agri-derived EO bioactives, strategically incorporated into nutrient-dense foods, offer a viable, scalable approach to reducing intestinal parasite burden. This work advances the integration of natural antiparasitic agents into functional food matrices as part of comprehensive global nutrition and infection-control strategies.

**Toward sustainable carotenoid extraction using green solvents** Alexandrina Focsan[1], alfocsan@valdosta.edu, Gopeekrishnan Sreenilayam[1], Lowell Kispert[2]. *(1) Chemistry and Geosciences, Valdosta State Univ., Valdosta, Georgia(2) Chemistry and Biochemistry, The Univ. of Alabama, Tuscaloosa* Carotenoids are agri-derived bioactive compounds that act as natural pigments and powerful antioxidants. Widely distributed in agricultural crops, residues, and by-products, they not only contribute to the color of fruits and vegetables but also provide significant health benefits due to their antioxidant, anti-inflammatory, and antimicrobial properties. These characteristics make them valuable for therapeutic applications, functional food development, and as sustainable alternatives to synthetic additives. Modern extraction technologies have improved efficiency and yield, while also minimizing degradation of these sensitive compounds. Furthermore, stability and bioavailability challenges are increasingly being addressed through encapsulation with different delivery systems. Recent advancements have shifted our attention toward green extraction methods. Traditional processes often rely on volatile organic compounds (VOCs), which present environmental and safety concerns. In the past few years, our undergraduate research program explores eco-friendly, safe, and efficient ways to extract carotenoids by replacing harmful organic solvents with sustainable, green alternatives such as deep eutectic solvents (DES) - a novel class of environmentally friendly solvents that combine high extraction efficiency with sustainability. DES show promise in carotenoid extraction and their adaptability suggests that they may become the preferred solvents in the future.

**GC-MS analysis of *Justicia secunda* and *Pelargonium hortorum* plants: In silico evaluation against SARS-CoV-II proteins** J. Patiño Rivera julian.patino@correounivalle.edu.co, Carlos Humberto Gomez, Fernanda. Cassasola Jiménez, Kellyn Jhoana Ramírez Adan, Gregorio Borja Meza, Gereli Darina Tejada Melo *YUMBO, Univ. del Valle, YUMBO, Valle del Cauca, Colombia(2) Univ. de Guadalajara, Jal., Mexico(3) Univ. Autonoma de Guerrero, Chilpancingo, Gro., Mexico* Plant-derived therapeutic agents have been widely used due to their diverse secondary metabolites, which interact with biological receptors to treat various diseases. Among the medicinal plants of Valle delCauca, Colombia, *Pelargonium hortorum* and *Justicia secunda* exhibit antimicrobial, antioxidant, anti-inflammatory, and antiviral properties. *Pelargonium hortorum* contains bioactive compounds such as coumarins, flavonoids, phenols, tannins, and essential oils, suggesting potential applications for respiratory infections. *Justicia secunda* is traditionally used for headaches, muscle pain, and respiratory ailments, withactive compounds including flavonoids, saponins, and volatile terpenes. Given their pharmacological potentialand the urgent need for effective SARS-CoV-2 therapies, this study employs in silico computer-aided drugdesign (CADD) to evaluate the interactions of bioactive compounds with viral target enzymes, including thespike glycoprotein and main protease. Plant material was collected at the Univ. del Valle Yumbo campus. Samples were washed, treated withsaline solution, dried at room temperature, and ground in an electric mill. Extracts were obtained usingpercolation with ethanol and cyclohexane phases, followed by fractionation via column chromatography. GC-MS analysis (Shimadzu QP2010) identified 10 compounds in the ethanol extract of Pelargonium hortorum and 21 in the cyclohexane extract. Justicia secunda extracts yielded 91 peaks, with 8 key compounds common toboth extracts and plants. ADME properties were assessed using SwissADME, and molecular docking was performed via SwissDock toanalyze the interaction of plant compounds with SARS-CoV-2 target enzymes, including the British Alphavariant spike protein (B.1.1.7) and the main protease. GC-MS analysis revealed distinct terpene compounds,sterols, fatty acids, esters, and oxygenated nitrogenous compounds. In silico results suggest lycopene from Justicia secunda as a potential candidate for SARS-CoV-2 treatment.

**Food protein-derived peptides as potential therapeutic agents against hypertension and hypercholesterolemia** Rotimi Aluko, rotimi.aluko@umanitoba.ca. *Dept. of Food and Human Nutritional Sciences, Univ. of Manitoba, Winnipeg, Canada* High blood pressure and excessive levels of blood cholesterol are leading drivers of cardiovascular diseases in the human population. Hypertension is the pathological outcome of uncontrolled high blood pressure and can lead to damaging levels of toxic reactive species, which then cause additional damages to the vascular walls. The result is a vicious cycle that promotes cholesterol accumulation, oxidative stress and hypertension. In this presentation, two protein derived hydrolyzed products are shown to negatively modulate the levels of cholesterol and metabolic pathways that lead to hypertension. First, an enzymatic digest of hemp seed protein with ability to reduce blood pressure and oxidative stress after a 6-week oral administration to hypertensive human volunteers showed better activity than the control (casein) and undigested hemp seed protein. Oral ingestion of the hemp seed hydrolysate resulted in significant ($p<0.05$) 9 mmHg reduction in systolic blood pressure when compared to the casein group. The hypotensive effect was accompanied by significant ($p<0.05$) reductions in plasma angiotensin converting enzyme, and renin, the two major metabolic enzymes that regulate blood pressure. The hemp seed hydrolysate group also had significantly higher levels of superoxide dismutase and catalase, which reflect stronger antioxidant capacity when compared to casein consumption. Five peptides (WYT, SVYT, WVYY, PSLPA and IPAGV) were identified to be the major contributors of the antihypertensive effect of the hemp seed protein hydrolysate and they all showed effective blood pressure reductions after oral administration to spontaneously hypertensive rats with proline-containing peptides being the most active. Second, cholesterol-binding resistant proteins were produced through enzymatic hydrolysis of cowpea proteins. Incorporation of the resistant proteins into a high fat diet resulted in significantly ($p<0.05$) lower plasma total cholesterol (1.8 mmol/L) in male Sprague Dawley rats when compared to 9.34 and 4.15 mmol/L for the untreated group. The results indicate potential use of enzymatically modified food proteins as therapeutic agents against cardiovascular diseases.

**Harnessing agri-derived bioactives for anti-fibrotic Therapeutics: A translational framework bridging ai-driven molecular modeling and clinical dermatology** Therese Wilson-Rawlins[1], twilsonrawlins@gmail.com, Kimberly Madison[2], Mariam Rabiu[2], Ashley Anderson[2], Jade Trevino[2]. *(1) Jax Lab Naturals, Toronto, Ontario, Canada(2) Mahogany Dermatology Nursing, Dallas, Texas* Background/Significance Fibrotic disorders such as uterine fibroids, keloids, and central centrifugal cicatricial alopecia (CCCA) disproportionately affect Black women and lack effective, non-invasive treatments. Current therapies often have high recurrence rates, creating an urgent need for novel interventions. Agri-derived bioactives offer a rich source of therapeutic potential, yet a systematic strategy to translate these compounds into clinical solutions is critically lacking. This nurse-led research addresses the need for an interdisciplinary approach to develop accessible, evidence-based natural health products (NHPs) for these conditions. Methods: This work outlines a translational framework integrating computational drug discovery with deep dermatology nursing science. The core research question is: What are the shared inflammatory and fibrotic molecular pathways (e.g., TGF-β, Smad signaling) dysregulated in uterine fibroids, keloids, and CCCA, and how can they be targeted by agri-derived bioactive compounds? An AI-driven molecular modeling platform will be utilized to screen and prioritize candidate compounds based on their predicted ability to modulate these key fibrotic pathways. Results: The primary anticipated result is the identification of at least three novel, non-steroidal, agri-derived bioactive compounds with high predicted anti-fibrotic activity. A secondary result will be the creation of a conceptual model outlining the shared molecular pathogenesis of these clinical presentations, which will serve as the foundation for future preclinical studies. Conclusion: By integrating natural product chemistry, AI-driven discovery, and expert nursing insights, this framework represents a powerful new paradigm for nurse-led therapeutic development. This collaborative approach champions an innovative solution to the complex health challenges disproportionately affecting Black women.

**From individual fibers to designed mixtures: A new paradigm for microbiota modulation** Thaisa Cantu-Jungles[1], tcantuju@purdue.edu, Bruce Hamaker[2]. *(1) Univ. of Manitoba, Winnipeg, Canada(2) Purdue Univ., West Lafayette, Indiana* Dietary fibers are key drivers of gut microbiota composition and function, influencing host health primarily through the production of short-chain fatty acids (SCFAs) and their downstream effects on inflammation and gut barrier integrity. Beyond total fiber intake, the type and combination of fibers determine how the microbiota responds and stabilizes over time. Our recent work demonstrates that fiber mixtures strategically designed to support complementary bacterial groups elicit stronger and more consistent compositional and metabolic outcomes than single fibers or random blends. These designed mixtures enhance SCFA production beyond additive expectations and promote a balanced microbial ecosystem across individuals, enriched in beneficial taxa such as butyrate producers and with a lower abundance of potentially pathogenic bacteria. This presentation will highlight the rationale, mechanisms, and outcomes of designed fiber mixtures as a strategy to optimize microbiome function for gut and whole-body health.

**Transforming spent coffee grounds into microrobots for sustainable water purification** Amit K. Singh[1,2], amitnano123@gmail.com, Tarini Basireddy[2], Jeffrey L. Moran[2]. *(1) School of Science, Woxsen Univ., Hyderabad, Telangana, India(2) Mechanical Engineering, George Mason Univ., Fairfax, Virginia* Aquatic pollutants such as oil spills, industrial dyes, and microplastics pose significant risks to public health and marine ecosystems. Conventional remediation approaches often face limitations due to high cost, low efficiency, and limited scalability. Herein, we report the sustainable synthesis of magnetic microrobots derived from spent coffee grounds (SCGs), termed *CoffeeBots*, for multifunctional water purification. Iron oxide nanoparticles (IONPs) were uniformly deposited on biodegradable SCGs via a green-chemistry route, imparting magnetic responsiveness for guided locomotion, microswarm assembly, and facile post-treatment recovery. The intrinsic hydrophobicity of CoffeeBots enables efficient capture and removal of oil droplets and microplastics under remote magnetic navigation. Furthermore, functionalization with ascorbic acid (AA@CoffeeBots) facilitated the degradation of methylene blue (MB) dye through synergistic bioadsorption and redox activity, accelerated by magnetically enhanced mixing. CoffeeBots demonstrated recyclability over multiple treatment cycles without loss of performance. This work highlights a scalable, low-cost, and eco-friendly strategy for converting agro-waste into active microrobotic platforms, offering promising applications in large-scale water remediation.

**Bag to bottle®: Transforming scientific discovery into scalable, market-ready industrial impact** *Ramesh Raliya, rameshraliya@gmail.com. Rhizophyll®, Washington* This talk examines the full journey of transforming scientific discoveries into scalable, market-ready industrial solutions through the Bag to Bottle® framework. It explores how early-stage research evolves into practical, high-impact technologies by addressing technical gaps, refining processes, and validating feasibility at the laboratory level. The discussion highlights the critical role of innovation ecosystems including universities, startups, and industrial partners in enabling pilot trials, process optimization, and scale-up readiness. Key considerations such as quality control, regulatory pathways, cost-effective manufacturing, and supply chain integration are addressed to illustrate the realities of industrial deployment. By mapping common challenges and actionable strategies across the innovation-to-industry pipeline, this talk provides a practical roadmap for researchers, entrepreneurs, and industry leaders seeking to convert lab concepts into commercially viable, industrial-scale technologies.

**Engineered plant viral particles for targeted delivery into solid tumors: applications in medicine and beyond** **Kathleen L. Hefferon, klh22@cornell.edu.** *Cornell Univ., Ithaca, New York* Over the past two decades, plant molecular farming—the use of plants as platforms for producing vaccines, monoclonal antibodies, and other therapeutic agents—has been steadily advancing. This interdisciplinary field brings together expertise from plant science, medicine, and pharmaceutical research across academic, governmental, and industrial sectors. Plants have long been recognized as a source of pharmaceuticals, and with the rise of synthetic biology, they can now be engineered to produce a wide range of biologics. Vaccines manufactured in plants are not only effective and cost-efficient but also capable of post-translational modifications that many microbial systems lack. Additionally, unlike mammalian cell-based production systems, plant-derived vaccines do not carry the risk of contamination with human pathogens. Plants also offer advantages such as scalability, protein stability at ambient temperatures, and accessibility, making them particularly suitable for use in low- to middle-income countries. Plant virus expression vectors have been extensively studied as a platform for vaccine development. They offer a cost-effective, efficient, and safe method for production. Recently, plant viruses have gained significance as a delivery system for nucleic acids into plant tissues, enabling gene expression regulation. Plant virus-based nanoparticles have emerged as a promising tool in cancer immunotherapy. This presentation delves into the design and implementation of plant virus nanoparticles for cancer immunotherapy, concluding with an outlook on the future potential of plant viruses in medicine and beyond.

**Influence of berry polyphenols on gut and vaginal microbiota and metabolic health through in vitro, animal and human dietary interventions** Ahhria Kirkendall[1], Christy Teets[2], Shirley Arbizu[2], Hira Shakoor[2], Jagrani Minj[2], Catherine Jarrett[2], Patrick Solverson[2], Franck Carbonero[1,2], franck.carbonero@wsu.edu. *(1) Dept. of Food Science, Washington State Univ., Pullman(2) Dept. of Nutrition and Exercise Physiology, Elson Floyd School of Medicine, Washington State Univ., Pullman* Dietary polyphenols have long been touted as healthful due to their antioxidant properties. Nowadays, a wider variety of metabolic mechanisms have been identified to explain polyphenols' health benefits, including modulation of and by the gut microbiota. Berries represent an ideal vehicle for dietary intake of polyphenols, due to their often-high concentrations, profiles together with consumer popularity. We tested the impact of elderberry consumption on metabolic status and gut microbiota. In high-fat fed mice, elderberry consumption very strongly mitigated the weight gain and metabolic dysfunction incurred by the high-fat diet. Those effects were associated with increase in beneficial bacterial genera including *Bifidobacterium* and *Akkermansia*. Dietary interventions with anthocyanin-rich elderberry juice confirmed a prebiotic-like effect on the gut microbiota with increase of *Bifidobacterium* and other beneficial genera. Elderberry consumption also reduced blood glucose, increased mitochondrial fat oxidation as well as modulating the thyroid metabolism. We also tested the impact of cranberry consumption on the gut and vaginal microbiota, in the context of their presupposed anti-urinary tract infection properties. In vitro gut microbiota fermentation of cranberry seeds (fiber-rich) and press cake (fiber and polyphenol rich) revealed that those by-products led to slightly different gut microbiota response. A pilot and full-scale human placebo-controlled dietary intervention were conducted to assess both the gut and vaginal microbiota in healthy women. Cranberries consumption was found to stimulate beneficial bacterial genera (*Faecalibacterium* and *Lactobacillus* among others) in the gut microbiota. Beneficial effects through *Lactobacillus* increase and decrease of non-*Lactobacillus* genera were observed in the majority of volunteers' vaginal microbiota. Remarkably, Significant correlation was observed between the gut and vaginal Lactobacillus only with the cranberry treatment. Taken together, our studies confirm the potential for berries polyphenols to positively modulate human microbiota and thereby improve human health. Future work will aim at maximizing those benefits through identification and characterization of the many polyphenol molecules responsible for health benefits.

**Farming in the final frontier: Exploring agriculture in microgravity** Abhijit Bhutey, abhijit@inboundaerospace.com. *Inbound Aerospace, Taramani, Chennai, India* Microgravity refers to the near-weightless environment experienced while orbiting in space, where gravitational forces are very less as compared to on Earth. This unique condition influences the behavior of physical, chemical, and biological processes, allowing researchers to observe phenomena that remain hidden under Earth's gravity. Further, microgravity research plays a critical role in understanding how organisms and plants adapt when gravity is no longer the dominant force. By removing gravitational bias, scientists can study cells, fluids, and plant growth with a clearer perspective, gaining insights that expand scientific knowledge and support future space missions. One of the most promising applications of microgravity studies lies in space agriculture often termed space farming which focuses on cultivating food in space to support long-duration missions and eventual human settlement beyond Earth. Growing plants in microgravity is essential for life-support as they provide food, oxygen, and psychological comfort to astronauts. As humanity ventures farther into space, from long-term stays on the Moon to potential Mars expeditions, sustainable agriculture becomes a necessity rather than an option. Research efforts include experimenting on various crops to understand how root orientation, water distribution, nutrient absorption, and photosynthesis change without gravity. Early experiments, whether nurturing leafy greens, chili peppers, or even exploring the idea of cultivating coffee in space, show just how much potential "space farming" holds. Beyond basic nutritional value, plants offer therapeutic and psychological benefits for astronauts living in isolated, confined environments through the study of agro- derived bioactives. Interaction with greenery has been shown to reduce stress, improve mental well-being, and create a sense of connection to Earth all of which are vital for maintaining crew health during long missions. This collaborative initiative aims to bring together researchers from agriculture, biotechnology, space science, and engineering to explore how microgravity can help us reimagine the future of food not only in space but back on Earth. By studying plant growth in space, we pave the way for advancements in food security, sustainable technologies, and a future where human life can flourish both on our planet and beyond.

**SUNDAY AFTERNOON**

**Advances on Agricultural and Food Chemistry - General Papers - Food Analysis & Sensory Evaluation**

**Effect of barrel aging on a straight rye whiskey produced in Tennessee** Thien Nguyen, tnguy103@vols.utk.edu, John P. Munafo. *Food Science, The Univ. of Tennessee Knoxville Institute of Agriculture* Straight rye whiskey is defined as a spirit distilled from at least 51% rye grain to no more than 80% alcohol by volume (160 proof). Additionally, it must enter new charred oak barrels at no more than 62.5% ABV (125 proof), be bottled at no less than 40% ABV (80 proof), and be aged a minimum of two years. No additives are allowed, except that water may be added to adjust alcohol levels prior to bottling. Different types of whiskey offer unique flavor profiles that are enjoyed by enthusiasts. The whiskey distillate can be produced through batch distillation (e.g., in a hybrid pot still) or continuous distillation, with each method imparting distinct characteristics to the distillate prior to barrel aging. Although previous studies have explored the odorants in rye whiskey, none have detailed the exact mash bill or production parameters, including fermentation, distillation, barrel entry proof, barrel char/toast levels, and barrel sizes. This study aimed to investigate how barrel aging affects the odorants in a single batch of commercial pot-distilled straight rye whiskey produced in Tennessee with defined production parameters. This was achieved by combining solvent-assisted flavor evaporation (SAFE) with comparative aroma extract dilution analysis (cAEDA) employing gas chromatography–olfactometry (GC–O). Notable results include increased flavor dilution (FD) factors for ethyl esters (fruity), attributed to the esterification of organic acids during aging. Additionally, FD factors for wood-derived odorants, such as guaiacol (smoky), eugenol (spicy), *cis*-whiskey lactone (coconut), and vanillin (vanilla), showed an increase, reflecting the migration of these compounds from the barrel into the aged whiskey. This presentation will explore the impact of barrel aging on the odorants in a pot-distilled straight rye whiskey, offering valuable insights to assist whiskey manufacturers in optimizing flavor profiles.

**Identification of bitter and astringent tastants in chardonnay marc fractions** Ngan Nguyen, nnguye49@vols.utk.edu, John P. Munafo. *Food Science, The Univ. of Tennessee Knoxville Institute of Agriculture* Chardonnay marc, an underutilized co-product of the wine-making process, is gaining significant interest due to its potential beneficial health effects and distinctive flavor. Chardonnay marc accounts for approximately 30% of whole grapes. In California, over 520,000 tons of chardonnay grapes were crushed in 2024, generating around 156,000 tons of marc, and this figure continues to rise. Although the aroma chemistry of chardonnay marc has been previously reported, there remains a knowledge gap regarding the taste compounds that contribute to its unique taste, particularly tastants imparting bitter and astringent sensory qualities. To bridge this gap, this current study employed taste-guided fractionation combining natural product chemistry separations and sensory evaluation to characterize tastants present in Chardonnay marc fractionated by preparative reversed phase high performance liquid chromatography (RP-HPLC). First, solid phase extraction (SPE) was employed to identify bitter and astringent tasting fractions. The identified fractions were then pooled and subjected to sequential solvent partitioning. The resulting bitter and astringent fractions were further separated using preparative RP-HPLC, generating a series of sub-fractions. These sub-fractions were then processed and evaluated by sensory analysis. Several bitter and astringent tastants were then identified and quantitated using liquid chromatography–mass spectrometry (LC–MS). This study reports on the sensory evaluation of preparative RP-HPLC fractions and the identification of some compounds responsible for the astringent and bitter taste attributes of the fractions. Furthermore, this work established a foundation for future research focusing on the key tastants driving Chardonnay marc taste, thereby enabling a comprehensive characterization of its flavor profile.

**Using grape volatilome as a way to understand and track grape maturity** Katarina Kent[1], katkent@ucdavis.edu, Arran Rumbaugh[2]. *(1) Viticulture and Enology, Univ. of California Davis(2) Crops Pathology and Genetics Unit, USDA Agricultural Research Service, Davis, California* Extreme weather events—heat waves, drought, flooding, and frost—impact agriculture worldwide, and California viticulture is no exception. Large swings in environmental conditions can alter grape metabolism, with heat waves in particular becoming more common. Elevated temperatures accelerate ripening, leading to imbalances in sugar-to-acid ratios that affect wine style. They also alter volatile secondary metabolites responsible for grape-derived aroma in finished wines. This study examined the grape volatilome in four cultivars (Zinfandel, Cabernet Sauvignon, Sauvignon Blanc, and Chardonnay) across four maturity stages (pre-veraison, veraison, post-veraison, and harvest) over two years. Volatile compounds in grape headspace were analyzed using SPME-GC-MS. A reproducible method was first developed to quantify grape volatiles during ripening. Results showed that pH, sugar concentration, and titratable acidity did not significantly affect volatile compound concentrations during headspace analysis. Among tested buffers, gluconolactone provided the strongest responses across compound classes, while the presence of seeds suppressed responses for most compounds. Using this optimized method, grape samples collected in 2023 were analyzed and visualized with principal component analysis. Across cultivars, terpenes (e.g., citronellol, geraniol) were strongly associated with post-veraison and harvest, while C6 alcohols correlated with pre-veraison and veraison. In contrast, C6 aldehydes correlated with post-veraison and harvest, indicating a metabolic shift from C6 alcohol to C6 aldehyde production via the lipoxygenase pathway. The next phase of this project will analyze samples collected in both years and quantify C6 alcohols and aldehydes to determine if they can be used as a marker for grape maturity**. (ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Identification of odor-active compounds in sharp-leaf galangal (*Alpinia oxyphylla*) rhizomes** Kriti Jha, Kjha2@vols.utk.edu, Thien Nguyen, Ngan Nguyen, John P. Munafo. *Food Science, The Univ. of Tennessee Knoxville Institute of Agriculture* Sharp-leaf galangal (*Alpinia oxyphylla*), also known by its traditional name Yizhi in China, is an aromatic plant that belongs to the *Zingiberaceae* family and is commonly found throughout East Asia. The rhizomes of this plant can be used in a variety of culinary applications, as they possess a pleasant aroma and pungent taste, making them particularly useful as a spice or flavoring agent. Additionally, these rhizomes have been used in the preparation of traditional medicines for centuries, frequently to manage health conditions such as diabetes, diarrhea, and Alzheimer's disease. Although sharp-leaf galangal is widely used in both food and medicine around the world, research on the volatiles of its rhizomes remains limited, and little is known about the specific odorants that contribute to their distinctive aroma. To address this knowledge gap, the present study aims to characterize the odorants present in sharp-leaf galangal rhizomes using solvent-assisted flavor evaporation (SAFE) and aroma extract dilution analysis (AEDA), by way of gas chromatography–olfactometry (GC–O) and gas chromatography–mass spectrometry (GC–MS). Some important odorants identified in this study included *α*-pinene (pine), 1,8-cineole (eucalyptus), fenchyl acetate (earthy, fruity), and methyl *trans*-cinnamate (cinnamon). The results provide a list of odorants present in sharp-leaf galangal rhizomes that may contribute to their pleasing aroma and establish a solid basis for future quantitative and sensory analysis. This study also provides a foundation for additional investigations into the variation in aroma chemistry of different members of the *Alpinia* genus, and how the plant could be used as a natural flavoring ingredient.

**Chemical and sensory effects of fruit protease from pineapple and kiwifruit on robusta coffee via pulsed electric field-assisted vacuum impregnation** Jinyoung Yun, o_odbswlsdud@naver.com, Kwang G. Lee. *Food Science and Biotechnology, Dongguk Univ., Jung-gu, Seoul, Korea (the Republic of)* Coffee is popular worldwide, and its consumption is steadily increasing. Recently, demand for specialty coffee with unique flavors has been rising, suggesting that more people are prioritizing aroma and flavor, and that premium coffee is becoming more popular. Kopi luwak, one of the well-known premium coffees, acquires its unique flavor from the digestive process of the civet. From the perspective of coffee species, Robusta coffee is generally less preferred than Arabica coffee because it has a more bitter, less floral flavor, even though it is cheaper and higher yielding. This study investigates an enzymatic strategy to modulate Robusta quality using fruit-derived cysteine proteases via pulsed electric field-assisted vacuum impregnation (PEF-VI). Crude bromelain and actinidin extracts were prepared from pineapple and kiwifruit, respectively. The pH was adjusted to 7.0 using a phosphate buffer to maintain near-maximal enzyme activity, and applied to Robusta green coffee beans via PEF-VI. PEF-VI applies short bursts of high-voltage electric fields prior to vacuum impregnation, promoting electroporation and improved uptake of compounds into coffee beans. The Robusta coffee treated with bromelain and actinidin showed significantly enhanced sweet and fruity notes in the sensory evaluation, and GC-MS analysis highlighted elevated levels of pyrazines, which contribute to these sweet and fruity notes. Additionally, PEF-VI enabled efficient enzyme delivery, yielding significant changes ($p < 0.05$) in coffee bean chemistry and roasted coffee attributes. Overall, coffee treated with fruit-derived proteases showed an upsurge in aromatic fruity notes while reducing the bitter notes and off-flavors. These outcomes are consistent with a mechanism in which proteolysis elevates free amino acid and peptide pools prior to roasting, thereby promoting desirable Maillard-derived volatiles during roasting. This approach, which uses enzymes derived from fruits, provides a practical and cost-effective way to improve the quality of Robusta coffee.

**Evaluation of orange peel extract as a natural fortifier in dairy and plant-based yogurt: Antioxidant properties, cytotoxicity, and sensory acceptability** Oluwasayo E. Ogunjinmi[1], oluwasayoesther@yahoo.com, Olayombo M. Banwo[1], Basheet T. Fayoyin[2]. *(1) Dept. of Industrial Chemistry, First Technical Univ., Ibadan, Oyo, Nigeria(2) Dept. of Physics and Science Laboratory Technology, First Technical Univ., Ibadan, Oyo, Nigeria* This study focused on the development of dairy and plant-based yoghurt formulations enriched with orange peel extract (OPE) and compared their antioxidant, cytotoxicity, and sensory properties. Orange peel extract was obtained via ethanolic maceration; the phytochemical profile of the extract was characterised using Gas chromatography-Mass spectrometry. The cytotoxicity and antioxidant activity were determined using the brine shrimp lethality assay and the 2,2-diphenylpicrylhydrazyl radical method, respectively. Sensory attributes and consumer acceptability of both yoghurt types, focused on taste, aroma, texture, and overall acceptability, were evaluated. The GC-MS analysis revealed twenty-nine compounds containing fatty acid esters, fatty acid methyl esters, and terpenoids, among others. The major compound was 9-Octadecenoic acid (Z)-, methyl ester, which accounted for 43.15% of the total composition. Among the minor terpenoid compounds were thymol (2.04%), D-limonene (1.23%), and Azulene (0.98%). The OPE-enriched cashew yoghurt (675.93 µg/mL) had higher antioxidant activity ($IC_{50}$ = 675.93 µg/mL) than OPE-enriched diary yoghurt ($IC_{50}$=1121.17 µg/mL). Compounds such as fatty acid esters and terpenoids present are known to possess potential bioactivity. The OPE-enriched cashew yoghurt and orange peel extract-enriched dairy yoghurt exhibited toxicity towards brine shrimps (*Artemia salina),* with $LC_{50}$ values of 309.44 µg/mL and 701.16 µg/mL, respectively; hence, the OPE-enriched cashew yoghurt showed higher cytotoxic potential. Sensory evaluation (n = 50) indicated that, although both yogurts were generally acceptable, the cashew-based yogurt showed a reduction in palatability and acceptance. Specifically, scores were: colour 4.88, appearance 4.82, taste 3.79, flavour 4.08, mouthfeel 3.96, and consistency 4.68. In comparison, the OPE-fortified dairy yogurt scored 6.08, 5.64, 3.92, 4.40, 4.22, and 4.98, respectively. The findings highlight the potential of orange peel, an agro-industrial by-product, as a valuable source of natural antioxidants for the development of health-promoting functional foods and underline the potential of orange peel-enriched yoghurts as sustainable functional foods. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Carbon dots as a dual-action platform for next-generation food packaging** Kafeel Ahmad, kafeel1122@gmail.com. *Dept. of Food and Nutrition, Kyung Hee Univ., Dongdaemun-gu, Seoul, Korea (the Republic of)* Active and intelligent packaging represents a paradigm shift in combating food spoilage and waste. This presentation focuses on the application of carbon dots (CDs) as a uniquely multifunctional platform within this paradigm. Unlike single-function additives, CDs can be engineered to simultaneously act as both real-time sensors and active preservation agents, creating a truly responsive packaging system. As intelligent sensors, CDs integrated into packaging films can visually signal the onset of spoilage. For example, their fluorescence responds to volatile amines generated by decaying meat and fish, providing a clear, naked-eye indicator of freshness for consumers and suppliers. Concurrently, these same CDs function as active components. Their inherent antimicrobial and antioxidant properties have been shown to inhibit the growth of mold on fruits like strawberries and prevent oxidative degradation in sensitive products, directly contributing to shelf-life extension. This dual-action capability creates a synergistic system where the packaging not only monitors food quality but actively protects it. We will discuss specific case studies where CD-based films have demonstrated significant improvements in food preservation. Finally, the presentation will address the critical next steps for translating these promising laboratory results into commercially viable solutions, focusing on the challenges of scalability and regulatory validation. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Organogels derived from eugenol-related agro-based materials** Atanu Biswas[2], H.N. Cheng[1], hncheng100@gmail.com, Bret Chisholm[2], Ryan Beni[2,3], Zengshe Liu[2], Karl Vermillion[2], Michael Appell[2], Kelton Forson[2]. *(1) (Retired) Southern Regional Research Center, USDA Agricultural Research Service, New Orleans, Louisiana(2) National Center for Agricultural Utilization Research, USDA Agricultural Research Service, Peoria, Illinois(3) Dept. of Chemistry, Tennessee State Univ., Nashville* Eugenol, a member of the allylbenzene family, is extracted from essential oils of clove, nutmeg, cinnamon, basil, and other natural sources. We have carried out a novel reaction between eugenol and related agro-based compounds with diethyl azodicarboxylate (DEAD) via the ene reaction. Ene reaction products were obtained at allylbenzene : DEAD molar ratios of up to 1:2; at higher DEAD levels, more complex reactions were observed. Similar products were found in the reaction of methyl eugenol with DEAD. The reactions involving eugenol were more complex; in addition to the ene product, other reaction pathways also occurred. Most product structures have been elucidated using NMR spectroscopy ($^{1}$H, $^{13}$C, and 2D), with further confirmation by FT-IR analysis. Interestingly, these products exhibit molecular aggregation, forming organogels or self-thickened materials in their neat forms. Upon dilution with solvent, viscosity decreases significantly. This gelling behavior suggests potential applications as gels in pharmaceuticals, cosmetics, and biotechnology, or as thickening agents in organic solvent formulations.

**Fully portable smartphone-integrated device coupled with nanozyme-based assay for rapid detection of TBHQ** Qianyi Wu, qianyiw3@illinois.edu, Mohammed Kamruzzaman. *Agriculture and Biological Engineering, Univ. of Illinois Urbana-Champaign* Tert-butylhydroquinone (TBHQ) is a synthetic antioxidant widely incorporated into edible oils and processed foods to extend shelf life by preventing lipid oxidation. However, excessive intake of TBHQ has been linked to cytotoxicity, DNA damage, and potential carcinogenic effects, raising ongoing concerns regarding its safety in consumable products. Therefore, reliable monitoring of TBHQ levels in food matrices is essential. However, conventional detection methods often rely on expensive instrumentation, labor-intensive sample preparation, and trained personnel, which restricts their suitability for routine or on-site screening. Therefore, there is a need for the development of a simpler or more effective way for on-site monitoring of TBHQ. Nanozymes, as enzyme-mimicking nanomaterials, have emerged as powerful candidates for catalytic sensing applications due to their high stability and low cost. However, most of the nanozymes reported to date are based on inorganic materials that often suffer from potential toxicity and limited biocompatibility. To address this limitation, we report the development of a fully organic nanozyme composed of taurine and polyacrylic acid (PAA), which exhibited peroxidase-mimicking catalytic activity while maintaining a non-toxic composition. This system also demonstrated excellent selectivity for TBHQ across several common metal ions and molecular compounds. Using UV-vis spectroscopy, the detection system achieved a detection limit as low as 2.20 nM, which is over 50-fold lower than the maximum concentration permitted by the U.S. Food and Drug Administration (FDA) for TBHQ in consumable products. Furthermore, to facilitate practical use, a fully portable detection platform was fabricated via 3D printing. The device was then integrated with a smartphone-based readout and custom mobile application for real-time RGB and ΔE analysis. This fully portable device reached a detection limit of 3.35 nM, comparable to that obtained via UV-vis spectroscopy. Overall, this work demonstrated a sensitive, selective, and fully portable nanozyme-based colorimetric platform for TBHQ detection, providing a practical and low-cost approach for potential on-site TBHQ monitoring.

