Advancing Pennycress as Alternative Renewable Energy

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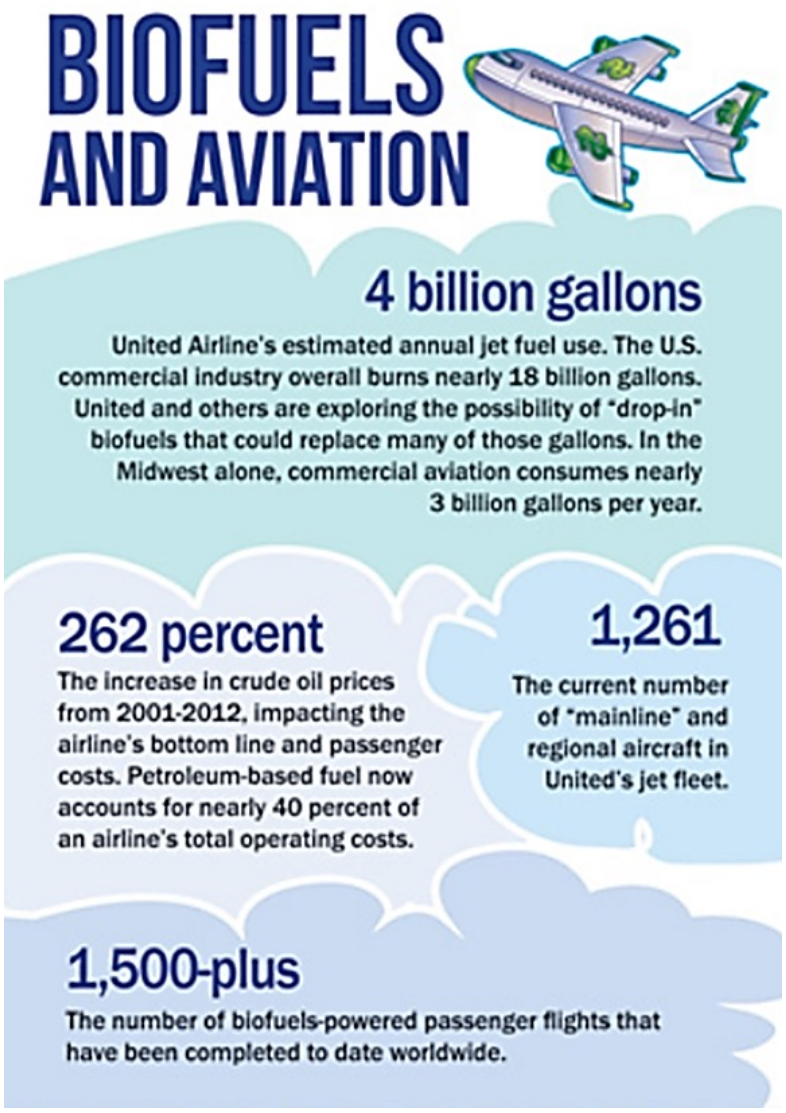


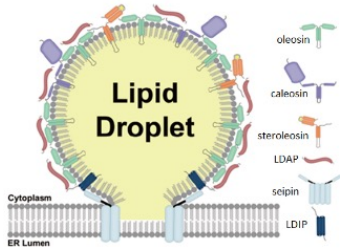
- **The U.S. commercial industry uses 18 billion gallons per year.**
- **Crude oil prices increased by 262% in 10 years.**
- **Petroleum-based fuel accounts for 40% of the airline's operating costs.**
- **Pennycress could be grown in 90 million-acre U.S. Midwest corn belt.**
- **Pennycress could produce up to 9 billion gallons of biodiesel per year.**

