



DONALD DANFORTH
PLANT SCIENCE CENTER

the Leaflet

VOLUME 26 • ISSUE 1 • SPRING 2024

PLANTS ARE THE FUTURE

*The Leaflet is a publication for partners,
friends, and supporters of the Donald
Danforth Plant Science Center.*





Table Of Contents

News.....	3
Discovery	6
Environment.....	8
Innovation	10
Education.....	13
Supporters.....	15

OUR MISSION

Improve the human condition through plant science



Feed the hungry and improve human health



Preserve and renew our environment



Enhance our region as a world center for plant science

Printed on paper from sustainably managed forests with 10% post-consumer content.

Cover
Plants are the future and plant science is leading the way. Learn more about how plants can feed the world and sustain the planet in this issue.

Contact
975 North Warson Road
Saint Louis, MO 63132
development@danforthcenter.org
314.587.1234 | danforthcenter.org

Credits
© 2024 Donald Danforth Plant Science Center All rights reserved.
The Leaflet is a biannual publication for partners, friends, and supporters of the Danforth Center. Thank you.
Editor: Elizabeth McNulty
Designer: Lee Kern
Contributors: Patrick Bowey, Kristina DeYong, Elizabeth McNulty, Karla Roeber

Photography: Adobe (cover, 2, 6 top, 16, 18); Alamy (7 top); Sandra Arango-Caro (13 top); Patrick Bowey (5 mid, 5R, 6 bottom, 9 top, 12 top); Kristina DeYong (4 mid, 8, 11 bottom); Devon Hill (back cover, 3 bottom, 5 inset, 6 mid, 10, 13 bottom, 14 top, 20); Courtesy Edward Jones (4L); Courtesy Larta (2 top); Elizabeth McNulty (3 top); Michael Rosenthal (4R, 11 top); Courtesy Jerry Steiner (22 mid); Bill Stutz (7 mid, 12 inset, 14 mid); Mike Thomas (22 top); Jim Umen (9 mid).

Leadership

FOUNDING CHAIR
William H. Danforth

PRESIDENT & CEO
Jim Carrington, PhD

BOARD DIRECTORS
Penny Pennington, *Chair*
Lisa Ainsworth, PhD
Teddy Bekele
Senator Roy Blunt
Sara Yang Bosco
Blackford F. "Beau" Brauer
Lee Broughton
Patrick O. Brown, MD, PhD
Johannes Burlin
Mun Y. Choi, PhD
Desiree S. Coleman-Fry
Christopher B. Danforth
Steven M. Fox
James L. Johnson, III
Robert J. Jones, PhD
Wesley Jones
Jackie Joyner-Kersee
Ruth E. Kim, JD
Sanjeev Krishnan
Ann C. Marr
Andrew D. Martin, PhD
Anna E. McKelvey, LL.M.
Thomas C. Melzer
William L. Polk, Jr.
Robert Reiter, PhD
Michael W. Riney
Todd R. Schnuck, *Immediate Past Chair*
Peter S. Wyse Jackson, PhD
John F. McDonnell, *Emeritus Director*
Philip Needleman, PhD, *Emeritus Director*

SCIENTIFIC ADVISORS
Eric Ward, PhD, *Chair*
David Braun, PhD
Natalia de Leon, PhD
Jen Heemstra, PhD
Carolyn Lawrence-Dill, PhD
Jan Leach, PhD
Jennifer Nemhauser, PhD



The Danforth Center holds the highest rating from both Charity Navigator (four stars) and GuideStar (the Platinum Seal of Transparency).

The Donald Danforth Plant Science Center is a nonprofit organization, tax exempt under Section 501(c)(3) of the Internal Revenue Code, Federal ID No. 31-1584621. Contributions are tax deductible as allowed by law.

News



Project manager Siva Velivelli, PhD. Peptyde Bio is the first company launched out of the Danforth Center Start-Up Initiative. Its biofungicide tech was so in demand it was acquired in only 18 months.

Fighting Fungus

STARTUP PEPTYDE BIO EXITS IN UNDER 2 YEARS

In startup culture, most successful "exits" (e.g., acquisitions) take place, if they happen at all, in five to seven years. **Peptyde Bio**, the first startup launched by the Danforth Center's new Start-Up Initiative, was recently acquired by Invaio Sciences in less than two years. The speed of this acquisition is a testament to the strong efficacy of and huge demand for Peptyde Bio's antifungal technology.

Fungal diseases are a persistent problem in agriculture. Causing up to 20% yield loss at a cost of nearly \$60 billion worldwide each year, fungal infections outpace the crop damage caused by viral and bacterial diseases combined—and the risks are growing, as climate change improves conditions for these opportunistic fungi. Chemical fungicides are toxic, expensive, and losing efficacy over time due to fungal resistance.

Co-founded by Danforth Center principal investigators **Dilip Shah, PhD**, and **Kirk Czymmek, PhD**, Peptyde Bio offers an alternative. Based on natural antimicrobial peptides derived from plants, Peptyde Bio's biofungicides are environmentally friendly, less expensive, and highly effective.

