Development of HT Camelina varieties

Problem Statement:

- *Brassica/Camelina* sensitivity to residual amounts of ALS-inhibitor (Group 2) herbicides is a major problem in adoption in PNW.
- >400,000 acres Clearfield wheat varieties grown in Washington last two years
- ALS inhibitor herbicides other than Beyond also used
- Chemicals have very long residual activity in soil.

ALS inhibitor herbicides:

- **Imidazolinones**
  - Beyond, Raptor, Pursuit…

- **Sulfonylureas**
  - Glean, Finesse, Osprey, Olympus Flex, Ally,
    - Accent, Amber, Mavrick, Harmony…
SM4 mutant in Cheyenne background.

More tolerant to imazethapyr (*Pursuit*) imazamox (*Beyond*) sulfosulfuron (*Maverick*) and flucarbazone (*Sierra*).

Cooperation with Ian Burke
### HT camelina following Clearfield wheat

<table>
<thead>
<tr>
<th>Line</th>
<th>Beyond rate</th>
<th>Yield Kg/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calena</td>
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<td>1374</td>
</tr>
<tr>
<td>Cheyenne</td>
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<td>1351</td>
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<td>1360</td>
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<td>1142</td>
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<tr>
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<tr>
<td>Cheyenne</td>
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<td>33</td>
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<tr>
<td>SM4-CC</td>
<td>4x</td>
<td>1438</td>
</tr>
</tbody>
</table>
HT cultivar ready for release:

Original cross: Calena x SM4 mutant

2012: 500 homozygous lines tested in replicated trials

2013: 50 lines tested in replicated trials, nine selected (F6 derived) for yield and oil content

2014: 9 lines compared in replicated trials, single line selected for release

2015: Release HT tolerant line, agronomically similar to Calena
Breeding considerations for the next generation of cultivars

- Seedling vigor/competitiveness
- **Seed size**
- Earliness
- Oil content
- **Oil composition** (low erucic)

Seed size variation

Crossing → $F_1$s → Early generation plots
Additional breeding populations

Seed size:
• SO-S x HT lines: F4 generation
• Multiparent recurrent selection population; parents: SOcam-S, Acc31 (Denmark), Acc40 (Poland): 3 cycles of intermating and selection

Yield:
• Acc31 (Denmark) x HT lines

Oil composition:
• CL1914 mutant x HT lines: F5 generation
Current & Future of Camelina use in Northwest

• Small fuel market; investments inhibited by $50/barrel oil
• Small food market, some want lower erucic acid
• Small feed market specializing in GMO-free feed
• Novel oils and byproducts under development; at least some will be GMO. Genetic engineering types prefer a non-food crop.
Questions / Comments ?