NITROGEN MANAGEMENT

2013 YWTG
Outline

• Background

• University Data

• ACSC field trials

• Summary
NITROGEN MANAGEMENT

• Current N recommendation
  – 4’ sample rec= 130 lb. soil N + applied
  – 2’ sample rec= 100 lb. soil N + applied
  • Minimum of 65 lb. needed in top 2’

• 2012 ACSC soil test encoded acres
  – 131,000 acres received (31%)
  – 80% of these acres avg. 136 lbs. total N

• Growers following recommendation closely
NITROGEN MANAGEMENT

• Is a 20 ton yield potential realistic anymore?
  – Nope
  – 2012 crop = 27.1 T/A
  – Nitrogen use efficiency

• Are their times we need to supplement more N for the crop? Side dressing?
  – U of M Crookston (Smith & Sims data)
RSA by TOTAL N

Smith & Nielsen
Why Side Dress then???

- **Climatic conditions**
  - wet/dry
  - cool/warm

- **N efficiency**
  - mineralization (OM%)
  - nitrification (warm, moist soils)
  - denitrification (water logged) (80+ lb./A losses can occur)

- **Other crops**
  - residue, previous crop credits

- **Environmental concerns**
  - leaching, runoff
University- Sims 2012

• Determine if N placement and timing can improve availability and utilization in sugar beet production on finer textured soils in the RRV.
• Compare traditional broadcast methods to broadcast + side dress
• 2 sites - North of Alvarado, NWROC
• Band application was at the 10-12 leaf stage
• Residual N was 65 lb./A
Yield, University – Sims 2012
Quality, University – Sims 2012

- Bdcst
- Bdcst + Side

Quality (lb sucrose/Ton)

65 lb Residual N + Applied N
Summary – Sims 2012

• Side dress N had little effect on root yield.

• Side dress N had less negative effect on root quality than broadcast
  – Later applied side dress N did not seem to reduce quality.

• One year of data
Objectives- Smith, Cymbaluk

- To Determine the best method of Correcting an in-season nitrogen deficiency.
- Does timing Nitrogen matter.
- What rate of Nitrogen should be applied
Trial was conducted at the NWROC in Crookston, Wheatville loam

Residual Nitrogen was 50 lb N per acre

Nitrogen treatments were fall applied with Urea at 30, 60, 90, 120, 150, and 180 lb. N/acre on October 21, 2010

28-0-0, UAN fertilizer was used for the in-season treatments at 30 and 60 lb N/acre at two different times: T1 June 8 (6 leaf), T2 July 6 (row closer)
Fall Applied Nitrogen
University of Minnesota (Smith, Cymbaluk)

Gross Revenue
($/A)

Total lb Nitrogen Per Acre

<table>
<thead>
<tr>
<th>Total lb Nitrogen Per Acre</th>
<th>Gross Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
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<td>1736</td>
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Yield and Sucrose Effects with 140 lb N per acre applied at different times
2011 University Of Minnesota (Smith, Cymbaluk)

<table>
<thead>
<tr>
<th>Residual + Fall N (lb/A)</th>
<th>Post N (lb/A)</th>
<th>Total Residual+ Applied</th>
<th>RSA (lb/A)</th>
<th>RST (lb/T)</th>
<th>Yield (T/A)</th>
<th>Net Sucrose (%)</th>
<th>Gross Returns ($/A)</th>
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Yield and Sucrose Effects with 170 lb N per acre applied at different times
2011 University of Minnesota (Smith, Cymbaluk)

<table>
<thead>
<tr>
<th>Applied Nitrogen</th>
<th>Residual + Fall N (lb/A)</th>
<th>Post N Residual+ (lb/A)</th>
<th>Total Applied (lb/A)</th>
<th>RSA (lb/A)</th>
<th>RST (lb/T)</th>
<th>Yield (T/A)</th>
<th>Net Sucrose (%)</th>
<th>Gross Returns** ($/A)</th>
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<td>28.4</td>
<td>16.72</td>
<td>1661</td>
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</table>
2011 University Minnesota (Smith, Cymbaluk)

Gross Revenue
$/A

T1 = 6 leaf stage
T2 = Full Canopy

Total lb. Nitrogen per Acre with side dressing

Total 140 lb N

1832 1807 1636 1604
T1 T1 T2 T2

Total 170 lb N

1777 1809 1792 1731 1661
T1 T1 T2 T2

T1 = 6 leaf stage
T2 = Full Canopy
## Applied Nitrogen (lb/A)