"One of the principal goals of the Danforth Center is to bring emerging technologies developed at the Center to the market quickly," said Tom Laurita, PhD, Director of Entrepreneurship and CEO, Danforth Technology Company. "This acquisition by Invaio proves that our strategy is working."

THANK YOU

Farmers need new solutions quickly in the face of climate change, and donors can help. Donor funding was used to demonstrate the effectiveness of Peptyde Bio technology, which led directly to the formation of the company.



Danforth Center Principal Investigators Dilip Shah (left) and Kirk Czymmek, co-founders of Peptyde Bio.

News & Events

NEW BOARD CHAIR PENNY PENNINGTON

Penny Pennington, managing partner of Edward Jones, has been elected to serve as the new chair of the Danforth Center Board of Directors. Pennington becomes the first woman to lead the Center's board, which also saw the addition of two new directors, Senator Roy Blunt and Johannes Burlin, co-CEO and co-Founder of Tilia Holdings, LLC. "Penny has been one of the most effective and tireless advocates for the Danforth Center," said President and CEO **Jim Carrington, PhD**. "We are grateful that she is contributing her inspiring leadership and considerable talents as Board Chair."

SERVING UP SUSTAINABILITY

This spring, the team at the Danforth Center Café applied for restaurant certification by the Green Dining Alliance. The judge awarded the Café four out of a possible five stars, ranking especially high in water conservation, energy conservation, and awareness. Inspired by the constructive feedback, the Café crew has set out to pursue that fifth star, adopting biodegradable or recyclable packaging, reusable dishes for in-house use, and planning to offer larger waste management bins. "It only makes sense because we work for a plant science center," said Kitchen Manager Ehrin Barry. "If the research here is working toward an eco-friendlier world, why shouldn't we?"

TIME MAGAZINE BEST INVENTIONS LIST

TIME Magazine has named a Pivot Bio product one of the best inventions of the year. Pivot Bio is a sustainable agriculture company with offices in BRDG Park on the Danforth Center's campus. Their seed-coating technology gives farmers a way to decrease fertilizer use. Synthetic nitrogen fertilizer has, until now, been an essential tool for farmers to grow the food the world needs. But

it is one of agriculture's leading contributors to global greenhouse gas emissions, poor water quality, and air pollution. (Read more about ways Danforth Center scientists are combatting this problem on page 6.)

CELEBRATING BLACK PLANT SCIENTISTS

Every February, Senior Research Scientist and Principal Investigator **Kevin Cox Jr., PhD**, spotlights one Black plant scientist online for each day of Black History Month. This year, his list was published on Plantae, the American Society of Plant Biologists' digital hub for plant scientists. Throughout his career, Cox noticed a lack of representation for Black plant scientists and was often told "Black plant scientists are difficult to find." Cox easily disproves that notion. "There are plenty of Black plant scientists out there doing some amazing work," said Cox. Get the full story on our website.

DR. KATIE MURPHY ON TV AND RADIO

Danforth Center scientists help educate the public on the importance of plant science whenever they get the chance. Principal Investigator and Director of Phenotyping **Katie Murphy, PhD**, appeared on a PBS

"Hungry Planet" segment to discuss how, in the face of climate change, plant science is key to keeping corn on the table for generations to come. She was also interviewed on local KMOX about the Danforth Center's collaboration with the Taylor Geospatial Institute. Watch and listen to both clips on our website.

VP OF RESEARCH TONI KUTCHAN HONORED

Principal Investigator and VP of Research **Toni Kutchan, PhD**, was recently honored with the Danforth Award for Plant Science.



The award recognizes outstanding scientists who have made exceptional contributions to plant biology, agriculture, or fields relevant to the Danforth Center.

Dr. Kutchan, who retired this year, was honored for her many scientific discoveries: her seminal research resulted in over 145 published works that reveal the biochemical and molecular underpinnings of plant natural products, including medicines. She was also celebrated for her dedication to the St. Louis community and her advocacy for women and girls in STEM.

• Penny Pennington



• Danforth Center Café Team



• Pivot Bio

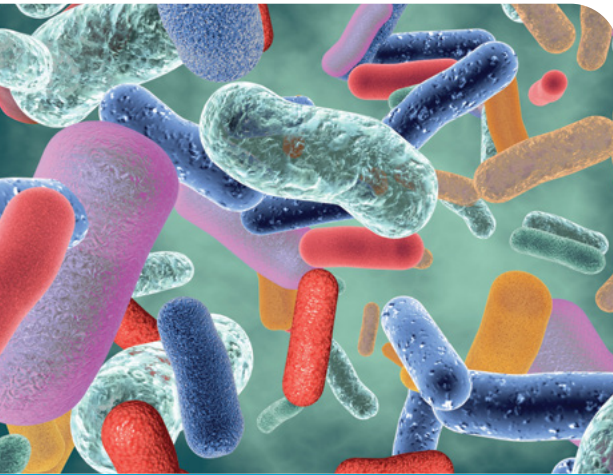


• Kevin Cox



• Katie Murphy





"To harness the power of plant-microbial interactions in modern day agriculture, we must understand how these microbes function, and what factors contribute to their longer-term persistence with crops."



