PI	Areas of Research	Model Organism(s)	Summary of Work	Mode	PI Quote (from DDPSC website)
Douglas Allen, PhD	Central Carbon Metabolism Metabolic Flux Analysis Photosynthesis Carbon Partitioning Lipid and Protein Biosynthesis and Turnover	Soybean Canola Camelina Grasses Legumes Oilseeds Algae	The Allen laboratory uses isotopes combined with computational methods to assess plant growth and productivity at the molecular level that contribute to enhanced biomass production and value-added seed compositions.	Bench Computer	"I'm motivated by studies that can give us insights to how plants work at a mechanistic level. The thought that we may explain something in the lab that no one else has figured out is awe-striking and worthy of the effort."
Rebecca Bart, PhD	Crop Improvement Disease Triangle Plant-microbe interactions Plant Pathology	Cassava Sorghum Cotton	The Bart laboratory combines genetics with molecular and computational biology to study host-microbe interactions in important crops including cassava, sorghum, and cotton.	Bench Computer	"Food security is a basic human right."
Ivan Baxter, PhD	Elemental Accumulation Bioinformatics Quantitative Genetics High-Throughput Phenotyping Ionomics	Corn Sorghum *Setaria viridis* (green foxtail millet)	The Baxter laboratory uses advanced technologies to understand the diverse ways plant genetics interacts with the environment to enable growth.	Bench Computer	"Studying how plants take up elements will allow us to understand how life works while also being able to improve plant, animal, and human nutrition."
Kristine Callis-Duehl, PhD	Education Research	*Setaria viridis* (green foxtail millet)	The Education Research & Outreach team studies how to effectively engage students in authentic STEM research at all grade levels, K-16, in formal, informal and virtual learning environments in an effort to recruit the next generation of diverse STEM and AgTech scientists and leaders in St. Louis and around the world.	Computer Social behavioral research	"Be it healthcare, agriculture, the environment, or human empowerment and freedom, the way we solve the majority of the world's problems is through education."
James Carrington, PhD	RNA Silencing Virus-Host Interactions Epigenetics	Arabidopsis	The Carrington laboratory focuses on how plants respond to viruses, mechanisms of epigenetics, and how crops can be improved to increase productivity.	Bench Computer	"Developing virus-resistant cassava has the potential to impact tens of millions of people."

Kirk Czymmek, PhD	Metabolic Systems and Synthetic Biology Biotic and Abiotic Interactions Genomics, Phenomics, and Data Science	Rice pathogen *Magnaporthe oryzae* *Fusarium* spp., including *Fusarium oxysporum*	The Czymmek laboratory uses advanced imaging approaches to understand the inner ings of plants, microbes, their interactions with each other and the environment.	Computer	"Plants are underrated. We take them for granted. It's more than just pretty flower gardens and yards. Our very survival depends on plants."
Bradley S. Evans, PhD	Proteomics Metabolomics Quantitative Analysis Metabolic Pathways Natural Products	*Chlamydomonas reinhardtii (Chlamydomonas)* *Arabidopsis thaliana* (thale cress)	The Evans laboratory uses high-performance mass spectrometry, proteomics, and metabolomics for connecting molecular phenotypes with the macroscopic form and function of organisms.	Bench	"If you want to engineer algae to create oil, how do you know whether or not you have succeeded? If you want to demonstrate that your enriched cassava actually has more iron and zinc, how do you do that? Proteomics and Mass Spectrometry can help."
Andrea Eveland, PhD	Developmental Genetics Genomics and Data Science Crop Improvement Systems Biology Abiotic Stress Interactions	*Zea mays* (maize) *Sorghum bicolor* (sorghum) *Setaria viridis* (green foxtail millet)	The Eveland laboratory uses experimental and computational approaches to investigate the regulation of architecture traits and yield potential in cereal crops.	Bench Computer	"Global food security and sustainable energy are grand challenges that can be met with innovative technologies and interdisciplinary science."
Noah Fahlgren, PhD	High-Throughput Phenotyping Computer Vision Machine Learning Genomics Computational Biology	*Camelina sativa (oilseed)* *Sorghum bicolor (lignocellulosic feedstock*	The Data Science team has recently developed computer vision-based software to enable high-throughput measurement of plant physical and physiological features and analysis of dynamic responses to the environment.	Computer	"Advances in DNA sequencing, robotics, imaging, and computing have provided us with unparalleled data on plants and their environment."
Malia Gehan, PhD	Environmental Stress Temperature Stress Phenomics Imaging	*Setaria viridis* (green foxtail millet) *Chenopodium quinoa* (quinoa)	The Gehan laboratory develops high-throughput phenotyping approaches to study mechanisms of crop resilience under temperature stress.	Bench Computer	"What's happening on Earth is the environment is getting more extreme. People studying plants in space are also studying plants in extreme environments."

