Camelina Production
Best Management Practices

Oilseed Crop Production Workshop
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Camelina

Oil content 33-36%
30 % Omega 3 fatty acid ALA
Drought tolerant
Cold Tolerant
Good rotation crop with cereals
Resistant to insect pests
Direct harvested
Very small seed (350K / lb)
No registered herbicides
Limited genetic adaptation
FDA & USDA Approval
Camelina Recommendations

Know herbicide history
Start with clean field
Glyphosate burn down
Plant early (can you be too early?)
3-6 lb seed drilled 

broadcast/harrowed
N 30-50 lb/acre (5# N/100# grain yield)
Harvest promptly Alfalfa sieves
### Camelina Expected Yields

<table>
<thead>
<tr>
<th>Location</th>
<th>Annual prec. (in)</th>
<th># years</th>
<th>Yield Range (lbs/acre)</th>
<th>Average yield (lbs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corvallis, OR</td>
<td>39.0</td>
<td>4</td>
<td>700-2200</td>
<td>1700</td>
</tr>
<tr>
<td>Lacrosse, WA</td>
<td>15.5</td>
<td>4</td>
<td>1740-2000</td>
<td>1800</td>
</tr>
<tr>
<td>Lind, WA</td>
<td>9.5</td>
<td>5</td>
<td>115-1030</td>
<td>600</td>
</tr>
<tr>
<td>Moscow/Pullman</td>
<td>21.0</td>
<td>6</td>
<td>1610-3070</td>
<td>2300</td>
</tr>
<tr>
<td>Pendleton, OR</td>
<td>16.5</td>
<td>5</td>
<td>1549-1756</td>
<td>1647</td>
</tr>
<tr>
<td>Ralston, WA</td>
<td>11.0</td>
<td>2</td>
<td>760-1580</td>
<td>1230</td>
</tr>
</tbody>
</table>
Seeding Rate Response

Yield lb/acre

<table>
<thead>
<tr>
<th>Rate lb/acre</th>
<th>Pdt</th>
<th>Moro</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>1183</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>1197</td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>1293</td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

“Calena”
Poast Herbicide registered for grass weed control
Camelina Variety Trials Pendleton, Oregon, 2008-2009

Photo taken June 23, 2009

Planted November 20
Harvested July 13

Planted March 18
Harvested July 17
Nitrogen

Apply N to achieve 80 lbs available N in the top 3 feet of soil for 1500 lb Yield, 5 lb N/100 lb expected grain yield

\[ y = 2.8332x + 1668 \]

\[ R^2 = 0.9272 \]
Harvest
What is needed

- Land  One crop in 3
- Storage and Seed Cleaning
- Crushing facility
- Oil processing / biodiesel/ Other
- Meal and co products
  Footes, glycerin
Summary

Building an Oilseed industry in PNW is essential to have a biofuel industry.

Higher value uses oil, meal, and byproducts will bring a biofuel industry with it.

Capacities beyond the Regional scale will require import/export of feedstock and byproducts.

An Oilseed industry will depend on multiple feedstocks.
Summary

Camelina is a promising oil seed

Need Additional Herbicide registration

Field History

At least two groups contracting

Meal has omega 3

GRAS AFCO Status
Summary

Camelina did not respond to applied N at Lind
Low precipitation, residual N sufficient for the crop

Camelina responded to applied N at Pendleton
Optimum economic rate 13-16 kg/ha (residual insufficient)
4 kg N/100 kg of expected grain yield per ha

Camelina responded to applied N at Moscow and Corvallis
Optimum economic rate 44-88 Kg/ha excluding 2008 at Moscow
soil N less of factor at Corvallis
Camelina N Trial Pendleton

Bar graph showing different nitrogen treatments and their respective yields. The treatments are 0, 15#N, 30#N, 45#N, 45#N+P&S, 45#N+S, 60#N, 75#N, with yields ranging from 1161 to 1600.
Camelina Recommendations

• Know the herbicide history of the field! Be cautious (use canola as the surrogate). Conduct bioassays.

