

# Speakers



## STACY A. BONOS

### Breeding for salinity tolerance in perennial ryegrass

*Professor, Turfgrass Breeding, Department of Plant Biology, Rutgers University*

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Bonos is a Professor of Turfgrass Breeding in the Department of Plant Biology at Rutgers University. She has been on the faculty for 19 years. Her research focuses on the development of improved, pest resistant, and stress tolerant, turfgrasses including native grasses. She has dedicated much of her research to improving bentgrasses for golf courses. She has developed or co-developed over 240 cool season turfgrass cultivars and has been recognized for her research through several awards including Golf Magazine's '40 under 40', Early Career Excellence in Plant Breeding – Plant Breeding Coordinating Committee; Young Crop Scientist Award – Crop Science Society of America (CSSA) and Fellow of CSSA.



## PARAG R. CHITNIS

### NIFA Recent changes and future direction

*Acting Director, National Institute of Food and Agriculture, USDA, Washington, DC/ Kansas City, MO*

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As the Acting Director at the National Institute of Food and Agriculture (NIFA) of USDA, Dr. Chitnis represents NIFA in its interactions with other agencies, stakeholders, and partners. He also leads implementation of NIFA's programs, which invest \$1.75 billion for research, extension and education projects in food and agricultural sciences. Prior to this appointment, he served as NIFA's Associate Director and was responsible for the agency's Kansas City staff and functions. He came to NIFA over five years ago as the Deputy Director for Institute of Food Production and Sustainability. Prior to joining NIFA, he was the Director for the Division of Molecular and Cellular Biosciences at the National Science Foundation (NSF). At both NIFA and NSF, Dr. Chitnis led initiatives at the interface of different disciplines, including biological sciences, agricultural sciences, physical

sciences, computer science, engineering, and social sciences. In his academic career, Dr. Chitnis was a professor in the Department of Biochemistry, Biophysics, and Molecular Biology at Iowa State University, and was an assistant professor in the Division of Biology at Kansas State University. As a researcher and educator at these universities, he received more than \$7 million in research, education, and training grants from federal and private sources including funding from NIFA, NSF, NIH, US-Israel BARD, Pioneer Hi-Bred, and Iowa Corn Promotion Board. He has authored over 110 peer-reviewed or invited publications in the areas of plant biochemistry, photosynthesis, computational biology, and proteomics. He has mentored over 50 undergraduate students, MS and PhD students, post-doctoral fellows, and AAAS fellows. Dr. Chitnis has a B.S. in botany/plant breeding from the Konkan Agricultural University in India, an M.S. in genetics and plant breeding from the Indian Agricultural Research Institute, and Ph.D. in biology from the University of California at Los Angeles.

**PRESENTATION:** Food and agricultural enterprise today is facing colossal challenges. By 2050, agriculture needs to produce 70% more food over current levels, while reducing its negative impact on our environment. Not only is the demand for food is growing, but so is the complexity of the demand. To meet these grand challenges, transformative changes are occurring in agriculture. The agriculture of the future will be enabled by genome design, automated and remote technologies as well as predictive use of data. These technologies will help us breed crops for intensified agriculture that is adapted to the changing climate. Breeding crops for the future farming will require new traits, breeding platforms built for accelerated transfer of traits to elite cultivars and coordination of breeding efforts in public and private domains. The presentation will highlight NIFA's efforts to address some needs of plant breeders.



## FAN-LI CHOU

### Regulatory Policy Update on Gene Editing and Why It Matters

*Vice-President for Scientific Affairs and Policy, American Seed Trade Association*

Chou is the Vice-President for Scientific Affairs and Policy at the American Seed Trade Association. Previous to ASTA, Fan-Li served at USDA for over 10 years, including as the Agricultural Biotechnology Advisor to the Office of the Secretary and in positions with the Foreign Agricultural Service and the Animal and Plant Health Inspection Service. She is an accomplished policy and program leader, with expertise in agricultural biotechnology regulatory, trade issues, and multilateral negotiations.

**PRESENTATION:** Overview of the U.S. domestic regulatory policy on genome editing, including the recently finalized revision to USDA's biotech regulation and expected actions from EPA and

FDA. Discussion on potential implications for the U.S. research community and how the research community can contribute to the U.S. policy development.



