Variety Performance & University of Idaho Breeding and Research

Jack Brown
January 20th, 2015
Crop Development

Winter canola/rapeseed
Spring canola/rapeseed
Yellow mustard
Oriental mustard
3-4 Graduate students

5-6 Undergraduate students
Breeding Objectives

Yield

- Oil Content

Quality

- Food
- Bio-fuel
- Feed

Reduce inputs

- Disease
- Insect Resistance
- Abiotic stress
• Standard Canola.
• Low Linolenic acid (LLIN’s) canola with less than 2% linolenic acid content.
• High Oleic, Low Linolenic acid (HOLL’s) canola with greater than 80% oleic acid, less than 6% linoleic acid and less than 2% linolenic acid.
Genomic Wide Association Studies

Breeding values & QTL’s
Plant Breeding

Selection

Field Trials

Disease Test

Molecular Markers

Tissue Culture

Quality Test
Canola, Rapeseed & Mustard Breeding Plots Annually

- 10,500 Head Row plots for visual evaluation.
- 6,500 Spring types, including mustards.
- 4,000 Winter types, canola and rapeseed lines.

- 3,648 Combine plots for yield and quality assessment.
- 1,350 off-station Regional Trials.
- 2,298 On-station Intermediate breeding lines.
Recent Cultivar Releases

Winter Canola
- ‘Ericka’
- ‘Athena’
- ‘Amanda’

Spring Canola
- ‘Clearwater’
- ‘Arriba’
- ‘Cara’
- ‘Empire’

Yellow Mustard
- ‘IdaGold’
- ‘WhiteGold’
- ‘Goldfield’

Winter Rape
- ‘Durola’

Spring Rape
- ‘Sterling’
- ‘Gem’

Indian Mustard
- ‘Pacific Gold’
- ‘Kodiak’
- ‘IndiGold’
Pacific Northwest Cultivar Variety Trials

• Spring and winter cultivar evaluation trials in four PNW States.

• Identify regions specifically suited to spring or winter canola.

• Provide growers information of ‘best’ cultivars.
Pacific Northwest Cultivar Variety Trials

• 616 different spring canola cultivars from 30 different companies have been tested.

• 453 different winter canola varieties have been tested from 20 different private and commercial breeding.
Winter Canola Yield 1992 to 2013

- Top yield = 47.5 x year + 3,147
- 'Bridger' yield = 21.1 x year + 2,393

Environment = 443 lb. acre^{-1}
Genetics = 554 lb. acre^{-1}
Spring Canola Yield 1992 to 2013

Top yield = 26.7 \times \text{year} + 1,739

‘Westar’ yield = 7.6 \times \text{year} + 1,481

Environment = 168 \text{ lb. acre}^{-1}

Genetics = 420 \text{ lb. acre}^{-1}
## Winter Canola Dryland

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Mean</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda</td>
<td>3,472</td>
<td>3,474</td>
<td>3,429</td>
<td>3,346</td>
<td>3,639</td>
</tr>
<tr>
<td>Athena</td>
<td>3,452</td>
<td>3,407</td>
<td>3,330</td>
<td>3,309</td>
<td>3,763</td>
</tr>
<tr>
<td>Ericka</td>
<td>2,865</td>
<td>-</td>
<td>2,777</td>
<td>3,019</td>
<td>2,800</td>
</tr>
<tr>
<td>Croplan.125RR¹</td>
<td>3,052</td>
<td>3,009</td>
<td>2,792</td>
<td>3,356</td>
<td>-</td>
</tr>
<tr>
<td>DKW44-10RR¹</td>
<td>3,092</td>
<td>-</td>
<td>-</td>
<td>3,322</td>
<td>2,863</td>
</tr>
</tbody>
</table>

