



DONALD DANFORTH  
PLANT SCIENCE CENTER

**Facts at a Glance**  
**Donald Danforth Plant Science Center**

**Mission**

The Donald Danforth Plant Science Center is a not-for-profit research institute with a mission to improve the human condition through plant science. Scientists at the Danforth Center are engaged in research, which will contribute to feeding the hungry, improving human health, preserving and renewing the environment, and enhancing the St. Louis region and the State of Missouri as world centers for plant science.

**Background**

The Danforth Center was founded in 1998 through a \$60 million gift from the Danforth Foundation, a \$50 million gift from the Monsanto Fund, the donation of 40 acres of land from Monsanto Company and \$25 million in tax credits from the State of Missouri. In addition to Chairman Dr. William H. Danforth and President Dr. James C. Carrington, the Center's activities are overseen by a Board of Trustees as well as a Scientific Advisory Board.

Named in honor of Donald Danforth, the Center is a fitting tribute to this onetime leader of the Ralston Purina Company. The company, which grew rapidly under his leadership, was in his day a pillar of American agriculture, a major producer of feed for farm animals and pets and of breakfast cereals. Today, the Danforth Center carries on a tradition of agricultural service and commitment to human health and well-being.

The Center employs more than 200 individuals, including 170 scientists and scientific staff, who attract an average of nearly \$11 million in annual grant and contract funding awards, more than twice the plant science average. In 2011, as in years past, the Center was voted #8 among the "Best Places to Work in Academia" by *The Scientist* magazine.

**Recent Developments**

Dr. James Carrington joined the Center as President on May 1, 2011 and expansion efforts are progressing rapidly. He recruited five new lead scientists, who will strengthen and diversify the Center's work in next generation biofuels, computational biology and new technologies. One of the new investigators, Dr. Thomas Brutnell will serve as Director of the Enterprise Rent-A-Car (ERAC) Institute for Renewable Fuels at the Danforth Center.

The new investigators hail from prestigious organizations and universities including the Boyce Thompson Institute at Cornell University, the Salk Institute for Biological Studies, Oregon State University, the University of California San Diego and include one internal promotion of Dr. Leslie Hicks who previously served as Director of the Proteomics and Mass Spectrometry facility. The new investigators are recent recipients of \$16 million in grant funding from the National Institutes

of Health (NIH), National Science Foundation (NSF), Department of Energy (DOE), Bill & Melinda Gates Foundation and others.

In addition to new faculty, the Center's expansion includes the addition of a Bioinformatics facility which is a physical and intellectual infrastructure that facilitates the bioinformatic computing and storage needs of members of the Danforth Center community. Users of the Bioinformatics facility are able to analyze massive biological datasets on a state-of-the-art, multi-user system with over 400 processing cores, more than 2 Terabytes of memory and 200 Terabytes of file storage.

### **Contributions to the Growth of the Regional "BioBelt"**

In June 2009, the BioResearch and Development Growth (BRDG) Park at the Donald Danforth Plant Science Center Plant opened the first of three buildings which will ultimately encompass 450,000 square feet. Although opening in during a very difficult economy, Building I already is two-thirds full. The new research park is one of the only laboratory facilities available for lease to emerging plant and life science companies nationwide to earn a coveted Gold LEED (Leadership in Energy and Environmental Design) certification from the U.S. Green Building Council (USGBC). In addition to enhancing collaborations at the international center of plant and life sciences research, BRDG Park helps provide the research, resources and relationships necessary to help plant and life sciences and clean-tech companies from the incubation stage to post-incubation stage achieve commercial success. BRDG Park received the Outstanding Local Government Achievement Award from the East-West Gateway Council of Governments in recognition of its partnerships with the St. Louis Economic Council, St. Louis Community College, City of Creve Coeur and the Donald Danforth Plant Science Center. More information can be found at [www.brdg-park.com](http://www.brdg-park.com).

The Ag Innovation Showcase, a signature event hosted by BRDG Park held at the Danforth Center was established in 2009. As an event for the "who's who" in worldwide agriculture, the Ag Showcase is designed to address critical issues and global policies impacting ag science and industry. The 2011 event nearly doubled attendance with more than 300 leaders representing entrepreneurial companies from Australia, the Netherlands, India, Malaysia and across North America, as well as industry leaders from Pioneer-DuPont, Dow AgroSciences, Kaneka Nestle, Monsanto, Sigma Aldrich, Solae BASF, Bunge North America and Novus International. Investors in attendance included TPG Capital, US Venture Partners, CMEA Capital, MidPoint Food and Ag Fund, Finistere Ventures, Nexus Venture Partners and Syngenta Ventures.