## JEAN CORMACK

**Innovation in Education – Breeding Education & Legal and Ethics Panel**

*Biostatistician on Tomosynthesis Mammographic Imaging Screening Trial*

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Cormack earned a B.A. in Music from Tufts University and M.S. and Ph.D. degrees in Plant Breeding from Iowa State University. Jean's professional career began in the seed industry where she worked for 15 years, initially with the Research Information Systems group at Garst Seed Company/ICI, then with the Corn Research Department at DEKALB Genetics (later Monsanto). In 2003 she left the world of plant breeding and began working as a Biostatistician in the Center for Statistical Sciences at Brown University, working over next 12 years on a variety of imaging clinical trials. After a brief interlude during the years 2015 and 2016 when she was a Program Analyst at the Department of Veterans Affairs in Boston, Jean returned to Brown, currently working as a Biostatistician on the TMIST (Tomosynthesis Mammographic Imaging Screening Trial) project, a large, multi-center screening research effort funded by the National Cancer Institute.



## JOVANA DAVIDOVIC

**Innovation in Education – Breeding Education & Legal and Ethics Panel**

*Associate Professor of Philosophy, University of Iowa*

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Jovana Davidovic is an associate professor of philosophy at University of Iowa with a secondary appointment at the Law School. She is specializing in military ethics, political philosophy, human rights and international law. Davidovic has written on humanitarian military interventions, ethics of military profession, refugees, human rights, international humanitarian law and most recently ethic of algorithms broadly and ethics of algorithm use in military settings. She is currently a part of developing a graduate certificate in Ethics at University of Iowa.



## GETU BEYENE DUGUMA

**Role of genome editing to enhance the speed of crop improvement in developing countries**

*Senior Research Scientist and Senior Manager, Regulatory Science, Donald Danforth Plant Science Center, St. Louis, Missouri*

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Getu Beyene Duguma (Getu Beyene in publications) is a senior research scientist and senior manager, regulatory science, at the Donald Danforth Plant Science Center, St. Louis MO. He graduated from Alemaya University of Agriculture, Ethiopia with BSc in Plant Science (1992) and MSc in Horticulture (1998). He earned a PhD in Botany at the University of Pretoria, South Africa (2006). He worked as postdoctoral fellow at the Council for Scientific and Industrial Research (CSIR), South Africa (2006-2007), as postdoctoral fellow at DuPont-Pioneer (2007-2009), and at Texas A&M AgriLife Research (2009-2011). Getu joined the Donald Danforth Plant Science Center in 2012. Since then he has worked as a cassava pipeline research manager, senior research scientist, and more recently (as of May 2019) he took a position as senior manager in regulatory science. Getu worked for over a decade on research and product development efforts on key traits in food security crops for sub-Saharan Africa, including the development of nutritionally enhanced cassava and sorghum (provitamin A, Iron and Zinc) and RNAi based cassava brown streak disease resistant cassava (both multi-national projects). Most recently he has worked on the development of improved panicle and plant architecture traits in tef (*Eragrostis tef*) using genome editing.



## TIA DUNBAR

**Optimization of *In Planta* Transformation Methods in Rice**

*Graduate Student, Plant Breeding at Texas A&M University, College Station, Texas*

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Dunbar is obtaining her master's degree in Plant Breeding at Texas A&M University in College Station, TX. Originally hailing from the San Francisco Bay Area, she received her bachelor's degree in Biological Sciences from the University of California, Davis. Her research now focuses on gene editing for crop improvement, specifically with rice. She is currently optimizing *in planta* gene editing techniques involving novel nanotechnologies. Outside of the lab, Tia is an officer of the nationally recognized Texas



A&M SACNAS chapter as well as the university's Women in Science and Engineering organization. Through her involvement in extracurricular activities, she seeks to integrate an agricultural science perspective into broader scientific discussion.