Elizabeth A. Kellogg, PhD	Comparative Genomics Systematics Developmental Genetics	Grasses,Rice Maize (corn) Wheat Sorghum Barley Oats	The Kellogg laboratory studies genomes, growth, and development of sorghum, maize, and their wild relatives, using biodiversity research to make ecosystems and agriculture more sustainable.	Bench Computer Field	"It's been said that there are only two kinds of organisms in the world: plants and plant parasites. All life depends on plants."
Toni Kutchan, PhD	Metabolic Systems and Synthetic Biology Sustainable Bioenergy Genomics, Phenomics, and Data Science	*Camelina sativa* (camelina)	The Kutchan laboratory studies the production of the anticancer compound cyclopamine in corn lily, the modification of plant medicinals by the soil microbiome, and the oilseed crop camelina as a source of renewable fuel.	Bench Computer Field	"Plant biodiversity is my profession and my hobby and my passion."
Mao Li, PhD	Plant Morphology Quantification and Modeling Geometric and Topological Data Analysis Phenomics 2D/3D Imaging Analysis	*Coleus* Sorghum *Arabidopsis thaliana* (thale cress) *Vitis* sp.	The Li laboratory develops mathematical methods, models, and computational tools to extract and analyze comprehensive plant morphological features from 2D and 3D imaging data to fully utilize new technologies and accelerate biological discoveries.	Computer	"I am grateful to have the opportunity to use my skills to help contribute to making the world a better place."
Donald MacKenzie, PhD	Biotic and Abiotic Interactions Crop Improvement Genomics, Phenomics, and Data Science	Rice	Dr. MacKenzie leads the Institute for International Crop Improvement (IICI), which translates key discoveries in plant science into new solutions for food quality and availability in the developing world. The IICI also provides regulatory, biosafety, and project management expertise.	Bench	"Plant science is a great tool to improve people's lives and livelihoods."
Blake Meyers, PhD	Pollen & Plant Reproduction Gene Regulation Small RNA Genomics Bioinformatics	*Arabidopsis thaliana* (thale cress) Maize Soybean Rice	The Meyers laboratory uses experimental and computational approaches to study plant reproduction and fertility to enhance yield gains in crop plants.	Bench Computer	"Plants have the potential to solve a lot of the problems we face. In a world with growing population and finite resources, we are ever more dependent on plants to address needs."
Allison Miller, PhD	Functional Trait Diversity and Evolution Root-Shoot Interaction G x E Interaction Agro-Ecosystem Sustainability	Grapevines, perennials	The Miller laboratory explores how long-lived plants respond to dynamic environments, with the goal of developing perennial crops that support ecologically sustainable agricultural systems.	Bench Field	"We can't fix the health of our planet without taking agriculture into account."