- **Becky Bart, PhD**, Danforth Center principal investigator and SINC co-director

Un-SINC-able Ambitions

SINC PROJECT SEEKS SOLUTIONS TO NITROGEN POLLUTION

Chemical nitrogen fertilizer is a significant driver of climate change and environmental degradation. To address this issue, the Danforth Center **Subterranean Influences on Nitrogen and Carbon** (SINC) Center is dedicated to reducing farmers' reliance on synthetic fertilizers. The approach involves three key strategies: fostering beneficial interactions with microbes, developing climate-smart cover crops, and optimizing plant genetics. This multifaceted approach aims to improve agricultural sustainability by minimizing the use of harmful chemical fertilizers while enhancing soil health and productivity.

The effort to leverage beneficial microbe interactions got a boost recently when the National Institute of Food and Agriculture funded a new project led by **Becky Bart, PhD**, and **Doug Allen, PhD**, Danforth Center principal investigators and co-directors of SINC (Dr. Allen is also a USDA research scientist). The project seeks to develop synthetic bacterial communities with plant growth-promoting abilities. Such communities are needed to improve the efficacy and reliability of microbial products for improved agricultural performance, reducing reliance on external inputs, and promoting soil health.

Another SINC Co-Director, **Ivan Baxter, PhD**, is leading a team of researchers on a project funded by the National Science Foundation to enhance understanding of the genetic processes enabling plants to absorb and utilize elements. Currently, little is known about the genes involved in elemental acquisition. This knowledge could improve crop nutrition, strengthen growth on marginal lands, and reduce fertilizer use. This research will also cultivate growth in the scientific community, integrating research into undergraduate classrooms and engaging middle school students in after-school activities.

The long-term goal of all SINC Center projects is to optimize production agriculture for a sustainable planet, benefiting farmers and the environment alike.



Ivan Baxter's new project studying plant elemental accumulation has a goal of reducing fertilizer and improving nutrition. It includes authentic research experiences for students as well.

Thank You

The SINC Center was made possible by a founding gift of Phil and Sima Needleman and with support from [Bank of America](#).



Smallholder farmers in Ethiopia collecting sheaves of teff for threshing. The Danforth Center's improved teff has received support from the Bill & Melinda Gates Foundation.

Transformative Teff Investment

DANFORTH CENTER AND ETHIOPIAN PARTNER TO REVOLUTIONIZE TEFF CULTIVATION

The Danforth Center and the Ethiopian Institute of Agricultural Research have secured funding from the Bill & Melinda Gates Foundation to improve teff, a staple crop of Ethiopia. Building on previous advances made at the Danforth Center, the grant will support research to validate the improved semidwarf teff in Ethiopia under greenhouse and field conditions and to introduce improved traits in farmer-preferred varieties. Ethiopian scientists will also be trained on plant transformation and gene-editing.

Teff (*Eragrostis tef*) is Ethiopia's largest cereal crop, sustaining over 80 million people and serving as a cornerstone of food and economic security. Gluten-free and mineral-rich, teff boasts adaptability to diverse growing conditions including drought. However, production has yet to be mechanized, and teff yields remain low. Labor, which is typically carried out by women and children, is demanding: seeding, weeding, harvest, and post-harvest. The challenge lies in the tall and weak stem causing the plants to fall over, a phenomenon known as "lodging." The estimated annual production loss due to lodging amounts to 23-30%.

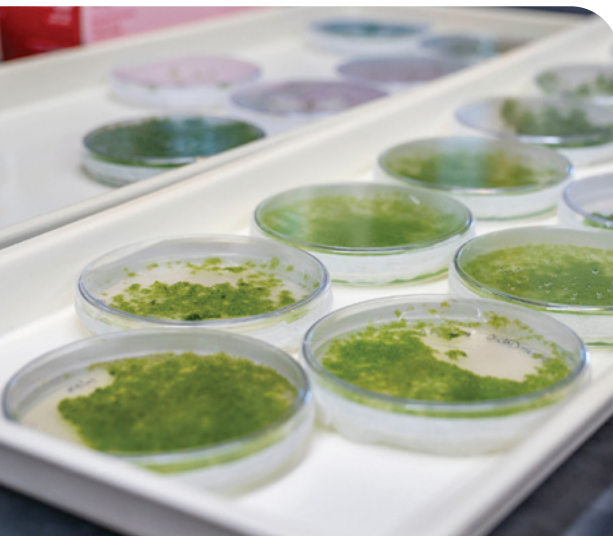
Senior Research Scientist and Principal Investigator at the Danforth Center **Getu Duguma, PhD**, and his team set out to do for teff what the Green Revolution did for wheat and rice: create semidwarf varieties to increase yields. When stalks are shorter, plants are less likely to fall over and lose their precious grains. And they succeeded: the first "short-stature teff" was developed in 2020, published in 2022, and underwent a US field trial in 2023. With the Gates investment, the project has the potential to revolutionize teff husbandry, delivering lodging-resistant teff varieties to smallholder farmers, and ensuring food security and economic prosperity for millions.