**PRESENTATION:** CRISPR/Cas gene editing technologies offer the potential to modify crops with precision, however their efficient *in planta* delivery remains a challenge. Existing tissue culture methods are time- and labor-intensive, hence, bypassing them could facilitate gene editing and expand its broader usage. Our research investigates transformation methods that could directly alter germline cells to eliminate the challenge of regeneration. Nanotechnologies present a promising approach: recent studies have demonstrated that carbon nanotubes (CNTs) loaded with plasmid DNA are able to penetrate plant cell walls, facilitating transient expression of foreign genetic elements. CNTs delivering Cas9 and single-guide RNA plasmids into mature embryos should therefore create heritable genetic edits. Rice seeds and excised embryos were imbibed in CNTs and CRISPR/Cas DNA targeting phytoene desaturase and grown on media to discern gene-edited phenotypes. Preliminary data indicate that CNTs transporting gene editing machinery are capable of passive diffusion through the seed coat.



**ISMAIL DWEIKAT**

**Initial efforts to breed hemp for Nebraska and the Midwest**

*Professor, Plant Breeding and Genetics, Department of Agronomy and Horticulture, University of Nebraska, Lincoln, NE*

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**LUCY EGAN**

**Identification of Founding Accessions and Patterns of Relatedness and Inbreeding Derived from Historical Pedigree Data in a White Clover Germplasm Collection in New Zealand.**

*Doctoral Candidate, Lincoln University, New Zealand*

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Egan has just submitted her PhD thesis titled, "Germplasm exploration and phenotyping in *Trifolium* species for the improvement of agronomic traits and abiotic stress tolerance." She received her BSc in Agricultural Biotechnology and Biochemistry (2015) and PGDipAppSc in

Plant Breeding and Genetics (2016) from Lincoln University, New Zealand. She has accepted a role as a postdoctoral researcher at CSIRO, Australia working in cotton breeding.

**PRESENTATION:** White clover is the most important legume to temporal pastoral systems. The pasture mix of white clover and ryegrass dominates New Zealand pastures. However, despite over a century of breeding efforts, a pedigree analysis has never been performed on a white clover collection. The objectives of this study were (i) to create a pedigree map of the collection, (ii) to identify founding accessions and determine the effective number of founders, and (iii) to detect patterns affecting inbreeding and kinship.



#### **SEAN FINNIE**

*Senior Manager, Cultivar Development and Research, Bay State Milling Company*

#### **Plot to Plate: building a high amylose wheat supply chain**

Sean Finnie received a Ph.D. in Grain Science and Industry from Kansas State University and a M.S. and B.S. in Food Science from the University of Idaho. Sean continued his training as a Postdoctoral Research Fellow at KU Leaven, in Belgium working under Dr. Jan Delcour with research emphasis on wheat lipids.

Sean is currently the Senior Manager of Cultivar Development and Research at Bay State Milling Company within the Varietal Solutions business unit. In this role, he leads cultivar development initiatives with an emphasis on nutrition and quality traits. Examples include high amylose wheat and high protein naked-oats. Sean is also active in Bay State Milling's seed development program as well as grain production.



#### **SHERRY FLINT-GARCIA**

#### **Exploring the Full Range of Zea for Food Quality Traits**

*Research Geneticist, USDA-Agricultural Research Service*

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Flint-Garcia received her B.A. in Biology from Saint Mary's University in Minnesota, and her Ph.D. in Genetics from the University of Missouri in 2001. She conducted postdoctoral research at North Carolina State University under the direction of Ed Buckler and then with USDA-ARS under the direction of Mike McMullen.

Flint-Garcia has been a Research Geneticist with the USDA-Agricultural Research Service since 2006. She also holds adjunct associate professor appointments in the Division of Plant Sciences and the Division of Biological Sciences at the University of Missouri-Columbia. She has taken a leading role in the development and characterization of maize genetics and breeding resources including assembling the 302 diverse inbred line association mapping panel, the maize nested-association mapping population, teosinte introgression populations, and the Zea Synthetic doubled haploid population. Her lab also leads in the analysis of kernel traits in diverse maize including kernel composition and kernel weight traits.