**Behavior of hydrophilic particles in oil droplets: From interfacial trapping via microfluidics to spontaneous double-emulsion transition** Peilong Li, pl573@cornell.edu. *Food Science, Cornell Univ., Ithaca, New York* The dynamics of solid particles in emulsions play a fundamental role in designing delivery systems yet remain unclear. This study uses microfluidic droplet generation to load solid particles in oil droplets and investigates how particles behave in the biphasic system. Using chlorophyllin as the model, droplet microfluidics enables particle incorporation and reduce leaching compared to using high-shear homogenizer. The distribution of particles within droplets whether at interface or in the core is governed by particle hydrophobicity. At droplet surface, gum Arabic stitches a barrier, captures the particles from escaping, while polysorbate surfactant led to rapid dissolution. The polymer network anchored to the droplet surface remained intact during dilution or storage preventing release. A spontaneous transition from particle-loaded emulsion to double emulsion occurs during storage, where water diffuses from outside into the oil. The structure of particle-loaded emulsions protected chlorophyllin from degradation caused by light and heat. These polymer-coated emulsions retained particles in oral and gastric digestion, with a responsive release observed in the intestine, where bile salts perforate the interface and provide paths for pigment diffusion. This study highlights the potential of microfluidic techniques as a platform for trapping solid particles into emulsions and provides a fundamental understanding on the fate of particles in the system. The platform can potentially be adapted to deliver versatile bioactive compounds across different fields.

## Withycombe-Charalambous Graduate Student Symposium

**Impact of post-harvest treatments on the micronutrient availability of spinach (*Spinacia oleracea* L.)** Ethan Lee[1], elee1212@umd.edu, Xianli Wu[2], Liangli Yu[1]. *(1) Nutirtion and Food Science, Univ. of Maryland College of Agriculture & Natural Resources, College Park (2) Methods and Application of Food Composition Laboratory, US Dept. of Agriculture, Beltsville, Maryland* This research aimed to 1) develop and refine the carotenoid extraction and quantification methods for leafy green vegetables and 2) determine the effect of domestic and commercial post-harvest processing on the total carotenoid content (TCC), total phenolics content (TPC), vitamin C content, and free radical scavenging properties of spinach. A relative response factor (RFFs) method was developed and validated for quantification of carotenoids. Using HPLC-PDA, UV spectras were documented for identification. RFFs of violaxanthin, neoxanthin, lutein, zeaxanthin, 9-cis-antheraxanthin, α-cryptoxanthin, β-cryptoxanthin, α-carotene, and lycopene were determined using β-carotene as the reference analyte. This effort overcomes the difficulty in obtaining reliable and stable carotenoid standard compounds. A carotenoid extraction protocol using rapid saponification was developed and validated for spinach and other leafy vegetables. The method tested extraction solvent, saponification time/effects, extraction cycles, and method. The method also removed chlorophyll during extraction and solved the issue of chlorophyll coeluting with carotenoids.
Two varieties of spinach (flat leafed, savoy) were harvested from a local farm and separated into six treatments that were spinach raw, stored at 4°C for 4 days, boiled in water for 3 minutes, placed in a steam basked for 5 minutes, placed in boiling water for 30 seconds, and frozen blanched sample stored at -20°C for 30 days. The effects of processing showed an increase in TCC and a decrease in TPC, vitamin C, and free radical scavenging activity. A matrix dependent effect was seen as savoy spinach showed higher susceptibility to processing effects. This research developed an accurate and cost-effective approach to quantify carotenoids in foods, created an accurate and efficient method of carotenoid extraction, and determined the effect of processing on spinach. This research not only provides valuable tools for the field but also helps the general population understand ways to maximize their consumption of micronutrients when eating spinach.

**Peptide directed immobilization of PETase for microplastic bioremediation** Sonia Su, ss2773@cornell.edu, Julie M. Goddard. *Food Science & Technology, Cornell Univ., Ithaca, New York* Microplastic contamination in the environment continues to pose a threat to human health and agricultural productivity. Engineering a polyethylene terephthalate (PET) degrading enzyme (PETase) for site-directed immobilization onto silica or charcoal supports enables recovery and reuse and enhances catalytic activity and stability, key factors in improving commercial translation. Previously, computational approaches have engineered PETase mutants with enhanced thermostability and catalytic efficiency, while immobilization strategies have primarily focused on magnetic nanoparticles or nanoflowers. In this research, we report the engineering of PETase by introducing a silica binding peptide (SBP) for site-directed immobilization onto silica microparticles, and a charcoal binding peptide (CBP) for immobilization onto activated charcoal, their performance was quantified with and without the introduction of a linker peptide. Engineered DNA of PETase mutants was verified with 100% pairwise alignment to predicted sequence through whole plasmid sequencing. PETase mutant catalytic activity was tested as free enzyme and after immobilization onto respective solid supports where PET degradation monomers were quantified by HPLC. PETase with SBP unbound to silica showed similar or lower enzymatic activity after 48 hours. Once bound to silica, degradation of PET by PETase with SBP, no linker, increased at 24 hours. PETase with a short flexible linker bound to silica showed the greatest PET degradation after 24-hour incubation with PET disk, which is a similar trend to unbound activity, and retained 10-20% activity after 5 cycles of reuse. After 5 cycles of reuse, the monomer products formed from PETase with a short flexible linker were approximately equal to cycle 1 of PETase with SBP. We continue this research for commercial applications by immobilizing PETase on activated charcoal for simultaneous microplastic degradation during water treatment and purification. PET microplastics are continually accumulating in the environment and adversely impacting human safety, water, and agriculture. Peptide directed immobilization of PETase aids industrial (e.g. wastewater treatment) application through improving PETase reusability and stability. Expanding the range of conditions PETase can effectively operate maximizes the impact of plastic degrading enzymes in bioremediation, ultimately reducing the environmental and health impacts of microplastics.

**Key flavor compounds in various *Vanilla* species and their biosynthetic pathways before harvest** Dongjoo Kim, dongjookim@ufl.edu, Yu Wang. *Food Science and Human Nutrition, Univ. of Florida, Lake Alfred* Vanilla, the second most expensive spice after saffron, is prized for its complex flavor profile. Yet, the key flavor compounds of vanilla beans, such as chocolate, fruity, caramel, and floral flavors, besides the commonly studied "vanilla" flavor, from different origins and varieties, remain underexplored. This research aimed to decode key flavor compounds and elucidate their biosynthesis pathways using advanced mass spectrometry analysis, machine learning, and sensory validation. The primary objective was to investigate the key flavor compounds of vanilla beans from various species and origins. Chemical composition data obtained through HS-SPME-GC-MS/O, UHPLC-Orbitrap-MS, and UHPLC-MS/MS were analyzed using multiple machine learning models to identify potential key compounds associated with each flavor perception. These findings were further screened through sensory evaluation with trained panelists. The research also explored the plant biosynthesis pathways of these key flavor compounds. Vanilla samples collected at various stages, from pollination to harvest, were analyzed using mass spectrometry techniques to track changes in key flavor compounds and their precursors. Pathway enrichment analysis using various pathway libraries, such as the Kyoto Encyclopedia of Genes and Genomes (KEGG) and in-house libraries with different machine learning algorithms, identified the correlation between key flavor compounds, their precursors, and pathways. This research will ultimately benefit the food industry and consumers by optimizing vanilla flavor production, improving the quality of vanilla-based products, and aiding breeders in developing superior vanilla species.

**Low temperature gelation of hemp protein for co-encapsulation of resveratrol and epigallocatechin gallate** Thilini Dissanayake[1], dissanat@myumanitoba.ca, Ria Cathleen Rodriguez[2], Filiz Koksel[1], Jose Bonilla[2], Nandika Bandara[1]. *(1) Food and Human Nutritional Sciences, Univ. of Manitoba, Winnipeg, Canada(2) Food Science, Kobenhavns Univ. Copenhagen, Denmark* Hemp protein (HP) is a sustainable carrier for bioactives, but conventional high-temperature gelation limits use with heat-sensitive compounds. This study aimed to induce HP gelation at 40 °C by optimizing CA (citric acid) crosslinking and sonication, evaluate ALK (alkaline), SALT (divalent salt), and DES (deep eutectic solvent) extracted HPs, and co-encapsulate resveratrol and epigallocatechin gallate (EGCG). HP was sonicated for 0, 5, or 10 minutes, and mixed with CA (0, 0.1, 0.3 or 0.5 mmol/g protein). For gelation, samples were heated at 40 °C for 1 hour and cooled to 4 °C. Two-way ANOVA was used to optimize CA concentration and sonication for gel strength. Resveratrol and EGCG were co-encapsulated at different ratios and concentrations to achieve maximum loading and encapsulation efficiency. SALT exhibited the strongest gelation. DES also formed stable gels with moderate strength and strain resilience, while ALK showed weak gelation. Also, gels showed significant interaction ($p<0.05$) between CA concentration and sonication time. Maximum gel strength (746.9 ± 25.4 g) was at 0.03 mmol/g CA and 5 min sonication, while controls had the lowest (198.4 ± 23.4 g). Resveratrol and EGCG at a 1:1 ratio achieved over 80% co-encapsulation efficiency with a loading capacity above 2.5% (w/w protein). Low-pH, low-temperature gel fabrication is key for delivering heat-sensitive bioactives. Sonication and CA crosslinking enabled gels from SALT extracted proteins that effectively co-encapsulated hydrophilic EGCG and hydrophobic resveratrol. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**On-site detection of thiram on apple surfaces using a flexible bacterial cellulose-based SERS substrate** Li Xiao, li.xiao3@mail.mcgill.ca, Xiaonan Lu. *Food Science and Agricultural Chemistry, McGill Univ. Faculty of Agriculture and Environment, Sainte-Anne-de-Bellevue, Quebec, Canada* Pesticide residues on fresh produce pose a significant risk to food safety and public health, underscoring the need for rapid and reliable monitoring methods. Traditional analytical approaches, while accurate, often involve laborious sample preparation and cannot provide on-site results. In this work, I developed a flexible bacterial cellulose-based surface-enhanced Raman scattering (SERS) substrate for the preparation-free detection of thiram residues on apple surfaces. The substrate enables pesticide residues to be collected from apple surfaces through a simple wiping step prior to SERS measurement. This method achieved high sensitivity, with detection limits below international maximum residue limits, and enabled rapid (<8 min), reproducible, and reliable analysis. When combined with a portable Raman spectrometer, the method enables on-site detection of pesticide residues on fresh produce in resource-limited settings. This approach transforms advanced material design into a field-ready solution for food safety monitoring and supports science-based regulatory decisions.

**Estimation of brewers' spent grains' proximate composition using NIR sensor and multivariate analysis** Veeramani Karuppuchamy, Karuppuchamy.1@osu.edu, Luis Rodriguez-Saona, Osvaldo Campanella. *Food Science and Technology, The Ohio State Univ., Columbus* Introduction: Brewers' spent grain (BSG), accounting for 85% of breweries waste, is an excellent source of dietary fibers and proteins. There is a growing interest in exploring BSG as a food ingredient. It is essential to determine the composition of BSG to get desired nutritional profile. Conventional wet chemistry methods are time consuming, labor intensive, and costly. In this study, we investigated the application of a new generation of near-infrared (NIR) device for estimating the proximate composition of BSG. Hypothesis:

The unique NIR vibrational overtones and combination bands of molecules that makeup foods combined with pattern recognition algorithms can provide rapid quantitative information of nutrients in BSG, representing an alternative to conventional wet chemistry methods. Methods: A total of 55 BSG samples were collected from local breweries in and around Columbus, Ohio, and milled using a cyclone mill for uniformity. Moisture (hot air oven), proteins (Dumas method), lipids (Soxhlet method), ash (microwave furnace), and carbohydrate (by subtraction) content of BSG samples were determined using reference wet chemistry methods, and these values were used to develop predication models. The BSG samples were scanned by a near infrared (NIR) sensor operating in the wavelength of 1350 to 2500 nm region. The resulting absorbance spectra were analyzed by regression (Partial least squares, PLS) algorithms for developing predictive models using Pirouette software. Results: BSG components obtained from reference methods matched with previously reported results. Calibration models were developed for moisture, proteins, lipids, ash, and carbohydrates. In 10s scans, these models predicted the BSG components with a low standard error of cross-validation (SECV) <0.5 and a high correlation coefficient of validation ($r_{val}$) >0.90. These results indicate that NIR spectroscopy can provide fast and reliable results for estimating BSG composition within a few seconds. Conclusions: An accurate measurement of composition is essential for nutrition labels. The NIR spectroscopic method was easy to use for rapid quantification of nutrients without any need of sample preparation or operator training, in addition to being a non-destructive technique. The NIR spectroscopy can be easily implemented in plants for real-time analysis of by-products of the food industry providing sustainable added value and low-cost alternative to ingredients that otherwise would become waste.

## Posters – NOON - Artificial Intelligence and Advanced Sensing for Enhancing Food Safety

**Development of fluorometric 3D PCL-PEO electrospun nanofiber scaffolds loaded with lysozyme for biosensing *Escherichia coli* in foods** Reuben Wang[1,2,3], reubenwang@ntu.edu.tw. *(1) Institute of Food Safety and Health, National Taiwan Univ., Taipei City(2) Mater of Public Health Program (MPH), National Taiwan Univ., Taipei City(3) (GIP-TRIAD) Global Innovation Joint-Degree Program, National Taiwan Univ., Taipei City* Pathogenic bacteria are a major global health concern, as contamination can occur at any point along the food supply chain. Current detection methods, while highly sensitive, typically require specialized equipment and trained personnel, limiting their accessibility for widespread use. In this study, we developed a user-friendly, all-in-one biosensor based on colorimetric and fluorometric three-dimensional (3D) electrospun nanofiber scaffolds loaded with lysozyme for bacterial detection, demonstrated using *Escherichia coli* as a model organism. Chromogenic and fluorogenic substrates—4-methylumbelliferyl-β-D-glucuronide—were immobilized onto 3D polycaprolactone–polyethylene oxide nanofiber scaffolds functionalized with N-[3-(trimethoxysilyl)propyl]ethylenediamine. The scaffolds, produced by expanding 2D membranes via sodium borohydride ($NaBH_4$) gas foaming, exhibited high elasticity and absorbency, enabling efficient probe immobilization. Upon contact with *E. coli*, the bacterial β-glucuronidase enzyme hydrolyzed the probes, inducing distinct optical changes that signaled bacterial presence. To further enhance sensitivity, lysozyme was incorporated into the scaffolds to disrupt bacterial cell walls, thereby increasing enzyme release and accelerating signal generation. This biosensor platform thus provides a simple, accessible, and effective tool for consumers to monitor food quality and reduce the risk of foodborne illness. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Qualitative analysis of pulegone in mint plants across the fourteen (14) parishes of Jamaica by gas chromatography-mass spectrometry** Jayan Thomas, Raymond Reid, Danielle Davis, Andrea Goldson-Barnaby, andrea.goldson03@uwimona.edu.jm. *Chemistry, The Univ. of the West Indies, Kingston, St. Andrew Parish, Jamaica* Mint, also known as Mentha, is a fragrant herb belonging to the Lamiaceae family. There are several varieties of mint, which include the peppermint plant (*Mentha piperita)*, spearmint plant (*Mentha spicata*), wild mint plant (*Satureja viminea*), the pennyroyals, and the mountain mint. Pulegone, a naturally occurring monoterpene in mint species, is often overlooked due to its toxicity and carcinogenicity at high concentrations. Despite its ability to cause adverse effects, the compound has many potential benefits and can be used in various applications, necessitating further research on this toxin. In the current research, we explore the presence of the toxin in mint plants found across Jamaica. The compound was detected by gas chromatography mass spectrometry. It was identified by characteristic ions 152, 81, 109 m/z from mass spectral data. Pulegone was detected in the mint tea samples of *Satureja viminea* after using the infusion and decoction extraction methods. It was also detected in hydro-distillation extracts of mint plants. The majority of the samples analyzed exceed the maximum level of 100 mg/kg. The highest detected concentration was 7690.6 mg/kg and the lowest 181.5 mg/kg. Future work can include recovery studies and variation of the plant harvesting period.

**Biodegradable & functional packaging films via coaxial electrospinning of micellar casein, pullulan, and thymol-based emulsions** Elif Peker, elifp@ksu.edu, Umut Yucel, Valentina Trinetta. *School of Health Sciences, Kansas State Univ., Manhattan* Biodegradable active packaging can extend the shelf life of perishable foods and reduce food waste. Electrospinning provides a versatile platform to create nanofibrous packaging with high surface area, tunable porosity, and functional properties. This study demonstrates the use of coaxial electrospinning to produce biopolymer mats using micellar casein (5 wt%) and pullulan (15 wt%) with thymol (0.2 and 0.8 wt%) nanoemulsions. Tween 20 (4 wt%) and lecithin (4 wt%) served as emulsifiers. Emulsions were prepared with a two-stage valve homogenizer (GEA) at 800 bar and three passes. Electrospinning was conducted at 18 kV and 12 cm. The core (emulsion) was fed at 1 mL/h through an inner 15G needle, while the shell (biopolymer) was fed at 0.5 mL/h through an outer 21G needle. Control films were prepared with a single-needle design. Particle size and zeta potential were measured by DLS. Films were characterized for tensile strength, water resistance, surface hydrophobicity, color, FTIR, and morphology (SEM). The shelf life of strawberries was tested for 10 days. Each treatment was replicated four times, and data were analyzed with ANOVA. Optimization showed a 12 cm needle distance produced uniform fibers, while an 8 cm distance caused localized deposits. Polymer concentration strongly affected fiber formation: 15% pullulan and 5% micellar casein were optimal. Sodium caseinate was unsuitable, forming gels at higher concentrations, whereas micellar casein yielded continuous fibers. A flow rate of 1 mL/h ensured smooth fibers, while 2.5 mL/h caused foamy structures. Pullulan films exhibited higher tensile strength than micellar casein, due to greater polymer entanglement. Emulsion droplet sizes ranged from 50 to 300 nm, increasing with thymol concentration ($p < 0.05$). Pullulan films were opaque and white, while micellar casein films were transparent. Emulsion addition did not alter film color, suggesting droplets were too small for light scattering. However, incorporation of emulsions increased hydrophobicity and decreased water permeability ($p < 0.05$), likely from lipid and emulsifier enrichment at the film interface. Overall, pullulan films showed superior structural qualities, while micellar casein produced thinner, lighter films. These findings highlight coaxial electrospinning as a promising route for biodegradable active packaging with tailored properties for food preservation. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Geometrical and numerical analysis for crop growth effect on pesticide residue dynamics** Kazuaki Iijima[1,2], iijima@iet.or.jp, Kei Kondo[1], Fuki Iwasaki[1], iwasaki_fuki@iet.or.jp, Takahiro Watanabe[2]. *(1) The Institute of Environmental Toxicology, Joso, Ibaraki, Japan(2) The National Institute of Health Sciences, Kawasaki, Kanagawa, Japan* When extrapolating a minor crop for which there is little residue data to the MRL group, it is important to quickly and easily predict the residue level of the minor crop compared to the levels of the representative crops of the MRL group. To simulate pesticide residue dynamics during field trial, the dilution effect of residue level on crop growth is important as well as degradation and was-off *via* precipitation of active ingredients (A.Is.). However, it is difficult to consider the geometrical characteristics of target crops because residue data is expressed as weight fraction. Therefore, a novel approach to predict residue level was developed; the crop morphology in various growth stages is investigated by 3D scanning and modelled by various geometrical models and then, the optimal geometrical model was coupled with a simple mass balance model to predict pesticide residue sprayed on fruiting crops. In this model, pesticide residue is expressed as the deposited amount per unit area and can be converted to weight fraction basis by the key parameter of surface area–weight ratio [$R_{\mathrm{A/W}}$ ($\mathrm{cm^2/g}$)]. Another key parameter controlling the spray deposition characteristics of A.Is. on crop surface is the mass deposited per surface area normalized by the application rate [$M_{0,\ \mathrm{norm}}$ ($\mu\mathrm{g/cm^2}$ in kg a.i./ha)], which can be derived from the calibration model with water retention amounts [$M_{\mathrm{W}}$ ($\mathrm{mg/cm^2}$)]. The developed model was tested by cucumber dataset collected from in-house experiments as well as public sources. The details of the results will be visually and statistically presented in the poster.

**Posters – NOON - Undergraduate Poster Competition**

**Resveratrol-enhanced oat straw cellulose films for food packaging applications** Kylie Rosenau[1], kylie.rosenau@jacks.sdstate.edu, Sumi Regmi[2], Sandeep Paudel[2], Sharad Bhattarai[2], Srinivas Janaswamy[2]. *(1) Chemistry, Biochemistry, and Physics, South Dakota State Univ., Brooking(2) Dairy and Food Science, South Dakota State Univ., Brookings* Plastic pollution poses serious environmental and health risks, as most plastics ultimately end up in landfills or ecosystems, where they break down into harmful microplastics and nanoplastics. To this end, biodegradable cellulose-based films offer a promising alternative for eco-friendly packaging. In this study, oat straw cellulose films were prepared with varying concentrations of resveratrol (0.1–0.7 g/L) to investigate the effect of an antioxidant compound on film properties. Tests on mechanical, physical, and biodegradation properties showed that the presence of resveratrol subtly changes the film's moisture content (10–11.5%), solubility (21–22%), tensile strength (32–38 MPa), elongation at break (2.5–4%), total color change (2.4 to 5.0), whiteness, and yellowness. However, enhanced antioxidant activity and reduced biodegradation are observed, suggesting the film's potential use as a replacement for plastic and as a shelf-life-enhancing packaging material. These findings suggest that oat straw cellulose films are a feasible and sustainable packaging option, and resveratrol may boost antioxidant activity without affecting mechanical or physical properties.

**Parameterization of the fermentation process of pineapple juice (ananas comosus)** Miller S. Rodriguez, rodriguez.miller@uniagraria.edu.co, Amy Castro. *bogota, UNIAGRARIA, Bogotá, Colombia* Pineapple guarapo (*Ananas comosus*) is a traditional Colombian fermented beverage of high cultural value. However, its production lacks standardization, limiting safety, quality, and industrial scalability. This research aimed to parameterize the fermentation process of pineapple guarapo to establish technical bases for its preservation and potential industrial development. The study was conducted through an experimental design, using a completely randomized arrangement with two factors: yeast type and pineapple pulp concentration. Physicochemical parameters (pH, soluble solids, acidity, and ethanol), bioactive compounds (total phenolics and antioxidant capacity), microbiological behavior, and sensory acceptance were evaluated throughout seven days of fermentation and in the pasteurized product. Results showed that yeast BE-134 and a 33% pulp concentration represented the optimal conditions for fermentation. Soluble solids decreased from 29 to 18 °Brix, while ethanol content increased to 16.6% v/v by day 7. Total phenolic content and antioxidant capacity rose progressively, peaking between days 5 and 7, though both decreased after pasteurization. Microbiological analysis confirmed yeast viability during the process, despite the absence of cultivable colonies in later stages, suggesting the presence of a viable but non-culturable (VBNC) state. Sensory analysis revealed high consumer acceptance, highlighting balanced pineapple aroma, flavor, and sweetness. In conclusion, the fermentation of pineapple guarapo can be parameterized through controlled conditions, yielding a beverage with stable physicochemical properties, relevant bioactive content, and favorable sensory acceptance. This study provides a scientific basis for the valorization and potential industrialization of a traditional Colombian beverage, contributing to cultural preservation and the development of the national agro-food sector

**Color transformations in sunflower seed butter: A natural colorant source?** Bryce Bragg[1], BBragg19@my.fisk.edu, Sanaz C. Habibi[2], Kaci L. Kuntz[1]. *(1) Life and Physical Sciences -- Chemistry, Fisk Univ., Nashville, Tennessee(2) Physical Sciences, Kutztown Univ. of Pennsylvania* Synthetic food dyes remain widely used in the US amid consumers raising health and environmental concerns—which is fueling demand for safer, plant-based alternatives. Sunflower seeds present a unique and under-studied opportunity as a natural food colorant. When sunflower seed butter cookies are baked in alkaline conditions (e.g. baking soda, pH ~8–9), these cookies undergo a transformation from light brown to vivid green to bright teal (see attached figure), particularly pronounced under humid conditions. Based on previous literature, these color changes are attributed to the oxidation of chlorogenic acid (CGA), as the compound reacts with amino acids to form green pigments. However, the precise chemical mechanisms including the roles of proteins, specific amino acids, sugars, pH ranges, time, temperature, and environmental factors remain unclear. While previous work has sought to minimize the green color in cookies containing sunflower butter, little has been done within the food industry to leverage these colored pigments. Herein, this project focused on studying the reaction conditions and mechanisms that produces these pigments, from the perspective of implementing these pigments within foods (e.g. slightly acidic pH values, aqueous environments, etc.). Specifically, we utilized chemical assays, chromatographic separation, and spectroscopic analysis to characterize the interactions between CGA, amino acids, and other food components under various temperatures, sugars/sweeteners, and pH environments. Ultimately, this research provides insights into the reaction mechanisms and conditions for novel pigment formation and highlights sunflower seed butter as a promising natural food colorant alternative.

**Leveraging local water composition: A practical toolkit for consistent microbrewery beer quality** Cora Walesch, wales1ce@cmich.edu, Jonah Guerrero, Dale J. Lecaptain. *Chemistry and Biochemistry, Central Michigan Univ., Mount Pleasant, Michigan* Beer brewing has been an important part of human culture for thousands of years. Over time, distinct beer styles have emerged worldwide, shaped by the unique water compositions of their regions.

Multiple water characteristics impact the resulting beer's flavor, mouthfeel, and aroma, including mineral content, pH, chlorine and chloramine levels, hardness, and dissolved oxygen concentrations. Large-scale breweries possess the resources to purify and adjust their water to accommodate any beer style they wish to produce. Microbreweries, however, must work within the constraints of their local water composition. To address this challenge, we are developing an affordable water quality testing kit that measures critical water quality parameters important to beer production. The kit's validation includes analysis using standard water quality techniques such as ion chromatography and ICP-OES (inductively coupled plasma optical emission spectroscopy). These water parameters will be monitored throughout the brewing process to establish best practices and techniques for achieving desired brewing outcomes. This kit will enable microbreweries to determine their water composition on a batch-by-batch basis, empowering them to make informed brewing decisions and optimize their processes for consistent, high-quality beer production.

**Visualizing plant stress: Hyperspectral imaging of invasive weeds in Monterey County** Elijah W. Brunnengraeber, ebrunnengraeber@csumb.edu, Arunkumar K. Sharma, Tyler Cassidy. *Biology and Chemistry, California State Univ. Monterey Bay, Seaside* Monterey County is one of the most agriculturally productive regions in the US, particularly for leafy greens. However, its farms face constant threats from weed species that compete with crops, reduce yields, and act as disease reservoirs. Two of the most problematic are annual sowthistle (*Sonchus oleraceus*) and little mallow (*Malvia parviflora*), both of which spread quickly and are known vectors of impatiens necrotic spot virus (INSV). INSV presents as necrotic spotting and can cause severe stunting or complete crop loss. In heavily affected fields, INSV related damage has been reported at rates approaching 100%. Early detection and classification of these weed species could lead to more effective management strategies. To support this effort, we developed a hyperspectral imaging (HSI) dataset to capture the spectral reflectance profiles of S. *oleraceus* and M. *parviflora* grown under five controlled abiotic stress treatments: standard conditions, drought, overwatering, high fertilizer, and no fertilizer. Plants were grown in greenhouse conditions and imaged weekly using a Specim IQ handheld HSI camera (400-1000 nm, 204 spectral bands). These measurements enabled the creation of full spectral profiles. Custom MATLAB scripts were developed to perform k-means clustering for region of interest (ROI) extraction, followed by calculation of spectral vegetation indices including the Normalized Difference Vegetation Index (NDVI), Photochemical Reflectance Index (PRI), and spectral entropy. This data set is designed to support supervised machine learning applications, such as 3D convolutional neural networks for stress classification and species recognition, and to inform the development of autonomous weed detection systems.

**Evaluation of phosphate-solubilizing capacity of rhizobacteria from rice fields in Guanacaste, Costa Rica: A step toward biofertilizer development** Susana P. Castro[1], susana.castro.colorado@est.una.ac.cr, Emanuel Potoy Requene[2], María B. Gómez Bogantes[1], Irena Hilje Rodriguez[2], Silvia Hernandez Villalobos[2], Mairon Madriz Martínez[2], Jose A. Rodríguez Corrales[1]. *(1) LIDETEQ, Escuela de Quimica, Univ. Nacional, Heredia, Heredia, Costa Rica(2) Escuela de Ciencias Agrarias, Univ. Nacional, Heredia, Heredia, Costa Rica* Phosphorus is an essential macronutrient for rice cultivation; however, it is often present in insoluble forms in agricultural soils, limiting its bioavailability and driving the intensive use of phosphate fertilizers. In Costa Rica, more than 80% of rice farms rely on chemical fertilizers, a practice that sustains yields but contributes to adverse environmental impacts, including eutrophication and groundwater contamination. As a sustainable alternative, plant growth-promoting microorganisms, particularly phosphate-solubilizing bacteria (PSB), can convert insoluble phosphorus into bioavailable forms, thereby enhancing nutrient uptake and reducing dependence on synthetic inputs. To investigate this potential, rhizospheric soil samples were collected from rice fields in Guanacaste, Costa Rica. Bacterial isolates with solubilizing activity were identified through serial dilutions and spread plating on NBRIP medium supplemented with $Ca_3(PO_4)_2$ as insoluble phosphate source, followed by incubation at 28 °C for 14 days. A total of 27 colonies showed clear halos around their growth, an effect associated with the release of organic acids that dissolve phosphate. Colony and halo diameters were measured to calculate the solubilization index (SI), allowing the selection of the most promising strains. These isolates were subsequently evaluated quantitatively in liquid NBRIP medium supplemented with $Ca_3(PO_4)_2$. After 48 hours of incubation at 30 °C under constant agitation, cultures were centrifuged, and the soluble phosphorus in the supernatant was determined using the vanadomolybdate colorimetric method. Quantification was performed against a calibration curve prepared with $KH_2PO_4$ as a primary standard, allowing comparison with uninoculated controls. Finally, the bacteria were molecularly characterized through 16S rRNA gene amplification and sequencing. The solubilization capacity of these strains, their molecular identity, and preliminary results from liquid culture scaling aimed at biomass production for biofertilizer development will be presented, along with perspectives for future research.

**Development of a computational tool for kombucha titration analysis** Cole Pearson[1], colepearson04@gmail.com, Jeb Kegerreis[1], John N. Richardson[1], Luis Melara[2]. *(1) Chemistry & Biochemistry, Shippensburg Univ., Pennsylvania(2) Mathematics, Shippensburg Univ., Pennsylvania* Kombucha is a fermented tea beverage that uniquely relies on a symbiotic culture of bacteria and yeast (SCOBY) to facilitate the fermentation process. Kombucha's flavor profile is largely determined by the complex array of organic acids present in the beverage, the two most common acids being acetic acid and gluconic acid. The current standard method employed to determine the acid concentrations within a mixture is high-performance liquid chromatography (HPLC) with an ultraviolet (UV) detector, but this is a time-consuming and expensive process. Previous work at Shippensburg Univ. demonstrated that it is possible to determine a sample's component acid concentrations and unique acid dissociation constants ($K_a$) from a single titration curve by fitting a theoretical model to the data that returned the desired information as regression parameters. Over the past two decades, an extensive suite of similar software has been released to the public by various sources, but these programs suffer from many limitations including poor accessibility, usability, and efficacy, necessitating the development of improved dedicated software for this analysis. While the previous model (termed the "stoichiometric model") was successful in predicting the concentrations and $K_a$ values of the component acids of the weak acid mixtures under study, it necessitated an arbitrary "pH drop" of the data. The research presented here incorporated the thermodynamic theory of aqueous electrolyte activity to develop a different model, termed the "thermodynamic model." This model, written in MATLAB and utilizing the Levenberg-Marquardt algorithm, was successful in deducing the concentrations and $K_a$ values of the acidic components within an array of kombuchas without necessitating the use of an ad hoc pH drop. Further, the thermodynamic model simultaneously provided activity coefficients, offering previously unreported insights into the physical phenomena of the kombucha system. Titration analysis results using the thermodynamic model showed minimal differences in acetic and gluconic acid concentration quantification relative to HPLC. Thus, this computational tool has the potential to have a profound impact on the study of the food chemistry of beverages, as acquiring a beverage's acid profile from a potentiometric titration increases the accessibility of such information by avoiding more costly and time-consuming instrumental techniques.