You Helped

Semidwarf teff was supported in the early stages by donors via the Danforth Center Impact Fund. Through your generosity, this vital project for Ethiopian food security was able to achieve liftoff. Thank you.



Dr. Getu Duguma, whose team created the improved teff. "I grew up on a farm in Ethiopia, so I know first-hand that if we succeed, the benefits will be immense for our farmers."



Moss in the lab. Despite their importance in climate change mitigation, mosses are poorly understood, especially their response to elevated CO₂.



Somnath Koley (left) and Boominathan Mohanasundaram collaborated on the study.

Moss Matters

DANFORTH CENTER RESEARCHERS PROVIDE INSIGHTS FOR CLIMATE CHANGE

The oldest of the land plants, mosses comprise around 12,000 species and cover nearly four million square miles of the Earth's surface. They play a crucial ecological and evolutionary role, contributing significantly to rainwater retention, carbon sequestration, and overall soil health, making them essential components of ecosystems worldwide. However, the impact of elevated CO₂ (eCO₂) levels on moss growth has not been explored to the extent of other plants.

A collaborative research effort published in the *New Phytologist* was led by the Pandey and Allen labs at the Danforth Center to address this gap. By studying the model moss *Physcomitrium patens*, they showed that the moss exhibited a three-fold increase in biomass through adjustments in growth, metabolism, and physiology. This increase was attributed to enhanced photosynthesis and a delicate balance between life cycle transitions, influenced by the availability of sugars and nitrogen. (*New Phytologist*)

RULES OF LIFE

Lead author Boominathan Mohanasundaram, PhD, a post-doctoral associate in the Pandey lab, emphasizes the significance of mosses in sustaining natural carbon storage systems like permafrost and bogs, highlighting their relevance to climate change mitigation efforts. Furthermore, the research provides a framework for comparing eCO₂ responses across different plant groups and contributes to the NSF Rules of Life initiative aimed at understanding the epigenetic inheritance mechanisms of eCO₂ response across a broad range of plants.

While further studies are needed to assess the growth of other moss classes and their response to different ecological conditions, the results suggest that eCO₂ environments could enhance moss biomass accumulation and potentially mitigate soil thawing in permafrost regions. Understanding how mosses respond to changing environmental conditions is crucial for predicting their role in future climate scenarios.



Green Gold

DANFORTH CENTER ADVANCES ALGAE RESEARCH

Algae are a diverse group of photosynthetic organisms and the predecessors of most land plants today. The lab of **James Umen, PhD**, the Danforth Center's Enterprise Rent-a-Car Institute for Renewable Fuels and Joseph Varner Distinguished Investigator, studies two model species of algae: *Volvox* and *Chlamydomonas*, focusing on sex and cell division. "If we want to turn algae into a productive oil crop," explained Umen, "It is important to be able to breed them as we have done to improve our food crop species, taking advantage of hybrid vigor."

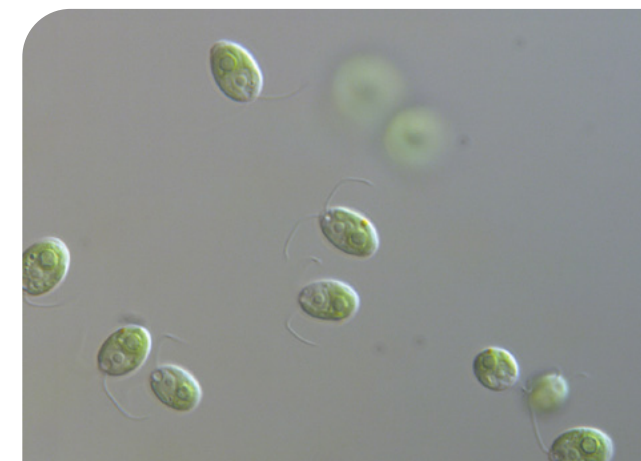
DIVIDE AND CONQUER

Last year, the lab uncovered a surprising twist on the cell division mechanism in *Chlamydomonas*. The cells normally grow large, then divide one or more times to size back down. Unexpectedly, mother cells rarely divided just once; they either avoided division altogether or divided multiple times. The discovery, which challenges previous models assuming equal probabilities for all division numbers, has implications for how algae evolved higher and higher cell numbers. Also revealed: the solo division is inhibited by the retinoblastoma tumor suppressor pathway, an ancient control mechanism for cell division shared with algae, plants, and humans. Further research may shed light on how the pathway also keeps plant cells from dividing at the wrong time and place—and human cells from developing cancer. (*Current Biology*)

SEX AND THE SINGLE CELL

Another groundbreaking study led by the Umen lab with international collaborators reveals a conserved mechanism behind sex determination in *Chlamydomonas* and *Volvox*. The research identifies a new gene, VSR1, essential for the development of female and male reproductive cells in *Volvox* (or plus and minus mating types in *Chlamydomonas*), providing a comprehensive model for algal sex determination. This discovery offers opportunities for targeted breeding and selection in related species, with implications for biotech, biofuels, and agriculture. (*Proceedings of the National Academy of Sciences*)

The Umen lab has recently made important discoveries in cell division and sex that could advance the development of algae as a bioenergy crop.



