ACKNOWLEDGEMENTS

AGRICULTURAL DEMONSTRATION OF TECHNOLOGIES & PRACTICES

SaskCanola
Manitoba Canola Growers
Saskatchewan Ministry of Agriculture
Growing Forward
Bayer CropScience
BrettYoung
VITERRA
Pioneer
DEKALB
UAP
Dow AgroSciences
SeedMaster
WHY STRAIGHT-COMBINE?

Reasons for Swathing

- Hastens and evens out maturity & desiccates green weeds
- Reduced potential for shattering under most conditions
- Flexible harvest timing relative to straight-combining
WHY STRAIGHT-COMBINE?

Incentives for Straight-Combining

- Eliminate swathing cost and reduced labor requirements (narrow window for swathing)
- Reduced risk under some conditions (ie: sparse stubble, short or badly lodged crop)
- Improved seed quality (ie: larger seeds, higher oil content)
WHAT ARE GROWERS DOING?

2009 CCC Agronomy Survey says...

- 14.6% straight-combine
- 13.8% want to increase straight-combined acres

Why aren’t more straight-combining?

- RISK!!!
- Conflicting reports from researchers & growers with no consensus as to which practice is better
STRAIGHT-COMBINED VERSUS SWATHED (SMALL PLOT TRIALS)

Site-Year

Grain Yield (kg/ha)

IH-09  IH-10  SC-09  SC-10  ME-09  ME-10  SW-09  SW-10  ALL

SWATHED

STRAIGHT-CUT

96%  112%  82%  110%  78%  92%  119%  101%  98%
OBSERVED SEED LOSS
(TIME OF HARVEST)

Site-Year

Seed Yield Loss (%)

ALL TREATMENTS

IH-09 IH-10 SC-09 SC-10 ME-09 ME-10 SW-09 SW-10 ALL

0.8% 1.0% 0.5% 1.0% 22% 7.1% 3.5% 14% 5.9%

IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
OBSERVED SEED LOSS
(2-3 WEEKS PAST HARVEST)

Seed Yield Loss (%)

Site-Year

IH-09  IH-10  SC-09  SC-10  ME-09  ME-10  SW-09  SW-10  ALL

27.8%  24.4%  5.8%  2.0%  16.8%  21.8%  16.4%
CULTIVAR & HARVEST METHOD EFFECTS ON SEED SIZE

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Seed Size (g / 1000 seeds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440 LL</td>
<td>3.4</td>
</tr>
<tr>
<td>4362 RR</td>
<td>3.6</td>
</tr>
<tr>
<td>45H26 RR</td>
<td>3.4</td>
</tr>
<tr>
<td>5020 LL</td>
<td>3.6</td>
</tr>
<tr>
<td>8571 LL</td>
<td>2.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Harvest Treatment</th>
<th>Seed Size (g / 1000 seeds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swathed</td>
<td>3.2</td>
</tr>
<tr>
<td>Untreated - Straight-cut</td>
<td>3.4</td>
</tr>
<tr>
<td>Pod Ceal - Straight-cut</td>
<td>3.4</td>
</tr>
<tr>
<td>Pod Stik - Straight-cut</td>
<td>3.4</td>
</tr>
</tbody>
</table>
CULTIVAR & HARVEST METHOD
EFFECTS ON GREEN SEED CONTENT

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Green Seed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440 LL</td>
<td>0</td>
</tr>
<tr>
<td>4362 RR</td>
<td>1</td>
</tr>
<tr>
<td>45H26 RR</td>
<td>2</td>
</tr>
<tr>
<td>5020 LL</td>
<td>3</td>
</tr>
<tr>
<td>8571 LL</td>
<td>4</td>
</tr>
</tbody>
</table>

Harvest Treatment
- Swathed
- Untreated - Straight-cut
- Pod Ceal - Straight-cut
- Pod Stik - Straight-cut

Green Seed (％)

0.8 3.2 0.7 2.5

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January 11, 2013
Crop Production Week, Saskatoon, SK
WHAT ABOUT POD SEALANTS?

