Advanced Research Projects Agency • ENERGY

PETRO PROJECT

TEXAS AGRILIFE RESEARCH

FUEL FROM TOBACCO AND ARUNDO DONAX

PROJECT TITLE:	Synthetic Crop for Direct Biofuel Production through Re-routing the Photosynthesis Intermediates and Engineering Terpenoid Pathways		
ORGANIZATION:	Texas Agrilife Research	LOCATION:	College Station, TX
PROGRAM:	PETRO	ARPA-E AWARD:	$1,877,584
TECH TOPIC:	Advanced Fuels	PROJECT TERM:	2/15/12 – 5/31/13
WEBSITE:	agriliferesearch.tamu.edu		

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

Texas Agrilife Research is addressing one of the major inefficiencies in photosynthesis, the process by which plants convert sunlight into energy. Texas Agrilife Research is targeting the most wasteful step in photosynthesis by redirecting a waste byproduct into a new pathway that will create terpenes—energy-dense fuel molecules that can be converted into jet or diesel fuel. This strategy will be first applied to tobacco to demonstrate more efficient terpene production in the leaf. If successful in tobacco, the approach will be translated into the high biomass plant Arundo donax (giant cane) for fuel production.

IMPACT

If successful, Texas Agrilife Research's project will improve the efficiency of photosynthesis, enabling plants to convert more sunlight into fuel. Cost-competitive, renewable biofuels could serve as a replacement 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 carbon dioxide as they grow, the level of 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.

CONTACTS

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