

HOME MADE BIODIESEL

A cost analysis of making biodiesel for
on farm use.

Why is it important

- ❑ Diesel is a big input on any operation.
- ❑ Diesel prices are pushing \$4.00 a gallon.
- ❑ If a savings can be made with biofuels, then why not.



Making the biodiesel

- ▣ Making the biodiesel is not that heard.
- ▣ You need oil, methanol, and lye.
- ▣ Oil can be pressed from canola.
- ▣ Methanol and lye can be found on the internet in bulk.



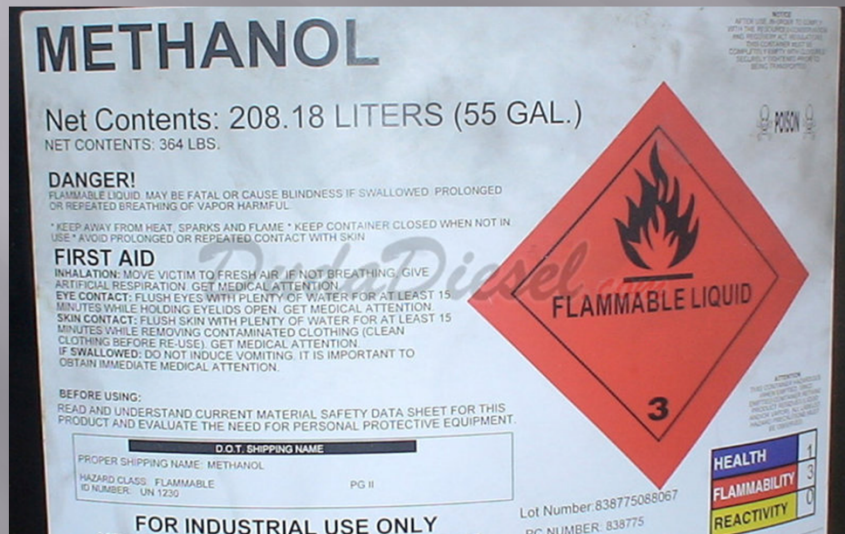
Canola

- ▣ Canola was developed in the 1970's
- ▣ It was done by removing erucic acid and glucosinolates from rapeseed.



Methanol & Lye

- ❑ Methanol has to be 99% pure.
- ❑ Most camp firer starters are 99% pure methanol.
- ❑ It can be found cheap on the internet.
- ❑ 575ml per gallon of oil to be converted.



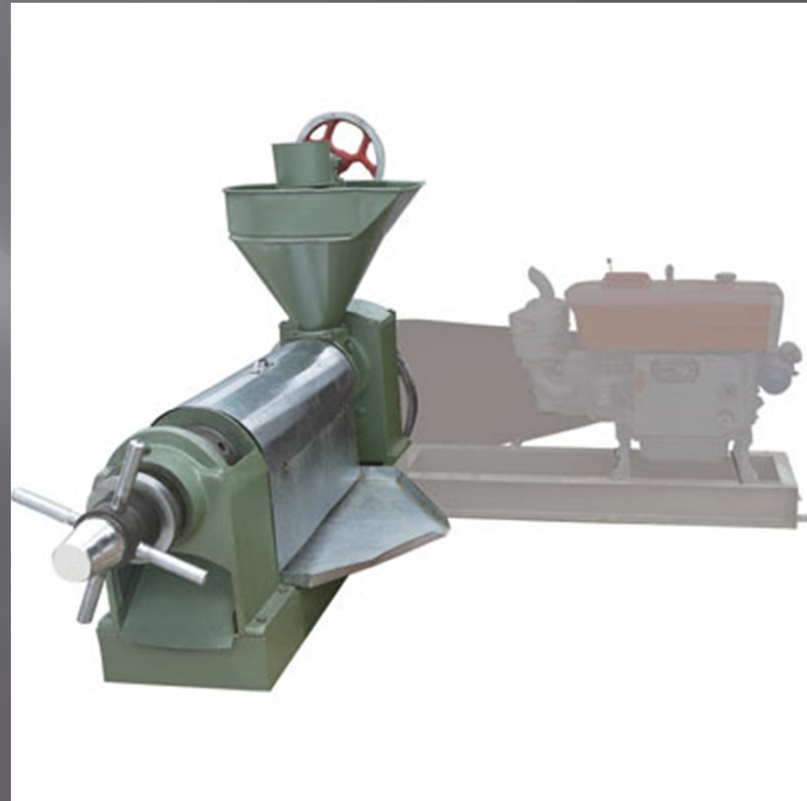
- ▣ Lye can be anything above 85% pure when using potassium hydroxide.
- ▣ The lower the percent the more you need.
- ▣ Can be found on the internet in bulk.
- ▣ 20.81 grams per gallon of oil to be converted



