

# U.S. Raw Material Sources for Biodiesel Production

Presented by J. Alan Weber  
January 13, 2009  
for the  
IEPR and Transportation Committee Workshop on Biofuels  
Sacramento, CA

## National Biodiesel Board

- Represents the biodiesel industry as the coordinating body for research and development in the US.
- Founded in 1992 by state soybean commodity groups.
- NBB's membership is comprised of state, national, and international feedstock and feedstock processor organizations, biodiesel suppliers, fuel marketers and distributors, and technology providers.
  - More than 400 members
  - Headquartered in Jefferson City, MO
  - Office also in Washington, DC





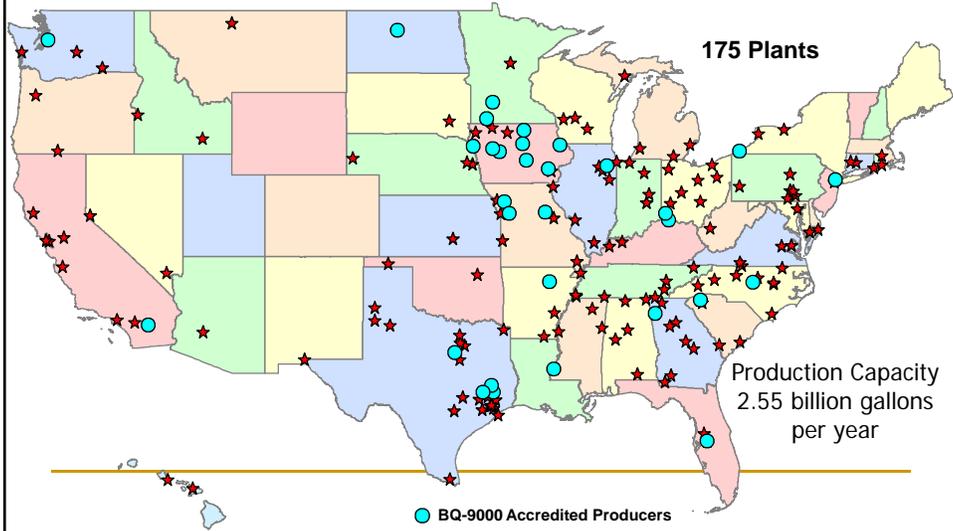
## **US Biodiesel Demand**

---

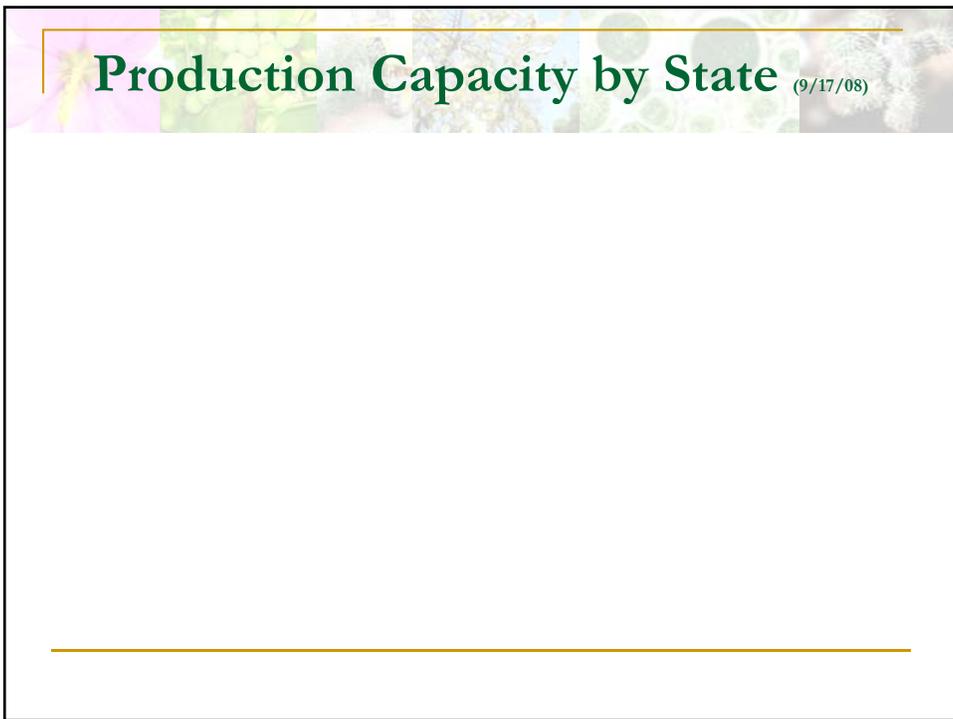
**Will industry capacity and  
raw material sources be  
sufficient in 2012?**

