

UNIVERSITY OF MASSACHUSETTS AMHERST

DEDICATED HIGH-VALUE BIOFUELS CROP

PROJECT TITLE:	Development of a Dedicated, High-Value Biofuels Crop		
ORGANIZATION:	University of Massachusetts Amherst	LOCATION:	Amherst, Massachusetts
FUNDING YEAR:	2011	ARPA-E AWARD:	\$1,482,264
PROGRAM:	PETRO	PROJECT TERM:	01/04/2012 – 07/03/2013
TECH TOPIC:	Renewable Power Generation	TECH STAGE:	Concept

CRITICAL NEED

Every increasing global demand for energy requires alternative, sustainable sources to replace dwindling and unreliable foreign petroleum imports. Cellulosic biofuels and electric vehicle technologies are advancing, but remain limited by prohibitive production costs or lack of broad applicability. Liquid transportation fuels based on plant seed oils (e.g. biodiesel and green diesel) have tremendous potential as environmentally, economically and technologically feasible alternatives to petroleum-derived fuels. In addition, biofuels derived from seed oils are minimally carbon neutral.

PROJECT INNOVATION + ADVANTAGES

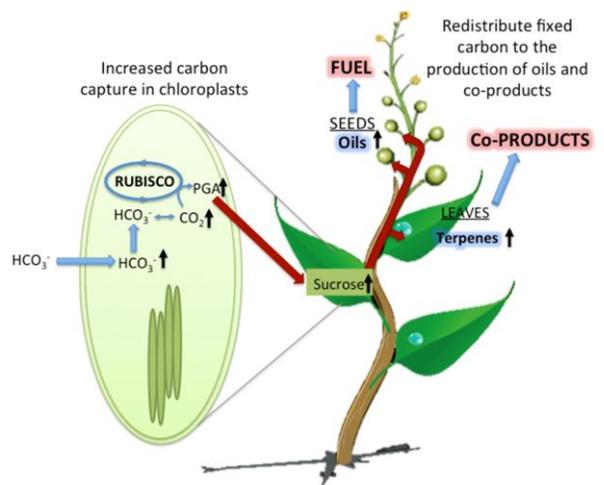
This project will establish a new paradigm for a sustainable bioenergy crop with high yields of plant oils that can be directly converted to fuels with existing technologies. We will develop a dedicated liquid biofuels crop using *Camelina sativa*, a non-food, cool season crop with low agronomic requirements, high seed yields and oil content. We will introduce highly efficient mechanisms of photosynthetic carbon fixation from photosynthetic bacteria to realize a 100% increase in plant productivity. In parallel, we will modify the metabolic pathways of lipid synthesis in *Camelina* to redistribute the increased fixed carbon into oils and terpenes. We have optimized a range of genetic resources that allow the introduction or knockdown of genes of interest in *Camelina*, thereby providing the essential methodologies for the development of *Camelina* as a high yield biofuels crop. This project will yield a lower cost seed oil feedstock from a more robust, non-food crop thus making this bio-oil based fuel cost-competitive and completely sustainable as opposed to petroleum-based fuels.

IMPACT

This project addresses three major limitations to sustainable, commercially viable biofuels production:

- DEVELOP A DEDICATED NON-FOOD BIOFUEL/BIOPRODUCTS CROP that can be cultivated in a broad geographic range,
- INCREASE CROP YIELDS by genetic engineering of plant chloroplasts to optimize photosynthesis, and
- INCREASE THE PRODUCTION OF SEED OIL AND CHEMICALS, thereby increasing the overall yields and suitability for the production of biofuels/bioproducts.

Our goals are to double the current estimated maximum seed and fuel yield of a particular plant species, thereby requiring less than one million acres of cultivation to achieve the 100 million gallons per year target for commercial viability.



CONTACTS

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