Chlamydomonas, a model green algae. The Umen lab has uncovered a bias against one-time cell division: the algae either avoided division altogether or divided multiple times.

Enterprise Rent-A-Car Institute for Renewable Fuels

Creating green solutions for global challenges, Danforth Center scientists are working to develop plant-based materials for bioenergy that are more environmentally sustainable and higher in energy content.



Danforth Center scientists entering the Michael W. and Quirsis V. Riney Greenhouse. The Danforth Center Plant Growth Facility provides cutting-edge research instrumentation and expertise.

Room to Grow

BEST-IN-CLASS PLANT GROWTH FACILITY CONTINUES TO EXPAND

Danforth Center scientists conduct research to address some of the biggest challenges confronting humanity. Access to state-of-the-art facilities and expertise is critical—not only to our scientists, but to the agtech and biotech startups at [BRDG Park](#), [Helix Center](#), and throughout the [39 North](#) innovation district. That’s why the Danforth Center’s **Plant Growth Facility** (PGF) is so essential.

The PGF today consists of more than 66,000 square feet of research-grade greenhouse space—a total of 50 greenhouses, 100 growth chambers, and seven other controlled-environment rooms with specialized uses, such as seed storage and biomass drying. It also includes the top-flight expert staff to manage even the most complex experimental projects.

EXPERIMENTAL ENVIRONMENTS

“As you might imagine in a plant science institute, our growth chambers are in incredibly high demand,” said Kevin Reilly, PGF director. Growth chambers are highly specialized rooms that allow for precise climate controls such as temperature, humidity, light, and carbon dioxide levels. The PGF reached a major milestone last year with the installation of its one-hundredth growth chamber.

We Need Your Help

The Danforth Center Plant Growth Facility is consistently at or near full capacity. If you’d like to help grow the agtech community in St. Louis by supporting high-tech greenhouse creation, please contact the Development team at 314.587.1234.

The new additions include Conviron GEN1000 models, a reach-in style chamber that allows for flexible configuration of shelves, air flow, and lighting. “Because of the ever-evolving nature of plant science research and the diverse needs of PGF users, flexibility of chamber design is crucial, in addition to the advanced environmental control capabilities,” Reilly explained. Even with the additional chambers, all one hundred growth chambers are regularly at or near full capacity.

SEEING A NEW LIGHT

LED lighting has been a watchword of sustainable home improvement for some time, but adopting new lighting technology in a greenhouse comes with special concerns. Will the new lighting affect plant growth in any way, potentially altering experimental outcomes? The Danforth Center PGF set out to find out. After collecting data to ensure that plant performance would not be adversely affected over multiple seasons for a variety of crops, the PGF was satisfied that LEDs required little to no changes in care protocols. Since making this determination, the PGF has replaced 100% of conventional grow lights with LEDs across the facility. This infrastructure upgrade has not only reduced electrical usage by 34% in the greenhouses alone, but it has also enabled more versatile research through better light control.

BIOLOGICAL CONTROL PROGRAM

The PGF team is also helping reduce the facilities’ environmental footprint through its biological control program, which uses beneficial insects and mites to control common greenhouse pests. An early adopter in the research greenhouse community, the Danforth Center effort has been ongoing for more than 10 years. Thanks to the use of biological controls, the PGF team is proud to report the reduction of traditional pesticide usage by more than 60%.

HAVE A QUESTION?

The expert PGF staff have office hours on Tuesdays at 10 a.m. in the Danforth Center’s lower atrium. Clients and potential clients are invited to drop in with questions or for help with brainstorming their next experiment.

Economic Impact on St. Louis Region:



\$412M

annually generated by the Danforth Center and BRDG Park



An aerial view of the greenhouses aglow with grow lights at night. Efficiency efforts over the last several years have resulted in a 34% reduction in energy use.



Dr. Malia Gehan and team members evaluating plants inside a growth chamber. The Plant Growth Facility recently installed its 100th growth chamber—but demand is still surging.



Greenhouse Manager Daniel Long harvests tomatoes in one of the 50 PGF research-grade greenhouses. The PGF offers cutting-edge facilities as well as staff expertise.



See FieldDock in Action

Visit the Danforth Center blog to watch a video clip of the FieldDock: danforthcenter.org/blog.

FieldDock Prototype Debuts

DANFORTH SCIENTISTS ARE REVOLUTIONIZING SMART FARMING AND CROP BREEDING

The development of an innovative smart-farm system set in motion through grants from the [National Institute of Food and Agriculture](#) and the [National Science Foundation](#) has resulted in the debut of the prototype FieldDock: “It’s here. It was delivered at 2 p.m.,” said **Nadia Shakoor, PhD**, senior research scientist and principal investigator.

“While the looks may continue to change, it’s fully functional and we accomplished everything we wanted to do.”