- Commercially available in Western Canada since 2008, examples include...
  - Pod Ceal DC™
  - Pod-Stik™
  - Desikote Max™

- Modes of action vary but sealants are designed to reduce pod shattering, extending the harvest window & make shatter-prone crops better suited for straight-combining.
POD SEALANT EFFECTS ON YIELD
(ALL TREATMENTS STRAIGHT-COMBINED)

Site-Year

Grain Yield (kg/ha)

Contrast - Treated vs Untreated
ns: not significant
* $P = 0.05-0.10$
** $P = 0.01-0.05$
*** $P < 0.01$

IH-09  IH-10  SC-09  SC-10  ME-09  ME-10  SW-09  SW-10  ALL
**Pod Sealants Effects on Seed Loss (Time of Harvest)**

<table>
<thead>
<tr>
<th>Site-Year</th>
<th>IH-09</th>
<th>IH-10</th>
<th>SC-09</th>
<th>SC-10</th>
<th>ME-09</th>
<th>ME-10</th>
<th>SW-09</th>
<th>SW-10</th>
<th>AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Yield Loss (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Untreated-DC</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Pod Ceal-DC</td>
<td>ns</td>
<td></td>
<td></td>
<td></td>
<td>ns</td>
<td></td>
<td></td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Pod-Stik-DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ns</td>
</tr>
</tbody>
</table>

Contrast - Treated vs Untreated

* $P = 0.05-0.10$

** $P = 0.01-0.05$

*** $P < 0.01$

ns: not significant
POD SEALANTS EFFECTS ON SEED LOSS (2-3 WEEKS PAST HARVEST)

Contrast - Treated vs Untreated
ns: not significant

* $P = 0.05-0.10$

** $P = 0.01-0.05$

*** $P < 0.01$

Seed Yield Loss (%)

Site-Year

- Untreated-DC
- Pod Ceal-DC
- Pod-Stik-DC

**IHARF**
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
FIELD-SCALE CANOLA HARVEST TRIAL (2010-11)

TREATMENTS

Harvest Methods
1) Swathed
2) Straight-Combined

Foliar Treatments*
1) Untreated
2) Pod Sealant
3) Glyphosate
4) Pod Sealant & Glyphosate

*applied at 30-40% pod colour change
## Field-Scale Canola Harvest Trial

### Untreated vs Sealant (Straight-Combined)

<table>
<thead>
<tr>
<th>Site-Year</th>
<th>IH-10</th>
<th>IH-11</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain Yield (kg/ha)</td>
<td>40</td>
<td>42</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>30</td>
<td>36</td>
</tr>
</tbody>
</table>

- **ns**: not significant
- * $P = 0.05-0.10$
- ** $P = 0.01-0.05$
- *** $P < 0.01$

Error bars are LSD values (Pr ≤ 0.05)

---

**IHARF**

Indian Head Agricultural Research Foundation
FIELD-SCALE CANOLA HARVEST TRIAL
UNTREATED VS GLYPHOSATE (STRAIGHT-COMBINED)

<table>
<thead>
<tr>
<th>Site-Year</th>
<th>IH-10</th>
<th>IH-11</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAIN YIELD (kg/ha)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STRAIGHT-UNT</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>STRAIGHT-GLY</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ns: not significant
*  $P = 0.05-0.10$
** $P = 0.01-0.05$
*** $P < 0.01$

Error bars are LSD values (Pr ≤ 0.05)
• Impact on seed yield not consistent, but pre-harvest glyphosate helps even out maturity, accelerate harvest, provides weed control benefits and make timing of straight-combining easier.
EQUIPMENT CONSIDERATIONS

Project at Swift Current evaluated canola header losses & seed yields when straight-combined using varying types of headers (Wheatland Conservation Area; 2005-07)

Measured seed loss during the harvest operation & the header types evaluated were:

1. Rigid header
2. Draper header
3. Stripper header
4. BISO header extension

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Crop Production Week, Saskatoon, SK
### Wheatland Canola Harvest Study

**Header Losses**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stripper</td>
<td>215</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Rigid</td>
<td>60</td>
<td>80</td>
<td>444</td>
</tr>
<tr>
<td>Draper</td>
<td>n/a</td>
<td>67</td>
<td>411</td>
</tr>
<tr>
<td>BISO</td>
<td>10</td>
<td>21</td>
<td>151</td>
</tr>
</tbody>
</table>

---

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## Wheatland Canola Harvest Study

(Seed Yield)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stripper</td>
<td>22</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Rigid</td>
<td>25</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>Draper</td>
<td>n/a</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>BISO</td>
<td>28</td>
<td>37</td>
<td>29</td>
</tr>
</tbody>
</table>

---------- bushels / acre ----------
Premium Flow (Zürn)

Sausse 2011 - 13th International Rapeseed Congress
Header losses at different header lengths during 2007

Distance from centre of the combine harvester, m

Sausse 2011 - 13th International Rapeseed Congress
CULTIVAR EFFECTS ON SEED LOSS
(AVERAGED ACROSS 8 SITE-YEARS)