**MARY GUTTIERI**

**2020 Vision for Improved Nutritional Quality of Wheat**

*Research Geneticist, USDA-ARS Hard Winter Wheat Genetics Research Unit, Manhattan, Kansas*

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Guttieri is a research geneticist for the USDA Agricultural Research Service in the Hard Winter Wheat Genetics Research Unit at Manhattan, KS. Her research focus is on development of resilient winter wheat germplasm to address the challenges of economically important wheat diseases and environmental stresses. She also has a research commitment to improvement of the nutritional quality of wheat germplasm toward the goal of “do right and feed everyone.” After serving in supporting roles in wheat breeding programs at the University of Idaho and Ohio State University, she completed her Ph.D. in 2014 at the University of Nebraska–Lincoln. She is the 2020 recipient of the USDA-ARS Plains Area Early Career Research Scientist Award.



**WAYNE HANNA**

**What Makes a Good Cultivar**

*Part-Time Professor, University of Georgia, Tifton Campus*

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Wayne Hanna has worked as a plant breeder at the University of Georgia, Tifton Campus for over 49 years – from 1971 to the present. His main breeding and genetic emphases from 1971 thru 2002 was as a Research Geneticist with the USDA/ARS where he worked on forage and turf grasses. He has been a part-time professor since 2003 where he has

diversified his interests to include ornamental grasses, cold tolerant citrus and coneless pine trees.



#### **JENNA HERSHBERGER**

*Ph.D. candidate in Plant Breeding and Genetics, Cornell University*

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Hershberger is a Ph.D. candidate and USDA NIFA AFRI EWD predoctoral fellow at Cornell University, where she studies plant breeding and genetics with Dr. Michael Gore. Jenna received a B.S. in Horticulture with a minor in African Studies from the University of Wisconsin-Madison. Her current research focuses on near-infrared spectroscopy-based phenotyping, cassava quality trait improvement, data management, digital analysis tool development, and the application of RNA-seq and statistical genetics and genomics to uncover the genetic architecture of nutritional quality traits in fresh sweet corn kernels. In addition to her research, Jenna has taught three international workshops on the use of PhenoApps, smartphone applications for plant phenotyping, and has served as the vice president and historian of Synapsis, the Cornell Plant Breeding graduate student organization. She belongs to the 2020 cohort of NAPB Borlaug Scholars and plans to graduate in May 2021.

Her team developed the open-source R package waves and integrated it into Breedbase for the streamlined storage, analysis, and routine use of spectral data in plant breeding programs. Further, we empirically tested waves for the prediction of root dry matter content in cassava within and across three breeding programs. Taken together, the standalone and Breedbase versions of waves enhance the accessibility of tools for the analysis of spectral data during the plant breeding process, enabling more efficient phenotyping and informed selection decisions.”



#### **TOM HOEGEMEYER**

**Corn Breeding History: The Road from Teosinte to Genomic Selection**

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Tom Hoegemeyer was raised on a mixed livestock and seed farm in rural Nebraska. After completing a B.S. in Ag Honors at the University of Nebraska in 1970, and a stint in the Army Reserve, he attended Iowa State University, finishing his Ph.D. in 1974. He started as a plant breeder at his small family company, became CEO in 1984, but continued breeding corn, eventually supplying



parent inbred lines to many companies in the seed industry. Syngenta purchased his breeding program in 2004, and Tom worked for them for about 4 years. He served as a Professor of Practice in the Department of Agronomy and Horticulture at University of Nebraska–Lincoln from 2008 to 2015, teaching plant breeding and associated courses.

#### **DONALD MACKENZI**

*Executive Director, Institute for International Crop Improvement, Donald Danforth Plant Science Center, Saint Louis, Missouri*

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Mackenzi is internationally recognized expert in regulatory systems for agriculture, including environmental risk assessment, biosafety and food safety assessment, and biotechnology. Extensive experience in plant biotechnology product development and in designing global regulatory strategies to efficiently advance products through to commercialization. Danforth Center aspires to develop into a leader in agricultural science by contributing global strategic insights and direction to the research program planning and collaboratively engaging across the Center's matrix of entrepreneurial Principal Investigators to deliver impact in the developing world.



