What’s New in Straight-Combining Canola?

Chris Holzapfel, MSc, PAg
Indian Head Agricultural Research Foundation
Funding and Sponsorship

AGRICULTURAL DEMONSTRATION OF PRACTICES & TECHNOLOGIES
Incentives for Straight-Combining

- Reduced labour / equipment cost
- Reduced risk of yield loss under some conditions (ie: swaths blowing, sparse stubble, short / badly lodged crop)
- Difficult to swath entire canola crop at optimal time (narrow window for swathing)
- Improved seed quality (ie: larger seeds, higher oil content, reduced green seed)
- Fall weed control opportunities with pre-harvest applications
- Crop and seed dry quicker after rains during harvest
Reasons for straight-combining provided by canola growers who currently do so (BASF)

Percent of respondents

- Fewer field operations: 63.8%
- Higher yield due to longer pod fill: 51.7%
- Lower machinery costs: 44.8%
- Lower risk of yield loss i.e. swaths blowing: 32.8%
- Forced to straight-combine i.e. shattering, poor crop, etc.: 15.5%
- Improved weed control: 8.6%
- Testing system out: 3.5%
- Lower green seed counts: 1.7%

2014 (n = 58)
Swathing also has Risks

- U of SK research on commercial farms showed that total seed losses (environmental + header + threshing) for swathed and straight-combined canola were equal and ~10% on average (Haile et al. 2014. Can. J. Plant Sci. 94:785-789)

- 2012 was the worst year in recent memory for swaths blowing with estimated yield losses >>50% in many cases

- Swathing too early results in significant yield loss due to smaller seeds and can lead to higher green seed counts, particularly under hot, dry conditions

- Swathing too late results in yield loss due to pod shatter

- Similar to straight-combining, the risks of environmental and header losses increase with the length of time that canola swaths remain in the field
How do yields between swathed and straight-cut canola compare?

![Graph showing grain yield comparison between swathed and straight-cut canola across different site-years. The graph includes site-years IH-09, IH-10, SC-09, SC-10, ME-09, ME-10, SW-09, SW-10, and ALL. The yield differences are marked with percentages, such as 96%, 82%, 112%, 110%, 78%, 92%, 98%, 119%, and 101%.]
ADOPT Canola Harvest Demo
Indian Head 2013 – Seed Yield

![Bar graph showing yield data]

- SWATH-T1 Aug-21
  - Yield: 60
  - 15-20% SCC

- SWATH-T2 Aug-27
  - Yield: 65
  - 40-50% SCC

- STRAIGHT-T1 Sep-12
  - Yield: 63

- STRAIGHT-T2 Sep-21
  - Yield: 62

- STRAIGHT-T3 Sep-28
  - Yield: 67

15/01/2015  AgriARM Research Update
ADOPT Canola Harvest Demo
Indian Head 2013 – Seed Size

TKW (g/1000 seeds)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>TKW (g/1000 seeds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWATH-T1 Aug-21</td>
<td>3.14</td>
</tr>
<tr>
<td>SWATH-T2 Aug-27</td>
<td>3.47</td>
</tr>
<tr>
<td>STRAIGHT-T1 Sep-12</td>
<td>3.56</td>
</tr>
<tr>
<td>STRAIGHT-T2 Sep-21</td>
<td>3.61</td>
</tr>
<tr>
<td>STRAIGHT-T3 Sep-28</td>
<td>3.60</td>
</tr>
</tbody>
</table>

15-20% SCC
40-50% SCC
Cultivar x Harvest Method Effects on Seed Size Averaged Across 8 Sites
Harvest Method Effects on Percent Green Seed are Inconsistent

- Less green seed sometimes identified as an advantage to straight-combining but this is not always the case
- Actual results vary depending on relative timing of operations, crop uniformity & weather leading up to harvest

8 site avg (by cultivar)

8 site avg (across cultivars)
ADOPT Canola Harvest Demo
Indian Head 2013 – Percent Green Seed

Green Seed (%)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Date</th>
<th>Percent Green Seed</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWATH-T1 Aug-21</td>
<td></td>
<td>2.0%</td>
</tr>
<tr>
<td>SWATH-T2 Aug-27</td>
<td></td>
<td>1.7%</td>
</tr>
<tr>
<td>STRAIGHT-T1 Sep-12</td>
<td></td>
<td>0.8%</td>
</tr>
<tr>
<td>STRAIGHT-T2 Sep-21</td>
<td></td>
<td>0.2%</td>
</tr>
<tr>
<td>STRAIGHT-T3 Sep-28</td>
<td></td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Note: Treatments marked with different letters (a, b, c) indicate significant differences.
What about Pod Sealants?