All Site-Years Combined (EARLY)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Seed Yield Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440 LL</td>
<td>0</td>
</tr>
<tr>
<td>4362 RR</td>
<td>5</td>
</tr>
<tr>
<td>45H26 RR</td>
<td>10</td>
</tr>
<tr>
<td>5020 LL</td>
<td>15</td>
</tr>
<tr>
<td>8571 CL</td>
<td>20</td>
</tr>
</tbody>
</table>

Dropped Pods: c
Shattered Pods: b

All Site-Years Combined (LATE)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Seed Yield Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440 LL</td>
<td>28</td>
</tr>
<tr>
<td>4362 RR</td>
<td>a</td>
</tr>
<tr>
<td>45H26 RR</td>
<td>a</td>
</tr>
<tr>
<td>5020 LL</td>
<td>a</td>
</tr>
<tr>
<td>8571 CL</td>
<td>a</td>
</tr>
</tbody>
</table>

Dropped Pods: b
Shattered Pods: a

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January 11, 2013
Crop Production Week, Saskatoon, SK
CULTIVAR EFFECTS ON SEED LOSS
(TIME OF HARVEST)

<table>
<thead>
<tr>
<th>Site-Year</th>
<th>IH-09</th>
<th>IH-10</th>
<th>SC-09</th>
<th>SC-10</th>
<th>ME-09</th>
<th>ME-10</th>
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<th>SW-10</th>
<th>AVG</th>
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<td>4362 RR</td>
<td>45H26 RR</td>
<td>5020 LL</td>
<td>8571 CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CULTIVAR EFFECTS ON SEED LOSS (2-3 WEEKS PAST HARVEST)

Site-Year

IH-09  IH-10  SC-09  SC-10  ME-09  ME-10  SW-09  SW-10  AVG

Seed Yield Loss (%)

5440 LL  4362 RR  45H26 RR  5020 LL  8571 CL

Site-Year

IH-09  IH-10  SC-09  SC-10  ME-09  ME-10  SW-09  SW-10  AVG
CURRENT RESEARCH

- Trials initiated in 2011 at Indian Head, Scott & Swift Current to further investigate importance of cultivar selection for straight combining
- Evaluating potential yield loss and measuring pod drop/shatter in 12 modern cultivars from various breeding programs / herbicide systems

<table>
<thead>
<tr>
<th>InVigor 5540</th>
<th>Pioneer HiBred 45H29</th>
<th>Dekalb 73-45</th>
<th>Pioneer HiBred 46H75</th>
</tr>
</thead>
<tbody>
<tr>
<td>InVigor L130</td>
<td>Pioneer HiBred 45H31</td>
<td>Brett Young 6060</td>
<td>Nexera 2012 CL</td>
</tr>
<tr>
<td>InVigor L150</td>
<td>Dekalb 73-75</td>
<td>Proven 9553</td>
<td>Brett Young 5525</td>
</tr>
</tbody>
</table>
STRAIGHT-COMBINED SEED YIELD
(2011 ALL LOCATIONS: EARLY-OPTIMAL TIMING)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Seed Yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440 LL</td>
<td></td>
</tr>
<tr>
<td>L130 LL</td>
<td></td>
</tr>
<tr>
<td>L150 LL</td>
<td></td>
</tr>
<tr>
<td>45H29 RR</td>
<td></td>
</tr>
<tr>
<td>45H31 RR</td>
<td></td>
</tr>
<tr>
<td>73-75 RR</td>
<td></td>
</tr>
<tr>
<td>73-45 RR</td>
<td></td>
</tr>
<tr>
<td>6060 RR</td>
<td></td>
</tr>
<tr>
<td>9553 RR</td>
<td></td>
</tr>
<tr>
<td>46H75 CL</td>
<td></td>
</tr>
<tr>
<td>2012 CL</td>
<td></td>
</tr>
<tr>
<td>5525 CL</td>
<td></td>
</tr>
</tbody>
</table>

T1-Yield (LL)
T1-Yield (RR)
T1-Yield (CL)
**CANOLA SEED LOSS (LATE)**

Indian Head - 2011

**Seed Loss (%)**

- **Pr > F = 0.020** (drop 2)
- **Pr > F < 0.001** (shatter 2)
- **Pr > F < 0.001** (total 2)

*multiple comparison groupings presented are for total losses (%)*

**Overall Avg. = 0.8%**
Canola Seed Loss (Late)

Swift Current - 2011

Pr > F = 0.692 (drop 2)
Pr > F = 0.761 (shatter 2)
Pr > F = 0.633 (total 2)

*Multiple comparison groupings presented are for total losses (%)