**General Posters – NOON -**

**Fermentation of artichoke by-products for the sustainable production of bioactive cosmetic molecules** *Nicola Cicero[1,2,3], nicola.cicero@unime.it, Laura DeMaria[1], Rita De Pasquale[1], Eleonora Di Salvo[1], Rossella Vadala[1], Rosaria Costa[1], Giovanna Lo Vecchio[1]. (1) Dept. of Biomedical Dental Morphological and Functional Imaging Sciences, Univ. degli Studi di Messina, Sicily, Italy(2) National Research Council, Institute for Agricultural and Forest Systems in the Mediterranean, Catania, Italy(3) Science4life S.r.l. Start Up, Messina, Italy* Fermentation represents a sustainable and environmentally friendly strategy for valorizing agri-food byproducts by producing bioactive ingredients for the cosmetics industry. In this study, artichoke (Cynara scolymus) waste, following ultrasound-assisted enzymatic hydrolysis, was used as a growth substrate for the yeast Phaffia rhodozyma, a natural producer of astaxanthin, a carotenoid widely recognized for its antioxidant, anti-inflammatory, and photoprotective properties. Fermentation, conducted for 1 week under controlled conditions (pH and temperature), produced a yield of 243 mg/L of astaxanthin, demonstrating the effectiveness of this biotechnological approach. The resulting astaxanthin extract showed strong antioxidant activity in the DPPH assay, with a clear dose-dependent response and IC50 values consistent with those reported in the literature for natural or microbial sources of the pigment. These results confirm the high free radical scavenging capacity of the obtained astaxanthin and support its potential use as a natural active ingredient in cosmetic formulations designed to protect the skin from oxidative stress and prevent premature aging. Overall, the findings highlight how microbial fermentation of plant by-products can represent a sustainable and circular route for the production of high-value bioactive compounds, suited to the needs of modern and eco-conscious cosmetics.

**Enhancing functional properties of pea protein through glycation with hydroxypropyl methyl cellulose** Bryan Castellanos, bcastel2@vols.utk.edu. *Food Science, UT AgResearch, Knoxville, Tennessee* Highly functional pea protein (PP) ingredients are demanded. This study aims to modify PPs by reacting 1.0% w/v PP isolate (PPI) with 2.0% w/v hydroxypropyl methyl cellulose (HPMC) at pH 10.0, 11.0, and 12.0 for 0.5, 1.0, 2.0 and 4.0 h at 20 °C. After the reaction, the pH was adjusted to 7.0, followed by centrifugation and dialysis of the supernatant prior to analyses. The reducing gel electrophoresis and FTIR confirmed the glycation. The degree of glycation measured with the ortho-phthalaldehyde assay was the highest at pH 11.0 for 1.0 h (56.0%) and pH 12.0 for 2.0 h (54.6%). Unlike PPI, the PPI-HPMC samples reacted for 2.0 h were translucent and free of precipitation at pH 4.5 and 3.0. The Z-average diameter of PPI at pH 7.0 was reduced from 5124.3 nm to 559.7-655.7 nm after glycation, which was consistent with atomic force microscopy results. The alternation in protein tertiary structure was also evidenced by the greater decline of fluorescence intensity for conjugates produced at a longer reaction time. The denaturation temperature of PPI at pH 7.0 was increased from 91.4 °C to 96.9, 104.5 and 106.1 °C for the conjugates prepared for 2.0 h at pH 10.0, 11.0 and 12.0, respectively, which was consistent with the increased thermal stability. Furthermore, the solubility of conjugates at pH 2-11 was consistently higher than PPI and was pH-independent, with the most significant increase at pH 4.5. The conjugates also showed significant improvements in emulsifying, foaming, water holding, and oil holding properties. The novel glycation method in this study offers a sustainable and scalable strategy to enhance pulse protein functionalities for food and non-food applications.

**Using alphafold to engineer transient tertiary structure (TTS) tags for enhanced expression and phosphorylation of casein proteins** Sierra Murrell, smurrell3782@sdsu.edu, Mia Bartolovich, Changqi Liu, Jing Zhao, John J. Love. *San Diego State Univ., California* The primary aim of this research is to produce the nutritious casein proteins found in milk using precision bacterial fermentation. As the global population continues to grow, the demand for reliable sources of high-quality protein will increase, and recombinant casein production provides a method to supplement traditional dairy farming. Caseins are intrinsically disordered proteins that often form insoluble aggregates when expressed in E. coli, which complicates purification and limits yields. To address this challenge, we are using AlphaFold3 to design Transient Tertiary Structure (TTS) tags that provide temporary increased stability/folding for the caseins during expression. These TTS tags reduce aggregation of αS1-casein and improve solubility allowing for more efficient recovery of the protein. Beyond expression, it is also important to replicate the native phosphorylation of caseins, which plays a key role in stabilizing micellar structures and influencing their structural and functional properties. To achieve this, we utilize a Bacterial Surface Display (BSD) system that enables expression of the kinases FAM20C and CK2 on the surface of E. coli. This will enable phosphorylation of the milk protein such as αS1-casein at serine and threonine residues. A red-fluorescent mCherry reporter was included to visibly confirm kinase expression, and AlphaFold3 predictions suggest that phosphorylation promotes α-helical formation, indicating a transition from disordered to more ordered structures. The TTS tags on the caseins can be removed following phosphorylation using the TEV protease to yield a functional protein ready for colloid formation. Our lab has successfully demonstrated using TTS tags to improve the expression and purification of αS1-casein and expressed the kinases in the BSD system. These strategies establish a framework for producing soluble and phosphorylated caseins using bacterial fermentation. This work not only demonstrates an approach to generate functional αS1-casein for food applications such as cheese but also lays the foundation for scalable production of the other caseins that are critical for milk protein functionality. By combining structural stabilization during expression with post-translational modification, this research provides an additional path to supply nutritious proteins to meet the dietary needs of a growing population.

**Optimization of chemical and physical conditioning of distillers' dried grains (DDGS) with solubles for biodegradable film production** Elif Peker[1], elifp@ksu.edu, Umut Yucel[1], Valentina Trinetta[1], Hulya Dogan[2]. *(1) School of Health Sciences, Kansas State Univ., Manhattan(2) Grain Science, Kansas State Univ., Manhattan* Distillers Dried Grains with Solubles (DDGS), a coproduct of grain fermentation and bioethanol production, is rich in protein and fiber can be repurposed to manufacture biopolymer films. However, it requires suitable pretreatment to functionalize the insoluble fibers and proteins that present as heavily agglomerated forms. The objective of this study was to systematically examine the effects of chemical pretreatment, defatting, and ball milling on the structural, mechanical, and barrier properties of DDGS-based films. DDGS (defatted and non-defatted) was subjected to two ball milling cycles (one or three) with four chemical treatments for a total of 16 sample sets: water (control), HCl (CONCENTRATION), NaOH (CONC), and NaOH + EtOH (CONC). Films were prepared via the casting method using DDGS (10% w/w) in water, locust bean gum (0.5%), xanthan gum (0.5%), and glycerol (2%) were added for improving plasticity based on our earlier work. The solution is heated and stirred at 500 rpm for 2 h before casting and subsequent drying. Films were characterized for surface hydrophobicity (SH), tensile strength (TS), water resistance (WR), thickness, and color analysis. Each set was performed with four replicates, and statistical analyses were conducted using ANOVA. NaOH pretreatment significantly ($p < 0.05$) and more than 40%

decreased the color difference (ΔE) to a lowest of 13.79 ± 4.47 as compared to the 20.11 ± 2.75 in water-treated non-defatted controls, indicating more clarity. Chemical pretreatment significantly ($p < 0.05$) increased the TS, for example, from non-defatted HCL films exhibiting the highest strength (0.57 kg.N), decreasing to 0.20 kg.N in films treated only with water. Additional ball milling cycles further decreased tensile strength and thickness, indicating disruption of structural integrity. The SH was similar ($p > 0.05$) in all non-defatted or defatted films. Defatting decreased the contact angle, thus surface hydrophobicity, from 47° for the defatted ones to 32°, indicating the contribution of lipids to surface properties. This aligns with the observations for the water resistance, where the films with HCl pretreatment showed 50% more permeability as compared to the NaOH pretreated films Overall, pretreatment and defatting significantly affected DDGS film properties, with NaOH reducing color difference, HCl maintaining higher strength, and defatting increasing moisture uptake.

**3D food printing enhances lutein delivery** Oluwatobi Amusat[1], oamusat@uark.edu, Safoura Ahmadzadeh[1], Sorour Barekat[1], Ali Ubeyitogullari[1,2], Sun-Ok Lee[1]. *(1) Food Science, Univ. of Arkansas, Fayetteville (2) Dept. of Biological and Agricultural Engineering, Univ. of Arkansas, Fayetteville* Lutein, a naturally occurring carotenoid abundant in leafy greens, fruits, and egg yolks, is widely recognized for its role in ocular health, particularly in mitigating age-related macular degeneration. Beyond its visual benefits, lutein exhibits potent antioxidant, anti-inflammatory, cardioprotective, and anticancer properties. Despite these advantages, its poor solubility and low bioavailability limit its effectiveness in functional food and nutraceutical applications. To address this challenge, this study investigated the release rate and intestinal transport efficacy of lutein using 3D food printing (3DFOODP) as a delivery system. 3DFOODP-encapsulated lutein (3DL) was compared to free lutein and a non-printed physical mixture of lutein with wall materials. Simulated gastrointestinal digestion was conducted to evaluate the release rate and bioaccessibility. In addition, antioxidant activity was assessed before and after digestion using radical scavenging and ferric reducing antioxidant power assays. Caco-2 cell monolayers served as an *in vitro* model for intestinal absorption and bioavailability. All data were analyzed using JMP Pro 17. Compared to controls, 3DL demonstrated significantly enhanced release during the intestinal phase and a higher bioaccessibility ($p < 0.05$). Post-digestion, the antioxidant activity remained significantly higher in the 3D-printed samples, indicating improved stability and functional retention. In addition, transport efficiency across Caco-2 cells was significantly higher than the control samples, with apparent permeability values 2.1–2.3 times greater than those of lutein and the crude mixture. These findings position 3DFOODP as a promising technology to overcome lutein's bioavailability limitations, enabling the design of next-generation functional foods and nutraceuticals with enhanced health benefits**.**
**(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Managing the malolactic fermentation to drive stylistic differences in Pinot Noir wines** Nicholas C. Mannino, nicholas.mannino@oregonstate.edu. *Food Science & Technology, Oregon State Univ. College of Agricultural Sciences, Corvallis* Malolactic fermentation (MLF) is a pivotal step in red wine production, influencing aroma, mouthfeel, and stability. Traditionally performed sequentially after alcoholic fermentation (AF), MLF can also be initiated concurrently during AF, potentially shortening production timelines. This study evaluated the effects of MLF timing (concurrent vs. sequential) and lactic acid bacteria strain (three *Oenococcus oeni* and one *Lactoplantibacillus plantarum* strain) on Pinot Noir fermentation kinetics, chemical composition, and sensory characteristics. Concurrent MLF completed more rapidly than sequential MLF without extending AF duration. Among strains, *O. oeni* Berry completed MLF fastest, while *L. plantarum* Prime was slowest. Acetic acid levels varied, with concurrent *O. oeni* Berry fermentations producing the highest concentrations and *L. plantarum* Prime the lowest. Sequential MLF with *L. plantarum* Prime resulted in higher color intensity. Polymeric pigment content was generally greater in the sequential treatments. 2D-NMR analysis revealed differences in polymer length and mean degree of polymerization between treatments, with concurrent MLF typically producing lower polymerization indices. GC-MS volatile profiling identified strain- and timing-specific differences in key aroma compounds, including esters and higher alcohols. Correlation of these differences in volatile aroma compounds and wine sensory attributes is ongoing. These findings indicate that MLF timing and strain choice could be strategically managed to modulate wine chemistry and potentially sensory attributes. Ongoing integration of phenolic and volatile data will further inform process optimization for the creation of different targeted wine styles.

**Valorisation of rice husk biosilica for cereal and legume seeds preservation** Zing Zing Bertrand, zingbertrand29@gmail.com. *Postharvest Technology, Institute of Agricultural Research for Developmenty, Yaoundé, Centre, Cameroon* Common bean (*Phaseolus vulgaris* L.) is a major source of affordable, high-quality dietary protein that complements maize (*Zea mays* L.)-based diets. Traditional storage of these seeds in sacks and glass jars without treatment often leads to infestation by insect pests, such as *Acanthoscelides obtectus* and *Sitophilus zeamais,* causing significant grain losses. This study evaluated grain losses, specifically grain damage and weight loss, after mixing biosilica with maize and common bean seeds, which were stored in glass jars (GJs), polyethylene (PE), and polypropylene (PP) bags, alongside negative controls (without biosilica), over a six-month period. Seed viability was also assessed during the storage period. The initial moisture level of less than 13% for all grain cultivars species was favorable for storage. After six months of storage without treatment, less than 50% of common beans (FEB 190 and NUV6) and more than 65% of maize seeds (CMS 8501 and CMS 8704) were affected. For treated seeds stored using different materials, only polyethylene bags and glass jars were more effective for common beans than for maize seeds after five months of storage. However, by the sixth month, all three conservation materials showed an insect perforation index of less than 50%, suggesting a positive protective effect of the biosilica. With seed viability exceeding 80% for both maize and common beans treated and stored in polyethylene and polypropylene over six months, the application of biosilica-coated seeds in bags can reduce storage losses. This, in turn, can help farmers improve safe grain storage over longer periods, ultimately enhancing their livelihoods and income.

**Comparative exposure and risk assessment of heavy metals, nutrients, and organochlorine pesticides in cow and plant-based milks** Tuan Phan, Tuan.Phan@tsu.edu, Sonya C. Good, Chukwunonso Anakwue. *Chemistry, Texas Southern Univ., Houston* Cow milk and plant-based milk alternatives (PBMAs) are dietary staples, yet environmental contaminants like heavy metals and organochlorine pesticides (OCPs) threaten their safety. This study quantifies lead (Pb), cadmium (Cd), chromium (Cr), essential macro and micro mineral nutrients, and banned OCPs (hexachlorobenzene, mirex, dicofol) in cow milk and PBMAs (almond, soy, oat, coconut, hemp, rice), using ICP-MS and GC-ECD. Pb (up to 1.0 ppb in hemp milk), Cd (0.1–0.4 ppb in soy, rice, oat, hemp), and Cr (up to 1.2 ppb in hemp milk) were detected, while cow milk showed levels below detection limits (Pb: <0.1 ppb, Cd: <0.05 ppb, Cr: <0.2 ppb). OCPs exceeded WHO thresholds, with dicofol at 946 ppb (cow milk) and 962 ppb (soy milk). PBMAs showed high nutrient levels (e.g., almond milk: 27,563.3 ppb calcium). These findings highlight how environmental contamination of milk and PBMAs can occur globally, underscoring the need for enhanced food safety measures.

**Molecular dynamics simulation of ovalbumin at a triolein-water interface** Julie Fetrow[1], jparsons6220@sdsu.edu, Charles Bilgrien[1], Jing Zhao[1], Sungwook Hong[2], Lexi Hwang[3], Changqi Liu[1], changqi.liu@sdsu.edu. *(1) San Diego State Univ., California(2) Loyola Marymount Univ., Los Angeles, California(3) Cal State LA, Los Angeles, California* Proteins at oil-water interfaces govern emulsion stability and function. We performed molecular dynamics (MD) simulations of ovalbumin at a triolein-water interface and compared its behavior to that in bulk water. The oil phase comprised 277 triolein molecules in an 8.26 × 8.26 × 6.61 $nm^3$ slab ($\rho$ = 0.90 g $cm^{-3}$). Simulations used GROMACS with the GROMOS 54a7 (ATB) force field and SPC/E water. Following steering to the interface, restrained NVT simulations at 300 K were performed to hold the protein at the oil-water boundary for structural and dynamical analysis. At the interface, ovalbumin exhibited pronounced structural remodeling. The α-helix and β-sheet content decreased from 26.0% in water to 17.6% at the interface and from 32.1% to 23.5%, respectively, while loop structures increased from 39.5% to 55.3%, indicating partial unfolding and enhanced flexibility. Consistently, the root-mean-square deviation rose from 0.19 ± 0.01 nm in water to 0.25 ± 0.03 nm at the interface, and the radius of gyration expanded from 2.21 ± 0.01 nm to 2.33 ± 0.02 nm, indicating a less compact state. Intramolecular hydrogen bonds declined from 288.0 ± 8.4 in water to 252.3 ± 8.9 at the interface, and the number of water molecules within 5 Å of the protein decreased from 1732 ± 26 to 1308 ± 25, reflecting reduced hydration near the oil boundary. Interestingly, the solvent-accessible surface area increased from 172.9 ± 2.3 $nm^2$ in water to 190.0 ± 2.7 $nm^2$ at the interface, likely due to interfacial unfolding that exposes additional surface area. These results provide molecular-level evidence that adsorption to a hydrophobic interface drives ovalbumin toward a more expanded and flexible state, offering mechanistic insights into its interfacial activity in food emulsions.

**Integrated processing effects of high pressure homogenization and gellan gum on soymilk's physical stability and physicochemical properties** Jerish Joyner Janahar, jerishjoyner.j@gmail.com, Sam K. Chang, schang@fsnhp.msstate.edu, Yan Zhang, yzhang@fsnhp.msstate.edu, Lin Bi, lb2224@msstate.edu. *Experimental Seafood Processing Lab, Coastal Research & Extension Center, Mississippi State Univ., Pascagoula* Soymilk is a nutritious beverage with rising consumption due to its lactose-free, vegan-friendly and high protein composition. Commercial soymilk processing faces challenges including sedimentation and textural changes. In this study, the influence of a novel processing method integrating high pressure homogenization (HPH) with a natural hydrocolloid-gellan gum on the stability and physicochemical properties of soymilk was investigated. Raw soymilk was extracted by hot grinding and gellan gum was added at different concentrations (0, 0.03, 0.05, 0.07 and 0.09%, w/v) followed by cooking at 100 °C for 30 min. Soymilk was processed by HPH at 4 pressure levels of 0, 17, 50, and 100 MPa and stored at 4 °C. The physicochemical properties including particle size, viscosity, precipitate, surface hydrophobicity, fluorescence were analyzed on 0, 45, 90 and 135 days. Results showed that with no HPH treatment, the particle size of soymilk increased with gum concentration above 0.03%. Upon HPH, the particle size decreased by at least 80% for all samples and a minimum size of 0.13 µm was attained at 100 MPa. When 0 or 17 MPa was applied, the precipitate decreased with the increase of gum concentration. However, at some high doses of gum and storage time, the application of 50 and 100 MPa could increase the precipitation, indicating an interaction effect of the factors including gum concentration, pressure and storage time. On day 135, the novelly devised method could reduce precipitate from 14% (control, no gum and no pressure) to below 3%. Viscosity increased with the gum added, highlighting the role of viscosity in retarding the migration of protein particles. Increases in HPH pressure led to decreases in viscosities, which could be due to breakdown of aggregates and protein unfolding by high mechanical forces generated by HPH. This was evidenced by increased surface hydrophobicity and fluorescence at 100 MPa. Additions of gum and HPH showed synergistic effect on soymilk stability and physicochemical properties. These findings provided valuable insights into understanding the stability mechanism and quality of soymilk, and revealed optimum conditions for soymilk processing.

**Extraction, encapsulation, and antioxidant capacity of anthocyanins from Peruvian purple corn (*Zea mays L.*)** Daniel Victor V. Alvino Garcia, danielalvino2013@hotmail.es, Melissa Rabanal. *Facultad de Química e Ingeniería Química, Univ. Nacional Mayor de San Marcos, Lima District,, Peru* Peruvian purple corn (*Zea mays L.*, variety INIA 601) is recognized as one of the richest natural sources of anthocyanins worldwide, particularly in the cobs. In this work, anthocyanins were extracted from dried and ground cobs using aqueous ethanol solutions (20–40%, pH 2 adjusted with HCl) under different temperature (25–70 °C) and time (1–2 h) conditions. The average yield was 0.420 g of crude extract per g of dry sample. UV–Vis spectroscopy confirmed the presence of anthocyanins with a maximum absorption at 510 nm, consistent with reported values. Encapsulation was performed by mixing 25 mg of extract with alginate (1.5% w/v) and solidifying in CaCl2 (1.1% w/v). The resulting microcapsules exhibited spherical morphology with diameters of 0.8–1.2 mm. The encapsulation efficiency, determined by the pH differential method, reached ~83%, corresponding to ~20 mg of extract retained per 25 mg initially added. Antioxidant capacity was assessed by the DPPH assay, showing that encapsulation preserved radical scavenging activity while improving pigment stability compared to free extracts. These results highlight the potential of Peruvian purple corn anthocyanins as stable natural antioxidants with applications in functional food and nutraceutical formulations.

**Changes in digestibility, viscosity, and microstructural properties of waxy and non- waxy rice starches after microwave heat-moisture treatment** Alfred Anderson, alfanders@gmail.com. *Food Science and Nutrition, Kuwait Univ., Safat, Al Asimah Governorate, Kuwait* Waxy and non-waxy rice starches adjusted to 20% moisture (wet basis, w.b.) were heat-moisture treated in microwave oven to determine the effects of the microwave heating characteristics on digestibility, pasting, and morphological properties of the heated starches. Microwave heating produced only minimal changes in digestibility as well as the physical characteristics of heated starches. Significant changes in viscosity properties after microwave heat treatment were observed for both waxy and non-waxy starches heat-treated in a microwave oven, relative to non-treated samples. Non-waxy starch heated in microwave oven showed an increase in breakdown viscosity from 29.8 RVU (non-treated starch) to 35.8 RVU after heating for 60 min. However, for waxy starch, breakdown viscosity decreased from 112.7 to 35.9 RVU after 60 min of microwave heat treatment reflecting an increased stability of microwave heat-treated starch under cooking. The data obtained in this study indicate that there was much higher re-aggregation of starch granules in waxy starch after microwave heat treatment than occurred in non-waxy starch, suggesting a re-association of amylopectin branch chains in the heat-treated waxy starch.

**Analysis of vitamin K content in traditional korean soy-based fermented foods** Keono Kim, Min Hyeok Ju, Jeehye Sung, jeehye@gknu.ac.kr. *Food Science and Biotechnology, Gyeongkuk National Univ., Andong-si, Gyeongsangbuk-do, Korea (the Republic of)* Fermented foods play an integral role in Korean cuisine, serving as key ingredients that enhance both flavor and nutritional value.

Among the various nutrients found in these foods, vitamin K is a fat-soluble vitamin essential for blood coagulation and bone metabolism. Because of its physiological role, dietary intake of vitamin K requires careful management, particularly for individuals taking anticoagulant medications, such as warfarin. Based on its chemical structure, vitamin K is classified into phylloquinone (PK), primarily derived from green leafy plants, and menaquinones (MK-n), which are produced by microbial fermentation and are predominantly found in animal-based or fermented foods. Among the menaquinones, MK-7 has been reported as the predominant form in fermented food products. Despite the widespread consumption of 19 fermented soy-based foods including cheonggukjang, doenjang, and ganjang in Korea, reliable data on their vitamin K content remain limited. The present study aimed to determine the contents of PK, MK-4, and MK-7 in traditional Korean fermented soy products—cheonggukjang, doenjang, and ganjang—and to provide foundational data for nutritional evaluation. Vitamin K compounds were extracted using solvent extraction method II in combination with enzymatic hydrolysis and subsequently quantified using HPLC equipped with a fluorescence detector after reducing quinones to fluorescent hydroquinones with zinc powder. In doenjang, PK concentrations ranged from 15.72 ± 0.06 to 18.87 ± 0.27 μg/100 g, and MK-7 levels from 28.77 ± 0.35 to 32.11 ± 0.02 μg/100 g, while MK-4 was not detected in any samples. In ganjang, both PK and MK-4 were not detected, whereas MK-7 was present in lower amounts ranging from 1.64 ± 0.02 to 3.27 ± 0.01 μg/100 g. In contrast, cheonggukjang and cheonggukjang powder exhibited markedly higher levels of vitamin K, with PK ranging from 13.78 ± 0.01 to 47.47 ± 0.05 μg/100 g and MK-7 from 80.64 ± 0.45 to 98.68 ± 0.68 μg/100 g, indicating that powdered products contain more concentrated vitamin K forms due to moisture removal during processing. This study presents comprehensive data on the vitamin K composition of traditional Korean soy-based fermented foods, providing essential baseline information for evaluating their functional properties and developing dietary guidelines for populations requiring regulated vitamin K intake.

**Salicylic acid enhances the muscle-protective effects of garlic sprouts** Seonghwa Hong, tjd3465@naver.com, Junsoo Lee. *Chungbuk National Univ., Cheongju-si, Chungcheongbuk-do, Korea (the Republic of)* Garlic (*Allium sativum* L.) has been reported to exhibit diverse biological activities, including antihypertensive, antioxidant, anticancer, hepatoprotective, and anti-sarcopenic effects. In particular, garlic sprouts (GS) have been shown to possess superior antioxidant and muscle-protective properties compared with garlic bulbs. Elicitors are substances that induce physiological and morphological changes in the target plant organism, and they are widely used to enhance the yield of secondary metabolites with valuable bioactivities in plant cells, tissues, or the whole plant. Therefore, elicitation is an efficient tool for improving the content of bioactive compounds and their biological activities in sprouts. Salicylic acid (SA) is a naturally occurring compound in plants that shows great potential as an elicitor molecule. SA functions as an elicitor by triggering plant defense responses and stimulating the production of various secondary metabolites. In this study, we evaluated the effects of SA treatment on GS as an elicitor, focusing on its potential to enhance muscle protection and differentiation in C2C12 cells. Cytotoxicity and protective effects were assessed using the MTT assay. GS cultivated with various concentrations of SA (0, 100, 200, 400, and 800 μM) at 100 μg/mL did not exhibit cytotoxicity in either myoblasts or myotubes. Therefore, concentrations of 50 and 100 μg/mL were selected for subsequent experiments. Muscle damage was induced by 500 μM hydrogen peroxide in myoblasts and by 100 μM dexamethasone in myotubes, with both treatments significantly reducing cell viability. However, SA-elicited GS demonstrated a concentration-dependent protective effect, with GS cultivated under 400 μM SA showing the most pronounced muscle-protective effect. Moreover, GS cultivated with 400 μM SA most effectively enhanced indicators of myogenic differentiation, including myotube diameter, fusion index, and myosin heavy chain-positive area. These findings suggest that SA may serve as an effective elicitor to potentiate the muscle-protective and myogenic effects of GS, probably through the elicitor-induced accumulation of bioactive compounds.

**Green extraction and quantitative analysis of polyphenols** Padam Prasad Acharya, padam.acharya@eku.edu, Erica Rylee Hilderbrand, Benjamin Gardner, Annamarie Seamans. *Chemistry and Forensic Science, Eastern Kentucky Univ., Richmond* Polyphenols are a class of organic compounds characterized by the presence of multiple phenol units. They are biosynthesized by vegetables, fruits, medicinal plants, and marine organisms. The main classes of polyphenols include stilbenes, flavonoids, lignans, and phenolic acids. These compounds are recognized for their antioxidant potential and are associated with diverse health benefits. Various methods have been developed for their extraction and quantification; however, recent research practice emphasizes the green techniques. In this study, the green extraction followed by quantification of polyphenols from representative bioactive plants will be discussed.

**Tharsis AeroFarm Project - Agricultural chemistry innovation: Development and design of a hermetically sealed aeroponic cultivation system for operation in extreme terrestrial and space environments** Shirley M. Quintero Blanco, shirleyquinteroblanco@gmail.com. *Univ. de Costa Rica, San José* Food sustainability, both on Earth and in future space missions, requires innovative cultivation systems capable of operating under extreme conditions, efficiently utilizing chemical resources and functioning without soil. The present work, Tharsis AeroFarm, is a project developed by students from the Univ. of Costa Rica (UCR). It focuses on the design of an automated and versatile aeroponic cultivation system, capable of functioning in both space environments and terrestrial areas affected by extreme climates or degraded, infertile, or contaminated soils. The initial prototype will be implemented on Earth to validate plant growth parameters through a soil-less system, controlling variables such as nutrients, chemical inputs, temperature, humidity, and light, with a long-term vision of adapting it to microgravity conditions or simulated atmospheres. Inspired by the need to transform realities in rural areas of our country—where intensive agrochemical use has compromised soil health—Tharsis AeroFarm aims to demonstrate that clean, sustainable, and resilient cultivation is possible in places once considered unsuitable for agriculture. Furthermore, the project does not seek to replace traditional agricultural work, but rather to complement and strengthen it, offering new opportunities for optimization and improvement for those engaged in cultivation. This integrated approach—combining science, technology, and social commitment—paves the way for inclusive agricultural solutions, both for vulnerable communities and for space exploration.

**Impact of roasting temperature on lignan content and antioxidant activity of safflower seeds** Yoonjeong Kim, ang1569@naver.com, Gajin Kim, Jinseo Lee, Younghwa Kim. *BB21 plus Project Team,* ***Dept. of*** *Food Science and Biotechnology, Kyungsung Univ., Busan, Busan, Korea (the Republic of)* Safflower (Carthamus tinctorius L.), an oilseed crop of the Asteraceae, is used for edible oil, biofuel, natural colorants, and functional foods. This study investigated the effect of roasting temperature on lignan content and antioxidant activity of safflower seeds. Seeds were roasted at 120, 140, 160, 180, and 200°C for 15 min, and six lignans (secoisolariciresinol, matairesinol, lariciresinol, pinoresinol, syringaresinol, medioresinol) were quantified. Total lignan content increased from 14,998 μg/100 g in raw seeds to 97,704 μg/100 g in the roasted seed at 200°C, representing a 6.5-fold increase, with medioresinol as the major component.

Antioxidant activity was assessed by total phenolic content (TPC), 2,2-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS), and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays. All values increased after roasting and were highest at 200°C. Pearson correlation analysis showed a strong relationship between TPC and total lignans ($r = 0.935$, $p < 0.01$) and between ABTS and DPPH ($r = 0.988$, $p < 0.01$). Cytoprotective effects of safflower seed extracts were evaluated in HepG2 cells under oxidative stress induced by 0.5 mM tert-butyl hydroperoxide (TBHP). At a concentration of 12.5 μg/mL, all roasted seeds significantly increased cell viability compared with the TBHP group. The highest cell viability was observed in the roasted seed at 200°C against oxidative stress. These results suggest that roasting can improve the functional properties of safflower seeds for potential use in functional foods and nutraceuticals.

**Biological potentials of Citrus unshiu flower extracts in metabolic diseases** Junsoo Lee, junsoo@chungbuk.ac.kr, Seonghwa Hong, Hana Lee. *Chungbuk National Univ., Cheongju-si, Chungcheongbuk-do, Korea (the Republic of)* Citrus unshiu, a fruit rich in vitamins and flavonoids, is predominantly cultivated in Korea, with Jeju Island accounting for the majority of its production. During the flower-thinning process, a significant quantity of these flowers is discarded, despite their potential as a source of functional materials. This study evaluated the biological activities of Citrus unshiu flower extract (CFE) and found that it exhibits a wide range of beneficial effects. The extract showed no toxicity at various concentrations up to 100 ug/mL and demonstrated strong antioxidant properties by protecting liver cells (HepG2) from oxidative stress, significantly increasing cell viability. Furthermore, CFE showed promise as an antidiabetic agent by increasing glucose consumption and glycogen content in hepatocytes. It also offered protection against muscle damage by reversing the effects of oxidative stress in muscle cells (C2C12) and increasing antioxidant levels. In addition, CFE exhibited potential antihypertensive properties by improving the viability of endothelial cells (EA.hy926), enhancing nitric oxide production, and suppressing inflammation. Taken together, these findings suggest that Citrus unshiu flower extract is a promising functional material with diverse biological activities, including antioxidant, hepatoprotective, antidiabetic, muscle-protective, and antihypertensive effects.

**Enhancement of bioactive compound accumulation and muscle-protective activity in *gynura procumbens* leaves by ultrasound treatment** Hana Lee, dlgksk0514@naver.com, Taemin Jeong, Junsoo Lee. *Dept. of Food Science and Biotechnology, Chungbuk National Univ., Cheongju-si, Chungcheongbuk-do, Korea (the Republic of)* Ultrasound is increasingly recognized as a safe and eco-friendly postharvest technology that can stimulate plant defense responses, thereby enhancing the accumulation of secondary metabolites with health-promoting effects. *Gynura procumbens* (*G. procumbens*), a medicinal plant traditionally used in Southeast Asia, contains bioactive compounds such as quercetin and kaempferol, which have potential benefits against metabolic disorders and inflammation. However, its role in muscle health remains largely unexplored. This study investigated whether ultrasound treatment could enhance the bioactive compound content and muscle-protective effects of *G. procumbens* leaves in vitro. Leaves were subjected to ultrasound (40 kHz, 300 W, 5–20 min), and their phytochemical content, antioxidant activities, and enzyme activities (CAT, POD, PAL, TAL) were assessed. The 10 min ultrasound-treated leaves (10 min-UTGP) showed the highest total phenol and flavonoid contents, accompanied by markedly increased antioxidant activities compared to untreated samples. In C2C12 myoblasts and myotubes, 10 min-UTGP significantly improved cell viability under $H_2O_2$-induced oxidative stress, elevated intracellular glutathione, and reduced malondialdehyde and ROS levels. It also enhanced SOD and CAT activities. 10 min-UTGP promoted myotube diameter, fusion index, and myosin heavy chain expression, suggesting improved differentiation and regeneration potential. Untargeted metabolomics identified 41 metabolites, with rutin, ferulic acid, 1-feruloylquinic acid, and kaempferol showing high contributions. Targeted HPLC confirmed elevated levels of quercetin, rutin, and kaempferol in 10 min-UTGP leaves. Correlation analyses indicated these compounds were strongly associated with antioxidant and muscle-protective activities. In conclusion, ultrasound treatment, particularly at 10 min, enhances the bioactive profile of *G. procumbens* leaves and confers protective effects against oxidative stress and muscle injury in vitro. These findings highlight ultrasound as a promising postharvest strategy to boost the therapeutic potential of medicinal plants for managing sarcopenia and related conditions.