¹ Roundup Ready,
<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Mean</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda</td>
<td>4,158</td>
<td>3,979</td>
<td>4,815</td>
<td>3,835</td>
<td>4,005</td>
</tr>
<tr>
<td>Athena</td>
<td>3,929</td>
<td>3,011</td>
<td>4,328</td>
<td>3,816</td>
<td>4,559</td>
</tr>
<tr>
<td>Ericka</td>
<td>3,507</td>
<td>-</td>
<td>3,281</td>
<td>3,208</td>
<td>4,028</td>
</tr>
<tr>
<td>Croplan.125RR(^1)</td>
<td>2,697</td>
<td>2,112</td>
<td>2,924</td>
<td>3,055</td>
<td>-</td>
</tr>
<tr>
<td>DKW44-10RR(^1)</td>
<td>3,085</td>
<td>-</td>
<td>-</td>
<td>3,094</td>
<td>3,077</td>
</tr>
</tbody>
</table>

\(^1\) Roundup Ready,
IMI Tolerant Winter Canola

Amanda = 3,515 lb/acre
05.WC.15.7.5 = 3,267 lb/acre
## Spring Canola Cultivars

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Mean</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westar</td>
<td>1,754</td>
<td>1,788</td>
<td>1,902</td>
<td>1,724</td>
<td>1,603</td>
</tr>
<tr>
<td>HyClass.955 RR(^1)</td>
<td>2,299</td>
<td>2,420</td>
<td>2,499</td>
<td>2,273</td>
<td>2,005</td>
</tr>
<tr>
<td>DKL30-42 RR(^1)</td>
<td>2,259</td>
<td>2,283</td>
<td>2,546</td>
<td>2,172</td>
<td>2,033</td>
</tr>
<tr>
<td>InVigor 5440 LL(^2)</td>
<td>2,378</td>
<td>2,241</td>
<td>2,582</td>
<td>-</td>
<td>2,313</td>
</tr>
<tr>
<td>Cara CL(^3)</td>
<td>1,828</td>
<td>1,695</td>
<td>1,831</td>
<td>1,800</td>
<td>1,986</td>
</tr>
<tr>
<td>Empire</td>
<td>1,960</td>
<td>1,855</td>
<td>2,095</td>
<td>1,841</td>
<td>2,048</td>
</tr>
<tr>
<td>Nexera 2012 CL(^3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,944</td>
<td>-</td>
</tr>
</tbody>
</table>

\(^1\) Roundup Ready, \(^2\) LibertyLink, \(^3\) Clearfield (Beyond)
## Potential ‘New’ Cultivars

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Yield</th>
<th>Oleic acid 18:1</th>
<th>Linoleic acid 18:2</th>
<th>Linoleneic acid 18:3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westar</td>
<td>1,749</td>
<td>65.1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>18.05&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4.97&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Profit</td>
<td>1,754</td>
<td>64.0&lt;sup&gt;c&lt;/sup&gt;</td>
<td>18.73&lt;sup&gt;c,d&lt;/sup&gt;</td>
<td>6.39&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>5SC12A10.19.12</td>
<td>2,096</td>
<td>66.5&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>20.46&lt;sup&gt;abc&lt;/sup&gt;</td>
<td>1.66&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>07.SC.27.19.B3</td>
<td>2,149</td>
<td>68.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>19.70&lt;sup&gt;bcd&lt;/sup&gt;</td>
<td>2.33&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>07.SC.36.17.B2</td>
<td>2,223</td>
<td>75.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15.05&lt;sup&gt;e&lt;/sup&gt;</td>
<td>2.05&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>07.SC.45.9.B10</td>
<td>2,194</td>
<td>74.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.81&lt;sup&gt;e&lt;/sup&gt;</td>
<td>2.15&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
Problems with canola ...

- Traditional management of canola leads to inconsistent yields.
- Fall planted winter canola: variable establishment and winter survival issues.
Early planted winter canola

- Improved establishment
- Longer growing period before winter, improving survival

Timeline:
- Spring Planting
- Fall Planting
- Winter
- Harvest Seed
Dual-purpose Canola

- Forage crop in the first year
- Oilseed crop in the second year

Timeline:
- May
- June
- July
- Aug
- Sep
- May
- June
- July
- Aug

Seasons:
- Spring Planting
- Harvest Forage
- Winter
- Harvest Seed
Strip Feeding
Questions