That functionality is extensive: the FieldDock is an all-in-one system that integrates a sensor base station with a remote wireless sensor network and autonomous UAV drone, which all runs on renewable energy. Daily data collection takes place on measurable plant traits, water usage, overall environmental and soil conditions, as well as daily snapshots of how a crop is performing in real world conditions. This robust data is then analyzed in the field via edge and cloud computing to produce real-time actionable information via an intuitive online user interface. It offers a comprehensive solution for enhancing crop breeding, performance measurement, and farm management, embodying the forefront of field phenotyping research to meet future agricultural challenges.

PARTNERS IN PROGRESS

The prototype was created in collaboration with **Agrela Ecosystems**, the tech company spun out of the Danforth Center by Shakoor in 2016 and partners from the [Taylor Geospatial Institute](#) at [Saint Louis University](#).

FieldDock represents a step toward the future of data-driven agriculture, ushering in a new era of precision farming and breeding research. Its potential to optimize crop productivity and conserve resources underscores its importance in the face of a changing climate.

Members of the Shakoor lab with the prototype FieldDock at the Danforth Center. This integrated smart farm system is a step toward greater precision agriculture availability.

“We had a team of experts—remote sensing, engineering, computer science, plant science—all working together to take FieldDock from concept to reality.”

- **Nadia Shakoor, PhD, Senior Research Scientist and PI**



Immersed in Science

EDUCATION TECH IS EMPOWERING TEACHERS, INSPIRING STUDENTS

The Danforth Center’s [Education Technology Program \(ETP\)](#) is inspiring the next generation of scientists through immersive experiences and cutting-edge technologies. Launched in 2019 with support from the [National Institute of Food and Agriculture](#) and the [National Science Foundation](#), the ETP introduces students to the world of plant science and agriculture using augmented and virtual reality, 3D modeling, and gaming.

Led by **Sandra Arango-Caro, PhD**, senior research scientist and principal investigator, the program offers curriculum content and professional development workshops for educators, empowering them to integrate these technologies into their teaching. Through collaborations with industry leaders like [zSpace](#), educators receive training in augmented reality and virtual reality technologies, with the option to borrow equipment for use in their classrooms.

CUTTING-EDGE CAREER PREP

For middle and high-school students, the ETP provides immersive experiences where they can explore the intersection of science, art, design, and technology. Supported by the National Science Foundation’s Innovative Technology Experiences for Students and Teachers, students collaborate in teams to create 3D models of plants, gaining scientific knowledge and skills while visualizing their work in immersive environments. These experiences not only deepen their understanding of plant science and agriculture, but also cultivate essential skills such as teamwork, problem-solving, and scientific communication—preparing them for future careers in STEM fields.

These experiences are not limited to urban areas: the ETP is bridging the digital divide by bringing transformative learning experiences to rural schools as well. To date, over 700 students from 27 institutions have participated in the ETP’s immersive experiences, with more schools joining each semester.

Students from the Saint Louis Science Center YES Program learn about plants through augmented reality with zSpace devices at the Danforth Center.



Demonstrating the Oculus device at the Danforth Center, where educators can receive training on immersive tech. Equipment is available for loan after training.

Want to Try AR/VR?

Visit the Danforth Center [PlantTech Jam](#) on April 27 where you’ll be able to sample an immersive experience.



Sarah Pardi with her thesis advisor, Danforth Center Principal Investigator Dmitri A. Nusinow, PhD.

Capturing the Light

MEET THE 2024 WILLIAM H. DANFORTH FELLOW

Sarah Pardi discovered her passion for plants while gardening with her parents in the Bay Area. This childhood fascination led her to pursue a biology degree at Loyola Marymount University, where she worked in the plant molecular biology lab. Encouraged by her mentor, she secured a McNair Scholarship and began her PhD journey at Washington University in St. Louis, driven by the opportunity to work at the Danforth Plant Science Center.

Sarah is now a sixth-year PhD student and has been named the Danforth Center's **2024 William H. Danforth Plant Science Fellow**. The fellowship is awarded each year to an outstanding PhD student whose research demonstrates great promise for advancing plant science. Danforth Center Principal Investigator **Dmitri A. Nusinow, PhD**, is her thesis advisor.

In her research, Sarah focuses on how plants perceive light, a vital factor in maximizing crop yield. She is particularly interested in the molecular mechanisms of light-responsive proteins and their role in plant-environment interactions.

FOR PLANTS AND PEOPLE TOO

"If we can understand at the molecular level how plants are able to see and respond to light, then we can develop crops to maximize light-use efficiency and grow more food."

Beyond advancing agricultural efficiency, Sarah's work holds promise for understanding neurodegenerative diseases like Alzheimer's, which share similar molecular mechanisms with plants' plasticity to environmental perception. By unraveling these complexities, Sarah aims to contribute not only to sustainable agriculture but also to broader scientific understanding with potential implications for human health.

The WHD Fellowship was endowed by Dr. P. Roy and Diana Vagelos to support outstanding PhD students in plant science. If you are interested in creating opportunities for bright, early career scientists, call 314.587.1234.



"If we can understand at the molecular level how plants are able to see and respond to light, ultimately, we can...grow more food."