**Enhancing biological control of bacterial pathogens in fruit tree crops using a probiotic targeted delivery system** Melissa M. Deinys[1,2,3], me825009@ucf.edu, Jorge Pereira[2], Everton Luis Vieira Aguilar De Souza[1], Swadeshmukul Santra[1,2]. *(1) Dept. of Chemistry, Univ. of Central Florida, Orlando(2) NanoScience Technology Center, Univ. of Central Florida, Orlando(3) Burnett School of Biomedical Sciences, Univ. of Central Florida, Orlando* Bacterial diseases continue to threaten citrus and apple production, with limited sustainable control options available to growers. Biological control agents, such as Aureobasidium pullulans, represent a promising alternative; however, their success depends on effective delivery, persistence, and compatibility with host plant tissues. In this study, a novel target delivery system composed of magnesium, calcium, and boron (MgCaB) was developed to preferentially deposit probiotics to sustain A. pullulans and mitigate plant disease. Zeta potential measurements were used to evaluate the surface charge and colloidal stability of the delivery system. Dynamic light scattering (DLS) through size exclusion filtration was conducted to determine the hydrodynamic size distribution of the particles. Furthermore, Fourier-transform infrared spectroscopy (FTIR) identified functional groups and confirmed their interactions within the formulation. Scanning electron microscopy (SEM) confirmed targeted adhesion and colonization of probiotics and A. pullulans on citrus leaf surfaces following application, demonstrating the delivery capacity of the formulation. Colony-forming unit (CFU) quantification further demonstrated that yeast populations persisted on treated leaves, while challenge assays with bacterial pathogens revealed a significant reduction in pathogen recovery relative to untreated controls. Together, these results indicate that the nutritional carrier enhances both the stability and protective efficacy of A. pullulans. This integrated micronutrient microbe delivery approach offers a dual benefit; it allows targeted delivery of beneficial biological control agents and nutritional support for host tissue health. These findings provide a foundation for scalable, field-ready biocontrol strategies that align with sustainable disease management in perennial fruit crops.

**Antimicrobial activity of a biobased polymer produced from a phenolic compound and lipids** Xuetong Fan, xuetong.fan@usda.gov, Helen Ngo, Karen Wagner. *USDA-ARS Eastern Regional Research Center, Wyndmoor, Pennsylvania* A lipid-based polymer synthesized from a natural phenolic compound and lipids was coated onto the bottom of glass jars. The coated jars were then tested against E. coli, *Listeria innocua* and *Candida albicans* in 0.1% peptone water. Non-coated jars served as control. Results showed that the antimicrobial coating reduced populations of E. coli from ~ 4 log CFU/mL to an undetectable level (detection limit: 1.0 log CFU/mL) within two hours of incubation at 37°C in 0.1% peptone water. The coating was more effective against L. innocua and C. albicans, whose populations decreased to non-detectable levels within 0.5 hours. The initial microbial inoculation levels affected the antimicrobial effectiveness of the coating which was more effective at low inoculation levels. The coating could be used against moderate microbial challenges (4-5 log CFU/mL) for at least four repeated uses without losing its antimicrobial activity. Leaching study using GC-MS and microbial test showed that the amount of the phenolic compound migrated from the coating to peptone water was only ~0.75 ppm while the phenolic compound started to exhibit its antimicrobial activity at 100 ppm against E. coli, indicating that the antimicrobial activity was not due to the migration of the phenolic compound into peptone water. Overall, our study demonstrates that the novel biobased polymer produced from agricultural byproducts has potent antimicrobial activity.

**Environmentally friendly CNCs as nanocarriers for copper-based antimicrobial treatments** Bhanu Sharma[1,2], Ronit Apsingekar[1,3], ronitapsingekar@gmail.com, Jorge Pereira[1], Swadeshmukul Santra[1,2,4]. *(1) NanoScience Technology Center, Univ. of Central Florida College of Sciences, Orlando(2) Chemistry, Univ. of Central Florida College of Sciences, Orlando(3) Biomedical Sciences, Univ. of Central Florida College of Sciences, Orlando(4) Univ. of Central Florida Burnett School of Biomedical Sciences, Orlando* The soluble form of copper (Cu) such as Cu sulfate and Cu-chelates are used as bactericides/fungicides due to their strong antimicrobial properties. However, these forms of Cu often cause phytotoxicity in plants and result in environmental runoff due to poor rainfastness. Cellulose nanocrystals (CNCs) are ideal for advanced materials due to their high crystallinity, strong tensile strength, and large surface area. However, the conventional method for obtaining CNCs (sulfuric acid hydrolysis) may raise concerns both environmentally and functionally. In this study, a modified hydrolysis approach with phosphoric acid was optimized to provide environmentally friendly CNCs, confirmed via XRD and SEM to be 300-500 nm. The CNCs were functionalized with copper for minimizing the above limitations of soluble Cu while maintaining antimicrobial potency. Elemental mapping was used to confirm copper functionalization. The copper–CNC (Cu-CNC) composites demonstrated significantly faster and more efficient bactericidal action against both Cu-sensitive and Cu-tolerant strains of Xanthomonas perforans and Escherichia coli than the commercial standard (Kocide®3000) and copper sulfate. MIC results showed the Cu-CNC treatments as having twofold improvement for Xanthomonas perforans over the commercial standard and fourfold improvement for Escherichia coli over the commercial standard. In disk diffusion, Cu-CNCs treatments showed larger zones of inhibition for both copper tolerant and copper sensitive variants, compared to copper sulfate and the standard. Cu-CNCs represent a new sustainable high-performance material with broad application opportunities for agriculture, water treatment, and more.

**Analysis of toxic heavy metals in processed consumables** Tuan Phan[1], Tuan.Phan@tsu.edu, Sonya C. Good[1], Victoria Tran[1], Victor Tran[1], Kamron Hadnot[1], Shauntasia Jackson[1], Thuan Nguyen[2,1], Tyler Gin[3,1], Crespin de la Cerda[2,1], Kevin Anthony[1]. *(1) Chemistry, Texas Southern Univ., Houston(2) Michael E DeBakey High School for Health Professions, Houston, Texas(3) Lawrence E. Elkins High School, Missouri, Texas* Heavy metal contaminants are frequently detected in processed consumable products due to the increasing demand for convenience. In this study, we assessed toxic heavy metals, including cadmium (Cd), lead (Pb), mercury (Hg), arsenic (As), and chromium (Cr), in honey, milk, candy, cosmetics, cookies, and noodles. Samples were ground into powder, digested with hydrochloric acid (HCl), nitric acid ($HNO_3$), and hydrogen peroxide ($H_2O_2$), and heated for 5–6 hours at 150 ºC before dilution. Concentrations were adjusted to fall within detection limits for Inductively Coupled Plasma–Mass Spectrometry (ICP-MS) analysis. Results revealed Pb and Cd concentrations exceeding FDA and WHO safety limits in several products, underscoring the need for stricter quality control during manufacturing to protect consumer health.

**Development of chemical-based reference standards for Korean distilled soju aroma wheel** Soyeon Park, Seungjoo Lee, sejlee@sejong.ac.kr. *Dept. of Culinary and Foodservice Management, Sejong Univ. College of Hospitality and Tourism Management, Gwangjin-gu, Seoul, Korea (the Republic of)* This study developed chemistry-based reference standards to refine the Aroma Wheel for distilled soju and enable objective sensory evaluation. Expert surveys and interviews confirmed 12 categories and 51 descriptors, from which 20 descriptors and 40 chemical compounds were selected. A trained panel assessed similarity between compounds and food-based standards (1 = very different to 9 = very similar) and intensity (1 = not perceptible to 9 = very strong). Compounds with similarity ≥6, including ethyl butyrate (Apple), γ-undecalactone (Peach), isoamyl acetate (Banana), 2-acetylpyridine (Steamed corn), α-terpineol (Pine needle), linalool and geraniol (Flower), 2,3-dimethyl pyrazine (Nut), and butyric acid (Cheese), were suitable as references. In contrast, ethyl octanoate (Pineapple), dimethyl sulfide (Steamed cabbage), 2-acetyl-1-pyrroline (Steamed rice), eugenol (Clove), furfuryl thiol (Burnt), 5-methylfurfural, and hexanoic acid (Cheese) were unsuitable. These results provide a scientific framework for aroma evaluation in distilled soju, supporting objective sensory analysis and quality standardization. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Reducing peanut allergenicity via magnetic nanoparticles for immunotherapeutic use** Miyona Harris, miyonah@email.uscupstate.edu, Bridget Lozano, bglozano@email.uscupstate.edu, Anselm I. Omoike. *Chemistry, Univ. of South Carolina Upstate Division of Natural Sciences and Engineering, Spartanburg* Peanut (*Arachis hypogaea*) allergy is among the most common food allergies in the U.S. and within the global population. Currently, the primary approach for managing peanut allergies is strict avoidance, but the use of immunotherapy is slowly emerging as a potential treatment to increase tolerance and reduce the risk of severe reactions. The major allergens responsible for most reactions are Ara h 1, h 2, and h 3. In this study, oxalic acid etched magnetic nanoparticles coated with tannic acid (MNP-TA) were synthesized and evaluated for their ability to adsorb the major peanut allergens. Peanut butter was defatted using two mixed solvents, hexane/ethanol and hexane/acetone (both 1:1 v/v). Extracted ARA was treated with MNP-TA (50 and 100 mg). Protein concentration, identification, and adsorption were evaluated using the bicinchoninic acid assay (BCA), sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), and attenuated total reflectance Fourier transform infrared (ATR-FTIR) spectroscopy, respectively. The BCA assay and SDS-PAGE showed significant protein removal, especially with the 100 mg of MNP-TA, and ATR-FTIR spectra confirmed adsorbed protein on the nanoparticles' surfaces. The BCA results indicated 45.8 ± 6.8% and 52.3 ± 0.3% protein removal in hexane/ethanol-derived ARA and hexane/acetone-derived ARA, respectively, using MNP-TA (100 mg). These results demonstrate the promising potential of MNP-TA as a tool for allergen removal, offering a novel strategy to reduce the risk of severe reactions in individuals with peanut allergies. Furthermore, this approach can be developed into an immunotherapeutic treatment to safely desensitize patients with reduced, or controlled, allergen exposure.

**HPLC-based characterization of phenolic pigments in thespesia grandiflora** Krystal Lassala, krystallassala@gmail.com, Jose L. Vera. *Science & Technology, Univ. Interamericana de Puerto Rico Centro de Acceso a la Informacion San German* *Thespesia grandiflora*, commonly known as "Flor de Maga," is the national flower of Puerto Rico and is recognized for its striking pink-red petals, which suggest a rich composition of phenolic pigments, particularly anthocyanins. This study focuses on the chromatographic characterization of phenolic pigments in fresh petals of *T. grandiflora* using High-Performance Liquid Chromatography (HPLC). Petal samples were lyophilized and then subjected to ultrasonic-assisted extraction with ethanol and aqueous ethanol mixtures. The extracts were analyzed using a Shimadzu Nexcol C18 column (50×3.0 mm, 5 µm particle size) under a gradient of 5% acetic acid and 80% acetonitrile (5% acetic acid), with detection at 320 nm and 520 nm. Quantification will be carried out using external calibration with anthocyanin standards. This project aims to study the anthocyanin components of *T. grandiflora* by HPLC, generate chromatographic fingerprints that reflect pigment composition, and evaluate the effect of solvent polarity on pigment recovery. The findings are expected to provide the first HPLC based dataset for *T. grandiflora* petals, offering valuable insights into its potential applications in nutraceuticals and natural colorant development.

**Molecular dynamics simulation of heat-induced denaturation of ovalbumin** Charles Bilgrien[1], cbilgrien4579@sdsu.edu, Jing Zhao[1], Sungwook Hong[2], Lexi Hwang[3], Changqi Liu[1], changqi.liu@sdsu.edu. *(1) San Diego State Univ., San Diego, California, US(2) Loyola Marymount Univ., Los Angeles, California(3) Cal State LA, Los Angeles, California* Molecular dynamics (MD) simulation was used to assess the thermal stability and unfolding pathways of ovalbumin over 300−500 K. Structural changes were quantified by root-mean-square deviation (RMSD), radius of gyration (Rg), free-energy landscapes (FELs), and DSSP-based secondary-structure analysis. At 300 K, a single native basin was observed (RMSD = 0.141 nm, Rg = 2.226 nm, G = 2.16 kJ mol$^{-1}$). Across 300−350 K, the protein retained near native structure with minimal RMSD growth, while progressive unfolding emerged at 400−475 K. At 500 K, the FEL exhibited multiple energy minima spanning RMSD = 0.4−3.1 nm and Rg = 2.2−3.2 nm. Two representative minima from the 500 K simulation were selected for further analysis: an early, near-native intermediate (Basin 1: RMSD = 0.507 nm, Rg = 2.297 nm, G = 3.08 kJ mol$^{-1}$ at 7.71 ns) and a later, denatured state (Basin 2: RMSD = 2.803 nm, Rg = 2.501 nm, G = 4.52 kJ mol$^{-1}$ at 83.51 ns). The protein extracted from each basin was annealed for 100 ns at 300 K to assess structural recovery. At 300 K, secondary structure composition was 28.25% α-helix, 31.10% β-strands, 38.60% loops/bends/turns, and 2.08% others. After annealing, Basin 1 shifts to 23.34% α-helix, 28.70% β-strands, 43.50% loops/bends/turns, and 4.39% others. In contrast, Basin 2 is strongly coil-rich with 6.00% α-helix, 16.80% β-strands, 68.80% loops/bends/turns, and 8.40% others. Together, these results show that brief heating results in a near-native intermediate, whereas prolonged heating drives the protein into an unfolded, coil-rich state that fails to recover native α-helices and β-strands upon cooling. The study highlights how MD can map multiple unfolding basins and quantify pathway-specific secondary-structure recovery in food proteins.

**Molecular dynamics simulation of ovalbumin behavior at the air-water interface** Esmeralda Ortiz[1], eortiz1464@sdsu.edu, Alejandra Hernandez[1], Charles Bilgrien[1], Jing Zhao[1], Sungwook Hong[2], Lexi Hwang[3], Changqi Liu[1], changqi.liu@sdsu.edu. *(1) San Diego State Univ., California(2) Loyola Marymount Univ., Los Angeles, California(3) Cal State LA, Los Angeles, California* Protein adsorption at air-water interfaces is critical for the formation and stability of food foams. In this study, molecular dynamics (MD) simulations were performed to compare the structural dynamics of ovalbumin in bulk water and at the air-water interface. The system contained one ovalbumin molecule and 30,872 TIP3P water molecules using the CHARMM36m force field. The gas phase was represented by nitrogen and oxygen molecules (17:7 ratio). Ovalbumin was positioned at the interface using the GROMACS pull code, where a 1,200 kJ/mol/nm$^2$ harmonic potential was applied to its center of mass and translated along the +z direction at 8 nm/ns. This was followed by a 10-ns production MD at the interface under NVT conditions at 300 K, with a 600 kJ/mol/nm$^2$ harmonic restraint applied along the z-axis to maintain its position. The number of water molecules within 5 Å of the protein was reduced at the interface, concomitant with a decline in solvent-accessible surface area (SASA). Despite reduced hydration, the protein retained structural stability with minimum changes in secondary structure. Root-mean-square deviation (RMSD) and radius of gyration (Rg) indicated that ovalbumin remained compact and equilibrated in both environments, with only modest fluctuations. Root-mean-square fluctuation (RMSF) analysis revealed that residues 340−357, comprising a loop and a short helix, showed a pronounced increase in flexibility at the air-water interface compared to bulk water, highlighting localized structural rearrangements without global unfolding. Together, these results demonstrate that ovalbumin at the air-water interface undergoes subtle conformational relaxation and decreased solvent exposure without drastic change in overall structure. This study provides mechanistic insight into how ovalbumin adapts to the heterogeneous environment of the air-water interface and informs the molecular basis of foam stability.

**Protein language model-based prediction of allergens in *Arthrospira platensis*** Liana Feng[1], lfeng8870@sdsu.edu, Shealyn Daley[1], Zhenjiao Du[2], Yonghui Li[3], John J. Love[1], Cristal Zuñiga[1], Jing Zhao[1], Changqi Liu[1], changqi.liu@sdsu.edu. *(1) San Diego State Univ., California(2) Univ. College Dublin, Leinster, Ireland(3) Kansas State Univ., Manhattan* *Arthrospira platensis* is a widely consumed cyanobacterium. We screened 281 non-redundant *A. platensis* proteins from UniProt using the protein language model pLM4Alg. Three proteins were predicted as highly likely allergens (probability > 0.9): the C-phycocyanin β-subunit, superoxide dismutase (SOD), and a 23-residue N-terminal peptide of LON peptidase. The C-phycocyanin β-subunit is a reported food allergen. AllerCatPro suggested weak evidence for SOD, with potential cross-reactivity to Timothy grass pollen allergen. Although the N-terminal peptide of the LON peptidase was predicted as an allergen, the intact protein was not. This peptide, especially its epitope, is largely buried in the folded protein. It may only be recognized when present as a free peptide. To explore distinguishing properties despite the small number of positives, each allergen was compared against 40 randomly sampled non-allergens with 2,000 bootstrap replicates to obtain stable effect size estimates. Bootstrapped median percentiles indicated allergens were above the 80th percentile of negatives for alanine, serine, and α-helix content, and below the 20th percentile for pI, molecular weight, isoleucine, and glutamine. Cliff's δ effect sizes reached +0.78 for alanine content (95% bootstrap CI 0.50−0.95) and −0.82 for pI (CI −0.90 to −0.70). Consistently, permutation tests (10,000 iterations) confirmed significant separation for alanine ($P = 0.015$), α-helix ($P = 0.021$), serine ($P = 0.040$), molecular weight ($P = 0.040$), glutamine ($P = 0.028$), isoleucine ($P = 0.018$), and pI ($P = 0.009$). This study validates a known *A. platensis* allergen, identifies new candidates, and highlights structural and compositional signatures associated with allergenicity. While the small sample size limits generalizability, the workflow demonstrates how resampling-based statistics can provide insights into allergen characterization.

**Structural dynamics of casein isoforms in water** Rabiul Alam Roni[1], rroni0528@sdsu.edu, Sarah Iller[1], Charles Bilgrien[1], John J. Love[1], Jing Zhao[1], Sungwook Hong[2], Lexi Hwang[3], Changqi Liu[1], changqi.liu@sdsu.edu. *(1) San Diego State Univ.,California(2) Loyola Marymount Univ., Los Angeles, California(3) Cal State LA, Los Angeles, California* Molecular dynamics simulations were performed in GROMACS to examine the stability, flexibility, compactness, hydrogen bonding, and secondary structures of bovine $\alpha_{s1}$-, $\alpha_{s2}$-, β-, and κ-caseins in water, using protein structures retrieved from AlphaFold. RMSD analysis revealed that $\alpha_{s2}$-casein was the most stable (1.78 ± 0.12 nm), followed by $\alpha_{s1}$ (2.27 ± 0.11 nm), whereas β- and κ-caseins showed higher deviations (2.58 ± 0.18 nm and 2.62 ± 0.43 nm, respectively). RMSF profiles identified peak flexibility at residue 214 for $\alpha_{s1}$ (1.90 nm), residue 222 for $\alpha_{s2}$ (1.60 nm), residue 142 for β (3.40 nm), and residue 190 for κ (3.56 nm). The average radius of gyration confirmed differences in compactness: $\alpha_{s2}$ (3.03 ± 0.21 nm) and β (3.01 ± 0.27 nm) were the most compact, $\alpha_{s1}$ was intermediate (3.28 ± 0.25 nm), and κ adopted the most expanded conformation (3.97 ± 0.31 nm). Hydrogen bond analysis further reflected isoform-specific stability. Total hydrogen bonds were highest in $\alpha_{s2}$ (93.9 ± 5.7), moderate in β (80.0 ± 5.8) and $\alpha_{s1}$ (79.3 ± 7.7), and lowest in κ (50.4 ± 5.3). Backbone hydrogen bonds followed a similar trend, with $\alpha_{s2}$ maintaining 69.2 ± 3.5 compared to only 25.7 ± 2.7 in κ. Secondary structure analysis revealed predominantly disordered conformations, with coil dominating across isoforms, ranging from 48.6% in $\alpha_{s2}$ to 65.2% in κ. α-helix content was highest in $\alpha_{s2}$ (39.6%) and $\alpha_{s1}$ (34.1%), moderate in β (31.5%), and lowest in κ (16.7%), while β-sheet content was negligible (<1%). This study is a first step in characterizing the dynamic behaviors of individual casein isoforms in solution. Building on these findings, future work will focus on simulating calcium-casein interactions and micelle assembly.

**Molecular and structural signatures of predicted allergens in *Chlorella vulgaris*** Shealyn Daley[1], sdaley0673@sdsu.edu, Zhenjiao Du[2], Yonghui Li[3], John J. Love[1], Cristal Zuñiga[1], Jing Zhao[1], Changqi Liu[1], changqi.liu@sdsu.edu. *(1) San Diego State Univ.,California, US(2) Univ. College Dublin, Leinster, Ireland(3) Kansas State Univ., Manhattan, Kansas* Microalgae are increasingly recognized as a sustainable nutrient source, yet their introduction into the food system raises concerns about allergenicity. We analyzed 11,486 proteins of *Chlorella vulgaris* using pLM4Alg, a protein language model-based predictor, and cross-validated results with AllerCatPro 2.0. The pLM4Alg model identified 505 proteins with high allergen probability (≥ 0.9), which exhibited significantly greater stability ($P < 0.001$), β-sheet content ($P < 0.001$), and aromaticity ($P = 0.009$) compared to lower-probability proteins. Subcellular localization analysis using DeepLoc revealed that high-probability allergens were more frequently localized to the cytoplasm but were underrepresented in the nucleus and plastids. Cross-validation identified 25 proteins with both high probability by pLM4Alg and strong evidence from AllerCatPro. These proteins were enriched in conserved protein families including glycoside hydrolases (GH16, GH47), pathogenesis-related proteins (PR4), tubulins, and translation elongation factors, many of which are established plant and fungal allergen families. At the superfamily level, predicted allergens clustered in P-loop NTPases and 6-hairpin glycosidase-like proteins, highlighting structural motifs associated with immunogenicity. Cross-reactivity analysis revealed strong similarity to major environmental allergens (dust mite, mold, latex, pollen) as well as food allergens (Ara h 18, Gal d 3, Pan h 9, Sal s 2). This dual environmental-food allergen profile suggests that microalgal proteins may contribute to cross-sensitization, with implications for both dietary exposure and occupational inhalation risks. By characterizing the molecular and structural features of potential allergens in *C. vulgaris*, this study provides a foundation for allergen risk assessment, experimental validation, and the safe development of microalgae as a food source.

**Advancing eco-friendly latex production: Tissue culture and agronomic studies of Dandelion (*Taraxacum officinale*)** Raghav Bharadwaj[1,3], raghav.bharadwaj@students.asdrp.org, Trisha Harish[1,4], trisha.harish@students.asdrp.org, Nandini Kumar[1,3], nandini.kumar@students.asdrp.org, Srikar Devarakonda[1,5], srikar.devarakonda@students.asdrp.org, Alyssa Menezes[1,6], alyssa.menezes@students.asdrp.org, Bharat Kumar K. Poudyal[1,2]. *(1) Poudyal Lab, Dept. of Biological, Human, & Life Sciences, Aspiring Scholars Directed Research Program, Fremont, California(2) Oakland Unified School District, Oakland, California(3) American High School, Fremont, California(4) Grade 11, Leland High School, San Jose, California(5) Leigh High School, San Jose, California(6) Mission San Jose High School, Fremont, California* The main source of commercial latex, rubber trees (*Hevea brasiliensis*), take seven to ten years to mature and are restricted to tropical areas, which contributes to deforestation. Though its agronomy and in vitro culture are still less explored than those of other commercial crops, dandelion (*Taraxacum officinale*) presents a viable and ecologically friendly substitute to produce latex. The production of latex in dandelions grown both *in situ* and *in vitro* will be examined in this study. For *in vitro* cultures MS medium supplemented with 1 mg/L BA, 0.1 mg/L IBA, 100 mg/L inositol, vitamins, and glycine were used. Plants were kept in potted soil for *in situ* growth and irrigated as needed. Reduced microbial contamination was best achieved by surface sterilizing explants with 20% sodium hypochlorite and 70% ethanol. Wild population seeds produced healthy seedlings for further research after successfully germinating *in vitro*. This study will also examine the function of mycorrhizal fungi in enhancing latex production as a biological strategy to increase productivity and sustainability, in addition to comparing latex yield and quality between *in situ* and *in vitro* systems. Lastly, this observation will highlight dandelions' potential as a scalable, ecologically friendly alternative to rubber trees, with a variety of applications in biotechnology, industry, and agriculture. It also shows low-cost, sustainable methods for growing dandelions both *in vitro* and *in situ*.

**Integrated analysis of sugars, organic acids, and volatile compounds for flavor characterization in Korean strawberry cultivars** Yuna Jeon[1], Youngjae Oh[2], Jeehye Sung[1], jeehye@gknu.ac.kr. *(1) Food Science and Biotechnology, Gyeongkuk National Univ., Andong-si, Gyeongsangbuk-do, Korea (the Republic of)(2) Horticultural Science, Chungbuk National Univ., Cheongju-si, Chungcheongbuk-do, Korea (the Republic of)* Strawberry (*Fragaria × ananassa*) is one of the most widely consumed fruits in Korea, renowned for its distinctive flavor profile that arises from a well-balanced combination of sweetness, acidity, and diverse volatile aromatic compounds. Despite the extensive breeding of diverse strawberry cultivars in Korea, comprehensive information on the chemical compounds associated with their flavor characteristics remains limited. This study aimed to investigate the composition of flavor-related compounds in eleven commercially distributed strawberry cultivars using chemometric analysis. The results revealed significant cultivar-dependent differences in soluble solids (7.93–12.07 °Brix), acidity (0.34–0.60%), pH (3.50–4.06), and moisture (83.8–88.8%), with 'Honghee' and 'Merry Queen' showing the highest °Brix and 'Janghee' the lowest acidity. Fructose (9.2–16.5 g/100 g), glucose (7.5–13.2 g/100 g), and sucrose (12.5–23.2 g/100 g) were identified as the predominant sugars across all cultivars, with 'Arihyang' and 'Altaking' exhibiting the highest total sugar contents. citric acid (3.49–7.23 g/100 g) and malic acid (0.58–1.94 g/100 g) as the major components, with 'Seolhyang' containing the highest total acid content (9.88 g/100 g). Volatile compounds were detected more than 70 identified compounds, including esters, alcohols, aldehydes, acids, and lactones. Esters were the predominant volatile group, imparting fruity and floral notes characteristic of high-quality strawberries. 'Altaking' and 'Vita Berry' showed high levels of ethyl butanoate, methyl butanoate, and methyl hexanoate, compounds associated with strong fruity aromas. 'Seolhyang' and 'Arihyang' exhibited elevated levels of hexanal and (*E*)-2-hexenal, contributing to green and fresh notes, whereas methyl cinnamate and γ-decalactone—key sweet-floral volatiles—were highly enriched in 'King's Berry'. Chemometric analysis grouped the cultivars into four types: Cluster I (Arihyang, Altaking, King's Berry)—sweet–fruity with high sugars and esters; Cluster II (Seolhyang, Kuemsil, Vita Berry)—fresh–sour with high acids and aldehydes; Cluster III (Merry Queen, King's Berry, Janghee)—sweet–floral with high °Brix and floral volatiles; and Cluster IV (Jukhyang, Honghee)—neutral with moderate sugar–acid balance and fewer volatiles. These findings provide valuable insights for cultivar selection, flavor-oriented breeding, and quality improvement strategies in the Korean strawberry industry.

**Growth effects of fluorescent, biopolymer-coated gold nanoparticles on hydroponically grown basil** Madison Johnson, majohnson26@wooster.edu, David Kirby. *Chemistry, The College of Wooster, Ohio* Engineered nanoparticles have the potential to help shape future food demand challenges as a platform to enhance plant growth, improve nutrient delivery, and provide feedback on environmental conditions. However, interactions between plants and nanoparticles vary depending on both the type of particle and the species of plant, leading to a limited understanding of their interactions. To further understand the outcomes of nanoparticle exposure on Ocimum basilicum (sweet basil), gold nanoparticles (AuNPs) were synthesized and coated with the biopolymer chitosan to control biocompatibility. A layer-by-layer approach with polystyrene sulfonate and fluorescein was employed to label particles for imaging. Particles were characterized by dynamic light scattering, UV–Vis spectroscopy, fluorimetry, and confocal microscopy to confirm particle size, successful coating, and fluorescence signal. Plants were exposed to particle solutions, and responses in growth were quantified via dry biomass and leaf area, which were then compared to untreated controls. Confocal fluorescence imaging of fixed tissues determined nanoparticle location, allowing correlation between particle presence and physiological outcomes. Results give insight into whether biopolymer-coated AuNPs affect plant development, further informing the use of engineered nanomaterials in agriculture. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Combining soybean-induced carbonate precipitation and methylcellulose for dust suppression in semi-arid agricultural environment** Asher M. Orenstein, orensteinasher@gmail.com, Samantha C. Wright, Natascha K. Knowlton. *Rowland Hall, Salt Lake City, Utah* The agricultural sector contributes 25% of the nation's anthropogenic dust emissions, with even higher concentrations observed in semi-arid regions of the US. Airborne dust particles contain organic matter and ammonia that merge midair, adversely impacting cardiovascular, respiratory, and immune health. To combat the negative impacts of sediment flux, current researchers are developing bioorganic dust suppressants that mitigate wind erosion while prioritizing environmental friendliness. For instance, soybean-induced carbonate precipitation (SICP) has been used to fill soil pores and bind dust particles, creating a cementing effect. Similarly, research shows that methylcellulose (MC) exhibits film-forming properties that prevent dust emission. Although these two suppressants have only been studied independently, this experiment combines SICP and MC to create a renewable and biodegradable dust suppressant for agricultural applications. Solutions with varying ratios of SICP and MC were applied to loamy sand soil to mimic semi-arid conditions and tested for surface tension, erodibility, and moisture absorption before and after wind-tunnel testing. Hard red winter wheat berries were germinated and planted with the optimized SICP-MC mixture that produced the least dust, and growth was measured to assess the suppressant's impacts on overall plant quality. The mixture is expected to decrease sediment flux under extreme wind conditions. Highly concentrated treatments may impair root stability due to excessive cementation, whereas lower concentrations are expected to suppress dust emissions while promoting healthy vegetation growth. Individually, SICP cements the soil more effectively than MC. However, combining the two suppressants is expected to reduce particulate matter while also facilitating and supporting wheat growth. By combining SICP and MC, the suppressant is expected to be effective at lower concentrations than when SICP and MC are used separately. Future research should test how different ratios perform under field conditions. Additional studies are needed to explore how these biosuppressants interact with natural factors beyond wind erosion, determining their ecological lifespans and long-term strengths.

**Hepatoprotective potential of *Citrus maxima* (pomelo) peel extracts against drug-induced liver injury** Zheng-Yuan Su[1], zysu@cycu.edu.tw, Ssu-Han Huang[1], Pei-Chin Lin[1], Pei-Xuan Lin[1], Yen-Chen Tung[2]. *(1) Dept. of Bioscience Technology, Chung Yuan Christian Univ., Taoyuan, Taoyuan City, Taiwan(2) Dept. of Food Science, National Ilan Univ., Yilan, Taiwan* Drug-induced liver injury (DILI) is liver dysfunction caused by pharmaceutical compounds, which can lead to severe liver damage. Nuclear factor erythroid 2–related factor 2 (Nrf2) is a key transcription factor regulating numerous antioxidant genes, and natural compounds that activate the Nrf2 pathway may exert hepatoprotective effects. This study aimed to evaluate the hepatoprotective potential and underlying mechanisms of pomelo (*Citrus maxima*, CMX) peel extracts. CMX ethanol extract (CMX-EE) and hot water extract (CMX-WE) were prepared. CMX-WE exhibited higher total phenolic and flavonoid contents, as well as superior DPPH radical scavenging activity ($IC_{50}$ = 568.5 μg/mL). CMX-EE at 100 μg/mL significantly restored the viability of acetaminophen (APAP)-damaged AML-12 normal mouse hepatocytes from 58.32% to 82.44% of the control level ($p < 0.05$), without affecting cell growth at the tested concentration. Microscopic observations further supported the protective effect of CMX-EE. Furthermore, we found that CMX-EE exerted hepatoprotective effects via activation of the Nrf2 pathway and epigenetic modulation in hepatocytes. These findings may provide a scientific basis for developing pomelo peel as a functional food ingredient for liver protection.

**Crop-specific microbial biofertilizer for indian ricegrass: A sustainable strategy to supplement alfalfa cultivation** Cecelia Hyman, cece.hyman17@gmail.com, Dylan Johnson de Lacy, dylanjohnsondelacy@rowlandhall.org, Natascha K. Knowlton. *Rowland Hall, Salt Lake City, Utah* Over the past half-century, increases to the global population and food supply have resulted in an over 500% increase in fertilizer use according to the Food and Agriculture Organization of the United Nations. Environmental pollution and physiochemical changes to the soil accompany this increase, and lead to a long-term decline in agricultural yield as well as potential health risks. Biofertilizers are a potential alternative, but greenhouse-based experiments testing new combinations have tended to prioritize broad application rather than crop specificity. This study aims to explore a crop-specific microbial consortium to address the environmental stress associated with the production of alfalfa in the Intermountain West; specifically that when used as a widely grown feedstock, alfalfa is a water intensive crop. The consortium would combat this issue by improving the nutrient viability of an alternative a native and drought tolerant crop, Indian ricegrass, which has similar agricultural potentials to alfalfa while also being more suited to the arid climate of the Intermountain West. The goal of this work is to create a crop-specific microbial-based biofertilizer for Indian Ricegrass using a combination of algal, bacterial, and fungal sources. Individually each biofertilizer is expected to improve growth and biochemical parameters, such as dry weight, shoot length, and phenol levels, in comparison to the negative and positive controls. The combined consortium is anticipated to yield the greatest increase in growth and biochemical parameters, suggesting that the biofertilizers act synergistically, generating compound effects. Future research should focus on developing a framework for creating crop-specific synergistic biofertilizer combinations, both to identify high-productivity combinations for otherwise low efficiency crops as well as expand unexplored agricultural niches, such as in localized crop growing systems that increase food supply diversity.