http://farmweeknow.com/story-flying-stover-pennycress-1-100446

Improving Oil Storage & Stability in Pennycress

DOE-BER # DE-SC0019233

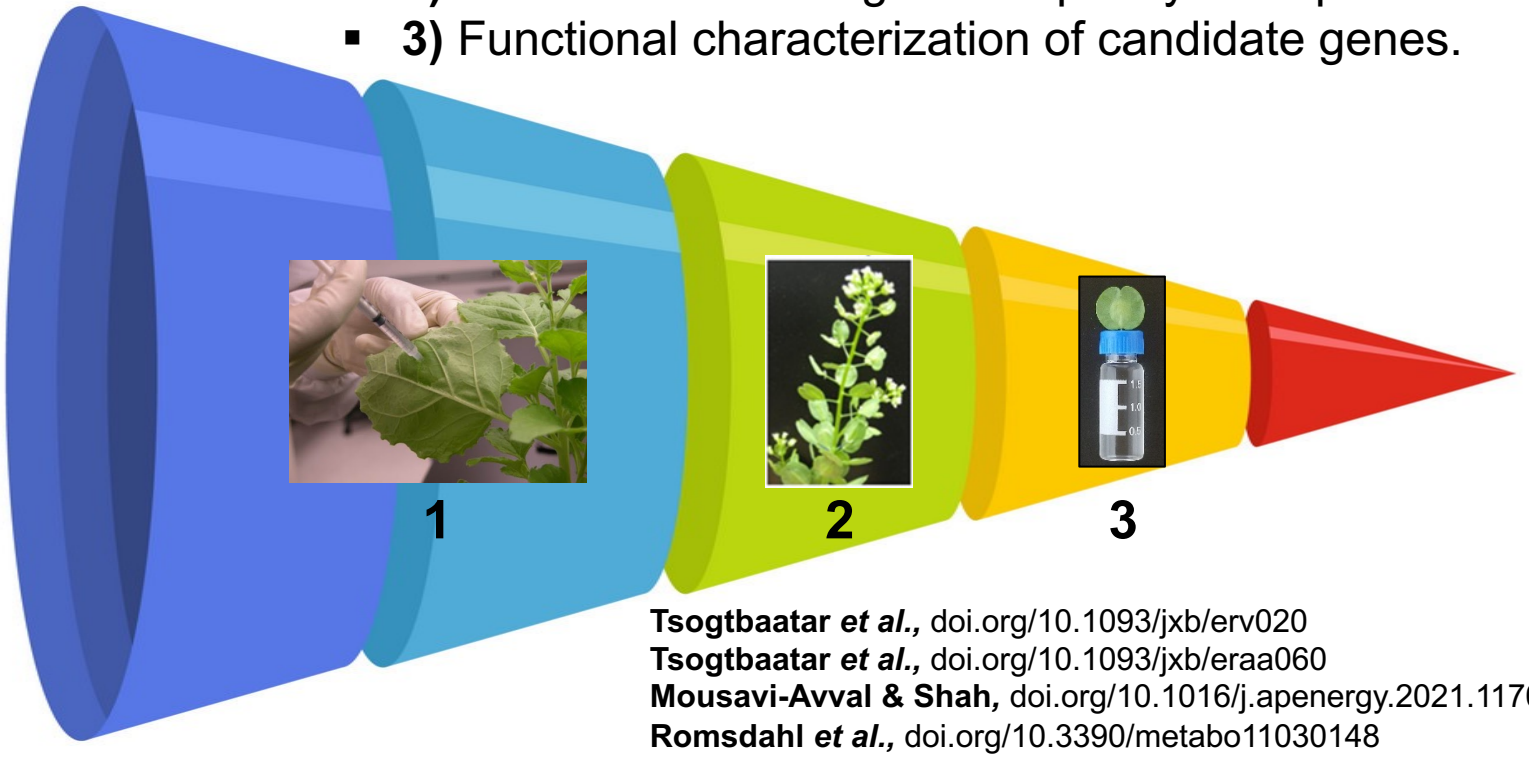
- **1)** Investigating pennycress natural variation associated with oil accumulation
- **2)** Identify targets



Putative functional class	Number of genes		Total
	(+) correlated to LD formation	*(-) correlated to LD formation*	
Storage and packaging proteins	6	7	13
Lipid transfer proteins	1	6	7
Lipases	3	6	9
ER/endomembrane organization	1	1	2
Other (Unknown function)	2	2	4
Total	**13**	**22**	**35**

DOE-BER # DE-SC0020325

- **1)** Screen candidate genes using transient expression in *N. benthamiana*
- **2)** Validate candidate genes in pennycress plants
- **3)** Functional characterization of candidate genes.