By spurring innovation of smart agricultural technologies, the event set the stage for new funding, strategic partnerships, and interactive dialogue in the areas of ag-bio, food and nutrition, biofuels, sustainable materials, clean-tech, animal health and information technology – with St. Louis at the center of the action. Two companies who attended the Ag showcase, SyMyco and BioGlow, Inc. have become tenants of BRDG Park.

### **International Commitments**

The Danforth Center has a strong international presence and commitment. Scientists from more than 20 different countries work at the Danforth Center and the Center has developed collaborations with educational and research institutes in Africa, China and India.

Dr. Paul Anderson serves as Executive Director of the Office of International Programs. In this capacity he Anderson travels throughout the world to facilitate collaborations with national research institutes and the governments who oversee them as well as to monitor Danforth Center field trials and ongoing crop improvements.

In 2011, the Danforth Center received \$11.9 million in additional funding for the Virus Resistant Cassava for Africa (VIRCA) project to advance its work to improve the health and wellbeing of farmers, their families, and other consumers of cassava living in Sub Saharan Africa. Funds will be used to support Phase II of the humanitarian effort to develop and deliver farmer-preferred cassava varieties enhanced to resist serious virus diseases that are greatly reducing crop yield and increasing the threat of poverty and famine. This funding came from the Bill & Melinda Gates Foundation (\$5.6 million), The Monsanto Fund (\$5.4 million) and the Howard Buffett Foundation (\$860,000). VIRCA is also supported by USAID from the American people (\$2.5 million).

The Center also received an \$8.3 million grant from the Bill & Melinda Gates Foundation in 2011 to support Phase II of BioCassava Plus (BC Plus), an innovative project that aims to reduce malnutrition by increasing the nutritional value of cassava, a staple crop consumed by more than 250 million sub-Saharan Africans and nearly 700 million people worldwide. Dr. Martin Fregene and Dr. Paul Anderson are serving as co-investigators.

The Office of International Programs also manages a BioSafety Resource Network (BRN) to support four project teams conducting research under Grand Challenge #9 (GC9) funded by the Bill & Melinda Gates Foundation which focuses on the use of appropriate technologies to increase nutrients in local crops in a socially and culturally acceptable way. The goal of the BRN is to ensure that research projects address quality assurance, biosafety science and regulatory science requirements. The BRN will conduct a thorough, preliminary biosafety assessment of all traits intended to be expressed in the crops, formulate a regulatory strategy and work plan for each trait-crop combination and provide support in the planning and implementation of confined field trials. The BRN will also oversee the systematic transfer of experience and services through the GC9 projects to scientific personnel and institutions thus building local and regional regulatory infrastructure.

### **Grant Success**

Danforth Center scientists have been increasingly successful at securing research funding from federal as well as private and industry sources. On average, the Danforth Center receives more than \$10 million annually in grants and contract revenue from sources such as the National Science Foundation, United States Department of Agriculture, U.S. Agency for International Development the Bill & Melinda Gates Foundation and the Monsanto Fund. Grants recently awarded to Danforth Center Scientists include:

- \$5.5 million from the U.S. Department of Energy (DOE) through its Advanced Research Projects Agency-Energy to support research led by investigators associated with the Danforth Center's Enterprise Rent-A-Car Institute for Renewable Fuels team to develop the oilseed plant *Camelina sativa* as a sustainable source of biofuel.
- \$1.2 million from the United States Department of Agriculture (USDA) and Department of Energy (DOE) as part of a \$510 million public private partnership aimed at building a national biofuels industry. Funds support our research focused on developing methods to increase yield and improve the composition of bioenergy grasses using the model grass, *Brachypodium distachyon*.
- \$2.0 million from the U.S. Department of Energy, Office of Biological and Environmental Research (BER), to examine the mechanisms that plants use to construct and regulate plant cell walls. Dr. Thomas Brutnell, Director of the Enterprise Institute of Renewable Fuels will work with Principal Investigator Joss Rose and colleagues at Cornell University and University of Kentucky to develop genetic resources to identify genes that are essential for cell wall biosynthesis in grasses.

- \$11.9 million from the Bill & Melinda Gates Foundation (\$5.6 million), The Monsanto Fund (\$5.4 million) and the Howard Buffett Foundation (\$860,000) and USAID from the American people (\$2.5 million) for the Virus Resistant Cassava for Africa (VIRCA) project further its work to develop and deliver farmer-preferred cassava varieties enhanced to resist serious virus diseases that are greatly reducing crop yield and increasing the threat of poverty and famine.
- \$8.3 million from the Bill & Melinda Gates Foundation to BioCassava Plus to support Phase II of an innovative project that aims to reduce malnutrition by increasing the nutritional value of cassava, a staple crop consumed by more than 250 million sub-Saharan Africans and nearly 700 million people worldwide. The BioCassava Plus grant now totals more than \$20 million over the life of the grant for all institutions involved here and in Africa.
- \$48 million from DOE to support The National Alliance for Advanced Biofuels and Bioproducts (NAABB) led by the Donald Danforth Plant Science Center. The consortium will conduct advanced biofuels research to support the development of a clean sustainable transportation sector.
- The Danforth Center was designated one of 46 multi-million-dollar Energy Frontier Research Centers (EFRCs) by the U.S. Department of Energy and received a \$15 million award to pursue advanced scientific research on energy.