**Yeast-Mediated biotransformation of polyphenolics in grape pomace** Ajila Chandran Matheyambath, ajilaa@yahoo.com, Haley Brown. *Chemistry and Forensic Science, Eastern Kentucky Univ., Richmond* The growing demand for functional beverages has increased interest in nutraceutical-enriched products. Grape pomace, a byproduct of juice and wine production, is rich in antioxidants, polyphenols, and dietary fibers, making it a promising substrate for value-added applications. This study explores the use of grape pomace in co-fermentation with traditional ale yeast to enhance the nutritional and functional properties of a fermented beverage. Fermentation kinetics were monitored, and the resulting product was evaluated for antioxidant activity, total phenolic content, and the presence of anthocyanins and flavonoids using a microplate reader, HPLC, and LC-MS. Results indicate that yeast fermentation facilitates the release and transformation of bioactive compounds, improving both the functional profile and potential health benefits of the beverage. This work demonstrates a sustainable approach to valorizing winery byproducts and presents grape pomace as a renewable ingredient for developing nutraceutical-enriched functional beverages.

**Mycorrhizal fungi as a biofertilizer: A pot experiment with legumes under natural conditions** Bharat Kumar K. Poudyal[1,2], Aksh Vijayant[1,3], aksh.vijayant@students.asdrp.org, Reuben Thayil[1,4], reuben.thayil@students.asdrp.org. *(1) Poudyal Lab, Dept. of Biological, Human, & Life Sciences, Aspiring Scholars Directed Research Program, Fremont, California(2) Oakland Unified School District, Oakland, California(3) Leland High School, San Jose, California(4) Milpitas High School, Milpitas, California* In an effort to promote more ecologically friendly methods, farmers are using biological fertilizers more and more. Among these, arbuscular mycorrhizal fungi (AMF) improve nutrient and water intake, particularly during stressful conditions, by forming advantageous connections with plant roots. Although the advantages of AMF under controlled greenhouse circumstances are well established, little is known about how successful they are in actual field situations. This study assessed the effects of AMF on three legume species cultivated in outdoor pots: bush beans (Phaseolus vulgaris), soybeans (Glycine max), and faba beans (Vicia faba). AMF-inoculated and non-inoculated controls were included in the experimental groups. Growth was assessed using biomass, leaf count, and height. Soybeans did not germinate, whereas faba beans reacted unevenly, with only one treated plant exhibiting growth enhancement. As opposed to controls, bush beans continuously responded well to AMF, showing enhanced biomass, leaf production, and general vigor. These findings demonstrate the advantages of AMF inoculation in natural settings for some legume species. All things considered, this study shows that AMF is an affordable biofertilizer that can promote sustainable farming methods by increasing plant growth and lowering dependency on artificial fertilizers.

**Improved quality control testing of saffron botanicals using** NMR Bethany Hayes, bhayes@mail.smcvt.edu, Shane M. Lamos. *Dept. of Chemistry, Saint Michael College, Colchester, Vermont* *S*affron is a fall blooming semi-perennial crocus (Crocus sativus L.) and is one of the most expensive spices in the world with a current market value between $2,897 and $4,345 per kilogram. The current ISO quality assessment is colorimetric and inconclusive for safranal and picrocrocin as their absorbances are very low and does not provide accurate quantitative measurements for the makeup of a given saffron sample or determine its purity. Saffron can be extracted in DMSO and using nuclear magnetic resonance peaks for safranal, picrocrocin, and crocin can be identified and their concentrations can be calculated. Over 100 samples of various growing conditions and areas of the US have been analyzed and will be presented. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**MONDAY MORNING March 23, 2026**

**DIGITAL SESSION**

**Global Virtual Symposium: Agri-Derived Bioactives and Their Therapeutic Potential**

**Improvement of cognitive function by a blood-brain barrier-transportable dipeptide** Toshiro Matsui, tmatsui@agr.kyushu-u.ac.jp. *Kyushu Daigaku, Fukuoka, Japan* The number of individuals with Alzheimer's disease (AD), a representative cognitive disorder, is increasing annually, posing a serious societal concern due to memory impairment and disruptions to daily activities. Current therapeutic drugs, such as acetylcholinesterase (AChE) inhibitors (e.g., tacrine, donepezil), *N*-methyl-D-aspartate receptor (NMDAR) antagonists (e.g., memantine), and anti-amyloid beta (Aβ) antibodies (e.g., Lecanemab), can only alleviate symptoms and do not offer a cure. Therefore, the ideal strategy is to prevent the progression of AD at the early stage of mild cognitive impairment (MCI), potentially through brain-beneficial foods. Although several functional peptides have been reported to exhibit cognitive benefits, their bioavailability and mechanisms of action remain largely unclear, primarily due to the strict regulation of substance transport across the blood-brain barrier (BBB). In this symposium, we investigated whether specific dipeptides can penetrate the BBB and elucidated the mechanism underlying their physiological effects. Using *ex vivo* brain-perfusion experiments in mice, we identified that the dipeptide Tyr-Pro crosses the BBB and accumulates in the brain parenchyma. Furthermore, Tyr-Pro was found to be orally absorbed into the bloodstream, subsequently undergoing BBB transport. In an acute AD mouse model induced by Aβ injection, Tyr-Pro significantly improved memory impairment, suggesting its potential as an orally effective functional food. In this presentation, we introduce our findings on: (1) bioavailability of Tyr-Pro in the brain, and (2) its mechanism of action on the acetylcholine (ACh) nervous system, as studied using mouse-derived nerve NE-4C cells. We hope our research contribute a novel perspective on AD prevention through the intake of brain-beneficial functional foods.

**Exploring the mechanism of ?-glucan in alleviating colitis** Shaoping Nie, spnie@ncu.edu.cn. *Nanchang Univ. National Key Laboratory of Food Science and Resource Mining, Nanchang, Jiangxi, China* In recent years, inflammatory bowel disease (IBD) has emerged as a significant global health challenge, affecting over 10 million individuals worldwide. According to the forecast, the number of IBD patients in China will exceed 1.5 million by 2025. IBD not only diminishes the quality of life for patients but also places a substantial burden on families and society. A growing body of evidence indicates that inadequate dietary fiber intake and gut microbiota dysbiosis are crucial factors in the development of IBD. β-glucan (BG), a soluble dietary fiber, has shown the potential to maintain intestinal health. How does barley BG regulate microbiota and alleviate intestinal inflammation? We investigated the specific regulatory effects of BG on the gut microbiota through animal studies and *in vitro* fermentation experiments, and identified that *Lactobacillus johnsonii* is significantly enriched and exhibits the capacity to protect against colitis. Multi-omics analysis reveal that *L. johnsonii* produce abundant indole-3-lactic acid (ILA) leading to the activation of aryl hydrocarbon receptor (AhR) which responsible for the mitigation of colitis. Interestingly, *L. johnsonii* cannot utilize BG but requires a cross-feeding with *Bacteroides uniformis*, which degrades BG and produces nicotinamide (NAM) to promote the growth of *L. johnsonii*. By elucidating the mechanisms through which BG ameliorates intestinal inflammation, our study highlights the crucial role of the gut microbiota in the process. It also provides novel insights into precision nutrition targeting the gut microbiota, offering potential applications for the future management of IBD.

**Constituent-taste relationship of Monascus-fermented cheese: Unveiling taste characteristics through untargeted metabolomics** Yadong Wang, wyd2020bgs@163.com, Ying Wang, 17863962116@163.com, Xiran Wang, 2997818416@qq.com, Bei Wang. *Beijing Technology and Business Univ., China* In this study, the dynamic evolution of flavor characteristics and the underlying metabolic mechanisms during the ripening of Monascus-fermented cheese were systematically investigated using electronic tongue analysis and untargeted metabolomics. The electronic tongue results revealed distinctive taste dynamics: sourness and aftertaste-B decreased initially and then increased, whereas saltiness, astringency, and aftertaste-A decreased continuously. Richness and umami were enhanced in the later ripening stage, and bitterness reached its peak on day 40. Untargeted metabolomic analysis identified 1,158 and 826 metabolites in positive and negative ion modes, respectively. Among these, 135 significantly differential metabolites (including small peptides, lipids, and organic acids) exhibited dynamic changes during ripening (VIP>1, $p$<0.01, $|Log_2FC|>2$). Correlation analysis demonstrated that certain metabolites, such as DL-glutamic acid and oleic acid, were significantly correlated ($|r| > 0.7$) with taste attributes including saltiness, richness, and bitter aftertaste. KEGG pathway enrichment analysis further highlighted the important roles of glutamate metabolism, unsaturated fatty acid biosynthesis, and polyketide synthase pathways in flavor formation. This study provides a metabolic network perspective on flavor development at the molecular level, offering a theoretical basis for the flavor optimization of fermented dairy products.

**Potential bioactives from Himalayan bioresources for food and pharma applications** Sudesh Kumar Yadav, director.ihbt@csir.res.in. *CSIR - Institute of Himalayan Bioresource Technology, Palampur, HP, India* Medicinal and aromatic plants in the Himalayas are rich sources of bioactive molecules with a wide array of health benefits, particularly in the treatment of lifestyle-related metabolic disorders. Various hyphenated analytical techniques, such as 1H NMR, HPTLC, and UHPLC-QTOF-IMS-based metabolomics, have been explored for profiling and characterizing phytomolecules from these Himalayan bioresources. For example, the isolation, characterization, and bioefficacy validation of iridoid glycosides, such as picroside I and II in *Picrorhiza kurroa* rhizome, have shown hepatoprotective and fatty liver symptom-treating properties. Other biomolecules like vanilic acid and apocynin have been identified as potential leads with antidiabetic properties, promoting β-cell proliferation and enhancing insulin production. Phloretin and phloridzin, found in apples, have shown promise in managing insulin resistance and type 2 diabetes-associated hyperglycemia by acting as natural PPAR-γ targeting ligands. An amorphous solid dispersion of phloretin was developed to improve its bioavailability and therapeutic efficacy in managing obesity in a diabetic mice model. Green tea polyphenols, particularly epigallocatechin gallate (EGCG), have demonstrated anti-inflammaging attributes by attenuating senescence-associated secretory phenotype (SASP) and reducing inflammation and oxidative stress in experimental animals. EGCG has also shown potential in preventing obesity-induced kidney damage in preclinical studies. Phenolics and alkaloids identified in *Berberis lycium* Royle fruits have shown bioactivity in mitigating oxi-inflammatory stress. Nano-conjugated gallic acid has been found to inhibit the aggregation of amyloid beta 42 (Aβ42), a peptide associated with Alzheimer's disease. Additionally, Himalayan wild edible plants (WEPs) like *Urtica dioica, Amaranthus spinosus, Momordica dioica,* and *Diplazium maximum* have been evaluated for their nutritional properties, containing omega-3 polyunsaturated fatty acids, carotenoids, flavonoid glycosides, and essential micronutrients. The nutrient quality of these WEPs surpasses that of traditional vegetables like carrots, spinach, and *Brassica* sp. Edible flowers such as *Bauhinia variegeta, Rhododendron arboreum*, and *Tropaeolum majus* have been found to contain antioxidant molecules like anthocyanins with strong antioxidant and alpha-glucosidase inhibition activity.

**Green extraction of bioactive compounds from thuja orientalis leaves and cones using microwave- and ultrasound-assisted techniques optimized by response surface methodology** Rana Haris Abdullah, ranaharisabdullah@gmail.com. *Lahore Univ. of Management Sciences Syed Babar Ali School of Science and Engineering, Lahore, Punjab, Pakistan* Thuja orientalis is a medicinal plant rich in polyphenols and antioxidants, yet its large-scale utilization requires efficient and environmentally sustainable extraction methods. This study optimized both microwave-assisted extraction (MAE) and ultrasound-assisted extraction (UAE) using response surface methodology (RSM) with 70 percent hydro-ethanol to maximize the recovery of key phytoconstituents. The evaluated responses included total phenolic content (TPC), total flavonoid content (TFC), antioxidant activity through DPPH and ABTS radical scavenging assays, and metal chelating activity (MCA). MAE optimization yielded a solvent-to-feed ratio of 35 mL/g, power of 640 W, and extraction time of 90 s, producing a TPC of 540.4 mg GAE/g DW, TFC of 63.03 mg RE/g DW, DPPH-RSA of 69.17 percent, ABTS-RSA of 77.69 percent, and MCA of 53.46 percent. UAE optimization identified amplitude 90 percent, time 2 min, and SFR 35 mL/g as ideal, resulting in TPC of 190.5 mg GAE/g DW, TFC of 48.59 mg RE/g DW, DPPH-RSA of 81.73 percent, ABTS-RSA of 73.63 percent, and MCA of 63.81 percent. SEM imaging confirmed substantial cell matrix disruption in both techniques. Overall, both MAE and UAE proved highly effective green extraction methods. MAE demonstrated superior efficiency in extracting phenolics, flavonoids, and ABTS-RSA, while UAE excelled in DPPH-RSA and MCA. These findings highlight the potential of Thuja orientalis, including its cones as value-added biomass, for scalable and eco-friendly production of bioactive compounds with therapeutic and industrial relevance.

**Translating plant science into agri-derived bioactives and functional foods: Lessons from durian and beyond** Supaart Sirikantaramas[1,2,3], supaart.s@chula.ac.th. *(1) Dept. of Biochemistry, Faculty of Science, Chulalongkorn Univ., Bangkok, Bangkok, Thailand(2) Center of Excellence in Molecular Crop, Chulalongkorn Univ., Bangkok, Thailand(3) Center of Excellence in Metabolomics for Life Sciences, Chulalongkorn Univ., Bangkok, Thailand* Agri-derived bioactives are central to developing functional foods with potential health benefits. Plant science provides the mechanistic basis for discovering and optimizing these compounds, linking molecular regulation in crops to their nutritional and therapeutic potential. Using durian (*Durio zibethinus*) as a core model, our research integrates multi-omics to elucidate metabolic pathways underlying ripening and bioactive accumulation, while valorizing agricultural by-products. We focus on key metabolite classes—including sulfur-containing compounds, flavonoids, and pectin-derived oligosaccharides, as well as enzymatically generated prebiotic carbohydrates—toward designing sucrose-reduced, prebiotic-rich fruit products that may support gut health and modulate oxidative and inflammatory status. Enzyme-based sucrose conversion and by-product upcycling further contribute to cleaner-label formulations and reduced environmental impact. Extending beyond durian, similar approaches are applied to mango, banana, and palmyra palm to explore metabolic diversity, and relate them to potential health-promoting functions. These case studies illustrate how plant science can be systematically translated into functional food innovation built on agri-derived bioactives, bridging fundamental discovery with circular, BCG-aligned applications and contributing to the UN Sustainable Development Goals.

**Essential oil profiling of the novel cardamom variety "Ranweli Yasas Sri" by gc-ms and raman spectroscopy** *Hiruni De Zoysa*[1], *hiruni.chem@stu.cmb.ac.lk, Hettiarachchige Dona Sachindra Perera*[1], *Neranga Abeyasinghe*[1], *Jagathpriya Weerasena*[2], Narmada Fernando[2], Shiroma Handunnetti[2], Iresha De Silva[3]. *(1) Dept. of Chemistry, Univ. of Colombo, WP, Sri Lanka(2) Institute of Biochemistry, Molecular Biology and Biotechnology, Univ. of Colombo, WP, Sri Lanka(3) Dept. of Export Agriculture, Sri Lanka, Dept. of Export Agriculture, Sri Lanka* Cardamom (Elettaria cardamomum) is the third most expensive spice in the world. "Ranweli Yasas Sri" (THC4) is a recently introduced high-yielding cardamom variety developed in Sri Lanka. However, its chemical composition has not been reported yet. In this study, hydrodistilled-essential oil profiles of THC4 were compared with export-grade Ceylon cardamom (UWC2) using GC-MS and Raman spectroscopy. Chemical analysis using GC-MS indicated that both UWC2 and THC4 contained high concentrations of α-terpinyl acetate (37.48% and 37.81%, respectively), the primary compound responsible for the characteristic sweet, floral aroma of cardamom and a key quality indicator. Higher linalool concentrations were observed in THC4 (11.83%) compared to UWC2 (9.59%) with THC4 also containing linalyl acetate (5.47%) contributing to a more refined floral profile. In contrast, elevated 1,8-cineole levels were found in UWC2 (23.46% vs. 14.82%), indicating a 1.6:1 composition ratio between two varieties. However, the reduced 1,8-cineole content in THC4 did not compromise quality, but rather it enhances the aromatic balance. Raman spectroscopic analysis revealed characteristic peaks that correlate with the major compounds identified by GC-MS. Prominent peaks at 467, 576, and 683 cm-1 correspond to ring deformation vibrations of 1,8-cineole and α-terpinyl acetate. The peak at 1368 cm-1 represents symmetric and asymmetric bending vibrations of methyl groups (CH3) directly attached to carbon-carbon double bonds (C=C) in unsaturated compounds such as α-terpinene. Ring quadrant stretching vibrations of cyclic terpenes were observed at 1605 cm-1, while the band at 1665 cm-1, attributed to C=O stretching, indicated the presence of cyclic esters. Around 2870 cm-1, a complex peak arises from C-H, CH3, and CH2 stretching vibrations in aliphatic compounds, representing contributions from various terpenes, esters, and alcohols including α-pinene, α-terpinyl acetate, 1,8-cineole, linalool, and limonene. The compositional variations among cardamom varieties revealed by GC-MS results correlate well with their respective Raman spectral patterns. Therefore, a Raman spectroscopic method can be developed as a rapid, cost-effective tool for cardamom authenticity verification and adulteration detection in quality control.

**Non-enzymatic amperometric determination of hydrogen peroxide in cassava using chitosan-nano-silver/graphene oxide sensors** Adetoun Akitoye[1], aakitoye@unilag.edu.ng, Isaac A. Akinbulu[1], iakinbulu@unilag.edu.ng, Wesley Okiei[1], wokiei@unilag.edu.ng, Tiago A. Silva[2]. *(1) Chemistry, Univ. of Lagos, Yaba, Federal Capital Territory, Nigeria(2) Chemistry, Univ. Federal de Vicosa, Viçosa, MG, Brazil* Metal nanoparticles have emerged as efficient materials for the determination of hydrogen peroxide due to their remarkable sensing capabilities. Notably, silver and gold nanoparticles have been extensively investigated for their potential in highly sensitive hydrogen peroxide detection. However, the catalytic sensing ability of silver nanoparticles is hindered by their susceptibility to agglomeration. This limitation underscores the necessity of identifying suitable stabilizing materials or matrices for these nanomaterials. In the present study, we explore the utilization of encapsulated graphene oxide within a chitosan film, along with nanomaterials (specifically, AgNW, AuNP, and AgNP) crosslinked with epichlorohydrin, to address the stability challenge. Hydrogen peroxide quantification was performed in phosphate buffer solution at a pH of 7.4, employing various electrochemical techniques including cyclic voltammetry, square wave voltammetry, and chronoamperometry at a potential of +0.5 V versus Ag/AgCl (3.0 mol L-1 KCl). The developed electrode matrices: AgNP-GO-ECH-CTS/GCE, AgNW-GO-ECH-CTS/GCE, and AuNPs-GO-CTS-ECH/GCE, exhibited linear response ranging from 1 uM to 5 mM, depending on the material. Notably, the AgNP-GO-ECH-CTS/GCE and AgNW-GO-ECH-CTS/GCE modifications displayed superior performance compared to the other materials studied. Both electrodes were successfully employed for hydrogen peroxide quantification in cassava samples.

**Phytochemical profiling and antimicrobial potentials of *Opuntia ficus-indica* Cladodes: A promising pharmaceutical resource** Oluwayemi O. Onawumi[1,2], estherdr@rocketmail.com, Adiketu Abubarka[1,3], Olubunmi A. Adewusi[4], Joseph A. Olaniyan[1,5], midejoe99@gmail.com, Segun S. Ojo[1], ojosegun65@gmail.com. *(1) Dept. of Pure and Applied Chemistry, Ladoke Akintola Univ. of Technology, Ogbomoso, Oyo, Nigeria(2) Dept. of Chemistry, Univ. of Ilorin, Ilorin, Kwara, Nigeria(3) Dept. of Integrated Science, Federal College of Education Special, Oyo, Oyo, Nigeria(4) Dept. of Chemistry, Lagos State Univ., Ojo, Lagos, Nigeria(5) Dept. of Chemistry, Auburn Univ. at Montgomery* Phytochemicals are biologically active, naturally occurring chemical compounds found in plants that provide health benefits to humans. Opuntia ficus-indica cladodes are medicinal plants belonging to the dicotyledonous angiosperm family Cactaceae. Extracts from Opuntia ficus-indica cladodes have been used in traditional medicine to treat various diseases and health conditions such as diabetes, hypertension, hemorrhoids, ulcers, glaucoma, and liver issues. However, scientific studies identifying the bioactive compounds responsible for these effects are still limited. Therefore, this study aims to analyze the phytochemicals, identify the chemical compounds, and assess the antimicrobial activities of Opuntia ficus-indica cladodes. Samples of Opuntia ficus-indica cladodes were freshly collected from a plantation, air-dried, ground into powder, and extracted with 80% ethanol. Phytochemical screening of the extract was performed using standard methods. After fractionation through column and thin-layer chromatography, the bioactive components were characterized using UV, FTIR, and GC-MS techniques. The antimicrobial activities of the ethanolic extract were tested against clinical isolates of Serratia marcescens, Escherichia coli, Klebsiella pneumoniae, Pseudomonas species, and Staphylococcus aureus using a modified liquid culture method. Results from the phytochemical screening of the ethanolic extract indicated the presence of alkaloids, flavonoids, betacyanin, glycosides, tannins, phenolic compounds, and anthraquinones. The chromatogram of the ethyl acetate extract revealed 24 distinct compounds. The antimicrobial testing showed that the ethanolic extract was active against the tested microorganisms, with inhibition percentages ranging from 17% to 88%. Opuntia ficus-indica cladodes contain bioactive constituents responsible for their antimicrobial properties. As such, they are recommended for both domestic and medicinal applications. Additionally, the pharmaceutical industry should explore its mechanisms of action in treating chronic diseases.

**Polyphenols from Brazilian biodiversity and its health benefits** Mario Roberto Marostica Junior, mmarosti@unicamp.br. *Dept. of Food Science and Nutrition, Univ. Estadual de Campinas, Campinas, SP, Brazil* Rich polyphenol from Brazilian biodiversity could be an important alternative for human health promotion. Recent studies characterize novel polyphenol-rich fruits and other plant foods native to Brazil. Little explored foods from Brazilian biodiversity have several interesting biochemical profiles and relevant mechanisms of action, including antioxidant, anti-inflammatory and metabolic-regulatory effects, contributing to prevention of chronic disorders such as obesity, non-alcoholic fatty liver disease and cognitive decline. The challenges of translating Brazil's plant-based biodiversity into functional foods and nutraceutical strategies are approached.

**Oat protein processing, functionality and allergenicity: New insights from Canadian oat lines** Maneka Malalgoda, maneka.malalgoda@umanitoba.ca. *Dept. of Food and Human Nutritional Sciences, Univ. of Manitoba, Winnipeg, Canada* Canada is a global leader in oat production with many cultivars being developed over the last decade. Beta glucan, the major dietary fiber component in oat, has been the focus of research for a long time given its demonstrated health benefits. However, with increasing interest in oat as a protein source, currently, there is emphasis on assessing the processing properties and functional attributes of oat proteins. In fact, research has associated many positive health outcomes with oat protein. Moreover, allergenicity is also a concern in oat from a food safety perspective which is currently under investigation. In our work, we focused on the defatting aspects of oat with an emphasis on eco-friendly defatting. From a functionality perspective, we assessed the impact of defatting method. Going further, we also examined the genotype x environment impact on protein chemistry and functionality, as well as allergenic properties. To assess allergenicity, we developed a mass spectrometry-based method. Our results to date indicate the promise of supercritical fluid extraction for eco-friendly defatting, and the criticality of identifying oat genotypes that perform consistently in varying environmental conditions for the development of oat-based protein ingredients. Allergenicity varied widely across different genotypes, therefore there is potential to identity cultivars that are celiac safe and hypoallergenic. Overall, our work opens new avenues for oat protein research, facilitating product development opportunities that utilize eco-friendly processing methods and new oat-based products for those with dietary sensitivities. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Cottonseed bioactive materials regulate glucose transport gene expression in mouse macrophages** Heping Cao, heping.cao@usda.gov, Kandan Sethumadhavan, H.N. Cheng. *Southern Regional Research Center, USDA-ARS Southeast Area, New Orleans, Louisiana* Cottonseed contains bioactive compounds such as 3,4-dihydroxybenzoic acid, flavonol glycosides, gallic acid, gossypol, peptides, and quercetin. Similar bioactive compounds from other plant sources have been used for disease prevention and treatment since ancient history. Therefore, cottonseed value may be increased by providing bioactive compounds for health promotion and disease prevention. The objective of this study was to explore the bioactivity of cottonseed-derived materials on the regulation of glucose transporter (Glut) gene expression in mouse macrophages. The rationale for selecting macrophages and Glut genes for this study was because macrophages are involved in insulin resistance and metabolic diseases and Glut proteins are critically important for host immunity due to facilitating glucose transport across the lipid membrane of the cell. Macrophages were treated with various concentrations of ethanol extracts or gossypol for different time followed by qPCR analysis of mRNA levels. As a first step towards gene expression comparison, we evaluated the relative basal mRNAs levels of Class I facilitative Gluts: Glut1, Glut2, Glut3 and Glut4 in the mouse RAW264.7 macrophages. Relative to Glut1 mRNA level using Rpl32 as the internal reference, Glut3 was more abundant than GLUT1 but GLUT4 was much less and GLUT2 was undetectable in the controlled macrophages treated with 1% DMSO. Cottonseed extracts had modest effects on Glut1 gene expression, but gossypol stimulated it up to 6-fold. Similar effect was observed on Glut3 mRNA, but Glut4 mRNA levels were not affected by gossypol. This study demonstrates that cottonseed ethanol extracts have modest effect, but gossypol has stronger effect on stimulating Glut gene expression and suggests that cottonseed bioactive materials may affect macrophage immunity.

## Food Ingredients - Sustainability and Natural Alternatives

**Innovations in natural functional food ingredients for enhancing food safety and performance in clean label food products** Pavan Soma[2,1], psoma@floridafood.com, Scott Lineback[2,1]. *(1) R&D, Florida Food Products LLC, Eustis(2) R&D, Vibrant Ingredients, Eustis, Florida* The clean label movement has become a major driver of innovation in the food industry, reflecting consumer demand for transparency, simplicity, and naturalness. Clean label products prioritize recognizable, minimally processed ingredients and avoid synthetic additives. Recent scientific developments have significantly advanced the formulation of clean label foods by identifying and optimizing natural food ingredients that serve functional roles in preservation, and functional performance. Clean functional nutrition focuses on natural bioactive compounds that support mental and physical performance while maintaining clean label standards. Ingredients such as caffeine, L-theanine, nitrates, adaptogens, and nootropics are increasingly formulated into beverages and supplements to promote energy, focus, and stress resilience. Sourced from tea, coffee, herbs, and plants, these compounds are valued for their synergistic effects, efficacy, and natural origin. Microbial fermentation has emerged as a valuable strategy for clean label preservation. Organic acids and bacteriocin peptides produced by lactic acid bacteria enhance food safety and shelf life without synthetic preservatives. In meat products, clean label curing agents derived from fermented celery juice and acerola extract effectively replace synthetic sodium nitrites, offering antimicrobial protection against pathogens such as *Clostridium botulinum* and *Clostridium perfringens*. Upcycling food byproducts has enabled the development of sustainable, clean label ingredients. One example is rice bran extract from defatted rice bran, a byproduct of milling, which serves as a clean alternative to phosphates in meat and poultry products by improving yield, texture, and sensory quality. Its high chelating activity, due to naturally occurring inositol phosphates, also enables it to replace EDTA in mayonnaise and dressings without compromising shelf life or organoleptic properties. Together, these advances highlight the evolution of natural ingredients from simple nutritional components to multifunctional, label-friendly solutions. Clean label products are increasingly positioned not just as a trend, but as the future foundation of responsible food and beverage formulation.

**Evolution of food products *via* new ingredients: Product taste and meeting consumer expectations** *Sudarshan Nadathur, Sudarshan.Nadathur@adm.com. ADM Nutrition, Erlanger, Kentucky* Food products are undergoing marked shifts as consumers demand nutritious options. This includes plant-based and higher-protein options and foods with reduced sugar, salt and fat. Soy, pea and oat-based products are more prevalent as consumers seek better nutrition and an eco-conscious lifestyle. In addition, fermentation-derived proteins and fats are expanding the food and foodservice sector and enabling a wider range of options for the consumer. Further, additives such as synthetic dyes are being replaced with alternatives sourced from natural ingredients. Finally, consumers desire product labels to be simpler and more easily approachable. Though these requirements lead to modification of existing products and the development of newer alternatives, it risks diminishing consumer acceptance when compared to traditional products. The objective of this talk is to discuss how taste modulation enables reformulated or novel food products to deliver the sensory quality consumers expect. Inclusion of new ingredients or reformulation with ingredients such as plant protein, non-nutritive sweeteners, and natural colors effects key product attributes such as product taste and texture. The off tastes may include vegetal notes, bitterness and astringency while textural changes may lead to chewier, dry or mealier product. These off-tastes or texture variations may conflict with consumers' expectations for new or reformulated food products to deliver a similar experience to their traditional counterparts. Thus, taste modulation is a vital tool to enable new or modified products meet these consumer demands. Whether the off-tastes come from proteins, fats, salts, botanicals or non-nutritive sweeteners, taste modulation can aid in the masking of a specific off-note and present a neutral canvas for the characterizing flavor such as vanilla, fruit, savory or meaty flavor. As consumers demand better products, taste modulation is a necessary aspect of developing great tasting products for today's requirements.

**Cyclodextrin-assisted extraction and electrospun biodegradable nanofibers for valorization of grape pomace bioactives** Zehra I. Yildiz[1,2], zehra.yildiz@btu.edu.tr, Elanur I. Gulamov[3], Mahmoud Aboelkheir[1], Tamer Uyar[1]. *(1) Human Centered Design, Cornell Univ., Ithaca, New York(2) Food Engineering, Bursa Teknik Univ., Bursa, Bursa, Turkey(3) Chemistry and Chemical Biology, Cornell Univ., Ithaca, New York* Upcycling food industry byproducts into functional materials represents a promising strategy for sustainability and resource efficiency. Grape pomace, a major byproduct of winemaking, is rich in phenolics and anthocyanins with strong antioxidant potential. However, the instability of these compounds limits their use, and efficient extraction typically requires organic solvents. Cyclodextrins (CDs), cyclic oligosaccharides capable of forming inclusion complexes, offer an alternative for organic solvent extraction by enhancing extraction yields and protecting labile compounds during processing. In this study, grape pomace was extracted with aqueous CD solution and compared with extracts obtained without CD. Total monomeric anthocyanin (TMA, pH-differential method), total phenolic content (TPC, Folin–Ciocalteu), and DPPH assays demonstrated that CD-assisted extraction improved the extraction yield of bioactive compounds. To improve feasibility and extend potential applications, the CD–grape pomace extracts were incorporated into biodegradable nanofibers using electrospinning. This technique produces nanoscale fibrous webs with high surface area, porous structure, and controlled release capacity, enabling stabilization of sensitive compounds and transformation of extracts from powder into a flexible, functional form. The nanofibers were characterized morphologically by scanning electron microscopy (SEM), chemically by Fourier-transform infrared spectroscopy (FTIR), structurally by X-ray diffraction (XRD), and thermally by thermogravimetric analysis (TGA), while their antioxidant activity was validated by DPPH assay. Stability and release studies have been designed to clarify the role of CD in preserving and delivering grape pomace bioactives within the nanofiber matrix. This approach highlights the dual use of CDs and nanofibers to valorize winery byproducts. The developed system improves extraction yield, enhances feasibility, and enables diverse applications ranging from active packaging to nutraceutical or therapeutic systems.

**Metabolic dynamics of kojic acid and other compounds in solid-state fermentation of two white grape pomaces by *Aspergillus oryzae* and *A. Tamarii*** Daniel Salta, Danhui Wang, Xiaofen Du, xdu@twu.edu. *Texas Woman's Univ., Denton* The wine industry generates large amounts of grape pomace (GP), a nutrient-rich byproduct that is often underutilized despite its high content of sugars, organic acids, and phenolic compounds. While previous research has explored GP valorization, the potential of solid-state fermentation (SSF) for enhancing the recovery of bioactive metabolites remains insufficiently understood. This study aimed to optimize a SSF approach to produce valuable substances from two GP varieties fermented with two Aspergillus strains (A. oryzae and A. tamarii) with aqueous extract samples collected over 6 days. The aqueous extracts were characterized by °Brix, pH, titratable acidity, total phenolics, 4 individual sugars, 5 organic acids, and 6 phenolics. The results showed °Brix, pH, and titratable acidity changed monotonically with fermentation and corresponded with changes in individual sugars and organic acids. Fermentation with the Aspergillus spp. consumed the fructose (98-99%), glucose (>99%), and tartaric acid (62-99%) in the GP, lowering the °Brix and titratable acidity while raising the pH. Though it was not reflected in their total phenolic content, fermentation significantly increased gallic acid concentration (124-159%) and produced kojic acid (0.041 g/g pomace dry mass). It appears that shorter solid-state fermentation lengths of 1-3 days are better suited to phenolic compound extraction versus 4 days or longer. The principal component analysis (PCA) biplot showed that fermentation duration and GP variety were the primary drivers of variation in chemical composition, while strain type had minimal impact. These findings demonstrate the potential increased phenolic extraction and novel production of kojic acid from GP demonstrated its potential for valorization as a source of valuable microbial metabolites. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Turning plants into nanoparticles: Advancing sustainable natural colorants for foods** Hualu Zhou, hualuzhou@uga.edu. *Univ. of Georgia, Athens* Growing consumer awareness of health concerns associated with synthetic food colorants has driven an urgent need for safe, naturally derived alternatives. Among them, curcumin from turmeric has emerged as a leading natural yellow pigment due to its vibrant color and potential health benefits. However, current curcumin production is constrained by low processing efficiency, and high solvent and energy demands, which restrict cost-effectiveness and broader application in foods. In this talk, I will introduce a novel "plant-to-nano" strategy, a pH-based chemical engineering approach that directly transforms raw plant materials into functional nanoparticles without the need for purified extracts. This one-step process improves resource utilization, minimizes environmental footprint, and enables more streamlined and scalable manufacturing. As a case study, I will present the direct nano-formulation of curcumin-loaded nanoparticles from turmeric, demonstrating its high yield and scalability compared to conventional extraction–encapsulation workflows, while reducing energy consumption and carbon emissions. Overall, this work shows how plant-derived nanoparticles can accelerate the translation of nanotechnology into sustainable, health-promoting food ingredients. By coupling material efficiency with environmental responsibility, the "plant-to-nano" approach offers a cost-effective and industrially relevant pathway to natural colorants and other functional food components.