- Sarah Pardi, 2024 WHD Fellow

Corporate Partners

The Danforth Center is grateful to our corporate partners for their generous support in 2023

\$100,000+

Edward Jones®

WELLS FARGO

\$50,000+

BOEING

MILLIPORE SIGMA

\$25,000+

BANK OF AMERICA

\$10,000+

Agrich Global, Inc.
Bunge North America Foundation
Novus International, Inc.

\$5,000+

Aon
Bayer Crop Science
Christner Architects
Genective
Graybar Electric Company, Inc.
Hjelle Advisors LLC
ICL Specialty Products, Inc.
Moneta Group Investment Advisors
Paycom Payroll LLC

\$1,000+

39 North Properties
Benjamin F. Edwards Investments
BioBalance Health
BioSTL
CMA Global, Inc.
Color Art Palette, Inc.
Common Ground Public Relations, Inc.
Conference Technologies, Inc.
CoverCress, Inc.
CSI Leasing, Inc.
CTC Genomics
Dive Bomb Industries
First Bank, Inc.
Hermann Companies, Inc.

KWS Saat AG
Lewis & Clark AgriFood
Mandel, Mandel, Marsh, Sudekum and Sanger
Maritz, Inc.
McKee, Vorhees & Sease, PLC
Nestlé Purina PetCare Company
Pluton Biosciences
Polsinelli
RiverVest Venture Partners
RNAissance Ag
RubinBrown LLP
St. Louis County Farm Bureau
The St. Louis Trust Company
Tarlton Corporation
Mary R. Wolff Real Estate Management Co.

Other Supporters

Alpha Dental Care
Aziotics
Gamble & Schlemeier
Heartland Barge Management LLC
The International Companies
Lutheran Convalescent Home Auxiliary
Meadowbrook Country Club
MOST Policy Initiative
Plastomics
Seven Pines Garden Club
Vulpes Agricultural Corp.





Denise and Jerry Steiner. The Danforth Center presented the Danforth Distinguished Service Award to Jerry in October.

Servant-Leadership

HOW JERRY STEINER STRIVES TO HELP PEOPLE, PLANTS, AND PLANET

Jerry Steiner has led a long and distinguished career in agriculture—and in giving back. As an ag economics major at the University of Wisconsin, he was president of his ag fraternity. In his role as Monsanto’s executive vice president of sustainability and corporate affairs, he championed the virus-resistant cassava for Africa project. When he co-founded CoverCress Inc., he wanted to help farmers combat climate change. For his many acts of service, connection, and support, in October, the Danforth Center presented Jerry with the Danforth Distinguished Service Award.

A FARMING FOUNDATION

Jerry Steiner grew up on a dairy farm in Wisconsin. It was hard physical work, but rewarding, and he credits that upbringing for his character formation.

“I give my parents a lot of credit. Besides the very full-time work of running a dairy farm, they also served in the town and county governments and did a lot of work for the Farm Bureau. They taught us the importance of doing your part and leaving things better than you found them.”

HIS “WHY”

A Danforth Society member since 2004, Steiner has served on the Danforth Leadership Council, elevated the profile of the Danforth Center innovation community, and continues to work with entrepreneurs tackling climate change. When asked why he believes in the mission of the Danforth Center, Jerry responds:

“Plants are essential for food, human health, planetary health, fiber, fuel and so much more. **What I love about the Danforth Center mission is that improving plants is a gift that keeps on giving.** Plants and people and the planet are so intertwined. If you can help plants, you can help everyone.”



Jerry riding his homemade seed planter. Steiner is well known for his can-do attitude and willingness to fulfill any role needed in service to the bigger vision.

Tributes

The Danforth Center is grateful to donors who choose to honor or memorialize their friends, loved ones, and colleagues with a gift to the Center. Gifts listed here were received by Dec. 31, 2023. To make a tribute, visit danforthcenter.org/donate.

In Honor of...

Jane Bond

Ms. Martha W. Bond
Mr. & Mrs. Lary Bozzay

Teri & Jim Carrington

Mrs. Carol R. Armstrong

Katie Claggett

Mr. & Mrs. Birch Mullins

Maxine Clark & Bob Fox

Mr. & Mrs. Kenneth Kranzberg

Senator John C. Danforth

Ms. Margot Miller

Glenn Fischer

Anonymous
Terri Fischer

Ted Guhr

Mrs. D'Arcy Elsperman

Gary Halls

Tim Halls

Ruth Kim

Anna & Wayne Crosslin

Dr. Allison Miller

Mary Ellen Miller

Rev. John B. Musgrave

Mr. & Mrs. Michael Rich

Karen Stern

Mr. & Mrs. Kenneth Kranzberg

Sarah & Dan Wessel

Tim Halls

Rose Winkel

Ms. Anne Leners

Jean Wright

Ms. Sandra L. Richardson

Bing Yang

Dudley & Beth McCarter

In Memory of...

Roxanne Astroth

Mr. & Mrs. William Astroth, Jr.

