

# Central Utah BioDiesel Project

David Drake and Matt Palmer<sup>1</sup>

Boyd Beck, Adam Larsen, Steve Peterson, Kevin Sorenson, and Doug Wendel<sup>2</sup>  
 Morgan Black and Alan Tripp<sup>3</sup>



<sup>1</sup>Utah State University Extension, Richfield and Ephraim <sup>2</sup>Snow College, Ephraim <sup>3</sup>Project Cooperators Ephraim and Spring City

## INTRODUCTION

The Central Utah Biodiesel Project is a collaboration between farmers and researchers who foresee:

- 1) The market price of energy will tend to increase in the foreseeable future.
- 2) To be viable, agriculture in Central Utah needs to hedge for energy pricing.
- 3) Farm produced biodiesel for on-farm use provides one possible energy hedge.
- 4) Small-scale farm biodiesel production for on-farm use can and should be adapted to local conditions and needs.
- 5) Producing a prototype for on-farm or cooperative based biodiesel production for farm energy self-sufficiency is a strategic priority in achieving energy security for the rural economy of Central Utah.
- 6) Biodiesel production provides an opportunity for agriculture to become more self sufficient and sustainable.

## BIODIESEL BASICS

Biodiesel fuel is produced by treating a biological fat, such as vegetable oil, with an alcohol such as methanol or ethanol. The reaction, readily accomplished in a kitchen using household containers (Figure 1), can be scaled to any level of production. The biodiesel is fully functional as fuel in modern diesel engines. The reaction also produces glycerin, useful for cosmetics, fertilizer, dust control, or other household and industrial applications.



Figure 1. Snow College chemistry students making biodiesel in household containers

## Research, Development, and Educational Goals

During 2006 the Central Utah Biodiesel Project to began addressing the following questions:

- 1) Can Central Utah farmers grow oilseeds in sufficient quantities to provide the vegetable oil feed stock for economic production of farmer self-sufficiency biodiesel?
- 2) Are the physical properties of farm produced biodiesel consistent with routine use in farm machinery or for space heating?
- 3) What are the engineering requirements for extracting oil from oil-seed and conversion into biodiesel on the farm or at a cooperative facility?
- 4) What are synergistic uses for byproducts of biodiesel production?
- 5) How can we best engage the rural community in investigating the local production and use of biodiesel?

## USU OILSEED ONFARM RESEARCH AND DEMONSTRATION TEST PLOTS

### Crops

Camelina (*Camelina sativa*)  
 Spring Canola (*Brassica spp.*)  
 Safflower (*Carthamus tinctorius*)  
 Sunflower (*Helianthus annuus*)

### Locations

Annabella-Sevier County  
 Circleville-Piute County  
 Ephraim- Sanpete County  
 Ferron-Emerly County  
 Spring City- Sanpete County

### Production Practices

Spring Seeded  
 Sprinkler Irrigated  
 Three Experimental Herbicide Treatments  
 Summer and Fall Harvested by Combine



Figure 2. Utah State University Extension Research and Demonstration Field Day in Ephraim, UT. Crops (top left to right) are Safflower, Canola, Camelina, and Sunflower.



Figure 3. Experimental combine and crops at a research and demonstration plot in Circleville, UT.

**Table 1.** Yields, expected percent oil content, and estimated gallons of oil for various oil seed crops grown in Central Utah during 2006 in pounds per acre (Lbs/Acre). Variation in seed yield varied by location, growing conditions, herbicide treatment, and variety.

Crop	Seed Yield Range	Expected % oil	Estimated gallons oil/acre
Camelina	127-720 Lbs/Acre	40	7-37
Canola	345-1356 Lbs/Acre	36	16-63
Safflower	340-2978 Lbs/Acre	37	16-143
Sunflower	1670-3989 Lbs/Acre	33	72-171

## Synergistic Products

In achieving maximum economic benefit from the production of biodiesel, it is important that every byproduct of the production be utilized. To date, we have identified three significant synergies.

- 1) Hand Cleaner Professor D. Wendel of Snow College has formulated a hand-cleanser from the glycerine byproduct of the biodiesel reaction. We believe that this hand-cleanser would have significant market appeal to up market consumers anxious to support renewable, sustainable energy.
- 2) Handmade Paper Professor A. Larsen and his students have been developing handmade artisanal paper from the oilseed straw. As with our handcleanser, this paper "with a story" should have significant appeal for an upscale market.
- 3) Animal Feed The press cake remaining after oil has been expelled from the seeds is a significant source of nutrition, potentially useful for animal feed. In particular a study has been undertaken by D. Frame and M. Palmer of USU Extension to evaluate the use of Omega-3 fatty acid rich Camelina press-cake for turkey feed.

## FARM SCALE PRODUCTION EQUIPMENT



Figure 4. Oilseed press purchased by the project (left), proposed small scale fuel processing equipment (right).

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