

# Future generation energy crops

## A. What is this research project?

The ARS-North Central Soil Conservation Research Lab (NCSCRL) in Morris, MN is conducting research to identify new and alternative oilseed crops that can provide feedstock for biofuels (e.g., biodiesel and aircraft fuel) and bioproducts (e.g., lubricants, soaps and detergents) and that are best suited for agricultural production in the Midwest. Moreover, this research includes developing and improving strategies for commercial production of new and alternative crops (e.g., cuphea and camelina; see below) that provide US citizens with improved agronomic, economic, and environmental benefits.

## B. What problem does it address?

This research seeks to:

- Develop oilseed crops that provide unique agronomic and commercial alternatives that do not compete with high-value food crops for bioenergy/bioproducts, while stabilizing US national food security
- Provide farmers with new and alternative crops to diversify their cropping systems to aid in reducing weed, insect, and disease problems
- Develop low input crops and management strategies that reduce soil erosion and improve water, air, and soil quality, thus improving agricultural sustainability

## C. How is the project different from or how does it enhance other projects?

The USDA-ARS is breaking new grounds in basic and applied research on future energy crops. Our work directly compliments research conducted by the New Crops and Processing Technology Research group at NCAUR in Peoria. Also, we are currently collaborating with the Energy and Environmental Research Center (Univ. of North Dakota) on the use of cuphea seed oil to make aircraft fuel.

## D. What are the potential benefits of partnering with ARS on this research?

The USDA-ARS is uniquely qualified and structured to tackle the challenges and long-term commitment of new and alternative crops research. The research team at the NCSCRL in Morris includes expertise in agronomy, crop physiology, weed science, and soil science and has recently been successful in developing cuphea as a new domestically produced crop-source of medium-chain fatty acid oil. Medium-chain fatty acids (see below) are highly valued in the US as feedstock for a wide range of industrial products and specialty chemicals, and until recently, were only derived from imported coconut and palm kernel oils and petroleum.

## E. Who are the potential customers?

Potential customers of this research include: a) farmers; b) oilseed processing industry; c) biofuel and specialty chemical industry; d) agricultural cooperatives; e) crop consultants; f) extension educators; g) crop seed industry; h) US Dept. of Defense; i) educators; and j) other researchers.



Future generation biofuel/bioproduct oilseed crops being researched by the ARS Lab in Morris, MN

Fatty acids in cuphea oil		
Caproic	6:0	Short-Chain
Caprylic	8:0	
Capric	10:0	Medium-Chain
Lauric	12:0	
Myristic	14:0	Long-Chain
Palmitic	16:0	
Stearic	18:0	
Oleic	18:1	
Linoleic	18:2	
Linolenic	18:3	
Arachidic	20:0	
Gadoleic	20:1	

Cuphea seed oil is rich in capric and lauric acid, which can be used for making aircraft fuel and high quality lubricants

Research on new and alternative crops for biofuels & bioproducts  
USDA-ARS Lab in Morris, MN



## Stage of Development

Recently, our team has achieved success in helping to advance cuphea from potential new crop status to on-farm production. Current research has expanded to include other potential crops (e.g., camelina, calendula, and bifora) for biofuels and other industrial uses. Cuphea was commercially introduced in 2005 and since then has expanded to include production in MN, SD, IL, ME, and ND. Based on current figures, approximately 4.5 million acres of cuphea production would be required to replace imported tropical plant oil usage in the US and another 4.5 million acres to replace petroleum usage for medium-chain oil.

## Moving Forward

Needs to advance new/alternative crops research for biofuels/bioproducts:

- Increased funding for germplasm improvement
- Cooperative efforts with industry and government to make commercializing new and alternative crops a smoother process
- Recognition of new and alternative crops by federal and state governments and appropriate actions taken to encourage farmers to produce new and alternative crops in addition to traditional commodity food and fiber crops.

## Researchers

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