#### **LEANDRA PARSONS**

##### **Quality Protein Popcorn: Hybrid Production and Selection**

*Graduate Student, Department of Agronomy and Horticulture, University of Nebraska–Lincoln*

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Leandra Parsons received her B.S. degrees in Chemistry and Biology from Westmont College in 2017 and began earning her Ph.D. in Agronomy and Horticulture at the University of Nebraska–Lincoln the following fall. She is now a Ph.D. candidate working in the final stages of a popcorn hybrid breeding program. Her current interests and collaborations involve the use of selection indices in plant hybrid breeding, identifying human microbiome compositional changes between conventional and Quality Protein Maize-based popcorn lines, and evaluating sensory differences between the two popcorn groups. Leandra received the UNL Othmer Fellowship in 2017 and is currently a Preparing Future Faculty fellow planning to graduate in May 2021.



## **CHARLIE ROHWER**

### **Small-scale hop breeding for regional growers and brewers**

*Horticultural Scientist, University of Minnesota Southern Research and Outreach Center, Waseca, Minnesota*

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Charlie Rohwer earned his BS in Horticulture and Biochemistry from Iowa State University, and graduate degrees in Horticulture from Michigan State University (MS) and the University of Minnesota (PhD, 2008), studying greenhouse crop physiology.

Rohwer is currently a Horticultural Scientist at the University of Minnesota Southern Research and Outreach Center. His research and collaborations involve field trials and production practice research of regionally-important vegetable processing crops (peas, sweet corn) and minor specialty crops (brassicas, carrots, tomatoes, peppers, ginger, etc). Rohwer also studies production practice effects on glucosinolates in brassicas. He began hop breeding in 2012 in an attempt to meet needs of the expanding local hop and craft beer industry.



## **DANIEL SCHACHTMAN**

### **Variation in maize root exudates and their impact on root bacterial microbiomes**

*George Holmes Professor and Director, Center for Biotechnology, University of Nebraska–Lincoln*

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Schachtman's current research focuses on crop plant abiotic stress tolerance and the interactions between plant roots and soil microbes and the impact those interactions have on plant performance in water and nitrogen limiting agroecosystems. He is a George Holmes University Professor in the Department of Agronomy and Horticulture and the Director of the Center for Biotechnology.

Prior to joining the University of Nebraska-Lincoln in 2014, Schachtman was project lead and science fellow at Monsanto Co where he worked on increasing the nitrogen use efficiency of maize. Previously, he was a principal investigator and full member at the Danforth Plant Science Center in St. Louis where his research focused on how plant roots respond and adapt to stressful conditions in soil. His research has led to seminal findings on the mechanisms of salt tolerance in wheat; the molecular identification and functional characterization of sodium,

potassium and auxin transporters in plants; and the signal transduction networks controlling root response and adaptation to low nutrient conditions.

He holds a doctorate from the Australian National University in Australia and did his PhD research at CSIRO Plant Industry in Canberra. He has a bachelor and masters degree from the University of California, Davis.



**JAMES SCHNABLE**

**Prioritizing of Genes with Phenotypic Impact**

*Associate Professor & Gardner Professor of Maize Quantitative Genetics, University of Nebraska–Lincoln*

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Schnable is an Associate Professor and the Gardner Professor of Maize Quantitative Genetics at the University of Nebraska-Lincoln. His research group focuses on integrating and applying new technologies and capabilities from engineering, computer science, and statistics to quantitative genetic and genomic research in maize and sorghum. Prof. Schnable received the Marcus Rhoades Early Career Award for Maize Genetics in 2018, the North American Plant Phenotyping Network Early Career Award in 2019, and the American Society of Plant Biologists Early Career Award in 2019. He has founded three companies that commercialize bioinformatics software, new breeding methodologies, or new phenotyping technologies. Prof. Schnable holds a BA in Biology from Cornell University (2008) and a PhD in Plant Biology from UC-Berkeley (2012). From 2013 to 2014 he was NSF Plant Genome Fellowship supported postdoctoral scholar at the Danforth Center in St. Louis and the Chinese Academy of Agricultural Sciences in Beijing China.



