The Center’s work is directed toward real impact. Much of the practical translation and application of discoveries are facilitated by two Danforth Center institutes. The development of environmentally sustainable sources of biofuels is achieved through the Enterprise Rent-a-Car Institute for Renewable Fuels, a research unit within the Danforth Center.

The goals are to develop technology for the next generation of plant-based materials, or feedstocks, for transportation fuels that are produced through sustainable agriculture and that contain higher energy content than our current feedstocks. The Institute moves basic discoveries in areas such as photosynthesis into commercialization in the private sector.

Improving Bioenergy Crops for Sustainable Production

The Enterprise Rent-A-Car Institute for Renewable Fuels was established in 2007 with a generous gift from the Taylor family.
Why do we use model systems?

A model system is one that has several characteristics that accelerate gene discovery. Characteristics that are particularly attractive for genetics and molecular biology include:

- Small size – a few inches
- Short life cycle – less than two months
- Simple growth requirements
- Small and sequenced genome
- Amenable to rapid genetic modification

It is also important that model plants be closely related to the target feedstocks.

Scientific Highlights

- Successfully demonstrated the use of precision genome engineering in *Setaria viridis* greatly accelerating our ability to determine the function of genes in a model system for bioenergy research.
- Discovered conserved genes that regulate plant growth in response to daily and seasonal changes in the environment.
- Initiated a DOE-funded project to study how sorghum plants respond to nitrogen and water stress and further, to identify microbes capable of protecting bio-energy sorghum from these stresses.
- Successfully assembled the genome of the model bioenergy grass *Setaria viridis* in collaboration with scientists at JGI-DOE.
- Performed one of the most detailed physiological characterizations of carbon transport in maize to date as a first step toward the engineering of improved photosynthetic efficiencies in bioenergy grasses.
- Successfully leveraged genome editing technology to increase biomass in *Setaria viridis*.

2015 Achievements by the numbers:

- Submitted 6 Inventions disclosures of Bioenergy Technologies
- Filed 3 Bioenergy provisional patent applications
- Filed 3 International applications
- Filed 3 US non-provisional applications
- Licensed 2 technologies to for-profit companies
- 16 interns worked alongside 10 laboratories focused on next-generation bioenergy in 2015
- Awarded 8 new grants/subawards expected to total $15,936,813 over the life of the awards

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