- Commercially available in Western Canada since 2008, examples include…
  - Pod Ceal DC™ (discontinued)
  - Pod-Stik™
  - Desikote Max™

- Modes of action vary but designed to reduce pod shattering and extending the harvest window to make shatter-prone crops better suited for straight-combining.
Pod Sealant Effects on Straight-Combined Canola Yield (by site)

Grain Yield (kg/ha)

Site-Year

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

Contrast - Treated vs Untreated
ns: not significant
* P = 0.05-0.10
** P = 0.01-0.05
*** P < 0.01
**Field-Scale Canola Harvest Trial**  
**Indian Head 2010-2011**

**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
Indian Head 2010-2011

![Graph showing grain yield in kg/ha for different site-years and treatments.](image)

- **ns**: not significant
- **Star (*)**: $P = 0.05-0.10$
- **Two stars (**)**: $P = 0.01-0.05$
- **Three stars (***)**: $P < 0.01$
Pre-harvest applications not always necessary but can have benefits

- Glyphosate is not a desiccant and only a potential harvest aid for Liberty Link® and Clearfield® canola
- HEAT now registered for pre-harvest application on canola
- Can facilitate earlier & easier harvest, even out variable fields and make field operations easier to time
- Perennial weed control opportunity with straight-combined canola
Equipment Considerations
## WCA Canola Header Evaluation (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 -------------

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**Stripper**
- 2005: 22 bushels/acre
- 2006: n/a
- 2007: n/a

**Rigid**
- 2005: 25 bushels/acre
- 2006: 31 bushels/acre
- 2007: 25 bushels/acre

**Draper**
- 2005: n/a
- 2006: 32 bushels/acre
- 2007: 26 bushels/acre

**BISO**
- 2005: 28 bushels/acre
- 2006: 37 bushels/acre
- 2007: 29 bushels/acre

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WCA Canola Header Evaluation (Header Losses)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
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<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>

--- seeds per tray ---
Premium Flow (Zürn)

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

Distance from centre of the combine harvester, m

Loses, kg/ha

Crop divider
Centre
Vertical knife

- 63 cm
- 83 cm
- 113 cm

Sausse 2011 - 13th International Rapeseed Congress
New Holland 760CG Varifeed™ Header

- One of several modern commercial rigid header that utilize similar principles as header extensions (23” of knife travel, vertical knives optional)
New Equipment Research in 2014

- ADF, SCGA, WGRF, Honeybee, CNH & Bayer CropScience partnered to fund a 3 year evaluation of commercial straight-cut headers for canola

Harvest Treatments*

- Swathed
- Honeybee Draper Header
- CNH Varifeed (retracted)
- CNH Varifeed (extended)

* Harvest treatments evaluated on 2 varieties – L130 and L140P
Preliminary Results – Seed Yield

- **Indian Head 2014**
- Good harvest conditions but delayed by wet weather
Cultivar Considerations
Cultivar Differences in Seed Loss from Standing Canola

8 Site Average – 2009-2010
Seed Loss Summary 2013 (4 sites)

Total Seed Losses – Early Harvest

*Dropped + shattered losses do not necessarily equal the total values due to individual component data not being available for all sites

NOTE: The values presented are only mathematical averages and differences between hybrids are not necessarily statistically significant

Average = 0.5%
# Seed Loss Summary 2011-12 (5 sites)

## Total Seed Losses – Early Harvest

<table>
<thead>
<tr>
<th>Canola Hybrid</th>
<th>SHATTERED PODS</th>
<th>DROPPED PODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>540 LL</td>
<td>3.7%*</td>
<td>0%</td>
</tr>
<tr>
<td>L130 LL</td>
<td>5.7%</td>
<td>0%</td>
</tr>
<tr>
<td>L150 LL</td>
<td>4.3%</td>
<td>0%</td>
</tr>
<tr>
<td>45H29 RR</td>
<td>3.3%</td>
<td>2.6%</td>
</tr>
<tr>
<td>45H31 RR</td>
<td>3.8%</td>
<td>0%</td>
</tr>
<tr>
<td>73-75 RR</td>
<td>6.7%</td>
<td>3.3%</td>
</tr>
<tr>
<td>73-45 RR</td>
<td>3.3%</td>
<td>4.5%</td>
</tr>
<tr>
<td>6060 RR</td>
<td>1.6%</td>
<td>3.7%</td>
</tr>
<tr>
<td>9553 RR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46H75 CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5525 CL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: The values presented are only mathematical averages and differences between hybrids are not necessarily statistically significant.

*Shattered + dropped losses do not necessarily equal the total values due to individual component data not being available for all sites.

