Biodiesel Production
Background: Biodiesel Production in the U.S.

- 1.8 billion gallons of biodiesel produced (2013)
- Primary feedstock = soybean, canola, used vegetable oil, animal fats
- The Renewable Fuel Standard (RFS) requires one billion gallons of biodiesel to be consumed in the US


Overview: Biodiesel Production

Bio-Energy Crop

Oilseed Crop

Seed Crusher

Bio Oil

Mix with Catalyst

Transesterification

Biodiesel

Glycerin

Oilseed Meal
Biodiesel – A primer

Transesterification:

Bio Oil + alcohol + catalyst → biodiesel + glycerin

- About 1 gallon of bio-oil produces about 0.95 gallons of biodiesel.
- The reaction produces a 1:5 ratio of glycerin to biodiesel volume and is a readily digestible product.
- High in protein and is primarily used for animal feed

Alcohol = Methanol
Catalyst = NaHO, KOH or Sodium Methylate
Biodiesel Cost of Production – From Canola

- Electricity, Labor, Treatment: $0.13
- Equipment: $0.69
- Chemicals: $1.25
- Oil (Harvesting): $1.49

$3.56/gallon* + 14 lbs of Canola Meal

*Source: Expanding Bioenergy Crops to Non-traditional Lands in Michigan, Task 7 Table 17. 2012
Market Value of Feedstocks/Byproducts

- **Seed**: $23/CWT
- **Meal**: $360/ton
- **Oil**: $4.33/gal
- **Crude Glycerin**: $6-8/CWT

*Biodiesel Production*

*Source: USDA Agricultural Marketing Service, Economic Research Service (ERS)*
Acknowledgements

Dennis Pennington, MSU Extension
Joe Tesar, Quantalux