Overall Avg. = 2.4%
CANOLA SEED LOSS (LATE)

Scott - 2011

Pr > F < 0.001 (drop 2)
Pr > F = 0.084 (shatter 2)
Pr > F < 0.001 (total 2)

*multiple comparison groupings presented are for total losses (%)

Overall Avg. = 7.4%
**CANOLA SEED LOSS (LATE)**

**Swift Current - 2012**

Pr > F = 0.057 (drop 2)
Pr > F = **0.005** (shatter 2)
Pr > F = 0.065 (total 2)

*multiple comparison groupings presented are for total losses (%)*

Overall Avg. = 19.0%

Seed Loss (%) vs Cultivars:
- Pr > F = 0.057 (drop 2)
- Pr > F = **0.005** (shatter 2)
- Pr > F = 0.065 (total 2)

*Multiple comparison groupings presented are for total losses (%)*
CANOLA SEED LOSS (LATE)

Indian Head - 2012

Pr > F = 0.050 (drop 2)
Pr > F < 0.001 (shatter 2)
Pr > F = 0.015 (total 2)

*multiple comparison groupings presented are for total losses (%)

Overall Avg. = 62.0%
OBSERVED SEED LOSS
(5 SITE AVERAGE / DELAYED HARVEST)

Total Yield Loss
Site (S): $P < 0.001$
Cultivar (C): $P < 0.001$
$S \times C$: $P = 0.001$

Seed Loss (%)

Overall Average = 17.4%
(Site Averages Ranged from 1-57%)

Dropped pods (%)
Shattered pods (%)

Cultivars

5440, L130, L150, 45H29, 45H31, 73-75, 73-45, 6060, 9553, 46H75, 2012, 5525

Site (S) $P < 0.001$
Cultivar (C) $P < 0.001$
$S \times C$: $P = 0.001$
**CANOLA CULTIVAR RANKINGS**

All Sites (2011-2012)

- **1** = least and **12** = most shattering for a given site
- Error bars are standard deviation of cultivar ranking across 5 sites

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Average Seed Loss Ranking (late)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440</td>
<td>3.0</td>
</tr>
<tr>
<td>L130</td>
<td>4.0</td>
</tr>
<tr>
<td>L150</td>
<td>4.2</td>
</tr>
<tr>
<td>45H29</td>
<td>8.6</td>
</tr>
<tr>
<td>45H31</td>
<td>7.6</td>
</tr>
<tr>
<td>7375</td>
<td>7.2</td>
</tr>
<tr>
<td>7345</td>
<td>9.6</td>
</tr>
<tr>
<td>6060</td>
<td>11.6</td>
</tr>
<tr>
<td>9553</td>
<td>6.6</td>
</tr>
<tr>
<td>46H75</td>
<td>4.6</td>
</tr>
<tr>
<td>2012</td>
<td>4.2</td>
</tr>
<tr>
<td>5525</td>
<td>6.8</td>
</tr>
</tbody>
</table>

**Liberty Link**

**Roundup Ready**

**Clearfield**
WHAT HAPPENED in 2012?
FACTOR #1: DISEASE

- Adjacent canola fungicide trial used to quantify sclerotinia pressure at Indian Head (2012)
- 65% incidence (3.8% severity) on untreated check & avg. incidence of 37% (3.4% severity) with foliar fungicide
- Average yield increase of 19% with fungicide
FACTOR #2: WIND

Gusts approached 80 km/hour on Aug. 25 (early cultivars, diseased plants & swathed canola) & on Sept. 11-12 (unharvested straight-combined & swathed canola)

Wind speeds >31 km/hr 32/40 days preceding harvest

Extensive damage to swathed & straight-combined canola reported across vast areas of the Prairies

Photo credit: Canola Council of Canada
TAKE-HOME MESSAGES

✗ Do not be afraid to try straight-combining canola but understand the risks…and there are risks
  - Harvest timing is critical compared to swathed canola
  - Limit straight-cut acres to what is manageable

✗ Consider cultivar differences whenever possible
  - Differences in genetic resistance to environmental seed losses frequently observed amongst *napus* varieties but losses can be substantial for all under certain conditions
  - Information on relative shattering resistance of varieties would be useful but is still limited

✗ Pod sealants and/or pre-harvest glyphosate
  - Pod sealants can be beneficial but have not shown a consistent return on investment in our trials
  - Pre-harvest glyphosate not a necessity but can have advantages in some cases

✗ Not all combine headers perform equally
  - Header extensions perform well but availability is limited
Thank You!

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Email: cholzapfel.iharf@sasktel.net
Phone: (306) 695-4200