- ▣ For the lye, sodium hydroxide could also be use.
- ▣ It is harder to mix and more dangerous.
- ▣ If you mess up the mixing the toxins could make you sick or kill you.

Press & Mixer

- ▣ Presses aren't cheap.
- ▣ The one I found is a 6ton press and it cost \$6000.00 after shipping.
- ▣ 6ton press means it will press 6 tons of seed in 24 hours.



- ❑ Mixers aren't as expensive as press.
- ❑ A plastic, heated mixing tank cost \$3200.00
- ❑ The tank has to be plastic or stainless.
- ❑ If its made with steel the chemical reaction will cause the tank to fall apart.



Other equipment needed

- ▣ Tank to store oil in.
- ▣ Motor for press.
- ▣ Tank to mix lye and methanol in(must be plastic or stainless)
- ▣ PPE (gloves and masks)
- ▣ Place to store finished product.
- ▣ Place to store canola
- ▣ Place to store by-products.
- ▣ The motor has to be at least 5hp
- ▣ 5hp motor will use 6 kw a hour.

What I plan to use.



- ❑ Empty glyphosate totes.
- ❑ Empty chemical tanks.
- ❑ Motor off an auger.
- ❑ On farm diesel tanks for the finished product.
- ❑ Empty grain ben or grain truck for the seed.

Pressing process

- ▣ Pressing gets two products.
- ▣ Oil
- ▣ Meal
- ▣ The meal can be stored and used or sold as feed.
- ▣ Oil can be stored in a tote for further pressing.



Mixing

- ▣ First mix lye and methanol in a empty chemical tank with the top cut off.
- ▣ Lye must dissolve.
- ▣ Heat oil in mixing tank to 130 degrees.
- ▣ Mix everything together for about $\frac{1}{2}$ hour to a hour.
- ▣ Let the mixture sit for at lest a day or more.
- ▣ Do this in the mixing tank or in a tote.
- ▣ Once it has settled there will be only two things in the tank.
- ▣ Biodiesel and glycerin.

Glycerin

- ▣ Can be distilled but that cost a lot to do.
 1. Feed additive
 2. Soap
- ▣ Un-distilled
 1. Nitro-glycerin
- ▣ Cant burn it.



Costs

- ▣ Seed cost \$480.00 a ton.
- ▣ Methanol \$170.00 for 55 gallons.
- ▣ Lye \$89.00 for 50lbs of 90% pure.
- ▣ Press cost \$6000.00
- ▣ Mixer cost \$3200.00
- ▣ Press motor cost \$.4692 an hour to run.

Cost to make 3000 Gallons

- ▣ $\$480 \times 30 = \$14,400$
- ▣ $575\text{ml} \times 3000 = 1725000$
ml
- ▣ Convert to gal. = 455.7
- ▣ $\$3.09 \times 455.7 = \1408.11
- ▣ $20.81\text{gr} \times 3000 = 62430\text{gr}$
- ▣ Convert to pounds
- ▣ 137.7lbs
- ▣ $\$1.78 \times 137.7 = \245.11
- ▣ Press \$580 per year.
- ▣ Mixer \$310 per year.
- ▣ $120 \times .4692 = \$56.30$
- ▣ Add it all together
- ▣ \$16,999.52
- ▣ \$5.66 a gallon

By-products

- ▣ Meal sold per ton
- ▣ 2010 average price is \$224.22 per ton.
- ▣ On average 1562lbs of meal per ton pressed.
- ▣ At 30 ton there is 23.50
- ▣ \$5270 or \$1.76 a gallon.