Average = 3.9%
Seed Loss Summary 2011-13 (9 sites)

Total Seed Losses – Early Harvest

*Dropped + shattered losses do not necessarily equal the total values due to individual component data not being available for all sites

NOTE: The values presented are only mathematical averages and differences between hybrids are not necessarily statistically significant

Average = 2.3%

Canola Hybrid

- 5440 LL: 2.3%
- L130 LL: 3.4%
- 45H29 RR: 2.1%
- 73-75 RR: 2.8%
- 46H75 CL: 1.1%
- 5525 CL: 2.3%
# Seed Loss Summary 2013 (4 sites)

**Total Seed Losses – Delayed Harvest**

*Note:* The values presented are only mathematical averages and differences between hybrids are not necessarily statistically significant

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<tr>
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<td>2.9%</td>
<td>3.4%</td>
</tr>
<tr>
<td>L140P LL</td>
<td>1.5%</td>
<td>2.9%</td>
</tr>
<tr>
<td>45H29 RR</td>
<td>2.9%</td>
<td>3.1%</td>
</tr>
<tr>
<td>45H32 RR</td>
<td>2.0%</td>
<td>2.8%</td>
</tr>
<tr>
<td>73-75 RR</td>
<td>2.0%</td>
<td>4.1%</td>
</tr>
<tr>
<td>74-44BL</td>
<td>2.8%</td>
<td>4.9%</td>
</tr>
<tr>
<td>6050 RR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46H75 CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5525 CL</td>
<td></td>
<td></td>
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* Dropped + shattered losses do not necessarily equal the total values due to individual component data not being available for all sites

Average = 3.0%
Seed Loss Summary 2011-12 (5 sites)

Total Seed Losses – Delayed Harvest

*Dropped + shattered losses do not necessarily equal the total values due to individual component data not being available for all sites.

NOTE: The values presented are only mathematical averages and differences between hybrids are not necessarily statistically significant.

Average = 10.4%
Seed Loss Summary 2011-13 (9 sites)

Total Seed Losses – Delayed Harvest

*Dropped + shattered losses do not necessarily equal the total values due to individual component data not being available for all sites

NOTE: The values presented are only mathematical averages and differences between hybrids are not necessarily statistically significant

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<td>5.9%</td>
<td>0%</td>
</tr>
<tr>
<td>5525 CL</td>
<td>7.7%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Average = 6.9%
Indian Head 2013
Seed Yield by Harvest Timing

Average = -8.8%

Canola Hybrid

0% - 17% -19%

-12% -11% -1%

-6% -8% -8% -6%

15/01/2015  AgriARM Research Update
Indian Head 2014
Seed Yield by Harvest Timing

Average = -11.9%

Canola Hybrid

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Yield-Sep 20</th>
<th>Yield-Oct 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>5440 LL</td>
<td>-10%</td>
<td>-11%</td>
</tr>
<tr>
<td>L130 LL</td>
<td>-11%</td>
<td>-11%</td>
</tr>
<tr>
<td>L140P LL</td>
<td>-3%</td>
<td>-9%</td>
</tr>
<tr>
<td>45H29 RR</td>
<td>-7%</td>
<td>-16%</td>
</tr>
<tr>
<td>45H32 RR</td>
<td>-13%</td>
<td>19%</td>
</tr>
<tr>
<td>73-75 RR</td>
<td>19%</td>
<td>-19%</td>
</tr>
<tr>
<td>74-44 RR</td>
<td>-7%</td>
<td>-13%</td>
</tr>
<tr>
<td>6050 RR</td>
<td>-13%</td>
<td>19%</td>
</tr>
<tr>
<td>46H75 CL</td>
<td>-12%</td>
<td>-19%</td>
</tr>
<tr>
<td>5525 CL</td>
<td>-12%</td>
<td>-19%</td>
</tr>
</tbody>
</table>
HAIL HAPPENS!

InVigor L140 P

InVigor L130

Photo Courtesy: Dale Oakes, Manitoba
Take-Home Messages (1 of 2)

- Straight-combining canola is feasible but understand and minimize the risks
  - Harvest timing usually considered more critical than with swathing
  - Limit straight-cut acres to what is manageable

- Early seeding and adequate seeding rates will ensure as early and uniform crop maturity as possible
  - Less branching and smaller plants at higher populations that may dry down quicker and combine easier

- Consider cultivar differences whenever possible
  - Differences in yield loss frequently occur but are not always consistent & typically less important than environmental conditions
  - New shatter tolerant varieties lengthen the window for straight-combining and reduce the overall risk of yield loss
Take-Home Messages (2 of 2)

- Pod sealants to reduce shatter losses
  - Beneficial under certain circumstances but difficult to predict potential losses or probability of a response at the time when pod sealants need to be applied

- Pre-harvest glyphosate / desiccation
  - Chemical harvest aids not a necessity but can have advantages such as evening out maturity, earlier/easier harvest and weed control
  - Heat® is now registered for pre-harvest application in canola

- Equipment considerations
  - Header extensions significantly reduce header losses and are a good option for straight-combining large acres of canola – headers with variable knife position should provide similar benefits
  - Draper versus auger? Modifications to existing equipment?
  - Header performance is the subject of current research
Chris Holzapfel, MSc PAg
Indian Head Agricultural Research Foundation
Email: cholzapfel@iharf.ca
Phone: (306) 695-4200
Website: www.iharf.ca