• Apply Glyphosate immediately prior to planting.

• Seed early March at 3-6 lb seed/acre.

• Drill ¼ deep, with good depth control and firm seed bed,
Harvest

Seed Colour Change
To assist in determining proper time of swathing

- The seeds in the pods at this part of the plant will look like this.
- The seeds are still green, but are firm when rolled between the thumb and forefinger.
- Seeds that are not firm will crush when rolled between thumb and forefinger.
- Seeds that are firm will not crush when rolled between thumb and forefinger.
- The seeds in the pods approximately 1/3 up the plant will look like this.
- Note that there are seeds with only a hint of colour (tan, brown) on them. These seeds are considered to be turned.
- The seeds in the pods at the bottom of the plant will be mostly turned and look like this.
Camelina Recommendations

- If broadcasting, have a firm seedbed and lightly incorporate (drying)
- Camelina is rapid germinator, but grows slowly
- Target is uniform, even emerging stand
- Apply N to achieve 80 lbs available N in the top 3 feet of soil for 1500 lb Yield, Increase 5 lbs for each additional 100 lb of expected seed yield
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FDA & USDA Approval
http://attra.ncat.org/attra-pub/oilseed.html#steps
Biodiesel

Pros

- Renewable
- High Energy Balance 1:5-7
- Simple Technology
- Lessens Oil import
- Mixes with petro-diesel
- Low water in processing
- High Lubricity

Cons

- Food v. Fuel
- Limited Feedstocks
- Subsidized
- Increases vegetable oil price
- Destruction of rain forest for oil palm.
- Uses for glycerin
Summary

Biofuels can only supply a small portion of current petroleum needs

Biofuels will be a part of the Energy Mix
Summary

Higher value uses for oil, meal, and byproducts will bring a biofuel industry with it (Biorefinery).

Capacities beyond the Regional scale will require import/export of feedstock and byproducts.

A Biofuel (PNW) industry will depend on multiple feedstocks.

Long-term sustainability is important efficiency, conservation, consumption, attitudes.
Biodiesel

100 pounds + 10 pounds = 100 pounds + 10 pounds
triglyceride Methanol Biodiesel Glycerine
(Vegetable oil or animal fat)

(Catalyst)

B100 = Biodiesel
Specified by ASTM D 6751

B20 = 20% B100 blended with 80% petrodiesel
Summary

Biofuels can only supply a small portion of current petroleum needs.

All proposed Biofuel plants will probably not be constructed.
Summary

Rapid expansion in processing capacity of corn ethanol
25 % corn crop, DDGS, distribution issues

Currently no Cellulosic ethanol plants are operating. First production scale plants 5-10 years out
logistic, feedstock costs, byproducts and resource challenges

Biodiesel is expanding rapidly but is more limited by feedstocks and economic
Summary

Yield recommendations of 7 lb N/100 lb grain yield reasonable provided drought or heat do not lower expected yields.

Full application in the fall provided best yield, followed by 2/3 fall, 1/3 spring split, 1/3 by 2/3 was less effective canola needs early N?

Current recommendations seem appropriate.
Energy Flow, 2010

Coal 22.08
Natural Gas 22.10
Crude Oil 11.67
NGPL 2.69
Nuclear Electric Power 8.44
Renewable Energy 8.05

Exports 8.17
Other Exports 3.36

Residential 22.15
Commercial 18.21
Industrial 30.14
Transportation 27.51

Supply 106.18

Coal 20.82
Natural Gas 24.64
Fossil Fuels 81.42
Petroleum 35.97

Consumption 98.00

Nuclear Electric Power 8.44
Renewable Energy 8.05

Imports 29.79
Petroleum 25.29
Other Imports 4.50
Stock Change and Other 1.35

Other Exports 3.36

Petroleum 4.81