- ▣ That brings the price down to \$3.90
- ▣ Compare that to \$3.70 for ruby diesel

Other things to consider

- ▣ British thermal units
- ▣ B100 had 130,000 Btu's per gallon
- ▣ Petro base has 140,000 Btu's per gallon
- ▣ 1.1 gallons of B100 to 1 gallon of diesel
- ▣ That more like saying \$4.29 a gallon

Gelling Point

- ▣ B100 15.8 degrees
- ▣ #2 diesel 0 degrees
- ▣ #1 diesel -45 degrees

Conclusion

Due to the cost of the seed and other things like Btu's and gelling point making your own biodiesel is not cost effective to buying diesel.

When to make biodiesel depends on the operation.

- Hofman, Vern. "Biodiesel Use In Engines ." *North Dakota State University*. NDSU, 2006. Web. 11 Apr 2011. <<http://www.ag.ndsu.edu/pubs/ageng/machine/ae1305w.htm#cold>>.
- "Canola Facts and Informaion." *Soyatech*. Web. 11 Apr 2011. <http://www.soyatech.com/canola_facts.htm>.
- Frisby, James. "Biodiesel Fuel." *University of Missouri*. N.p., 1993. Web. 11 Apr 2011. <<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1990>>.
- Hofman, Vern. "Biodiesel." North Dakota State University. N.p., 2003. Web. 11 Apr 2011. <<http://www.ag.ndsu.edu/pubs/ageng/machine/ae1240w.htm>>.
- Kurki, Al. "Oilseed Processing for Small-scale Producers." *NSAIS*. N.p., 2008. Web. 11 Apr 2011. <<http://attra.ncat.org/attra-pub/oilseed.html>>.
- "Biodiesel Conversion factors." University of Missouri. N.p., n.d. Web. 11 Apr 2011. <<http://www.fapri.missouri.edu/outreach/publications/2006/biofuelconversions.pdf>>.
- "Energy Content." Nation Biodiesel Board. N.p., n.d. Web. 11 Apr 2011. <http://www.biodiesel.org/pdf_files/fuelfactsheets/BTU_Content_Final_Oct2005.pdf>.
- Addison, Keith . "Make Your Own Biodiesel." *Journey to Forever*. N.p., n.d. Web. 11 Apr 2011. <http://journeytoforever.org/biodiesel_make.html>.
- "50 lb bag." *Biodiesel Suply*. Web. 11 Apr 2011. <http://www.dudadiesel.com/choose_item.php?id=Cpotash>.

- "Seed, Oil and Meal Prices." Canola Council of Canada. Web. 11 Apr 2011. <<http://www.canolacouncil.org/canolaprices.aspx>>.
- "Average retail price of electricity." PPI. Web. 11 Apr 2011. <<http://www.ppiny.org/reports/jtf/electricprices.html>>.
- "Process Vessel With Mixer." *White Mountain Process*. Web. 11 Apr 2011. <<http://www.wmprocess.com/mixing-tanks/process-vessel/>>.
- "Daily grain prices." *Canola Producers Commision*. Web. 11 Apr 2011. <<http://canola.ab.ca/dailygrains.aspx>>.
- "ICE Canola." NYSE. Web. 11 Apr 2011. <<http://data.tradingcharts.com/futures/quotes/RS.html>>.
- Buyukkaya, Ekrem. "Effects of biodiesel on a DI diesel engine performance, emission and combustion characteristics ." Sakarya University, 2010. Web. 11 Apr 2011.
- Peiró, Talens. "Extended exergy accounting applied to biodiesel production ." Institute of Environmental Science and Technology, n.d. Web. 11 Apr 2011.
- Karmakar, Aninidita. "Properties of various plants and animals feedstocks for biodiesel production ." Biotech, 2010. Web. 11 Apr 2011.
- Demirbas, . "New Biorenewable Fuels from Vegetable Oils ." *Energy Sources* , 2006. Web. 11 Apr 2011.
- Hill, Jason. "Environmental, economic, and energetic costs and benefits of biodiesel and ethanol biofuels." University of Minnesota, 2006. Web. 11 Apr 2011.
- "Methanol." *Biodiesel supply*. Web. 11 Apr 2011. <http://www.dudadiesel.com/choose_item.php?id=methdrum>.
- "Northern Industrial 6-Ton Seed Press ." Northern Tool. Web. 11 Apr 2011. <http://www.northerntool.com/shop/tools/product_200366763_200366763?cm_sp=Upsells-_-Top%20Sellers-_-Product%20Page>.