**Physicochemical characteristics of different fermented legume protein and flour by lactic acid bacteria** Tahmina Parveen, Danhui Wang, dwang4@twu.edu. *Texas Woman's Univ., Denton* Legume proteins are increasingly recognized for their nutritional benefits and environmental sustainability. However, the application of legume protein in the food industry is limited due to their relatively low functional properties. Fermentation technology offers a potential natural approach for modifying their physicochemical properties. The aim of this study is to investigate the impact of fermentation by two lactic acid bacteria (*Lactococcus lactis* and *Lactobacillus plantarum)* on the physicochemical properties of four different types of legume protein (soy, pea, chickpea, and fava bean) and flour, respectively. After fermentation, all samples were analyzed for pH, titratable acidity, total soluble solids, viscosity, and texture. Results showed that pH of all inoculated protein samples were reduced with titratable acidity increased. The total soluble solids were decreased after fermentation for all samples. The viscosity of all samples was increased for *Lc. lactis*. The texture profile of all protein and flour samples was significantly improved. Soy protein showed more significant changes in most parameters compared to other protein. *Lc. lactis* showed better performance in changing the physicochemical characteristics of legume protein. These findings demonstrate that fermentation is a potential technology to obtain tailored physicochemical properties of legume protein and improve their functionality in the food industry.

**Unlocking the value of fruit and vegetable by-products: Validating texturizing and shelf-life extension functionality in real-world food systems** Alexandra Grygorczyk[1], alexandra.grygorczyk@vinelandresearch.com, Amy Jenkins[1], Amy Blake[1], Christine Kempthorne[1], Thomas Wu[2]. *(1) Vineland Research and Innovation Centre, Vineland Station, Ontario, Canada(2) GPI Inc, Newmarket, Ontario, Canada* It is estimated that nearly one-third of fruit and vegetable waste from farm to retail is deemed "unavoidable." These by-products, including peels, cores, and pomace, are predictable yet underutilized materials rich in antioxidants, hydrocolloids, and antimicrobials. While their functional potential is well-documented, commercial adoption has lagged due to limited validation in real-world formulations and insufficient sensory data to demonstrate palatability and functionality. This study demonstrates a process for bridging that gap, translating fundamental functionality and validating in practical, clean-label applications, through two case studies: texture modification and shelf-life extension. Case Study 1: Texture Enhancement and Native Transglutaminases (TGases) TGases are protein cross-linking enzymes widely used in food processing, typically sourced from microbial fermentation. Although plant-derived TGases are recognized, they remain commercially untapped. Twelve freeze-dried by-products (e.g., apple pomace, onion peel) were screened for TGase activity using a modified Folk & Cole assay. High-activity samples were further evaluated for the effects of drying temperature and calcium on enzyme activity, then incorporated into plant-based patties. Sensory testing of patties using difference-from-control and relative-to-reference revealed significant differences in adhesiveness and cohesiveness, corroborated by instrumental texture analysis. Case Study 2: Shelf-Life Extension Using Onion Peel Powder Sensory profiling compared onion peel powders prepared under varied drying conditions with conventional onion powder. Based on this, drying conditions were selected for rejection threshold testing of onion peel powder in pork sausages. The maximum acceptable concentration of onion peel powder was determine then used in microbial challenge tests. Results showed spoilage suppression and moderate inhibition of cocktails of *Salmonella* and *E. coli* species. By validating functionality in real-world food systems, this work demonstrates processes for advancing the commercial readiness of fruit and vegetable by-product powders, supporting sustainability, clean-label innovation, and circular food systems.

**Extraction, characterization, and efficacy of rosmarinic and carnosic acids as natural preservatives in enhancing the shelf life of food models and nephroprotective potential** Salako N. Olatunji[1,2], salakoolatunji9@gmail.com, Modupe Adebanji[3], Vincent Eze[4], Idayat S. Salako[1]. *(1) Research and Development, Center for Countermeasures against Chemical and Biological Warfare Agents, Oshodi, Lagos, Nigeria(2) Mechanical Engineering, Panepistemio Dytikes Attikes, Egaleo, Greece(3) Anatomy, Ekiti State Univ. College of Medicine, Ado Ekiti, Ekiti, Nigeria(4) Microbiology, Michael Okpara Univ. of Agriculture, Umudike, Abia, Nigeria* Rosmarinic acid (RA) from *Melissa officinalis* and carnosic acid (CA) from *Rosmarinus officinalis* were extracted, purified, and evaluated as natural preservatives and nutraceuticals. Optimized protocols yielded high-purity RA (75%, 85%) and CA (86%, 97%). Both showed potent antioxidant activity, with RA superior in radical scavenging. In food models, CA provided stronger antimicrobial protection, reducing bacterial counts to 10 CFU/g and extending shelf life up to 5 years, versus ~1.5 years with RA. In vivo, RA demonstrated nephroprotection without toxicity. CA is the stronger industrial candidate, while RA offers valuable therapeutic potential.

## The Chemistry of Nonalcoholic and Alcoholic Beverages

**Industrial hemp as a hop alternative: Chemical, volatile, and cannabinoid profiles in dry-hemp beer** Kai Kawachika[1], Shea Keene[7], Drew Budner[2], Jose Reyes De-Corcuera[6], Sarvesh Verma[4], Abhisheak Sharma[4], Mengzi Zhang[3], Brian J. Pearson[5,3], Andrew J. MacIntosh[1], Katherine Witrick[1], Kthompsonwitrick@ufl.edu. *(1) Food Science and Human Nutrition, Univ. of Florida Institute of Food and Agricultural Sciences, Gainesville, Chemistry, Coastal Carolina Univ. Gupta College of Science, Conway, South Carolina(3) Horticultural Sciences, Univ. of Florida Institute of Food and Agricultural Sciences, Apopka(4) Pharmacy, Univ. of Florida, Gainesville(5) Horticultural Science, Oregon State Univ., Hood River(6) Agricultural and Biological Engineering, Univ. of Florida Institute of Food and Agricultural Sciences, Gainesville(7) Biology, Florida Southern College, Lakeland* Beer is a complex alcoholic beverage composed of a multiple of flavor and aroma compounds. Slight variations in the concentration of these compounds can influence the overall aroma and flavor of a beverage. Hops are one of the four main ingredients utilized to make beer. Industrial hemp (*Cannabis sativa),* a botanical cousin to hops share similar aromatic and flavor characteristics to them. Industrial hemp is federal legal (THC <0.03 %) can be more easily grown throughout the southeast, which makes it a potential contender for use in beer over that of hops. While hemp shares similar aromatic and flavor characteristics with hops (*Humulus lupulus*), current legislation prohibits the addition of cannabidiol (CBD) to food and supplements under the Food, Drug, and Cosmetic Act (FDCA) section 21 U.S.C. § 321(ff)(3)(B). However, CBD is an FDA-approved drug. This study investigates the feasibility of incorporating industrial hemp (*Cannabis sativa)* into beer production using dry hopping techniques. Industrial hemp was grown at the Mid-Florida Research and Education Center (Apopka, FL) and dried to a moisture content of 10-13% moisture content (wet basis) to be compared against hops. After drying the hops were vacuum sealed and stored in a -20C freezer till the chemical analysis and the brewing experiments could be conducted. This specific study looked at the influence alcohol concentration had on the aromatic characteristics and the cannabinoids that were extracted into the beer. The aromatic properties of both the hemp-oil and the beer were evaluated using a GC-MS. The Univ. of Florida's Drug Translation laboratory ran the cannabinoid analysis on the hemp flowers and beer. This study provides a foundation for further research into the potential of industrial hemp in beer production, with implications for the brewing industry and the development of novel hemp-derived beverages.

**Impact of different commercially available SCOBY compositions on the fermentation of kombucha** Drew Budner[1], dbudner@coastal.edu, Victoria Jordan[1], Barbara Di Pillo[1], Brielle Normandin[1], Alexis Morisset[1], Ryan Maley[1], Philip J. Yeboah[2], Boce Zhang[2], Katherine Witrick[2]. *(1) Chemistry, Coastal Carolina Univ., Conway, South Carolina(2) Food Science and Human Nutrition, Univ. of Florida, Gainesville* Kombucha is produced by fermenting sweetened tea with a Symbiotic Culture of Bacteria and Yeast (SCOBY). In recent years, consumer interest has surged as people seek beverages that promote health. Kombucha has been reported to benefit skin, digestion, and blood sugar regulation. The final composition of the drink depends not only on the tea used but also on the SCOBY's own microbiological makeup. In this study, researchers examined three commercially available SCOBYs, assessing how each one influenced fermentation products such as final pH, titratable acidity, free amino nitrogen, total flavonoids, total polyphenols, antioxidant capacity, as well as the volatile and semivolatile profiles and other biologically relevant compounds. The kinetics of fermentation for each SCOBY were also monitored.

**Targeted analysis of purine derivatives in beer and fermented beverages using HPLC-QDA with single ion recording** Rahul Sen, rsen@uark.edu, Heena Rani, Christian Schubert, Scott Lafontaine.

*Food Science, Univ. of Arkansas System, Fayetteville* Beer contains substantially higher amounts of purine than other alcoholic beverages, largely due to malt-derived precursors. Dietary purines are metabolized to uric acid, and excess intake is directly linked to hyperuricemia and gout. Studies reported that beer consumption elevates serum urate more than wine or spirits, underscoring the need to better characterize beverage-specific purine composition. Despite this importance, comprehensive and routine quantification of purine derivatives in both alcoholic and non-alcoholic beverages remains limited. Current assessments of beer quality emphasize parameters such as alcohol content, bitterness units, color, polyphenols, and volatile compounds, whereas purine metabolites receive little attention despite their relevance to both health and sensory properties. Traditional HPLC with UV-vis detection provides foundational surveys of purines but suffers from matrix co-elution and limited selectivity in complex samples. Whereas, conventional approaches rely on triple quadrupole mass spectrometry, offers high sensitivity are not always accessible to routine brewing and nutritional laboratories due to cost and complexity. In this study, we developed a robust and accessible method using a single quadrupole mass detector (Waters ACQUITY QDA) operated in single ion recording (SIR) mode for the targeted analysis of purine derivatives. Method development focuses on optimizing separation, establishing SIR conditions, validating calibration and recovery performance in complex beverage matrices. Importantly, this approach enables comparative profiling of beer types (high-, medium-, and low-malt), non-alcoholic beers, sake, and related beverages. Alongside purine profiling, complementary quality parameters including free amino nitrogen (FAN) estimation and beer quality parameters including ethanol % (v/v), density and extract are being integrated to provide a more holistic assessment of beer composition. This work demonstrates that HPLC-QDA with SIR detection offers a simple, cost-effective, and reproducible alternative to high-end MS platforms. Beyond analytical innovation, the method supports brewing science and nutritional research by integrating purine composition into the broader framework of beer quality evaluation, linking these measures to raw material selection, processing, beverage category, and potential health outcomes. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**Chemical composition vs. sensory reality: Investigating smoke phenol interactions in wine matrices** Jillian Thrall, Camilla Sartori, Elizabeth Tomasino, elizabeth.tomasino@oregonstate.edu. *Food Science & Technology, Oregon State Univ., Corvallis* The sensory impact of volatile compounds is governed not only by their individual concentrations but by complex interactions within the aroma matrix. Traditional approaches to aroma prediction have relied heavily on odor activity values (OAVs), which compare compound concentrations to detection thresholds. However, mounting evidence suggests OAVs alone are insufficient for predicting aroma perception in complex mixtures. Omission and reconstitution experiments often reveal discrepancies between analytical and sensory outcomes, and studies have increasingly shown the additive, synergistic, and masking effects exerted by sub-threshold compounds, underscoring the limitations of threshold-based models. This study uses red wine and volatile smoke phenols—guaiacol, 4-methylguaiacol, *o*-, *m*-, and *p*-cresols, syringol, and 4-methylsyringol—as a model system to investigate perceptual behavior within a complex matrix. These compounds, known to contribute to smoky, ashy, burnt, and medicinal aromas in smoke-exposed wine, were evaluated in controlled mixtures to examine how concentration ratios and threshold-level dynamics influence aroma perception. Three experimental scenarios were designed to investigate interaction effects: (1) constant total phenol concentration with varying compound ratios, (2) inclusion versus omission of syringols to assess their sensory relevance beyond marker status, and (3) mixtures with identical compound ratios presented above and below odor thresholds. Pinot Noir and Cabernet Sauvignon wines were spiked with three ratio groupings: a low and high concentration group derived from real wine data, and a third group with all compounds at equal concentrations. Sensory evaluation using check-all-that-apply and trained descriptive intensity scaling revealed that aroma quality was primarily determined by total phenol concentration. Syringols showed no significant direct sensory impact, supporting their role as exposure markers rather than aroma-active contributors. Mixtures below threshold levels still produced perceptual effects, suggesting additive or synergistic interactions among volatile phenols. These findings emphasize the importance of matrix interactions in predicting aroma outcomes from chemical data. A deeper understanding of volatile phenol interactions enhances interpretability of analytical results and supports more informed decision-making for winemakers facing smoke events in the vineyard.

**Mechanistic control of polyfunctional thiols in fermentations: Wine-informed sulfur-aldehyde pathways in beer** Sujata Chatterjee, sfc5967@psu.edu, Ryan Elias, Misha T. Kwasniewski. *Food Science, The Pennsylvania State Univ., Univ. Park* Hydrogen sulfide (H2S) is a problematic volatile sulfidic compound (VSC) in fermented beverages (such as beer and wine), detectable at sub-ppb levels, and known to produce heavier downstream VSCs associated with many beer faults. Although, copper fining and splash racking are standard wine remedies for sulfur off-aromas, brewing rarely uses copper fining. Brewers routinely manage sulfur via fermentation control and lagering, which can reduce H2S (and downstream products) but may also volatilize or degrade polyfunctional thiols (PFTs). Importantly, beyond its off-aroma, H2S is a highly reactive nucleophile and can serve as a precursor to PFTs, which has been leveraged previously in winemaking. Green leaf volatiles (GLVs) such as trans-2-hexenal (T2H), are abundant C6 compounds from hops and other plants, contain electrophilic double bonds that readily react with H2S. In wine, this chemistry contributes to 3-mercaptohexanol (3MH), a PFT associated with grapefruit- and passionfruit-like aromas. However, most enology research has emphasized product outcomes, with little focus on the specific chemical mechanisms at play, and relevant factors that affect the rates and outcomes of those reactions. By not employing realistic reactant concentrations or taking into account sensory implications, questions are raised about the utility of this approach in real food systems (especially under typical fermentation conditions). Our objective was to address this knowledge gap by directly testing the reactivity of H2S with T2H in worts freshly fermented with Saccharomyces cerevisiae. We conducted parallel, replicated airtight micro-fermentations, to which H2S was spiked along with a molar excess of T2H. The fate of H2S was tracked over the course of the reaction (4 h) using gas detection tubes. After 3 h, H2S levels were ~30% lower than a corresponding no-aldehyde added control, suggesting fast depletion kinetics detectable at sub-ppb levels. High-precision assays (GC-SCD for H2S; GC-MS for T2H; derivatization-LC–MS for 3MH) further quantified reactant depletion and revealed detectable product formation. Reaction mapping across multiple dosing ratios confirmed stoichiometric dependence and suggested specific windows of higher reactivity during fermentation. Together, these advances elucidate sulfur–aldehyde mechanisms and demonstrate a novel brewery-relevant route for enhancing desirable PFTs while mitigating off-odor sulfur compounds. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**HS-SPME-GC-MS metabolomic profiling of flavor variation in Utah whiskey: Effects of charring and yeast strain** Ian Wixom[1,2], ianwixom@gmail.com, John T. Flood[1], Rajan Kochambilli[1]. *(1) Chemistry, Salt Lake Community College, Salt Lake City, Utah (2) Population Health Sciences, Univ. of Utah Health, Salt Lake City* American whiskey is a popular liquor that is known for its complex flavors and aromas, many of which arise during fermentation and maturation. During fermentation, S. cerevisiae produces ethanol as the primary metabolite, along with other compounds such as acetaldehyde and fusel alcohols. The profile of these byproducts can vary significantly depending on the yeast strain used. The distillate is then matured in charred American oak barrels for a minimum of two years. Barrels have the interior burned beforehand – a process known as charring – which introduces additional volatile organic compounds (VOCs) that further shape the whiskey's sensory characteristics. However, there is limited information in scientific literature on the impact of VOC composition by charring level and yeast strain, particularly using solid phase microextraction (SPME) techniques. Understanding the role that yeast strains and charring level play in whiskey production is of great interest to many distillers. In this study, headspace SPME with a DVB-CWR-PMDS fiber is used in conjunction with single-quadrupole GC-MS for qualitative and comparative VOC analysis of six samples varying by char level and yeast strain. Preliminary results indicate distinct VOC profiles, particularly within the ethyl ester class, are influenced by both char level and yeast strain, with specific compound classes differing in abundance. **(ALSO PRESENTED AT MONDAY EVENING SCI-MIX)**

**MONDAY AFTERNOON**

**Food Ingredients - Sustainability and Natural Alternatives**

**From by-product to breakthrough: Antineurodegenerative promise of coffee pulp procyanidins** Michael B. Bamikale, bamikalemicheal@yahoo.com, Cristobal Noe, Aguila, Sandoval Cortes Jose. *Food Chemistry, Univ. Autonoma de Coahuila, Saltillo, Coah., Mexico* Coffee production generates large amounts of coffee pulp, posing economic, social, and environmental concerns. However, this waste is now recognized as a rich source of bioactive compounds, including procyanidins with potential anti-neurodegenerative properties. This study investigates the extraction, isolation, characterization, and antioxidant activity of procyanidins from coffee pulp. Extraction was performed using a hybrid microwave-ultrasound system with ethanol, followed by Sephadex LH-20 column chromatography. HPLC/ESI-MS identified procyanidin dimers and trimers, confirming the method's effectiveness. Antioxidant activity, assessed by DPPH and ABTS assays, showed strong radical scavenging with IC50 values of 12.77 ± 0.16 µg/mL and 15.52 ± 0.23 µg/mL, respectively. These results demonstrate superior antioxidant capacity compared to Trolox and gallic acid, highlighting the potential of coffee pulp procyanidins in health and sustainability applications. The *in vitro* evaluation of coffee pulp-derived procyanidins for their neuroprotective effects against rotenone-induced toxicity in BE(2)-M17 neuroblastoma cells yielded promising results. Rotenone treatment reduced cell viability to approximately 68%; however, co-treatment with procyanidins significantly restored viability to 95%. Flow cytometry analysis further supported these findings, revealing that rotenone induced nearly caused 40% cell death, which was markedly reduced upon procyanidin treatment, with live cell populations increasing to 90%. These results indicate that procyanidins effectively protect dopaminergic neurons by mitigating cell death and mitochondrial dysfunction, underscoring their potential as neuroprotective agents. Furthermore, these results underscore the potential of coffee pulp-derived procyanidins as a novel strategy for combating neurodegenerative diseases while simultaneously promoting sustainability in the coffee industry.

**Gastrointestinal fate of turmeric-derived nanoparticles and its enhanced bioavailability of curcumin** Minghe Wang, minghe.wang@uga.edu, Xiping Gong, Hualu Zhou. *Food Science, Univ. of Georgia, Athens* Introduction Curcumin shows great promise for preventing and treating chronic diseases due to its anti-inflammatory, anticancer, and antidiabetic properties. However, its low water solubility and poor bioavailability limit its practical application in food and pharmaceutical industries. Recently, the synthesis of curcumin-loaded nanoparticles derived from turmeric can significantly enhance the water solubility of curcumin, due to structural change. This study systematically investigated the gastrointestinal fate of curcumin-loaded nanoparticles, in particular whether it can enhance the stability and bioaccessibility curcumin. Methods The turmeric-derived curcumin nanoparticles were first synthesized by a pH-based method, where turmeric powder was treated with NaOH solution (pH 13) to solubilize phenolic compounds, followed by acidification with HCl to pH 7. We also selected different curcumin-loaded systems (such as curcumin crystals, turmeric-derived curcumin nanoparticles (TurNPs), also their mixture with nanoemulsion as a food system). After that, the standardized INFOGEST in vitro digestion model was used to examine the gastrointestinal fate of these samples, in three gastrointestinal phases. Particle size, zeta potential, and microstructure were characterized using Mastersizer, Zetasizer, and confocal fluorescence microscopy, respectively. Result As a result, we clearly observed that the curcumin crystals are insoluble in all gastrointestinal phases, while TurNPs tend to aggregate when going through the stomach phase, due to the change of pH from 7 to 3. However, TurNPs still showed a higher gastrointestinal stability (76% ± 8%), which was 1.6 times higher than that of curcumin crystal. The bioaccessibility of TurNPs reached 66.8% ± 2.5%, an 8-fold increase compared to curcumin crystal. Importantly, we found that incorporating them into a nanoemuslion food system, the stability of TurNPs reached 93.9% ± 6.3%, which is the highest among all tested samples, while bioaccessibility was increased to 82.9% ± 3.4%, 5.2 times higher than curcumin crystal-added nanoemulsion system. Significance The findings show that the use of turmeric-derived nanoparticles can not only improve the water solubility of curcumin, but also enhance the gastrointestinal stability and bioavailability of curcumin, in particular by the mixture of an emulsion-like food system. This implies the potential of TurNPs for improved functional delivery of curcumin in food and nutrition systems.

**Atmospheric plasma treatment for meat curing: A comparison with conventional and plant-based systems** Sanket P. Vanare, spv33496@uga.edu, Ronald B. Pegg. *Food Science & Technology, Univ. of Georgia College of Agricultural & Environmental Sciences, Athens* Uncured' meat products allegedly promise consumers a safer alternative but fail to achieve so in reality, thereby endangering consumers' health. Traditional meat curing relies on the addition of sodium nitrite (NaNO2) to impart characteristic flavor, color, and preservation properties to processed meats. Nitrite is a multifunctional additive critical for developing the distinctive pink hue and flavor associated with cured meats such as ham, bacon, and hotdogs; as well as preventing the sporulation of Clostridium botulinum, a lethal pathogen. However, concerns regarding the formation of *N*-nitrosamines, which have been associated with potential carcinogenic risks, have led to increased scrutiny over the use of synthetic nitrite in meat processing. In response to these concerns, "uncured" meat products have gained popularity, often using vegetable sources such as celery or Swiss chard powder, which are rich in nitrate and then converted to nitrite through bacterial fermentation (either preconversion outside or once added to the meat matrix). Ironically, these "uncured" products may contain even higher levels of nitrite than their traditionally cured counterparts or hot spots of nitrite, raising questions about labeling accuracy and health implications. Recent advances in atmospheric plasma technology present a novel opportunity to generate reactive nitrogen species, which can be converted into nitrite, potentially affording a controlled, efficient, and safer alternative to traditional and plant-based nitrite sources. This study explored the feasibility of using atmospheric plasma technology to generate nitrite for meat curing; to evaluate its stability, applicability, and chemistry; and to compare it against conventional and "uncured" meat processing methods. Our work also aimed to apply ion-exchange chromatography (IEC) to investigate the chemistry of nitrate and nitrite in atmospheric plasma systems under various pH conditions. IEC provides a sensitive and selective means of separating these anions, enabling accurate quantification and the potential identification of reaction intermediates. This knowledge can prove useful in understanding the underlying chemistry of plasma-generated nitrite curing systems as well as developing safer and sustainable meat curing systems.

**Disease tolerance with sweet orange flavor** Yu Wang, yu.wang@ufl.edu, Dongjoo Kim, dongjookim@ufl.edu. *Univ. of Florida, Gainesville* Citrus greening disease (Huanglongbing, HLB) has significantly reduced sweet orange yields in Florida and other regions. Beyond lowering production, HLB also changes juice quality—making it more sour, bitter, and less flavorful. In response, researchers are developing disease-resistant cultivars, with mandarins and mandarin hybrids emerging as key options. Blending juice from these tolerant cultivars with sweet orange can improve yield and stability, while also enhancing consumer acceptance. However, such blends still carry distinct "mandarin notes," which differ from the traditional sweet orange flavor profile. Our work focus on how mixing strategies, sensory analysis, and chemical profiling can guide breeding programs toward cultivars that are both disease-tolerant and flavor-consistent with sweet orange. By comparing flavor and juice attributes across cultivars, we can better understand how to achieve higher resilience without sacrificing taste.

**Potential solutions for citrus greening disease** Weston Johnson, westjohnson@coca-cola.com. *R&D, The Coca-Cola Company, Apopka, Florida* Two potential solutions to the devastating Huanglongbing (HLB) citrus greening disease will be presented:1. The development of new tolerant citrus varieties through traditional breeding, and 2. The cultivation of existing citrus varieties in colder climates like South Georgia where HLB appears to be less impactful. The search for and identification of three promising new mandarin hybrids will be discussed in detail. Additionally, the case for expanding citrus cultivation in South Georgia and North Florida will be explored.

**Evaluation of citrus juices in the era of citrus greening** Steven Allmon, allmon@coca-cola.com. *The Coca-Cola Company, Apopka, Florida* Citrus Greening Disease has created an era of highly variable citrus juice quality. With this, accurate analytical testing results become even more critical towards meeting a juice supplier or producer's goals. Accurate, actionable data enables better inventory management, blending decision-making, and ultimately helps deliver the best possible consumer experience. Additionally, there has been extensive work towards the development of tolerant citrus varities which requires a system for standarized juice extraction and characterization across sites to enable meaningful comparisons between varietals. Here, analytical methods and protocols to obtain accurate, actionable results in the era of Greening Disease will be discussed.

## The Chemistry of Nonalcoholic and Alcoholic Beverages

**Exploring aroma-taste interactions in alcohol-free beers: Effects on sweetness and bitterness perception** Jose A. Piornos[1], jose-antonio.piornos-martinez@inrae.fr, Anna Claret[2], Juliana Meléndrez-Ruiz[1], Charlotte Sinding[1]. *(1) Centre des Sciences du Gout et de l'Alimentation, Dijon, Bourgogne-Franche-Comté, France(2) Food Quality and Technology, Institut de Recerca i Tecnologia Agroalimentaries, Monells, Catalonia, Spain* Although sales have generally increased, the consumption of alcohol-free beer is still hindered by its sensory properties, which are sometimes considered to be drawbacks because of the tendency to compare them with alcoholic beers. Alcohol-free beers brewed using biological methods usually contain high concentrations of residual sugars that have not been converted into alcohol. Another issue is the presence of Strecker aldehydes that have not been metabolised into fruity esters and fusel alcohols, and that contribute to the malty, honey-like aromas. These aromas might interact with the sweet taste, thereby enhancing the overall perceived sweetness of these beers via the OITE (Odour-Induced Taste Enhancement) mechanism. Taste and aroma are not only integrated into flavour but are also capable of modulating each other's perception. We hypothesised that the presence of Strecker aldehydes in alcohol-free beer might modulate taste perception by enhancing sweetness and reducing bitterness. The objective of this research was to understand aroma-taste cross-modal interactions in alcohol-free beers, with a particular focus on sweetness and bitterness perception. To achieve this, we modified the sugar, as well as the Strecker aldehyde concentration (methylpropanal, 3-methylbutanal and methional for the malty aroma; and phenylacetaldehyde and 2-phenylethanol for the honey aroma), of a commercial alcohol-free beer. Similarly, water-based model solutions were prepared at the same concentrations. Then, 40 panelists were asked to rank the samples according to their sweetness and bitterness. Each ranking consisted of four solutions: three with an increasing concentration of either sugar; and a fourth containing the lowest concentration and the aroma molecules. Contrary to our initial hypothesis, no OITE effect was observed for sweetness, however, a weak enhancement of bitterness was observed. The addition of the malty aroma compounds increased bitterness, but honey aroma compounds did not have the same effect. These results highlight that alcohol-free beer aroma and taste should be studied jointly, as their interactions determine the overall sensory perception and consumer appreciation.

**Interactions between aroma compounds and ethanol: implications for aroma release in hydroalcoholic solutions** Loïc Joubert-Laurencin, loic.joubert-laurencin@inrae.fr, Christian Salles, Thierry Thomas-Danguin, Jose A. Piornos. *Centre des Sciences du Gout et de l'Alimentation, Dijon, Bourgogne-Franche-Comté, France* Despite the success of non- or low-alcoholic (NoLo), consumers usually find the flavour of these beverages different from that of their alcoholic counterparts, which restrains their consumption. One reason behind this difference is the absence of alcohol affecting the release of volatile aroma compounds. This study aims to understand how ethanol affects the release of aroma compounds from water/ethanol solutions into the headspace. The influence of molecular features on the partition coefficient has been investigated as well. To do so, samples containing selected aroma compounds, commonly found in fermented beverages, were prepared in hydroalcoholic solutions at different ethanol concentrations (from 0 to 45%v/v) and their headspace was analysed by GC-FID and GC-MS. Gas/liquid partition coefficient ($K_{GL}$) values for the 29 aroma compounds were determined using the Vapour Phase Calibration (VPC) method. The study focuses on four chemical classes, alcohols, aldehydes, acetates, and ethyl esters, with different carbon chain length (linear and branched). A Quantitative Structure–Property Relationship (QSPR) model was developed to investigate the influence of molecular features on the partition coefficient. Results showed a decrease of the $K_{GL}$ as concentration of ethanol increased in the liquid, indicating a lower concentration of aroma compounds in the headspace. When compared to 0% v/v ethanol, partition coefficient decreased by 64-98% at 45%v/v. Differences in partition coefficients were also observed between the four chemical classes investigated, with alcohols showing a greater degree of retention compared to the other classes. These findings can be attributed to stronger molecular interactions between ethanol and aroma compounds, particularly hydroxyl compounds. The QSPR model revealed that the partition coefficient is related to molecular polarity at low ethanol concentrations, since LogP and polarity surface area were positively correlated to $K_{GL}$ values. However, at higher ethanol concentrations, the partition coefficient values for molecules within the same class were very close, what was reflected on a much lower contribution of the molecular features on the QSPR model. The results from this work will help understand the lost functionality of alcohol in alcohol-free drinks in terms of its release modulator role, which could imply a higher aroma intensity at low alcohol contents.

**Understanding rice traits that drive extract efficiency in brewing** Matthew Aitkens, Christian Schubert, Heena Rani, Scott Lafontaine, scott.r.lafontaine@gmail.com. *Food Science, Univ. of Arkansas, Fayetteville* Rice has been used as a brewing adjunct for more than a century, yet the factors that drive its extract yield remain underexplored compared to barley. As brewers look to diversify starch sources in response to rising barley costs and climate pressures, understanding how rice variety and processing affect brewhouse efficiency has become increasingly important. This presentation will highlight the major cultivar, compositional, and processing traits that influence extract yield in rice. Topics will include the roles of amylose content, gelatinization temperature, particle size distribution, and milling behavior, as well as preliminary insights into harvest conditions and kernel quality. Together, these features shape how effectively starch from rice is converted into fermentable sugars during mashing. By providing a clearer picture of rice functionality in brewing, this work supports the development of more sustainable, efficient, and locally adaptable brewing practices.

**Exploring malting and brewing properties of diverse rice germplasm** Heena Rani, hrani@uark.edu, Matthew Aitkens, Rahul Sen, Bernardo Guimaraes, Madeline Shults, Chijindu Peace Onwuchekwa, Scott Lafontaine. *Food Science, Univ. of Arkansas, Fayetteville* Climate-driven challenges, including rising temperatures and declining barley yields, are threatening global malt supply. Rice, with its broad cultivation and relative climate resilience, represents a promising alternative raw material in brewing industry. Despite this growing interest, limited data exist on the malting performance of diverse rice cultivars. In this study, we assessed the malting potential of diverse rice genotypes sourced from more than 30 countries across Asia, Africa, Europe, and the Americas using an optimized benchtop malting system. The system requires only 3-5 g of seeds and allows precise control of steeping and germination conditions while enabling high-throughput evaluation of diverse germplasm. Standard malt quality parameters including extract yield, diastatic power, α-amylase and β-amylase activities, soluble protein, FAN, and Kolbach index were measured alongside starch related traits such as amylose content and gelatinization temperature. Significant variation in genotypes led to extract yields up to ~72%, limit dextrinase and glucoamylase activities were 5-10-fold higher than barley, and several cultivars exhibited favorable protein modification and FAN levels comparable to commercial barley malts. Genotypes with lower amylose and gelatinization temperatures showed higher extract yields, highlighting the strong interplay between starch properties and enzymatic potential. Germination duration also significantly affected modification, with 5-day malts showing longer shoot growth as well as full modification compared to 3-day and 4-day malts. The observed variation in malting traits provides a basis for identifying genetic markers linked to malt quality and supports targeted breeding strategies to enhance rice's suitability for malting. Moreover, by evaluating a geographically diverse set of rice cultivars, this study provided insights into variability in malting traits, identifying rice varieties with superior brewing potential and possible directionality in breeding for malting qualities. Overall, these findings advance the development of malted rice-based beverages, offering climate-resilient options to the brewing industry.