---

## Production Locations (9/17/08)

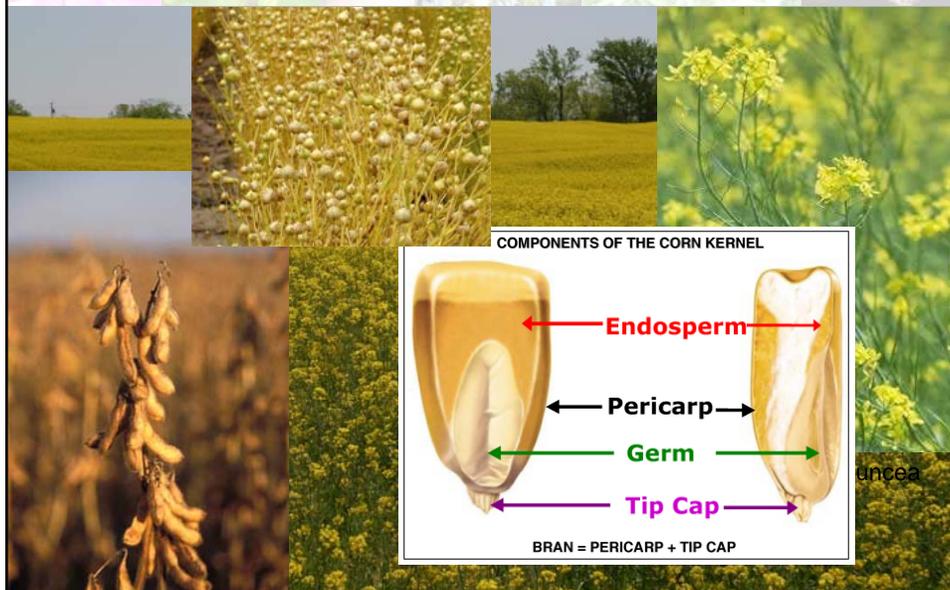


## Production Capacity by State (9/17/08)



# Near Term Potential

## Near Term Raw Material Sources



## Dry Grind Ethanol Plans

- Reaching the RFSII goal of 15 billion gallons of ethanol would utilize approximately 5 billion bushels of corn
  - Securing 1/3 of the potential corn oil per bushel could generate 400 million gallons of vegetable oil.
- Recent Announcements
  - October 22, 2007 — GS CleanTech Corporation announced agreement with Northeast Biofuels, LP to extract about 10 million gallons per year of crude corn oil from the distillers grain co-product from Nebraska's new 114 million gallon per year dry mill ethanol plant.
  - June 16, 2008 — ICM Unveils 'Food and Fuel' Technology (dry corn fractionation process).

## Camelina

- Relatively low input crop
- 30 to 40% oil
- Increasing acreage in Montana and PNW
  - At least two companies contracting acres in 2009 with stated goal of 2 million acres
    - Represents roughly 10% of wheat acres in 8 state region
    - Approximately 116 million gallons of potential biodiesel



## Winter Canola

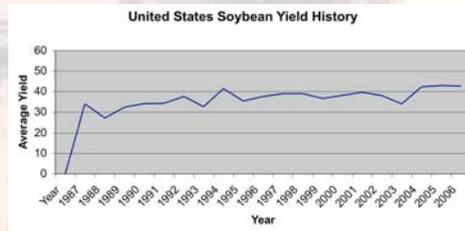
- Spring canola acreage in upper Midwest
- Winter canola possibilities in....
  - Great Plains
  - Pacific Northwest
  - Mid-South/Southeast
- U.S. Canola Association working to increase acreage to 2 million acres by 2010
  - Roughly doubling acreage from present
  - Represents an additional 100 million gallons of canola oil