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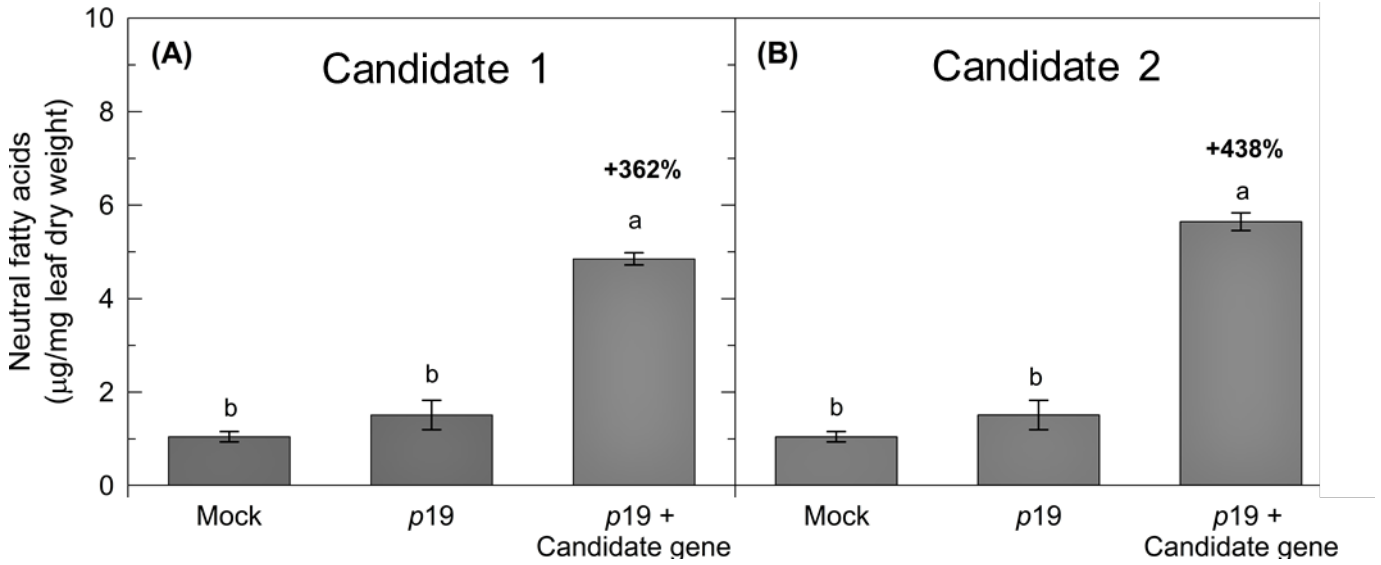
Improving Oil Storage & Stability in Pennycress

Main outcomes



- ✓ 15 candidates were shown to increase lipid droplet formation and neutral FAs.
- ✓ These genes are being cloned and the generation of transgenic pennycress plants is in progress.
- ✓ We established time course labeling experiments to evaluate the temporal and spatial organization of storage lipids in developing pennycress seeds.

Future work

- ✓ This project is generating a set of mutants and tools that will boost the development of pennycress as a bioenergy crop.
- ✓ Design a novel route for catalytic conversion of pennycress oil, from wild-type and mutants, into alkanes.
- ✓ Establish the relation between the composition and physico-chemical characteristics of pennycress oil and its derived alkanes.