**Making chemistry accessible: Formal and informal education using beverage alcohol** Leonard Demoranville, leonard.demoranville@centre.edu. *Centre College, Danville, Kentucky* Open discussions at prior AGFD "The Chemistry of Alcoholic and Non-Alcoholic Beverages" Symposia have noted the importance of undergraduate chemistry education for the field and vice versa. Real-world context and interesting topics are known to increase student engagement and learning. Many instructors have used beverage alcohol to motivate student learning through individual activities and labs in courses. The topic has also formed the basis for complete courses within chemistry major curriculum and has also formed the basis of non-chemistry major general education courses. The topic also engages audiences in informal learning settings. This talk will provide a review of some these applications in formal educational settings, reflect on informal educational experiences and summarize some related resources.

**MONDAY EVENING – 8:00PM**

**AGFD SCI-MIX**

Find abstracts for these presentations, marked '**ALSO PRESENTED AT MONDAY EVENING SCI-MIX'**, among the entries of the following sessions:

SUNDAY MORNING & AFTERNOON Advances on Agricultural and Food Chemistry - General Papers - Food Analysis & Technology

SUNDAY AFTERNOON - Withycombe-Charalambous Graduate Student Symposium

SUNDAY NOON – Artificial Intelligence and Advanced Sensing for Enhancing Food Safety

MONDAY MORNING - DIGITAL SESSION - Global Virtual Symposium: Agri-Derived Bioactives and Their Therapeutic Potential

MONDAY MORNING - Food Ingredients - Sustainability and Natural Alternatives

MONDAY MORNING - The Chemistry of Nonalcoholic and Alcoholic Beverages

**TUESDAY MORNING March 24, 2026**

**Advances on Agricultural and Food Chemistry - General Papers - Functional Ingredients and Food Processing**

**Tandem mass spectrometry-based characterization of celiac antigenicity in Canadian oat cultivars** Sachini C. Senarathna, senarat1@myumanitoba.ca, Maneka Malalgoda. *Food and Human Nutritional Sciences, Univ. of Manitoba, Winnipeg, Canada* Oat is recognized as a unique cereal with numerous health benefits, yet its suitability for people with celiac disease remains debated. This concern arises from avenin proteins, which contain celiac epitopes, with antigenicity varying by genotype and environment. The present study focused on developing a liquid chromatography tandem mass spectrometry (LC-MS/MS) method to quantify celiac epitopes in avenins and to investigate variation in antigenicity among oat cultivars. For the analysis, 38 oat cultivars were sourced from Brandon, Swan River, and Saskatchewan. Total protein content was measured, and the protein composition was assessed by size-exclusion high-performance liquid chromatography (SE-HPLC). Avenins were isolated using Osborne fractionation, enzymatically digested with chymotrypsin, and subsequently examined by untargeted LC-MS/MS on an Evosep One LC - Orbitrap Exploris$^{TM}$ 480 MS. In parallel, total gluten content was determined using the RIDASCREEN ELISA. Total protein levels ranged from 11.7±0.10% (Bolina-Brandon) to 16.94±0.21% (Morrison-Brandon). SE-HPLC revealed three protein fractions in all samples: polymeric proteins (65.00±0.30% in Minstrel-Brandon to

72.92±0.43% in Anson-Brandon), avenin-type proteins (20.34±0.38% in Anson-Brandon to 27.06±0.12% in Kolosse-Brandon), and monomeric globulins (5.96±0.15% in Roskens-Brandon to 8.62±0.17% in Ruffian-Brandon). LC-MS/MS analysis identified three celiac epitopes (PYPEQQQPI, PYPEQQPF, PYPEQQEPF). The results also indicated that genotype, environment, and their interaction significantly influence the celiac epitope expression in oat. ELISA results showed gluten concentrations ranging from 5.19±0.46 mg/kg (Noranda-Brandon) to 14.47±0.01 mg/kg (Triactor-Brandon). Furthermore, a weak positive association was observed between LC-MS/MS and ELISA, reflecting that avenin epitopes comprise a minor fraction of total gluten, thus the need to focus on avenins when determining oat celiac antigenicity using immunochemical or biochemical approaches. Overall, this study establishes a relative quantification method for avenin-derived celiac epitopes and highlights significant variability among cultivars. These insights provide a foundation for breeding oat with reduced antigenicity, advancing the development of celiac-safe oat-based protein sources.

**Carbohydrate and whey protein-based microcapsules for stabilizing β-carotene and Vitamin B12 in fortified foods** Yilun Weng, y.weng@uq.edu.au, Alberto Baldelli, Karen Magallanes, Kunhao Liu, Hale Oguzlu. *Univ. of Queensland, Brisbane, Australia* Fat-soluble β-carotene and water-soluble vitamin B12 are essential micronutrients, but their instability during food processing and storage limits their application in fortified foods. This study developed spray-dried microcapsules using carbohydrate- and protein-based wall materials, including maltodextrin (MD), gum Arabic (GA), trehalose, cellulose nanocrystals (CNC), and whey protein isolate (WPI), to improve stability and functionality of these bioactives. For β-carotene, encapsulation achieved enhanced thermal stability and a 98% targeted release in fortified flour. For vitamin B12, the microcapsules improved stability and successfully masked the characteristic color when incorporated into fortified milk powder. WPI contributed emulsification and film-forming properties, while CNC improved droplet stabilization during atomization, resulting in high encapsulation efficiency. The combination of carbohydrates and protein carriers provided effective protection against degradation while enabling controlled release in food matrices. This carbohydrate–protein encapsulation platform offers a sustainable and scalable approach for stabilizing sensitive micronutrients, supporting the development of fortified foods with improved nutritional and sensory qualities.

**Physicochemical and protein characterization of Canadian winter wheat for food applications** Santiago Rivera Alba[1], santiago.rivera.alba@gmail.com, Nikisha Muhandiram[1], Curt McCartney[2], Maneka Malalgoda[1]. *(1) Dept. of Food and Human Nutritional Sciences, Univ. of Manitoba, Winnipeg, Canada(2) Dept. of Plant Science, Univ. of Manitoba, Winnipeg, Canada* Winter wheat is an important yet underutilized cereal crop in Canada, with potential to diversify raw material options for food processing industries. While spring wheat has been extensively studied, limited information exists on the physicochemical and protein characteristics of Canadian winter wheat and their implications for food functionality. Understanding these characteristics is essential to optimize product development and expand market opportunities for winter wheat. This study aimed to characterize the physicochemical properties and protein composition of selected Canadian winter wheat cultivars. Grain samples were analyzed for proximate composition, which includes, moisture, ash, total starch, and crude protein. Further, protein composition was determined using size-exclusion high-performance liquid chromatography (SE-HPLC), allowing the quantitative analysis of albumins, globulins, gliadins, and glutenins. The proximate analysis showed variation among cultivars, with protein content ranging from 11.54% to 13.38% db and total starch varying from 53.48% to 67.29% db. SE-HPLC analysis provided detailed insight into protein distribution, with gliadins and glutenins representing the dominant fractions. Notably, breeding lines four advanced breeding lines exhibited a higher glutenin-to-gliadin ratio compared to control cultivars (AAC Vortex, AAC Coldfront and AAC Elevate), suggesting stronger gluten-forming potential. Such compositional differences are likely to influence functional attributes such as dough strength, extensibility, and baking performance. These findings highlight the diversity within Canadian winter wheat cultivars and breeding lines and provide a foundation for identifying cultivars with desirable functionality and end-use quality characteristics. By linking protein composition data to potential food applications, this work contributes to a better understanding of winter wheat functionality and supports its strategic use in the development of innovative food products including bread and noodles.

**Differential zinc speciation modulates pfoa bioavailability and ecotoxicological responses in alfalfa:soil systems** Nusrat Easmin[3,2,1], Hamidreza Sharifan[1,2,3], hsharifan@utep.edu. *(1) Chemistry and Biochemistry, The Univ. of Texas at El Paso(2) SHARIFARM Lab, The Univ. of Texas at El Paso(3) Environmental Science and Engineering Program, The Univ. of Texas at El Paso* Perfluorooctanoic acid (PFOA), a persistent per- and polyfluoroalkyl substance (PFAS), increasingly threatens agricultural soils through irrigation and biosolid inputs, raising concerns for food-chain transfer via forage crops. Zinc (Zn), widely applied in ionic ($Zn^{2+}$) or nanoparticulate (ZnO NP) forms, may alter PFAS fate and plant responses, yet the role of Zn speciation in shaping contaminant dynamics remains poorly understood. Here, we employed *Medicago sativa* (alfalfa) as a model crop to investigate how ionic $Zn^{2+}$ (as $ZnSO_4$) versus ZnO nanoparticles modulate PFOA retention, plant uptake, and physiological stress. Soil and plant compartments were analyzed for elemental composition, organic carbon, biomass, photosynthetic pigments, and antioxidant enzyme activities (CAT, APX, POD, SOD). PFOA fate was quantified using mass balance metrics including bioconcentration factor (BCF), bioaccumulation index (BAI), translocation factor (TF), and leaching fraction (LF). Results reveal contrasting outcomes: $Zn^{2+}$ consistently exacerbated PFOA mobility, reducing soil organic carbon, enhancing root uptake, and elevating oxidative stress, leading to suppressed biomass and chlorophyll content. In contrast, ZnO NPs enhanced soil PFOA retention and buffered photosynthetic and enzymatic stress responses at moderate concentrations, though at 50–70 mg/kg they facilitated elevated shoot translocation, suggesting a speciation-dependent "window" of enhanced PFOA bioavailability. These findings demonstrate that Zn speciation governs PFAS fate at soil–plant interfaces, with ionic $Zn^{2+}$ amplifying risk pathways and ZnO NPs exhibiting dual protective and mobilizing roles. The study underscores the importance of considering fertilizer speciation in PFAS-contaminated agroecosystems and highlights opportunities for developing sustainable soil management strategies.

**Impact of UV-A light dehydration on sensory properties, volatile profiles, enzyme activity, and nutritional quality of fruits and mushrooms** Sajad Karami, sajad.karami@usu.edu, Luis J. Bastarrachea. *Nutrition, Dietetics & Food Sciences, Utah State Univ. College of Agriculture and Applied Sciences, Logan* Dehydration methods play a critical role in shaping the sensory, chemical, and nutritional properties of food products. This study evaluates UV-A light dehydration as a novel nonthermal technique and compares its effects with hot air drying and freeze drying on mango, apple, and white button mushrooms. Sensory evaluation, including hedonic testing and Check-All-That-Apply (CATA) analysis with 120 participants, revealed significant differences among treatments ($\alpha$ = 0.5%). Texture analysis indicated that UV-A dehydrated samples were chewier and softer, hot air-dried samples were more brittle and crisp, and freeze-dried samples developed puffed, brittle structures resembling snack-like textures due to expansion. SPME-GC/MS analysis confirmed distinct volatile profiles across treatments. Freeze drying caused major losses of volatile compounds, as the high vacuum facilitated rapid escape of low-volatility molecules before water removal. Consequently, panelists perceived mainly non-volatile compounds such as sugars and organic acids. In contrast, UV-A dehydration preserved flavor-active volatiles more effectively, improving flavor recognition and consumer acceptability. Multivariate statistical analyses, including principal component analysis (PCA) and hierarchical clustering, demonstrated strong correlations between volatile composition and sensory responses. Word cloud visualizations of CATA results further illustrated consumer perceptions across treatments. The impact of UV-A dehydration on degradative enzymes (ascorbic acid dehydrogenase, ascorbic acid oxidase, pectin methyl esterase, peroxidase, polygalacturonase, and polyphenol oxidase) was also assessed. Hot air drying showed the greatest inhibitory effect, followed by UV-A light, while freeze-dried and fresh samples retained higher enzymatic activity ($\alpha = 0.5\%$). For mushrooms, HPLC-PDA analysis revealed that UV-A light slightly increased vitamin D2 while reducing ergosterol compared to fresh and hot air-dried samples. Antioxidant capacity, measured by ABTS, DPPH, FRAP, total phenolic content, and total flavonoid content assays, further demonstrated UV-A's potential for enhancing bioactive properties. These findings broaden understanding of UV-A light dehydration as a promising nonthermal technology, offering insights into its ability to retain flavor-active volatiles, modify texture, modulate enzyme activity, and enhance nutritional and antioxidant properties.

**Pyrroloquinoline quinone and hydrolyzed collagen: Bioenergetic synergy and pro-collagen effects in human dermal fibroblasts** **G**iovanni **S**capagnini[1], giovanni.scapagnini@unimol.it, Alessandro Medoro[1], Sergio Davinelli[1], Eugenio Luigi Iorio[2], Antonio Mazzucco[3]. *(1) Medicine and Health Science, Univ. degli Studi del Molise, Campobasso, Molise, Italy(2) Instituto de Biotecnologia, Univ. Federal de Uberlandia, Brazil(3) Biotechnology, Chemistry and pharmacy, Univ. degli Studi di Siena, Tuscany, Italy* Type I collagen is the dominant structural protein of skin. Its progressive degradation, together with damage to elastic and reticular fibers, underlies hallmark features of cutaneous aging and is exacerbated by chronic photoexposure. Multiple studies in rodents and humans indicate that cellular NAD content and nicotinamide phosphoribosyltransferase (NAMPT) decline with age across organs, including skin. The resulting bioenergetic shortfall in dermal fibroblasts may impair collagen synthesis and matrix integrity, contributing to the aging phenotype. Pyrroloquinoline quinone (PQQ) is a redox-active o-quinone found in foods and mammalian tissues that has been linked to enhanced mitochondrial biogenesis, though its molecular mechanism remains incompletely defined. Here, we evaluated PQQ (1 and 10 μM) in cultured human dermal fibroblasts and examined its combination with hydrolyzed collagen (HCOL), a nutraceutical reported to stimulate collagen neosynthesis. PQQ significantly increased intracellular NAD and ATP levels; co-administration with HCOL produced a synergistic rise in collagen production and fibroblast proliferation and migration, compared with either agent alone. To explore mechanistic underpinnings, we performed in silico analyses focused on NAMPT. Molecular docking revealed favorable PQQ–NAMPT binding ($\Delta G = -9.4$ kcal/mol). Density functional theory (DFT) showed PQQ to possess high kinetic and thermodynamic stability; its chemical potential ($\mu = 5.343$ eV) and elevated electrophilicity index ($\omega = 8.910$ eV) are consistent with potent electrophilic behavior and plausible enzyme engagement. Collectively, our data indicate that PQQ enhances fibroblast bioenergetics, increases NAD and ATP levels, and, when paired with HCOL, synergistically promotes collagen neosynthesis. The in silico findings support a model in which PQQ may positively modulate NAMPT and NAD biosynthesis, thereby increasing intracellular NAD and ATP concentrations and raising the energetic threshold required for anabolic dermal processes. The PQQ+HCOL combination emerges as a promising cosmeceutical strategy to mitigate skin aging, warranting confirmation in preclinical in vivo models and randomized clinical studies.

**Edible oil-based extraction of hemp roots: Effect of solvent and temperature on bioactive yield and antioxidant activity for cosmetic applications** Johana Angelica A. Guerrero Amaya, jguerre7@uwo.ca, William Xu, Paul Charpentier. *Chemical and Biochemical Engineering, Western Univ., London, Ontario, Canada* Hemp roots, long overlooked, are now receiving growing interest due to their potential bioactive compounds with antioxidant, antimicrobial, and anti-inflammatory properties. While previous studies have focused on conventional extractions using ethanol or water, the feasibility of oil-based extraction remains unexplored. This study investigated the extraction of root compounds using hemp seed oil, MCT coconut oil, and grape seed oil at six temperatures (50–90 °C). Extracts were analyzed by GC-MS to identify and quantify extracted compounds, and their antioxidant capacity was assessed using the DPPH assay, with results statistically evaluated by ANOVA. The pentacyclic triterpenoid Friedelin was successfully extracted with all three oils, with grape seed oil yielding the highest concentration but the lowest selectivity due to extensive co-extraction of other compounds. MCT oil showed the highest selectivity for Friedelin but at slightly lower yields. Carvone was not detected in any sample. All extracts demonstrated positive antioxidant activity. ANOVA revealed a significant effect of solvent type on both Friedelin concentration and antioxidant capacity, while temperature showed no significant effect. MCT extracts consistently showed the highest antioxidant activity, despite lower Friedelin concentrations, suggesting that other co-extracted compounds also contribute to radical scavenging. These findings demonstrate that hemp roots can be effectively extracted with common edible oils to yield bioactive compounds with confirmed antioxidant capacity, providing a foundation for developing root-derived products for potential cosmetic use.

**Phytochemical characterization and bioactivities of buckwheat seeds (*Fagopyrum esculentum*) polyphenols: Linking extraction, profiling and *in vitro* effects** Roberta Tardugno[1], roberta.tardugno@uniba.it, Gianvito Caggiano[2], Angelica Spano[3], Maria Lisa Clodoveo[3], Alessandra Stasi[2], Paola Pontrelli[2], Loreto Gesualdo[2], Filomena Corbo[1]. *(1) Dept. of Pharmacy-Drug Sciences, Univ. degli Studi di Bari Aldo Moro, Bari, Apulia, Italy(2) Nephrology, Dialysis and Transplantation Unit, DiMePRe-J, Univ. degli Studi di Bari Aldo Moro, Bari, Apulia, Italy(3) Interdisciplinary Dept. of Medicine, Univ. degli Studi di Bari Aldo Moro, Bari, Apulia, Italy* Buckwheat (Fagopyrum esculentum) is a gluten-free pseudocereal increasingly valued for its content of antioxidant polyphenols with potential health benefits. This study aimed to characterize the major phenolic compounds in buckwheat seed fractions and to evaluate their antioxidant and cytoprotective activities. Phenolic extraction was optimized using ultrasound-assisted extraction (UAE). Total phenolic content (TPC) was determined by Folin-Ciocalteu and the most recent Fast BB Blue (FBBB) assays, total flavonoid content (TFC) was determined by the $AlCl_3$ method. Antioxidant and radical scavenging activities were assessed by FRAP, ABTS, and DPPH assays. The quali-quantitative analyses of the phenolic profiles were performed by using HPLC-MS and HPLC-DAD. The HPLC method was validated according to the ICH (International Conference of Harmonization) guidelines. A 1:20 matrix/solvent ratio (EtOH: H 2 O, 1:1) for 15 minutes by using an ultrasonic bath (100 W, 37 kHz) three times led to the highest TPC yield and was selected as the extraction procedure. According to the antioxidant and anti-radical assays, the hull fraction reported highest values 3.69 mg GAE/mL and 1.17 mg GAE/mL

(Gallic Acid Equivalent), respectively. Twenty-five phenolic compounds were identified, including phenolic acids, flavanols, and flavones. Cell-based assays on EA.hy926 endothelial and RPTEC/TERT1 renal cells revealed no cytotoxicity up to 200 µg/mL and demonstrated protective effects against indoxyl sulfate-induced toxicity. These results highlight buckwheat polyphenols as promising bioactive compounds for functional food and nutraceutical applications.

**Analysis of prebiotics using *in vitro* model systems** Karley Mahalak, karley.mahalak@usda.gov, Adrienne B. Narrowe, Jenni Firrman, Johanna Lemons, Lin Liu. *USDA Agricultural Research Service, Wyndmoor, Pennsylvania* The gut microbiome plays an integral role in overall human health. The increasing prevalence of gastrointestinal disease, including inflammatory bowel disease, ulcerative colitis, and colorectal cancer, have been linked to an increase in the prevalence of the western diet, and a decrease in dietary fiber intake. Some dietary fibers have been shown to function as prebiotics, which can be utilized by residents of the gut microbiota and improve gastrointestinal health. Advancements in in vitro technology continue to provide a greater understanding of how a variety of prebiotics benefit the health of the gut microbiota. These benefits include increasing key beneficial taxa, such as bifidobacteria, and key metabolites, such as butyrate. This work will explore the ability of selected prebiotics to modulate the gut microbiota and how in vitro technology is being leveraged to provide a greater understanding of the mechanism of these effects.

**Thomas H. Parliment ACS Award Symposium for Advances in Flavor Chemistry: honoring Terry E. Acree**

**From cells to smells and back** Nancy Rawson, nrawson@monell.org. *Monell Chemical Senses Center, Philadelphia, Pennsylvania* Over the past few decades, olfactory science has undergone a renaissance. Breakthroughs in genomics, neurobiology, and analytical chemistry have illuminated the remarkable complexity of the olfactory system. We now know that humans possess hundreds of odorant receptors, each responding to different combinations of molecules, enabling an almost infinite palette of sensory experiences. Advances in neuroimaging and psychophysics have shown how smell influences cognition, emotion, and behavior. At the same time, new tools—from organoid models and AI-powered scent mapping to wearable sensors and digital olfaction—are transforming how we study and apply olfactory insights. This work hinges on decades of research elaborating the anatomical, cellular, molecular and neurophysiological basis for odor detection, processing and interpretation. However, elaborating biological responses is perilous without a solid understanding of the stimuli being used to activate the response. In addition, the knowledge of molecular receptors, cellular signaling and neural processing cannot be synthesized in a meaningful way if the perceptual phenomena we seek to explain are not described with precision. Success requires communication and collaboration across disciplines which use distinct languages and approaches. Indeed, even the very term used to describe a volatile stimulus that activates the olfactory pathway has been debated: is it an "odorant", an "odor", a "smell" or an "aroma"? Using examples from research exploring the biology of human olfaction, this presentation will highlight the importance of cross-disciplinary discourse – a practice that the awardee, Dr. Terry Acree, practiced with patience, curiosity and joy.

**Subconscious processing of tastes, smells, and flavors** Paul Breslin[1,2], breslin@monell.org. *(1) Monell Chemical Senses Center, Philadelphia, Pennsylvania(2) Dept of Nutritional Sciences, Rutgers Univ. New Brunswick, New Jersey* We each exist as a conscious being in a world filled with physical stimuli that act upon all of our sensory receptors. These sensory inputs and resulting experiences have captured the attention of scholars for well over a millennium. The outputs of our sensory systems, however, do more than generate conscious perceptions. We process activations of our sensory receptors at levels below those that trigger conscious perception. Moreover, there are output pathways of some sensory systems that result in exocrine, endocrine, and motor responses of which we have little or no awareness. This is especially true of the chemical senses: taste, smell, and chemesthesis. In this presentation, I will discuss the impacts of carbohydrates, bitter tasting stimuli, salts, and fats on our taste system and their ensuing subconscious regulatory physiological responses. I will also discuss the integration of subconscious tastes and odors to influence flavor perception, including perception of subthreshold taste and odor mixtures, the role of gustatory noise in odor perception, and the perceptual impact of adapting to subthreshold stimuli. Perhaps we do not perceive every chemosensory receptor activation in order to prevent the madness that comes with being overwhelmed. Yet, subconscious activations are registered by our central nervous system and used to help process both our perceptions and responses to these chemical stimuli.

**Rapid methods of trace volatile analysis: Practical Considerations for chromatography and Chromatography-Free techniques** Andre P. Kalenak[1,2], apk66@cornell.edu, Gavin L. Sacks[1]. *(1) Food Science, Cornell Univ., Ithaca, New York(2) Quantera Analytical, Ithaca, New York* Volatile and semivolatile organic compounds and the detection thereof have myriad importance in the fields of medicine, environmental science, ecology, perfumery, and food science. Trace volatile analyses by necessity require throughput-limiting steps to achieve acceptable limits of detection and quantitation. Solid phase micro extraction (SPME) and thin-film microextraction (TFME) have profoundly streamlined the preconcentration step, yet chromatographic separation remains throughput limiting. One such example is grape and wine aroma, where industry standard analyses take 17-25 minutes per sample by headspace SPME gas chromatography-mass spectrometry (GC-MS). Odorant analyses are not amenable to most forms of "fast GC" due to low sample capacity inherent to the narrow, thin film columns employed and high split ratio required to address peak distortion. Any loss of sensitivity and linear calibration range is not acceptable in these applications. Inlet-restricted wide bore column configurations, termed low pressure GC (LP-GC), offer an alternative with large sample capacity and potential 2.5 to 4 fold increased throughput, with a significant caveat. High volatility targets will not focus at low pressure without specialized equipment. Might it be simpler to eschew chromatography altogether then? No, but doing so offers certain benefits. Recent work utilizing parallelized sorbent sheet extraction (SPMESH) coupled with direct analysis in real time mass spectrometry (DART-MS) leverages MS analytical power to bypass the need for chromatographic separation, reducing per-sample analysis time to under 30 seconds, a ~40-fold improvement. In a system where analysis of a single sample takes less than 30 seconds and a 24-well SPMESH sheet takes ~12 minutes, sample preparation is rate limiting. Derivatization affords further selectivity and therefore performance but also increases prep time. Obviating the need for derivatization through more performant SPMESH is far more desirable from a cost and time standpoint. Advances in basic SPMESH operating procedure may allow for streamlined preparation workflows, pushing towards faster, cheaper routine trace volatile quantitation. We will discuss the state of the art, development to this point, and near and long-term prospects for chromatography-free trace volatile quantitation.

**TUESDAY AFTERNOON**

**Artificial Intelligence in Food and Agricultural Chemistry - From Molecular Insights to Field Applications**

**Identification of multi-target anti-alzheimer's compounds from korean citrus peel flavonoids using deep neural networks** Samuel Park, nenjgks2@gmail.com, Jeehye Sung. *Food Science and Biotechnology, Gyeongkuk National Univ., Andong-si, Gyeongsangbuk-do, Korea (the Republic of)* Alzheimer's disease (AD) is a progressive neurodegenerative disorder with a complex pathogenesis that has hindered the development of effective therapeutic drugs because of the limitations of the traditional single-target drug discovery paradigm. This study aimed to propose a state-of-the-art drug screening strategy for AD based on artificial intelligence (AI) analysis by (1) investigating flavonoids identified through LC-MS/MS analysis in the peels of Korean citrus varieties, (2) developing AI models, (3) discovering potential multi-target therapeutic compounds, and (4) performing validation using cell-based models. In this study, four distinct deep neural network (DNN) models were developed for a comprehensive screening process, which were trained to predict activity against key pathological targets: acetylcholinesterase (AChE), beta-secretase 1 (BACE-1), caspase-3, and glycogen synthase kinase-3β (GSK-3β). Training data were curated from the ChEMBL database, with compounds labeled as active (1) or inactive (0) based on an $IC_{50}$ threshold of 50 μM for binary classification. To maximize predictive power, the models combined graph-based molecular representations with RDKit-derived 2D descriptors. Hyperparameters were optimized via Bayesian optimization, and ensemble averaging of 20 trained models per target was applied to improve robustness and reliability. The four resulting ensemble models demonstrated robust predictive performance, achieving high ROC-AUC values ranging from 0.884 to 0.959 in cross-validation and on test sets. Rutin, didymin, and hesperidin achieved high scores simultaneously against both BACE-1 and caspase-3, although no compounds exhibited strong activities across three or more targets. For AChE, 3,5,6,7,3′,4′,5′-heptamethoxyflavone showed the highest predicted activity, while apigenin was the top-scoring compound against GSK-3β. Molecular docking simulations confirmed the strong binding affinity of the top-scoring compounds to their target proteins, and subsequent in vitro validation demonstrated their inhibitory effects at the enzyme level and in cell-based assays using amyloid beta-induced PC12 and tau-mutated HEK293T cells. In conclusion, this study established an effective platform that integrates deep learning with LC-MS/MS-identified citrus peel flavonoids for the rapid and cost-effective discovery of multi-target drug candidates for AD.

**Novel approach for the discovery of bioactive peptides from corn gluten meal: Artificial intelligence-assisted *in silico* screening to selective peptide purification and bioactivity confirmation** Samuel O. Ogundipe, soo54666@uga.edu, Ronald B. Pegg, Joon Hyuk Suh. *Food Science and Technology, Univ. of Georgia, Athens* In recent years, therapeutic peptides have gained increasing attention, with several approved for clinical use. By 2030, they have a projected global market value exceeding $100 billion. Corn gluten meal (CGM), an abundant coproduct of the corn starch industry, remains underutilized despite its high protein content and potential to generate health-promoting bioactive peptides. However, the discovery of such peptides presents significant challenges, as conventional methods are time-consuming and inefficient, involving hydrolysis, extraction, and the screening of hundreds of unknown peptides. To address this, the present study employed an integrated workflow that combines *in silico* predictions with selective extraction and bioactivity assays to efficiently develop bioactive peptides from CGM. *In silico* databases and models were used to guide enzyme selection and predict peptide sequences with potential bioactivity, enabling the targeted purification of protein fractions for subsequent *in vitro* assays. Candidate peptides were prioritized using in-house criteria, with only those having a composite index > 0.70 selected for *in vitro* testing (e.g., ACE-inhibitory, antioxidant assays). The findings highlight how *in silico*-guided selection can streamline experimental workflows, accelerate validation, and enhance the valorization of CGM as a sustainable functional food ingredient.

**Machine learning-assisted prediction of fragmentation patterns in GC-MS/MS for volatile compound identification without authentic standards** Miguel Vasconez, Dongjoo Kim, dongjookim@ufl.edu, Yu Wang. *Citrus Research and Education Center, Food Science and Human Nutrition, Univ. of Florida, Lake Alfred* Gas chromatography coupled with tandem mass spectrometry (GC-MS/MS) is widely used for the targeted analysis of volatile compounds in omics studies, including metabolomics and flavoromics. Application of authentic standards, GC-MS/MS using Multiple Reaction Monitoring (MRM) enhances specificity by monitoring unique precursor-product ion transitions under optimized collision energies. However, the high cost and limited availability of authentic standards pose significant barriers. In this study, we systematically analyzed the fragmentation behavior of a diverse set of volatile compounds using authentic standards across multiple collision energies. By leveraging structural information, precursor-product ion pairs, and collision energy parameters, we developed machine learning models capable of predicting ion intensities for various fragmentation pathways. These models enable the selection of optimal MRM transitions even in the absence of authentic standards. Our approach offers a flexible and scalable solution for volatile compound identification, potentially standardizing access to high-precision analytical tools in flavor and metabolomics research through data-driven methodologies.

**Scalable molecular featurizer pipeline: From quantum/chemoinformatic descriptors to machine-learned odor profiles** Zachary T. Gardner, zachgardner@comcast.net, Nolan C. Lok, Qianxiang Ai, Chad Risko. *Chemistry, **Univ.** of Kentucky, Lexington* Human sensory panels remain the de facto standard for odor evaluation. These panels, however, are costly, subjective, and difficult to reproduce across concentration regimes. We introduce a scalable, computational workflow that generates rich, mechanistically meaningful descriptors for odor prediction, enabling machine learning (ML) models that complement or replace panel testing. Our pipeline integrates (i) quantum-chemical proxies from xTB (energetics and electronic features), (ii) acid–base behavior via QupKake micro-pKa predictions, (iii) bond-dissociation energies derived with a graph-theoretic scheme, and (iv) broad cheminformatics representations (Mordred and related fingerprints). To encode receptor-level interactions, we pair AlphaFold-derived receptor structures with Boltz-2 protein–ligand binding affinity predictions, yielding ligand–target interaction features that enrich purely ligand-based models. We then train ML models on curated odor datasets, using established workflows to benchmark categorical notes and multi-label scent vectors. The resulting feature space captures orthogonal physicochemical axes—electronic, steric, acid–base, stability, and putative binding propensities.

**Redefining food safety and authenticity through aptasensors, nanotechnology, and AI-driven approaches** Muhammad Shoaib, shoaib_ju@hotmail.com, Li Xiaoli. *College of Biosystems Engineering and Food Science, Zhejiang Univ., Hangzhou, China* Food safety and authenticity face increasing challenges from complex supply chains, emerging contaminants, and rising cases of adulteration and fraud. Traditional detection methods, although widely used, often lack the speed, sensitivity, and flexibility needed to handle these issues in real-world situations. Aptasensors, biosensors based on functional DNA or RNA aptamers, have become powerful next-generation tools to overcome these limitations. Recent advances have shown that aptasensors, combined with nanomaterials and surface-enhanced Raman spectroscopy (SERS), enable ultra-sensitive and highly specific detection of pesticide residues, toxins, antibiotics, and adulterants. Modifying and engineering aptamers further improves selectivity, stability, and reproducibility, while integrating AI-driven chemometric techniques supports intelligent data processing, real-time monitoring, and predictive modeling for early risk identification. Applications targeting high-value foods, including tea, grains, and processed products, demonstrate the potential of aptasensors for translation into real-world use. Major challenges still exist, including scalability, robustness in complex samples, and regulatory approval; however, multiplexed and multifunctional aptasensor platforms offer promising paths forward. By combining molecular recognition, nanotechnology, and artificial intelligence, aptasensors provide a sustainable and reliable approach to advancing global food safety and authenticity. These innovations support the goals of ACS Spring 2026, highlighting the crucial role of chemistry in safeguarding public health and fostering transparent, sustainable food systems.