**BERNICE SLUTSKY**

**Regulatory Policy Update on Gene Editing and Why It Matters**

*ASTA, Senior Vice President, Innovation*

Dr. Bernice Slutsky is currently the Senior Vice President for Innovation at the American Seed Trade Association (ASTA). In this capacity, Slutsky is responsible for coordinating and developing the domestic and international advocacy and policy efforts around plant breeding innovation for the U.S. seed industry. Slutsky joined ASTA in 2006 as the Vice President of Science and International Affairs to work on issues involving emerging technologies, intellectual property rights and

international regulation and trade. Before joining ASTA, Slutsky was the Senior Advisor to the Secretary of Agriculture for Biotechnology and was the Science Policy Advisor for USDA's Foreign Agricultural Service. Slutsky received her Ph.D. in biology at the University of Iowa.

Slutsky is the chair of the Plant Breeding Innovation Working Group of the International Seed Federation.



**WALTER SUZA**

**Innovation in Education – Breeding Education & Legal and Ethics Panel**

*Adjunct Associate Professor, Department of Agronomy, Iowa State University and Director of Plant Breeding E-learning in Africa*

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Walter Suza is an adjunct assistant professor in the Department of Agronomy at Iowa State University (ISU) and serves as the Director of Plant Breeding E-learning in Africa (PBEA). Building on Iowa State University's expertise with online plant breeding education, PBEA e-modules are used to train African students in management of crop breeding programs for public, local, and international organizations. Collaborating with faculty at Makerere University in Uganda, the University of KwaZulu-Natal in South Africa, and Kwame Nkrumah University of Science and Technology in Ghana, PBEA has created open educational resources that hone essential capabilities with real-world challenges of cultivar development in Africa using Applied Learning Activities.

Suza received his B.Sc. in Agriculture and Natural Resources from Africa University in Zimbabwe, M.S. in Agriculture from Murray State University in Kentucky, and Ph.D. from the University of Nebraska–Lincoln. He co-developed several key courses for the ISU Online Master of Science in Plant Breeding. Suza holds post-graduate certificates in Food Security and Vulnerability Assessment from Istituto Agronomico per l'Oltremare in Florence, Italy, Business Administration from the University of Kentucky, and Project Leadership from Cornell University.

His prior roles at the World Food Programme in Angola and United Nations Children's Fund in Zimbabwe were in food security assessment, mapping of vulnerable groups, drought assessment, and coordination of food aid. His research is on the physiology of plant sterols and their role in helping plants cope with stress conditions.





## **LUIS VERDE**

### **Corn Breeding, the path to 600bu/a**

*Maize Product Development Director for Latin America and Global Sorghum Lead, Corteva Agriscience™*

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Luis was born in Uruguay but moved at early age to Argentina where he earned his B.S. in Agronomy at UNMdelp. In 1998, Luis moved to Iowa to study with Mike Lee and holds a M.S and Ph.D. degrees in Plant Breeding from Iowa State University.

After obtaining his PhD, Luis became a Maize Breeder at Pioneer, where he has served on several scientific roles, progressing to become Research Director and Latin America R&D Commercial Zone Lead and R&D World Sorghum Lead. During his tenure as field breeder in Pioneer (now Corteva Agriscience), he has been granted more than 90 patents and commercialized products in more than 18 countries. Products and germplasm developed have been recognized within the company and by the public sector.

In addition, Luis has contributions to product development by leading/participating in initiatives that have led to a complete global transformation of breeding at Corteva.

In his latest role, Luis leads the Latin America Plant Breeding organization and focus on breeding technologies and methods to accelerate genetic gain and continue delivering the best products to the market.



## **MAGGIE WAGNER**

### **Evidence for an ecological mechanism of heterosis in maize**

*Assistant Professor, Ecology and Evolutionary Biology, University of Kansas, Lawrence, Kansas*

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Wagner earned her B.S. in Plant Biology at the University of Michigan, followed by a Ph.D. in Genetics & Genomics at Duke University. Her dissertation research focused on the ecological causes and evolutionary consequences of phenotypic plasticity in a wild perennial mustard species, and she developed a strong interest in plant-associated microbiomes both as a critical component of the plant's environment and as an "extended phenotype" of the plant host. She was awarded a NSF Plant

Genome Postdoctoral Fellowship to investigate how modern breeding affects the composition and function of the maize microbiome, while based at North Carolina State University. In 2019 she established her lab in the Department of Ecology and Evolutionary Biology and the Kansas Biological Survey at the University of Kansas, where she continues to work on the complex interplay between plant genotype, phenotype, and microbiome.