## **Educational Outreach**

Danforth Center scientists are involved in training and inspiring the next generation of scientists, as well as supporting regional science educators. Generous funding secured from the National Science Foundation by Danforth Center Principal Investigators supports a summer internship program for college students. Recent participants have won top honors and special prizes at national and international science fair competitions. Local science educators also have trained in Danforth Center labs and in conjunction with Danforth scientists they have produced online teaching and learning modules for classroom use.

Dr. Terry Woodford-Thomas, the Danforth Center's Director of Educational Outreach, established a travelling "Technology Trunk" program that brings scientific equipment and lab materials into science classrooms in underserved areas. The program began with initial funding from the Boeing Company and with additional financial support, will be expanded to make more trunks available to regional high schools.

The Danforth Center is collaborating with the Saint Louis Science Center in an exciting new research project dubbed Backyard Biofuels that has the potential to discover algae species located within the St. Louis metro area which may be used in cutting edge biofuels research. Citizen scientists of all ages are invited to collect samples of algae using a special collection kit which is then returned to the Life Science Lab at the Science Center where it is cultured, identified and induced to produce lipids in a liquid culture. The samples are then sent to the Danforth Plant Science Center to determine how well the different algae species produce lipids. Further testing will be conducted on select high-yielding species at the Danforth Center. The 2011 program was launched at Algaepalooza, a family event held on Saturday, May 7, at the Science Center and will run through the fall. In 2010, 169 algae collecting kits were returned to the Life Science Lab. From those samples, we were able to isolate and test 105 individual algae strains.

## Community Programs

The Danforth Center's quarterly *Conversations* program (sponsored by The Boeing Company) features a discussion about timely topics related to plant science with leading scientists led by moderator, Dr. Jim Davis, Professor Emeritus from Washington University. *Conversations* programs are free and open to the public.

"*Seeds of Change*" an annual event presented by the Danforth Leadership Council features an influential thought leader and is designed to give people an opportunity to connect with others who think passionately about our community and of our world-class assets like the Danforth Plant Science Center. The inaugural program in 2010 featured Hugh Grant, CEO Monsanto Company and the 2011 program featured Richard Longworth, noted author of *Caught in the Middle: America's Heartland in the Age of Globalism*.

The Donald Danforth Society presents visiting speakers whose interests are relevant to the Center's mission. Previous speakers in the series have included Davis Guggenheim, the Academy-Award® winning director of the film *An Inconvenient Truth*; photographer and philanthropist Howard G. Buffett; and ABC News Correspondent Bill Blakemore.

## Facilities

Designed and developed by Nicholas Grimshaw & Partners of London, England and Hellmuth, Obata, and Kassabaum of St. Louis, Missouri, the Danforth Center's state-of-the-art research building was completed in 2001. The innovative space provides research and training facilities, a modern e-library, and lecture auditorium with video-conferencing capabilities and a series of core facilities that serve scientists at the Center and across the region:

- The Senator Christopher S. "Kit" Bond **Integrated Plant Growth Facility** features compartmentalized greenhouses and environmentally-controlled growth chambers;
- The **Proteomics & Mass Spectrometry Facility** develops new tools and provides high quality sample analysis to Danforth Center investigators as well as external academic and institutional clients;
- The **Plant Tissue Culture and Transformation Facility** is a critical component of the Danforth Center's ability to move scientific breakthroughs from the laboratory into farmer's fields by facilitating the understanding and improvement of crops of interest; and
- The **Integrated Microscopy Facility** serves both Danforth Center and regional scientists in their quest to look inside plant cells and tissues, and features state-of-the-art imaging equipment.
- The **Bioinformatics Facility** is the newest core facility to be added to the Danforth Center. It is a physical and intellectual infrastructure that facilitates the bioinformatic computing and storage needs of members of the Danforth Center community. Users of the Bioinformatics facility are able to analyze massive biological datasets on a state-of-the-art, multi-user system with over 400 processing cores, more than 2 Terabytes of memory and 200 Terabytes of file storage.

For more information visit [www.danforthcenter.org](http://www.danforthcenter.org)