**Precision-controlled environment agriculture with AI-driven nutrient sensing and 3D phenotyping** Yuankai Huang, yuankai.huang@memphis.edu. *Dept. of Civil, Construction, and Environmental Engineering, The Univ. of Memphis, Tennessee* Optimizing nutrient use efficiency while safeguarding quality is a central challenge for controlled-environment agriculture (CEA). Standard measurements of biomass and nutrient uptake rely on destructive sampling or costly imaging equipment, which interrupts growth and limits the frequency of data collection. As a result, long-term trends and subtle shifts in nutrient demand are often overlooked, leading to preventable yield losses or excessive fertilizer use. To address this gap, we introduce an integrated, non-destructive framework that combines continuous ion-selective electrode (ISE) sensing with canopy-level hyperspectral imaging for plant monitoring in CEA, such as hydroponics. On the sensing side, we encode candidate ISE formulations (ionophore/plasticizer/polymer/additives) with chemistry-aware descriptors from 1,745 data sets in 164 papers and train machine learning (ML) models to predict sensor performance, such as slope, detection limit, selectivity, and drift, and use Bayesian optimization and active learning to design robust, low-drift sensors in nutrient solutions with the Nernst slopes ≤ 8.2% from ideal and detection limits at the $10^{-7}$ M level. The fabricated $NH_4^+$, $NO_3^-$, and $K^+$ ISEs are modified with a self-assembled, channel-type zwitterionic copolymer to enhance durability and calibration stability in nutrient-rich solutions for over 50 days. In parallel, we integrate these continuous nutrient streams, provided by sensors, with a lightweight, automated imaging pipeline that reconstructs plant roots and shoots from multi-view sequences (40 views per plant, with ray-tracing correction). The system combines silhouette-based space carving with ray-tracing corrections for refractive distortion in hydroponic canisters, generating volumetric models from which we estimate biomass and growth trajectories non-destructively. We fuse multimodal signals, including solution chemistry, root/shoot volume, and canopy appearance, via gradient-boosted ensembles and temporal graph models to infer uptake kinetics, predict short-term biomass gains, and detect emerging nutrient imbalances before visual stress occurs. By coupling AI-designed nano/polymeric sensing membranes with AI-assisted 3D phenotyping, this work advances the AI-based analysis of plant nutrient profiles, data-driven process optimization, and real-time monitoring, delivering a practical, scalable toolkit to improve yield and quality while reducing inputs and environmental footprint in the CEA.

**A joint metabolomics and machine learning approach: A new direction in food chemistry and agriculture** Min Jeong Kang, Joon Hyuk Suh, J.Suh@uga.edu. *Food Science & Technology, Univ. of Georgia College of Agricultural & Environmental Sciences, Athens* Artificial intelligence (AI) is an emerging technology that analyzes and interprets large, complex datasets to derive actionable insights. Machine learning (ML), a subset of AI, trains computers to learn from data and simulate certain aspects of human intelligence, such as perception, judgement, and decision-making. Based on this capability, ML can develop algorithms to predict human-like behaviors and make decisions to achieve defined goals. Metabolomics involves the comprehensive analysis of small molecules, known as metabolites, within biological systems. It has been widely applied in food and agricultural sciences to uncover biochemical mechanisms at the molecular level. One of the key challenges is managing the large, high-dimensional datasets generated from the measurement of a broad spectrum of metabolites, making it difficult to extract meaningful insights. In this context, ML is being increasingly used for data interpretation and modeling in metabolomics research. This presentation will introduce the fundamentals of metabolomics and machine learning, along with their applications in the context of food and agriculture. Two case studies will be highlighted: one exploring food color prediction based on metabolite profiles, and the other focusing on biomarker discovery for plant disease resistance.

**Integrating artificial intelligence and chemical validation for multiplex detection of agrichemical stress in citrus leaves** Melissa M. Deinys[1,2,3], me825009@ucf.edu, Giulio Diracca[1], William Bu[4], Jorge Pereira[2], Swadeshmukul Santra[1,2]. *(1) Dept. of Chemistry, Univ. of Central Florida, Orlando(2) NanoScience Technology Center, Univ. of Central Florida, Orlando(3) Burnett School of Biomedical Sciences, Univ. of Central Florida, Orlando(4) Computer Science, Univ. of Central Florida, Orlando* Citrus production in recent decades has faced multiple challenges, including devastating disease such as huanglongbing and increasing pest pressure. These challenges have increased the widespread use of agrichemicals to alleviate these issues but they themselves can have adverse effects such as phytotoxicity. These overlapping stressors make it difficult for growers to distinguish the true cause of foliar symptoms in the field and may lead to incorrect management decisions. The emergence of artificial intelligence (AI) has shown promise for crop diagnostics, however due to limitations in data acquisition most models remain limited to single-target identification, making them ineffective in field settings. To address this gap, a multiplex AI system capable of identifying multiple foliar symptoms and pesticide quantification using RGB images captured through a consumer smartphone was developed. Greenhouse grown Valencia orange trees were treated with copper sulfate (800 mg/L), herbicide (0.8% v/v) to induce leaf injury; as well as clay/dirt solutions and water were applied to mimic natural residues. For residue quantification, Kocide 3000 was applied at varying concentrations (800 mg/L - 200 mg/L), and area coverage of leaves was quantified by ImageJ software. The samples were later validated through ICP-OES analysis, which allowed a direct correlation between visual residue coverage and quantitative copper deposition. Our AI workflow combined RF-DETR for leaf detection, MobileSAM for segmentation, and FastViT-SA12 as a lightweight classification backbone. Trained on ~1,600 images (~400 per class), the model achieved ~98% accuracy despite setting variability such as lighting, angle, and symptom development. This system's ability to accurately distinguish between multiple leaf symptoms and quantify pesticides demonstrates its potential to transform crop management. By providing growers with reliable diagnostics, it reduces the risk of misinterpretation of symptoms and helps limit over over-application of pesticides.

**Machine learning-driven insights into the chemical basis of apple flavor perception** Keono Kim[1], rlarjsdh1129@naver.com, Joon Hyuk Suh[2], Jeehye Sung[1]. *(1) Food Science and Biotechnology, Gyeongkuk National Univ., Andong-si, Gyeongsangbuk-do, Korea (the Republic of)(2) Food Science and Technology, Univ. of Georgia,*

*Athens* Artificial intelligence (AI) is a powerful tool in food and agricultural chemistry, enabling the discovery of molecular patterns underlying sensory perception and quality. Apple (*Malus domestica* Borkh.) is one of the most widely consumed fruits worldwide due to its pleasant flavor. Despite its flavor importance to consumer preference, there is still a lack of AI-based research clarifying the role of flavor-related compounds in shaping apple sensory perception. A dataset comprising more than 100 apple fruits from multiple cultivars was used for model development. These samples were subjected to descriptive sensory analysis including sweetness, sourness, apple, pear, pineapple, cucumber, floral, fruity, green, and honey. Non-volatile compounds (e.g., sugars and organic acids) and volatile compounds were quantitatively profiled using HPLC and HS-SPME-GC-MS, respectively. The integrated dataset was used to train and validate five machine learning algorithms—Random Forest, LASSO, XGBoost, PLSR, and SVR—through five-fold cross-validation. Model performance was evaluated using the coefficient of determination ($R^2$) and residual predictive deviation (RPD). Among the tested models, XGBoost exhibited the best predictive performance across multiple sensory attributes. Sweetness and sourness achieved excellent prediction accuracy ($R^2$ = 0.8833, RPD = 2.93; $R^2$ = 0.8367, RPD = 2.47, respectively), while honey ($R^2$ = 0.7223, RPD = 1.90), pineapple ($R^2$ = 0.7360, RPD = 1.95), and green ($R^2$ = 0.6713, RPD = 1.75) also demonstrated reliable estimation potential. In contrast, more complex flavor descriptors such as apple and cucumber showed lower predictability, reflecting their multifactorial sensory nature. Feature importance and SHAP (SHapley Additive exPlanations) analyses provided molecular-level interpretability by identifying key chemical drivers of sensory perception. Butyl acetate, tartaric acid, and glucose were strongly associated with sweetness, whereas 2-methylbutyl acetate, butyl acetate, and citric acid significantly contributed to sourness perception. The "honey-like" note was linked to (*E*)-2-hexenol and total sugars, while the "pineapple-like" note was primarily influenced by esters such as 2-methylbutyl acetate and hexyl hexanoate. This study provides the potential of AI-assisted flavor modeling as a valuable tool for cultivar selection and provide a robust framework for precision flavor management and data-driven innovation in food and agricultural systems.

**Non-volatile precursors as predictors of roasted peanut flavor: A metabolomics and machine-learning approach** Namhee Lee[1], NamHee.Lee@uga.edu, Koushik Adhikari[2], Abhinav Mishra[1], Nino Brown[3], Joon Hyuk Suh[1]. *(1) Dept. of Food Science and Technology, Univ. of Georgia, Athens(2) Dept. of Food Science and Technology,, Univ. of Georgia, Griffin(3) Dept. of Crop and Soil Sciences, Univ. of Georgia, Tifton* Roasted peanut flavor is a critical quality attribute of peanuts, influencing consumer acceptance and market value. While sensory evaluation is the conventional approach for assessing this trait, it requires large sample sizes and significant resources, limiting its feasibility during early breeding stages when peanut availability is low. For chemical information-based evaluation, the current efforts have focused on volatile aroma compounds, leaving the role of non-volatile precursors (e.g., sugars, amino acids) largely unexplored, despite their fundamental function in flavor development via browning reactions. In this study, a combined metabolomics and machine learning approach was employed to predict roasted peanut flavor quality based on non-volatile precursors, including sugars and amino acids. Peanuts representing a range of roasted peanut flavor qualities were profiled using liquid chromatography-mass spectrometry (LC-MS), and key non-volatile precursors were identified and quantified. These precursors served as input variables to train and validate machine learning models, with sensory panel scores of roasted peanut flavor as the outcome variable. Through this process, significant metabolite variables linked to roasted flavor were selected and modeled. This work is expected to provide cost-effective, scalable tools for evaluating the quality of peanuts in early-stage breeding programs, where sample quantities are insufficient for sensory evaluation.

## Thomas H. Parliment ACS Award Symposium for Advances in Flavor Chemistry: honoring Terry E. Acree

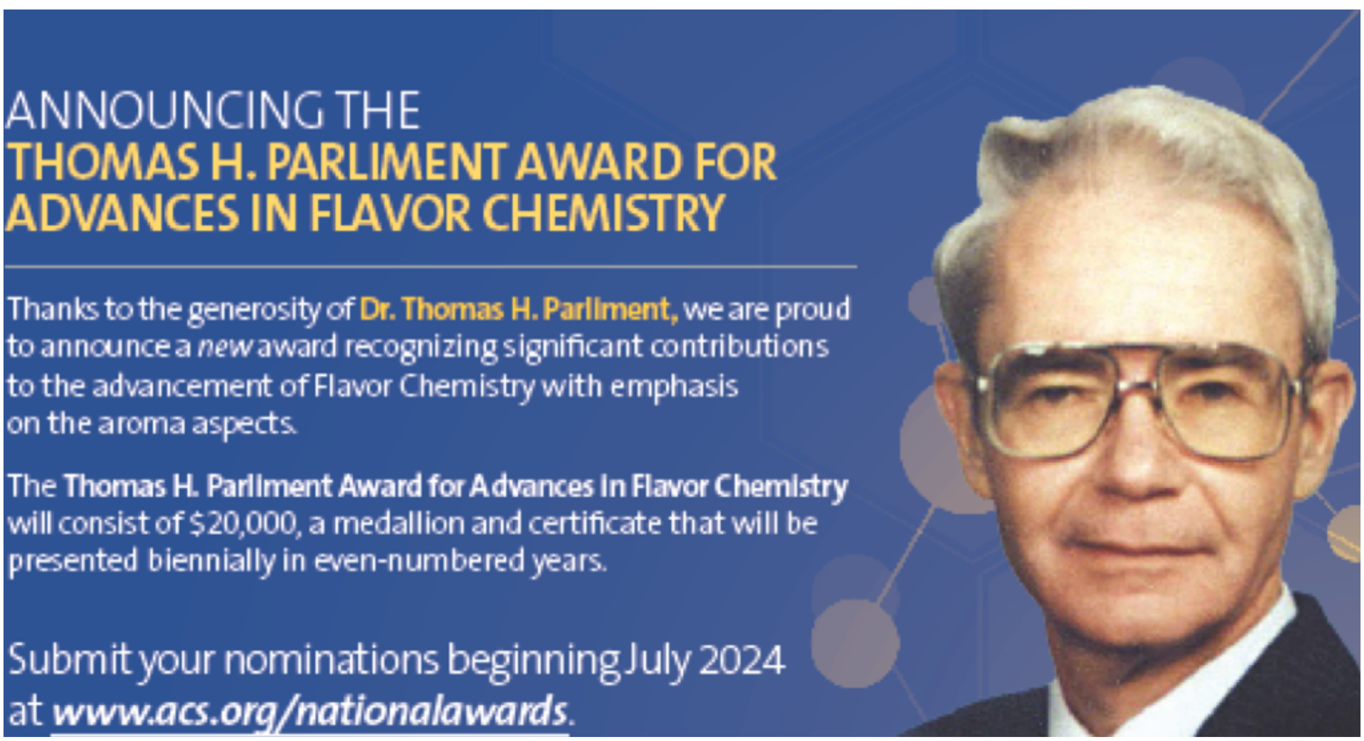
**Odor mixtures: A chord with silent notes** Stuart Firestein, sjf24@columbia.edu. *Biological Sciences, Columbia Univ., New York, New York* The sense of flavor has a strong olfactory component and is virtually always a blend of molecules that comprises a complex flavor. With the discovery of large family of odor receptors there has been considerable effort in identifying odor ligands for specific receptors. Recently we and others found that some molecules can act as antagonists at odor receptors and in some cases molecules known to be odors (agonists) at one receptor can be an antagonist at another receptor. This complicates the pattern of activity in the peripheral olfactory epithelium as mixtures could contain agonist and antagonist molecules. Thus a molecule that bocks certain receptors can have as great an effect on the perception of a blend as one that activates receptors. In a simple model we demonstrate how this level of inhibition counter intuitively increases the dynamic range of the olfactory system several fold.

**Teaching mice to Speak: Investigating Olfactory Perception using a mouse model** Dmitry Rinberg, rinberg@nyu.edu. *Neuroscience Institute, NYU Langone Health, New York, New York* Most of the research on olfactory perception has been conducted with humans, who can describe odors and assess their strength. However, humans are not the ideal model for studying the neural processing of odor information. Despite significant advancements in neural recording technology in mice over the past two decades, measuring perceptual variables in animal models remains challenging, beyond basic stimulus discrimination tasks. To address this, we have developed two experimental approaches to assess odor perception in mice. For characterizing odor identity, we introduced a behavioral approach using Delayed-Match-to-Sample task to measure perceptual distances between odor pairs. Instead of relying on verbal descriptions, we evaluate the relationships between individual odors and a variety of others, allowing us to construct an animal perceptual odor space and compare it with human perception. To assess odor intensity, we developed a two-odor concentration discrimination paradigm. This method enables us to determine the relative intensities of odor pairs and identify the concentrations at which their perceived intensities match. Testing this paradigm in humans confirmed that the matched intensities correspond to human perceptions, validating our approach. By measuring perceptual variables in animal models, we can compare perceptions across species, including humans. This approach paves the way for exploring the neural correlates of odor perception using animal models.

**From smoke to signal: Human olfactory ERPs at millisecond resolution** Ann-Sophie Barwich[1,2], abarwich@iu.edu. *(1) Harvard Univ. Radcliffe Institute for Advanced Study, Cambridge, Massachusetts(2) History & Philosophy of Science and Medicine | Cognitive Science, Indiana Univ., Bloomington* The human olfactory system elicits complex neural responses that unfold over time and can be measured at the scalp using event-related potentials (ERPs). Like visual and auditory ERPs, olfactory ERPSs (OERPs) are identified with specific ERP components, such as the N1, P2, and P3, that link this observable neural activity with distinct task and stimulus conditions. Unlike their visual and auditory counterparts, OERPs have been found to have markedly slower latencies. Moreover, OERP characteristics vary significantly with experimental design, exacerbating comparisons across studies and reproducibility. We asked whether these slower OERP latencies and their variability are integral to olfactory processing or constitute a result of experimental design. We collected EEG data from 38 participants with a new protocol involving a sniff-olfactometer with precise time-locked stimulus presentation of 70ms duration, avoiding peripheral adaptation while facilitating conscious perception. We found multiple waveform deflections with early latencies associated with known ERP components. Here we focus on the analysis of waveform deflections for well-known ERP components (P1, N1, P2, N2, P3) with regards to their robustness and reproducibility across participants and trial-by-trial variability of individuals. Our findings highlight how OERP studies can be optimized to control stimulation presentation and normalized component analysis to tailor investigations to the temporal pipeline of human olfactory information processing and its mechanisms.

**Award Address (Thomas H. Parliment Award for Advances in Flavor Chemistry supported by an endowed fund established by Thomas H. Parliment). Flavor psychophysics** Terry E. Acree, tea2@cornell.edu, Tiffany Hsu, Yao Jiang, Quanlin (Charles) Wu, Hanzhi (Jessica) Zheng, Hansheng (Kayle) Chen. *Food Science, Cornell Univ., Ithaca, New York* Animals evolve and develop in dynamic ecologies where survival is due to their "selection" of traits and behaviors from a random pallet of "choices." Each selection comes from successful past encounters with pray, predators, mates, and other symbionts when a perception was associated with a valuable outcome. At the core of this process are rules, heuristics, laws, algorithms, frameworks, … that relate life events to reproducible sensory perceptions In 1830 Ernst Weber used the perception of weight differences in hand-held objects to determine what he called the "Just Noticeable Difference" (JND) between two weights. After comparing many objects of different weights he discovered a rule of thumb, a heuristic: for many years called Weber's law. Mathematically, Weber's law is expressed with the algorithm: $\Delta(I1\text{-}I2)/I1 = K$ when $\Delta(I1\text{-}I2) = JND$. This algorithm should be evident in the neurobiological circuitry of animals as well as the psychophysical responses they produce after stimulation. This presentation will describe several of the algorithms that seem to govern taste and smell in humans discovered during the 200 years since the Weber. Flavor perception, a multimodal process, primarily involves the modulation of taste and smell by flavor active chemicals. It is well established that single odorants, tastants and chemesthetic compounds create clear recognizable sensations while mixtures of stimulants induce idiosyncratic configurations. Some mixtures are obvious composites of the most potent (key) stimulant and in others a single subthreshold odorant (a silent note) creates a unique configuration suppressing the most potent (key) odorants. In other cases, like some fruit odors, the most potent odorants are strongly suppressed by weaker but exclusive odorants creating a configural perception. Using precise psychophysical data and computational modeling we hope to discover the algorithms that underly the modulatory behavior of mixture perception.

## AWARDS APPLICATION FORMS




This ACS-administered award is granted in even numbered years.

**Agricultural and Food Chemistry (AGFD) Division of the American Chemical Society (ACS)**
**Graduate Student Symposium Competition**

This AGFD sponsored competition is designed to showcase the research talents of agricultural and food chemistry graduate students anticipating a 2027 graduation. All applicants must hold membership in AGFD and ACS. This symposium will comprise part of the ACS National Meeting held in New Orleans, Louisiana between March 21 and March 25, 2027. Students chosen as participants in the competition will receive $1000 in travel expenses to allow them to present at the meeting. Competition winners will receive cash awards - $500 (1st place), $250 (2nd), $100 (3rd).

Application requirements (submitted in the following order as a single PDF document) – 1-Completed application form (below), 2-Resume (2 page max.), 3-Abstract (also entered on ACS MAPS on-line system as part of the AGFD Graduate Student Symposium), 4-Recommendation Letters (1000 words max., each) from 2 professors, one preferably the graduate advisor.

Email complete application, **no later than Sept. 25, 2026**, to Dr. Kathryn Deibler kdd3@cornell.edu

**APPLICATION FORM**
**Agricultural & Food Chemistry (AGFD) Division of the American Chemical Society (ACS)**

## Withycombe-Charalambous Graduate Student Symposium Competition

Name: ______________________________

University: ______________________________

Major(s): ______________________________

Undergraduate Grade Point Average (provide scale): ______________________________

Graduate Grade Point Average (provide scale): ______________________________

Address: ______________________________

Phone number: ______________________________

Email address: ______________________________

ACS membership number: ______________________________
Member of AGFD? (check one) Yes ( ) No ( )

Research advisor: ______________________________

ACS MAPS Abstract Submission Number: ______________________________

Complete all application requirements (submitted in the following order as a single PDF document) –
1-Completed application form (above)
2-Resume (2 pages max.)
3-Abstract (also entered on ACS MAPS on-line system as part of the **AGFD Graduate Student Symposium**)
4-Recommendation Letters (1000 words max., each) from 2 professors, one preferably the graduate advisor.

Email complete application, **no later than September 25, 2026**, to Dr. Kathryn Deibler kdd3@cornell.edu

**Agricultural and Food Chemistry (AGFD) Division of the American Chemical Society (ACS)**
**Undergraduate Student Poster Competition**

This AGFD sponsored competition is designed to showcase the research talents of agricultural and food chemistry undergraduate students, provide a professional forum for presenting their research and promote their continued agricultural and food education. All applicants must hold membership in AGFD and ACS. This poster session will comprise part of the ACS National Meeting held in New Orleans, Louisiana between March 21 and March 25, 2027. Students chosen as participants in the competition will receive $1000 in travel expenses to allow them to attend the meeting and present their poster. Competition winners will receive cash awards - $500 (1st place), $250 (2$^{nd}$), $100 (3$^{rd}$).

Application requirements (submitted in the following order as a single PDF document) – 1-Completed application form (below), 2-Resume (1 page max.), 3-Abstract (also entered on ACS MAPS on-line system as part of the AGFD General Poster Session), 4-Recommendation Letter (1000 words max.) from 1 professor.

Email complete application, **no later than September 25, 2026**, to Dr. Kathryn Deibler kdd3@cornell.edu

**APPLICATION FORM**
**Agricultural & Food Chemistry (AGFD) Division of the American Chemical Society (ACS)**
**Undergraduate Student Poster Competition**

Name: ______________________________

College/University: ______________________________

Major(s): ______________________________

Grade Point Average (provide scale): ______________________________

Address: ______________________________

______________________________

Phone number: ______________________________

Email address: ______________________________

ACS membership number: ______________________________
Member of AGFD? (check one) Yes ( ) No ( )

Research advisor: ______________________________

ACS MAPS Abstract Submission Number: ______________________________
Complete all application requirements (submitted in the following order as a single PDF document) –
1-Completed application form (above)
2-Resume (1 page max.)
3-Abstract (also entered on ACS MAPS on-line system as part of the **AGFD General Poster Session**)
4-Recommendation Letter (1000 words max.) from 1 professor.
Email complete application, **no later than September 25, 2026**, to Dr. Kathryn Deibler kdd3@cornell.edu

## Young Industrial Scientist Achievement Award

**Purpose**: Recognize the significant scientific - development contributions of junior industrial scientists to commercial fields of agricultural and food chemistry

**Eligibility**: Must have <=10 years of industrial service (age <40).

- Must be full member of the division (>= 5 years)
- Must be active in the division, for example: presentations/posters in AGFD technical programs, attendance at AGFD technical programs, service as a symposium organizer, or subdivision officer
- Must have made significant scientific and/ or commercial contributions, including technical publications, patents and patent application fillings, product-ingredient development, analysis methodology

**Prize**: The awardee(s) will be invited to present their research during a symposium as part of the AGFD program at the fall ACS national meeting.

- The awardee(S) will receive up to $1000 to off-set travel expenses.
- The awardee(s) will be presented an engraved plaque to commemorate this distinguished award.

**Application Deadline**: February 1

**Information for Nominations:** A panel of AGFD judges will choose the Young Industrial Scientist based on the nomination package.

- A maximum of two Awardees may be selected in a given year
- Nominations will be valid for two years, as long as nominees maintain their eligibility status.

**Self Nomination Package:** A self nomination letter

- Two letters of support, one of which must be from an AGFD member
- A one page summary of the research - development significance
- A 150-word abstract of the proposed oral presentation

The candidate's curriculum vitae, including service to AGFD

## Roy Teranishi Graduate Fellowship in Food Chemistry

**Purpose:**
To fund original graduate school research.

**Eligibility**:
Beginning graduate students. The student must have an outstanding graduate grade point average (GPA) and show promise of an excellent graduate research career.

**Prize:** A one-time fellowship award of $2500.

**Applications due:** February 1

## AGFD Fellow

**Purpose**: To recognize outstanding scientific contributions to the field of ag and food chemistry.

**Eligibility:** The award recognizes the application of chemistry to improve the supply, safety, and/or quality of food and agricultural products. A significant portion of the research should have been reported in ACS journals and books and/or at Divisional symposia. For industrial chemists, who may be discouraged or prohibited from publishing, qualification criteria might include: patents, product launches, process enhancements, reports & presentations. The nominee must have been a member of ACS and the Division for at least the preceding ten (10) years. Nominations must be made by an AGFD Fellow.

**Prize:** The winner receives an engraved plaque at the ACS Fall Meeting.
The nominations are reviewed by a committee consisting of AGFD Fellows.

**Deadline:** February 1

**Nomination Package:** A--Letter of nomination, B--letters (2-4) of support form AGFD Fellows, C--Brief summary of nominee's research. D--Brief curriculum vitae, E--Up-to-date publication list highlighting ACS publication record. Note-there is no nomination form

**Email nominations to**: Dr. Fereidoon Shahidi, Department of Biochemistry, Memorial University of Newfoundland, 45 Arctic Avenue, St. John's, NL, Canada A1C 5S7, fshahidi@gmail.com

## Exemplary Leadership Award

**Purpose:** Recognize substantial and extended service to AGFD.

**Eligibility:** The nominee should have provided a minimum 25 years of active service to AGFD. Areas of service to be considered are: A--Division Officer, B--Subdivision Officer, C--Councilor, D--Executive Committee Member, E--Committee Chair, Councilor, F--Symposium Organizer

**Prize:** An engraved award presented at the ACS Fall Meeting.

**Deadline:** February 1

**Nominations:** Made by email from AGFD executive committee members to the award chair

**Selection:** Simple majority vote by the AGFD executive committee.

## Distinguished Service to the Division of Agricultural and Food Chemistry

**Purpose**:
To recognize substantial and sustained service to the Division.

**Eligibility**:
The nominee must have served the Division for a minimum of ten years in at least two of the following categories:

- Service as an officer
- Participation as a member of the Executive Committee
- Organization of Divisional symposia

**Prize**:
The winner receives an engraved plaque at the ACS Fall Meeting.

**Deadline:**
February 1

**Nominations**:
Made by email from AGFD executive committee members to awards chair

**Selection**:
Simple majority vote by the AGFD executive committee.

## Journal of Agricultural and Food Chemistry Research Article of the Year Lectureship

sponsored by *JAFC* together with the American Chemical Society (ACS) Divisions of Agricultural and Food Chemistry (AGFD) and Agrochemicals (AGRO)

Nominations are solicited from the JAFC Advisory Board and the awards are selected by the JAFC Editor and Associate Editors.

Lectures are presented as part of the Division’s technical program held at the Fall ACS national meeting.

A $1000 USD award is presented in conjunction with the lectureship.

# Sterling B. Hendricks Memorial Lectureship Award

Administered by the Agricultural Research Service of the U.S. Department of Agriculture:
cosponsored by the Division of Agricultural and Food Chemistry and the Division of Agrochemicals.

Dr. Hendricks contributed to many diverse scientific disciplines, including soil science, mineralogy, agronomy, plant physiology, geology, and chemistry. He is most frequently remembered for discovering phytochrome, the light-activated molecule that regulates many plant processes.
https://www.ars.usda.gov/research/lectures/hendricksp/

**Purpose:**
To recognize scientists who have made outstanding contributions to the chemical science of agriculture.

**Eligibility:**
Nominees may be outstanding, senior scientists in industry, universities, or government positions. Current ARS employees are not eligible.

**Prize:**
The Lecture, on a scientific topic, trend or policy issue of the Lecturer's choice, will be presented at the ACS Fall Meeting. The lectureship is presented at an AGFD symposium in odd-numbered years and in an AGRO symposium in even-numbered years. The award includes an honorarium of $2000, a bronze medallion, and expenses to present the Lecture. All of these costs are borne by ARS, which selects the winner.

**Nomination Deadline:**
See https://www.ars.usda.gov/research/lectures/2023/sb-hendricks/

HendricksLecture@usda.gov.

- Letter explaining the nominee's contributions to chemistry and to agriculture
- Nominee's current *curriculum vitae*

# ACS Fellow

https://www.acs.org/content/acs/en/funding-and-awards/fellows.html

The American Chemical Society (ACS) Fellows Program was created by the ACS Board of Directors in December 2008 to recognize members of ACS for outstanding achievements in and contributions to science, the profession, and the Society.
Divisions can nominate twice their number of councilors

## Kenneth A. Spencer Award

Administered by the Kansas City Section of ACS:
cosponsored by the Division of Agricultural and Food Chemistry and the Division of Agrochemicals.

**Purpose:**
The Kansas City Section continues to present this award to stimulate education, research and industrial developments in science and technology at all levels in the area and to promote chemistry in agricultural and food science nationwide.

**Eligibility:**
A candidate must be a citizen of the United States and must have done the work for which he or she qualified as a candidate within the United States. The candidate need not be a member of ACS. A candidate's work, whether done in education, industry or research, should have meritoriously contributed to the advancement of agricultural and food chemistry.

**Prize:**
The Award consists of a medal and an honorarium of $6,000, both of which are presented at a public meeting sponsored by the Kansas City Section. At this meeting the recipient will deliver an address outlining his or her achievements.

**Deadline:**
See https://acs-kc.com/spencer-application

**Nomination information:**
https://acs-kc.com/spencer-application

## Book Award

**Purpose:**
To recognize editors who publish under division auspices, and whose books have achieved a high sales volume, which provides a source of royalty income to subsidize costs for future Division Symposia.

**Eligibility:**
The awardee should be a member of ACS and AGFD. Editors who have published a book under Division auspices and sales of which have achieved sales of 1000 copies or greater are eligible for a Platinum Club Award. Editors whose books equal or exceed 700 copies qualify for the 700 Club Award.

**Award:**
An inscribed plaque that commemorates the accomplishment, which is presented at the Division awards banquet at the ACS Fall national meeting.

## Young Scientist Award

**Purpose:** To recognize outstanding scientific contributions of scientists early in their careers to the field of agricultural and food chemistry.

**Eligibility:** Candidates must have earned their last degree within twelve years of October 1 of the year of the presentation. Nominees are required to have been active members of the AGFD for a minimum of three (3) years when submitting their applications

**Prize:** A panel of AGFD judges will choose the Young Scientist based on the nomination package.
The awardee will be invited to present their research during a symposium as part of the AGFD program at the fall ACS meeting. The awardee will receive up to $1000 to off-set travel expenses.
An engraved plaque and a check for $1000 will be presented to the Young Scientist to commemorate this distinguished award.

- **Application Deadline:** February 1
- Nomination letter from a member AGFD
- Two letters of recommendation
- A two-page summary of the research of significance
- A 150-word abstract of the proposed oral presentation
- The candidate's curriculum vitae
- Nominees must be members of AGFD

## Advancement of Application of Agricultural and Food Chemistry sponsored by International Flavors and Fragrances, Inc

**Purpose:**
To recognize and encourage outstanding contributions to pure and/or applied agricultural and food chemistry.

**Eligibility:**
A nominee must have made: An outstanding application of chemistry and/or chemical technology to the solution of agricultural or food problems of importance to the nourishment and health of mankind, or Outstanding contributions to the advancement of pure and/or applied agricultural and food chemistry. Special consideration shall be given to independence of thought and the originality shown, or to the importance of the work when applied to the public welfare or the needs of humanity. The nominee must be actively engaged in the line of work for which the Award is made.

**Prize:**
$3000, an engraved plaque, and an allowance to cover the traveling expenses of the awardee to the ACS Fall Meeting at which the Award will be presented.

See application form, below.

# AWARD FOR THE ADVANCEMENT OF AGRICULTURAL AND FOOD CHEMISTRY NOMINATION FORM

Send completed form to Award Committee Chairman Michael J. Morello mjmorello226@gmail.com
This form is a guide and should not restrict the scope of the nomination. Provide additional information as needed.

Candidate's name:

Citizenship:

Email address:

Home address:

Business address:

Description of the nature, purpose and results of the candidates' work:

Appraisal/Evaluation: (Provide a detailed evaluation of the candidate's work and its importance to the advancement of agriculture or food chemistry, spotlighting contributions of particular significance to the theory and practice of agricultural and food chemistry. Any important publications cited should reference the co-authors and specify the nominee's contributions.)

Present occupation, describing duties and responsibilities:

Education (degrees and dates):

Professional Career (described thoroughly from present to start):

Memberships in societies, clubs, organizations:

List of previous honors with dates:

List of candidate's patents and publications by title and reference:

Spouse/partner's name (optional):

Names and ages of children (optional):

Major non-professional interests (optional):

I submit that the facts contains in this nomination are accurate to the best of my knowledge:
Submitter's name & title
address
phone
email

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**Schedule of AGFD Technical, Business and Social Meetings** (all Eastern Daylight Time)

| | | | |
|---|---|---|---|
| Sun. March 22 | noon-2:00pm | AGFD Poster Session | Congress Ctr. B3/B4 exhibit hall |
| Mon. March 23 | noon-1:00pm | AGFD Leadership Luncheon | Congress Ctr. C107 |
| Mon. March 23 | 1:00-2:00pm | Future Program Meeting | Congress Ctr. C107 |
| Mon. March 23 | 5:00-7:30pm | Executive Committee Meeting | Congress. Ctr. C107 |
| Mon. March 23 | 8:00-10:00pm | Sci-Mix | Congress Ctr. B3/B4 exhibit hall |
| Tues. March 24 | noon | Student Activities Team Event | See details on page 15 |
| Tues. March 24 | 3:50pm | Thomas H. Parliament Award Address | Congress Ctr. A302 |
| Tues. March 24 | 6:00-8:00pm | AGFD Chair's Reception | STATS Brewpub (see front cover) |