Stubble management recommendations and limitations for frost prone landscapes

Rebecca Smith
Stubble management recommendations and limitations for frost prone landscapes

Rebecca Smith
When it works

2016

Minimum air temperature at canopy height (°C)

Date


York

0 t/ha 1 t/ha 2 t/ha 4 t/ha

-7
When it works York

When it works

2016

Time below temperature thresholds (hrs)

Temperature (°C)

0°C -1°C -2°C -3°C -4°C -5°C -6°C

0 t/ha 1 t/ha 2 t/ha 4 t/ha

0°C a a a b b a

-1°C b b b a

-2°C b b a

-3°C b b

-4°C a

-5°C a

-6°C
<table>
<thead>
<tr>
<th>Stubble load</th>
<th>0 t/ha</th>
<th>1 t/ha</th>
<th>2 t/ha</th>
<th>4 t/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (t/ha)</td>
<td>0.82b</td>
<td>0.48ab</td>
<td>0.39ab</td>
<td>0.23a</td>
</tr>
<tr>
<td>Cost of stubble management ($/ha)</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Nitrogen removal (kg)*</td>
<td>16</td>
<td>12</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Nitrogen removal cost ($)**</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Wheat return ($)***</td>
<td>205</td>
<td>120</td>
<td>97</td>
<td>57</td>
</tr>
<tr>
<td>Gross Margin ($/ha)</td>
<td>195</td>
<td>108</td>
<td>87</td>
<td>57</td>
</tr>
</tbody>
</table>

* Assuming 4 kg N/t stubble.
** Nitrogen price of $500/t
*** Grain price of $250/t
When it doesn’t work

2016

2. Removed short stubble
3. Retained long stubble
Minimum air temperature at canopy height (°C)

<table>
<thead>
<tr>
<th>Date</th>
<th>Removed</th>
<th>Retained short stubble</th>
<th>Retained long stubble</th>
</tr>
</thead>
<tbody>
<tr>
<td>14/09/2016</td>
<td>ab</td>
<td>ab</td>
<td>b</td>
</tr>
<tr>
<td>15/09/2016</td>
<td>b</td>
<td>ab</td>
<td>ab</td>
</tr>
<tr>
<td>16/09/2016</td>
<td>a</td>
<td>b</td>
<td>ab</td>
</tr>
<tr>
<td>17/09/2016</td>
<td>b</td>
<td>a</td>
<td>ab</td>
</tr>
<tr>
<td>19/09/2016</td>
<td>b</td>
<td>a</td>
<td>ab</td>
</tr>
<tr>
<td>20/09/2016</td>
<td>ab</td>
<td>ab</td>
<td>ab</td>
</tr>
<tr>
<td>21/09/2016</td>
<td>a</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>23/09/2016</td>
<td>b</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>24/09/2016</td>
<td>b</td>
<td>ab</td>
<td>ab</td>
</tr>
<tr>
<td>25/09/2016</td>
<td>b</td>
<td>ab</td>
<td>ab</td>
</tr>
<tr>
<td>27/09/2016</td>
<td>b</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>28/09/2016</td>
<td>b</td>
<td>ab</td>
<td>ab</td>
</tr>
<tr>
<td>29/09/2016</td>
<td>b</td>
<td>ab</td>
<td>ab</td>
</tr>
</tbody>
</table>

When it doesn’t work

Corrigin

2016
When it doesn’t work

2016

Time below temperature thresholds (hrs)

Temperature (°C)

-6°C -5°C -4°C -3°C -2°C -1°C 0°C

-6° C -5° C -4° C -3° C -2° C -1° C 0° C

Removed Retained short stubble Retained tall stubble

When it doesn’t work

Corigin

2016
When it doesn’t work

2016

Corrigin

- Frost
  - Induced Shrinkage = 12%
  - FIS = 64%
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Removed</th>
<th>Retained short stubble</th>
<th>Retained tall stubble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (t/ha)</td>
<td>0.19a</td>
<td>0.08b</td>
<td>0.09ab</td>
</tr>
<tr>
<td>Stubble load (t/ha)</td>
<td>0.0</td>
<td>5.75</td>
<td>5.80</td>
</tr>
<tr>
<td>Cost of stubble management ($/ha)</td>
<td>2</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Nitrogen removal (kg)*</td>
<td>23</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Nitrogen removal cost ($)**</td>
<td>11.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wheat return ($)***</td>
<td>47</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Gross Margin ($/ha)</td>
<td>34</td>
<td>14</td>
<td>23</td>
</tr>
</tbody>
</table>

* Assuming 4 kg N/t stubble.
** Nitrogen price of $500/t
*** Grain price of $250/t
Effect of landscape York 2015
Effect of landscape
York
2015

Cumulative time below temperature thresholds (hrs)

Temperature (°C)

0°C  -1°C  -2°C  -3°C  -4°C  -5°C  -6°C

High  Mid  Low

0°C: a a
-1°C: b a a
-2°C: b a a
-3°C: b a a
-4°C: b a a
-5°C: b a a
-6°C: b a a

Cumulative time below temperature thresholds

Temperature (°C)
To finish the story

• Rule of thumb: Get your stubble loads to your grain yield

• 1t grain = 2t stubble
• 2t grain = 4t stubble
• 4t grain = 8t stubble
Thank you
2 t/ha Stubble

8 t/ha Stubble