**PRESENTATION:** The mechanisms underlying heterosis are poorly understood despite over a century of intensive research. The leading hypotheses—which focus on molecular and quantitative genetic mechanisms—have been able to explain some but not all of the observed patterns of heterosis. However, possible ecological drivers of heterosis have largely been ignored. Because soil-borne microbes are known to have strong effects on plant phenotype, we hypothesized that they might play a role in heterosis. We measured root/shoot biomass of B73, Mo17, and their hybrid in a variety of soil microbial environments. First, in gnotobiotic (germ-free) chambers and inoculated with sterile buffer or a simple community of seven bacterial strains; second, in gnotobiotic chambers inoculated with sterile buffer, a live soil slurry, or an autoclaved aliquot of the same soil slurry; and third, in the field with or without soil fumigation. In all three experiments, reduction or removal of soil microbes greatly weakened heterosis of root biomass and germination. This was due to reduced growth of the inbred lines in the presence of live microbes (47% average reduction in root biomass, 20% reduction in shoot biomass), not due to improved performance of the hybrid under sterile conditions. Although none of the bacterial strains were known pathogens, this result is consistent with a general negative effect of soil microbes on maize growth. Together, our results suggest a novel, ecological mechanism for heterosis whereby soil microbes generally impair the germination and early growth of inbred but not hybrid maize.



**HARKAMAL WALIA**

**Genetic Basis of High Temperature Response in Cereals**

*Associate Professor, Plant Molecular Physiologist, Department of Agronomy and Horticulture, University of Nebraska, Lincoln, NE*

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Walia received his Ph.D. in Plant Biology from the University of California, Riverside. His research interest is in understanding the physiological and molecular basis of abiotic stress tolerance in crops. His program uses genomics and phenomics approaches for discovering novel genes and genetic variants for improving crop performance in sub-optimal growing conditions. Of particular interest are crop responses to variation in water quantity and quality and high temperature. Ongoing efforts are aimed at understanding how seed development and yields are impacted by increasing temperatures in cereals and legumes.



## **JASON WALLACE**

### **Understanding Genome-by-Genome Interactions with the Corn Microbiome**

*Assistant Professor, University of Georgia*

[jason.wallace@uga.edu](mailto:jason.wallace@uga.edu)

Dr. Jason Wallace is an Assistant Professor at the University of Georgia. His lab brings together microbiology, genetics, statistics, and bioinformatics to understand the genetics of complex traits in a wide variety of crops (maize, cotton, peanut, millet, forages, etc.).

One of the main focuses of the lab is to determine how plants work with and manipulate their microbial communities, with the end goal of harnessing these interactions to improve agriculture. Currently the lab is focusing on endophytes, organisms that live inside plant tissues, to understand how the plant reacts to and controls these intimate associations.

**PRESENTATION:** All crops interact with trillions of microbes in their environment. Many of these interactions are beneficial, and there is great interest in harnessing them for agriculture. However, we generally know very little about how these interactions work or what is needed to optimize them for field production. In this talk, I will summarize several investigations my lab has performed to look at how the genetics of corn plants affects microbial communities on root and leaf surfaces and inside plant tissue. Although environmental effects dominate, in each case we see clear evidence of genotype-by-genotype interaction, meaning different corn varieties affect their microbial communities in different ways—a prerequisite for being able to improve these effects through breeding. The magnitude of these effects is probably too small to use in breeding programs right now, but further understanding could change that in the next few years. Ultimately, we still need to answer the biggest question, of what kind of microbial communities we want corn to have in order to achieve improved results in the field.



## **BRANDON WARDYN**

### **Innovation in Education – Breeding Education & Legal and Ethics Panel**

*Zone Lead, Corteva*

[brandon.wardyn@corteva.com](mailto:brandon.wardyn@corteva.com)

Wardyn is Zone Lead for Corteva's North America Far West Evaluation Zone, and manages an active corn breeding project. Brandon was raised on a row crop and livestock farm in central

Nebraska and received both his B.S. and M.S. degrees at the University of Nebraska, then earning his Ph.D. at Iowa State University. His 15 plus career years have been spent in private industry, breeding corn and developing corn hybrids for the Western Corn Belt.