Todd Mockler, PhD	Metabolic Systems and Synthetic Biology Biotic and Abiotic Interactions Crop Improvement Sustainable Bioenergy Genomics and Data Science	Sorghum Maize *Setaria* *Brachypodium* *Arabidopsis*	The Mockler laboratory uses genomics, high-resolution phenotyping, and computational biology to understand plant responses to environmental stresses to improve productivity in food and energy crops.	Bench Computer	"Access to food is fundamental to societal stability—and it all comes from plants."
Dmitri Nusinow, PhD	Circadian Rhythms Photoperiodism Temperature Perception Optogenetics Synthetic Biology	*Arabidopsis thaliana* (thale cress)	The Nusinow laboratory focuses on finding new genes that have the potential to increase productivity in response to daily and seasonal changes in light and temperature.	Bench	"We're now just beginning to understand how complex plants are."
Sona Pandey, PhD	Biotic and Abiotic Signaling Mechanisms Evolution Genomics Data Science	*Arabidopsis thaliana* (thale cress) *Camelina* Soybean *Setaria* *P. patens* (moss) *Brachypodium*	The Pandey laboratory uses molecular, biochemical, and functional studies to understand the mechanisms of stress tolerance and yield improvement in plants by heterotrimeric G-proteins.	Bench	"I find joy in being a mentor. I want to inspire more people to become scientists."
Dilip Shah, PhD	Antimicrobial Peptides Biotic Interactions Crop Protection	*Medicago truncatula*	The Shah laboratory investigates modes of action of antifungal plant defensins and defensin-like peptides to enable development of fungal disease resistant crops for yield protection.	Bench	"I know I need to keep going because there is still much to discover and much to invent. There is a great opportunity to make a difference in crop protection."
R. Keith Slotkin, PhD	Epigenetics Transposable Elements DNA Methylation	*Arabidopsis thaliana* (thale cress)	The Slotkin laboratory seeks to uncover how plants determine which regions of their genomes should be expressed, which regions should not be expressed, and to create new technologies in plant biology.	Bench Computer	"The programmability of the cell is the future of plant science."

Nigel Taylor, PhD	Crop Improvement	Cassava	The Taylor laboratory has advanced virus-resistant cassava into regulatory field trials in East Africa as a critical step toward delivering enhanced planting materials to farmers.	Bench	"The plant science of the Green Revolution has allowed us to provide food security for more people, allowing access to safe, nutritious food at a reasonable price. With a growing world, and finite resources, we need a second Green Revolution."
Christopher Topp, PhD	Root Systems Rhizosphere Phenomics X-Ray Imaging Growth Modelling	Sorghum Grapevine Maize Rice	The Topp laboratory deploys X-ray-based imaging and analysis of corn and other root systems to develop more robust and sustainable crops.	Computer	"Everything you see above ground is supported and nourished by what's underground."
James Umen, PhD	Algae Cell Cycle Evolution of Multicellularity Photosynthetic Growth Control Evolution of Sex	*Chlamydomonas reinhardtii* (Chlamydomonas) *Volvox carteri* (Volvox)	The Umen laboratory investigates the genetics and cell biology of green algae to enable development of sustainable sources of biofuel and other high-value compounds.	Bench	"Algae help illuminate some of the most fundamental evolutionary processes that contribute to biodiversity and shape life on Earth."
Veena Veena, PhD, MBA	Plant Transformation Genetic Engineering Genome-Editing Genome-Modification Technology Agrobacterium Crop Improvement	*Agrobacterium*	The Veena laboratory develops and explores genetic engineering technologies to develop plants with improved traits. Her core facility collaborates with all of our Principal Investigators, helping them test and develop transgenic plants to further their research. "The goal of our lab is to develop technologies that make plant transformation faster, more cost efficient and more precise. We also want to share those tools and services with the larger research community," explains Veena.	Bench	"Every experiment we work on makes me excited about the potential impact."
Sam Wang, PhD	Cell Signaling Lipid Metabolism Vegetable Oil Production P/N Use Efficiency Drought Response	Camelina	The Wang laboratory focuses on lipid metabolism and signaling in plant response to nitrogen/phosphorus/water deficiency and seed oil production.	Bench	"All human society is based on plants."

Bing Yang, PhD	Gene Editing Disease Biology Crop Improvement Genetic Engineering Improved Traits	Rice *Xanthomonas oryzae* pathovar oryzae, Xoo	The Yang laboratory uses enhanced genetic and molecular tools to increase the understanding of plant responses to biotic and abiotic stresses that can be coupled with enabling technologies to develop improved crops.	Bench	"Plant science holds the key to making our food more nutritious, our environment more sustainable, and our world more secure."
Ru Zhang, PhD	Photosynthesis Heat Stress Abiotic Stress Green Algae C4 Plants	*Chlamydomonas reinhardti* (green alga)	The Zhang laboratory studies how photosynthetic cells, especially photosynthesis, responds to high temperatures in order to engineer more heat-resistant crops and algae for improved food and biofuel production.	Bench Computer	"Plant science provides essential information for the basic foundation of our life."