New Crops and Processing Unit
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Research summary

Bioenergy research in our group is split into three programs.

1.) Identifying and developing new oilseed crops with potential as biodiesel sources. We are currently studying several Brassicas, *Camellina*, *Cuphea*, *Coriander*, and pennycress as promising candidates. *Cuphea* is attractive as a potential jet fuel due to its large quantity of short-chain fatty acids. Pennycress is a native winter annual weed species in the Midwest where it can be sown in corn stubble and harvested in the spring ahead of soybean planting. *Coriander* is being tested as a second crop following wheat harvest. These two crops should allow us to circumvent the conflict developing between food and fuel uses of seed oil crops.
2.) Catalytic upgrading of pyrolysis oil. The thermochemical conversion of biomass yields an unstable, corrosive liquid which must be upgraded to be suitable for refining in an existing petroleum refinery. Out of the reactor, the pyrolysis oil can be used as fuel in a stationary engine but upon standing becomes a semisolid mass. Our work is focused on catalytically converting this material to a transportable liquid.
3.) Pretreatment of cellulosic material for fermentation to ethanol. Cellulosic material such as corn stover has been expanded by treating with high pressure carbon dioxide followed by rapid depressurization, or explosion. This yields a material more accessible to the microorganisms used in the hydrolysis and fermentation of the cellulose.