William H. Danforth

Mr. & Mrs. Blackford F. Brauer

Tom & Meg Claggett

Mr.† & Mrs.† David C. Farrell

Mr. & Mrs. Michael Rich

Sandy & Laing Rogers

Mark & Senator Jill Schupp

Derick Driemeyer

Mrs. Nancy L. Allen

Mr. Wayne Althen

Mr. & Mrs. Howard Anthes

Mrs. Carol R. Armstrong

Tom & Cindy Bander

Mr. & Mrs. William Bergfeld

Mr. & Mrs. James T. Blair, IV

Mr. & Mrs. Frank J. Bush

Mr. Theodore C. Christner &

Mrs. Claudia Trautmann

Terry & Jim Coleman

Ms. MaryBeth Davidson

Mr. & Mrs. Walter Diggs

Ms. Barbara English

Mr. & Mrs. Gary Giessow

Joan & Joseph Goltzman

Mr. & Mrs. Harold F.

Helmkamp

Mr. & Mrs. Donald Hicks

Mr. Patrick Kenney

Katie Klingler

Mr. & Mrs. Michael D. Latta

Mr. & Mrs. John S. McCarthy

Mrs. Barbara McKinney

Dr. & Mrs. Roger Mell

Dr. Patrick Osborne & Nancy

Birge-Osborne

Mrs. Claire J. Robertson

Janet Slater

A. Nicholas Filippello

Mrs. Abigail B. Filippello

Samuel W. Greaves

Ms. Tamara Baldwin Sessoms

Ms. Donna S. Grunik

Bonnie Halls

Dr. & Mrs. Martin P. Altman

Tom & Cindy Bander

Ms. Brenda Bauer

Mr. & Mrs. Bill Borger

Terry & Jim Coleman

Mr. Edwin M. Epstein

Mr. & Mrs. Thomas W. Hough

James D McMillan

Meadowbrook Country Club

Teresa & Keith Wheeler

Robert L. Jackson

Mr. & Mrs. Ronald E. Wirts

Bob & Joan Jasper

Butch & Cindy Jasper

Mike & Diane Jasper

David F. Jones

James & Barbara Forst

William & Nancy Knowles

Ms. Lesley McIntire

Jo Ann Zaccarello Lampe

Mr. & Mrs. Michael D. Zaccarello

Robert S. Matthews, Sr.

Elizabeth & Michael Brunt

Todd Mockler

Tom & Cindy Bander

Dr. Erica A. Fishel

Melissa Rung-Blue & David Blue

Charles M.M. Shepherd

Susanne W. Shepherd

Mike Taich

Dr. Alison Bedell

Jack C. Taylor

John & Anne McDonnell

Thomas E. Thompson

Anonymous

Geraldine Virgil

Tom & Cindy Bander

Francis & Estelle Walls

Anonymous

Betty Woyak

Mr. & Mrs. Harold Denlow

Gene Zafft

Mrs. Marlene D. Zafft

WHD Legacy Society

The Danforth Center is grateful to donors who have planned for future needs of the Center by designating an estate gift. To learn more about estate giving, visit legacy.danforthcenter.org.

Anonymous

Mel† & Sue† Bahle

Mr.† & Mrs. William J. Barnard

Senator & Mrs. Christopher S. Bond

William R. Boyle†

Cicardi & Susan Bruce

Ann Case†

Dr.† & Mrs.† William H. Danforth

Dr. Robert† & Lorene† Drews

Elizabeth Early

Mr.† & Mrs.† David C. Farrell

George L. Fonyo

Harris J. Frank†

Allen W. Gaebel†

Mr.† & Mrs. David P. Gast

Mrs. Charles Guggenheim

Irene & Bob Gulovsen

Dr.† & Mrs.† Ernest G. Jaworski

Karen Kalish

Janet M. & Newell† S. Knight, Jr.

Nancy Knowles†

Dr.† & Mrs.† Wilfred R. Konneker

Mary† & Oliver† Langenberg

William A. & Christine A.

Linnenbringer

The Mares Family Endowment

Marilyn Miles

Mr.† & Mrs.† Jefferson Miller

Philip & Sima Needleman

Jo Oertli

Mr. & Mrs. John W. Rowe

Carol & D.C.† Rucker

Walter† & Marie† Schmitz

Francine & Jerome† Seslen

Steven C. Shepley

Sanford† & Gloria Spitzer

Moir Stevens†

Mr. & Mrs. Austin Tao

Alice H. Vosburgh

Ambassador† & Mrs. George Walker, III

Mr. Blanton J. Whitmire†

Mr. & Mrs. John J. Wolfe, Jr.

Aleene Schneider Zawada

† Deceased



DONALD DANFORTH PLANT SCIENCE CENTER

975 North Warson Road
Saint Louis, MO 63132 USA

Address service requested

NONPROFIT ORG
U.S. POSTAGE
PAID
ST. LOUIS, MO
PERMIT NO. 5385

Connect with us.      danforthcenter.org

PlantTech Jam

Saturday, April 27 | 12 – 4 PM

Hands-on science, tinkering,
and robotics fun for the whole
family. Free registration at
danforthcenter.org.



Scan to
register