## Animal Fats & Yellow Grease

- Yellow Grease
  - 300 million gallon potential in U.S. based upon per capita generation potential.
  - Approximately  $\frac{1}{2}$  of U.S. inedible fats & yellow grease currently exported.
- Animal Fats
  - 964 million gallon potential in the U.S.
  - Due to existing uses for animal fats, reasonable to assume up to  $\frac{1}{4}$  for biodiesel production.

## Expansion of Soybean Oil Supplies

- Technology exists for stepwise change in yields.
  - Monsanto and Pioneer set to introduce new varieties
    - 10% yield increases
    - Full introduction in 2010
- Adoption of yield enhancing technology on 60 million acres could result in 380 additional gallons of additional soybean oil supplies.



## Feedstock Supplies in 2012

### Estimated Feedstock Supplies for the Production of Biodiesel in 2012

Feedstock Source	million gallons
Soybean Oil	780
Animal Fats & Yellow Grease	410
Expansion of Camelina Acreage	116
Expansion of Canola Acreage	100
Corn Oil from Ethanol Plants	400

**Total near-term sources** **1,806**

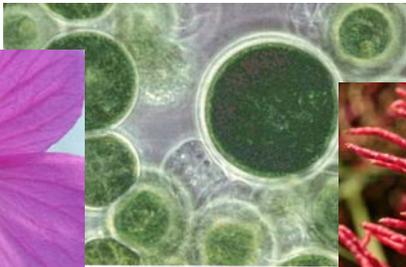
- Near term opportunity for 1.8 billion gallons of fats & oils
- More than 2 billion gallons of additional potential depending upon expansion of oilseed crushing capacity, imports of feedstocks, and global economic & policy conditions.

# What is on the horizon?

## Longer Term Sources



Seashore Mallow



Algae



Pickleweed

Brown Grease  
Chinese Tallow  
Pennycress  
Pickleweed  
Etc.



Jatropha



Low Ricin Castor

## Algae

- Significant Potential
  - It has been cited that 16,000 square miles of algae production (1/2 of Indiana) could meet 60% of our energy needs.
- More than 3,000 known strains of algae
  - Most of them blue-green strains
- Active research programs.....
  - Biology – strain development
  - Harvesting – dewatering techniques
  - Processing – oil extraction

## Brown Grease

- Brown grease is collected from grease traps installed in commercial, industrial, or municipal sewage facilities to separate grease and oil.
- 1998 Report by Wiltsee estimated brown grease generation at roughly 13 lbs/capita, potentially generating more than 475 million gallons of feedstock.



*Photo by: Joel Rose*

## Jatropha

- *Jatropha Curcas L.* gaining attention due to high oil content and ability to grow in less than ideal conditions.
  - Up to 40% oil (typically 35%)
  - 8 to 12 inches of rain
  - Not frost tolerant
  - Meal contains toxic compounds
- Estimated production of 900,000 hectares by GEXSI market study:
  - 85% in Asia



## Halophytes

- Plant that naturally grows where it is affected by salinity in the root area or by salt spray, such as in saline semi-deserts, mangrove swamps, marshes and sloughs, and seashores
- Examples of potential halophyte crops:
  - Salicornia
  - Seashore Mallow

## Summary

- Neither equity investment in plant capacity nor feedstock supplies represent a constraint in the marketplace for production of sufficient quantities of biodiesel to meet the RFS2 requirements for one billion gallons of biomass derived diesel by 2012 or state policies requiring similar amounts of fuel such as the California low carbon fuel standard.

## U.S. Raw Material Sources for Biodiesel Production

Presented by J. Alan Weber  
January 13, 2009  
for the  
IEPR and Transportation Committee Workshop on Biofuels  
Sacramento, CA