Advanced Research Projects Agency • ENERGY

PETRO PROJECT

DONALD DANFORTH CENTER

IMPROVED LIGHT UTILIZATION IN CAMELINA

PROJECT TITLE:	Center for Enhanced Camelina Oil		
ORGANIZATION:	Donald Danforth Plant Science Center (Danforth Center)	LOCATION:	St. Louis, MO
PROGRAM:	PETRO	ARPA-E AWARD:	$5,524,564
TECH TOPIC:	Advanced Fuels	PROJECT TERM:	1/1/12 – 12/31/15
WEBSITE:	www.danforthcenter.org		

CRITICAL NEED

Biofuels offer renewable alternatives to petroleum-based fuels that reduce net greenhouse gas emissions to nearly zero. However, traditional biofuels production is limited not only by the small amount of solar energy that plants convert through photosynthesis into biological materials, but also by inefficient processes for converting these biological materials into fuels. Farm-ready, non-food crops are needed that produce fuels or fuel-like precursors at significantly lower costs with significantly higher productivity. To make biofuels cost-competitive with petroleum-based fuels, biofuels production costs must be cut in half.

PROJECT INNOVATION + ADVANTAGES

The Danforth Center will optimize light utilization in Camelina, a drought-resistant, cold-tolerant oilseed crop. The team is modifying how Camelina collects sunlight, engineering its topmost leaves to be lighter in color so sunlight can more easily reflect onto lower parts of the plant. A more uniform distribution of light would improve the efficiency of photosynthesis. Combined with other strategies to produce more oil in the seed, Camelina would yield more oil per plant. The team is also working to allow Camelina to absorb carbon dioxide (CO_2) more efficiently, providing more carbon input for oil production. The goal is to improve light utilization and oil production to the point where Camelina produces enough fuel precursors per acre to compete with other fuels.

IMPACT

If successful, The Danforth Center's project will enable large-scale production of oil from Camelina on land not typically suited for food production, serving as an environmentally friendly alternative for petroleum-based fuels.

- SECURITY: The transportation sector accounts for nearly all of our petroleum imports. Providing an advanced biofuels alternative to petroleum will allow the U.S. to reduce these imports, improving our energy independence.
- ENVIRONMENT: More than 25% of all greenhouse gas emissions in the U.S. come from the transportation sector. Because plants naturally absorb CO_2 as they grow, greenhouse gas emissions from biofuels is less than half that of petroleum fuels.
- ECONOMY: The U.S. imports nearly $1 billion in petroleum each day, accounting for the single largest factor in our trade balance with the rest of the world. Biofuels can be produced domestically, allowing us to keep more dollars at home.
- JOBS: A self-sustaining biofuels industry that is cost-competitive with oil is well-positioned to see job growth in the agricultural, engineering, and research sectors.

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