2012 University of Minnesota (Smith)

<table>
<thead>
<tr>
<th>Fall N</th>
<th>Post N</th>
<th>Total (Res+ App)</th>
<th>RSA (lb/A)</th>
<th>Yield (T/A)</th>
<th>Net Sugar (%)</th>
<th>Gross ($/A)</th>
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<td>-</td>
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<td>10297</td>
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<td>9519</td>
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<td>18.0</td>
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</table>
2012 University Minnesota (Smith)

Gross Revenue
$/A

Total Nitrogen per Acre

- Fall 135
- Fall 165
- T1 30 lb
- T1 60 lb
- T2 30 lb
- T2 60 lb

- Fall 135
- Fall 165
- Fall 135 + 30
- Fall 105 + 60
- Fall 135 + 30
- Fall 105 + 60

- 1936
- 1885
- 1830
- 1773
- 1814
- 1741
Fall applied N at 140 lb per acre maximized tonnage and gross return.

With no Nitrogen loss, timing of Nitrogen did not improve tonnage or sugar.

If there is a N deficiency, application of nitrogen at the 6 leaf stage was more beneficial than at row closure.

- At row closure, yield reduction has already occurred.
- Late application of N will usually give you a reduction in sugar.
- Lack of rain fall in August may have contributed to less nitrogen uptake from late application of Nitrogen.
ACSC- ADA, MN

• Grower had field prepared with 0# N applied
  – Soil Test= 15 units avail. (0-2’)
  – Dry soil cond. led him to plant and fert. in-season
  – Waited for forecasted rain and made fert. app.
    • Timing #1= 6-8lf beets, 100 units urea applied
      – Rained .7” 2 days after
    • Timing #2= row closure, 20 and 60 units urea applied
      – Rained .4” immediately after
  – Field harvested 10/15/12
    • Prepiled 10 loads 8/28/12 (175#)
ACSC- ADA, MN

• August 28th prepile results (sugar, SLM)

<table>
<thead>
<tr>
<th>Prepile Avg.</th>
<th>SLM %</th>
<th>Sugar %</th>
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<tbody>
<tr>
<td>175# N</td>
<td>1.98</td>
<td>16.42</td>
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<tr>
<td>Daily piling site</td>
<td>1.63</td>
<td>18.04</td>
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<td>+.35%</td>
<td>-1.62%</td>
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• Recommend Not to Prepile side dressed fields, when possible

• Stockpile results?
<table>
<thead>
<tr>
<th>N Residual 0-2’</th>
<th>N Fall Applied</th>
<th>N Side Dressed (6-8 lf)</th>
<th>N Side Dressed (Row Closure)</th>
<th>Total N</th>
<th>SLM (%)</th>
<th>Sugar (%)</th>
<th>Yield (T/A)</th>
<th>RST (Lb/T)</th>
<th>RSA (Lb/A)</th>
<th>Rev/A ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0</td>
<td>80</td>
<td>20</td>
<td>115</td>
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<td>28.5</td>
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<td>10437</td>
<td>1939</td>
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</table>
ACSC – Felton, MN

• Test plot done on tiled ground
• Planted April 20, Harvested Sept 24
• Fall soil test called for no added nitrogen
  – Re-tested in spring- same result
• 4 Reps- 0# check, 30# preplant, 30# side dress, 80# side dress
• Side dressed UAN June 6 at 8-12 leaf stage
  – 2 N rates- 30# and 80#
## ACSC – Felton, MN

<table>
<thead>
<tr>
<th>Residual N 0-2'</th>
<th>N Spring Applied</th>
<th>N Side Dressed</th>
<th>Total N</th>
<th>SLM %</th>
<th>Sugar %</th>
<th>Yield (T/A)</th>
<th>RST (Lb/T)</th>
<th>RSA (Lb/A)</th>
<th>Rev/A ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>0</td>
<td>87</td>
<td>87</td>
<td>1.15%</td>
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<td>117</td>
<td>1.15%</td>
<td>19.28%</td>
<td>27.9</td>
<td>363</td>
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<td>$1,869.25</td>
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<td>117</td>
<td>1.23%</td>
<td>19.47%</td>
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<td>365</td>
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<td>167</td>
<td>1.14%</td>
<td>19.20%</td>
<td>31.3</td>
<td>361</td>
<td>11311</td>
<td>$2,082.91</td>
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</table>
ACSC - Stephen, Mn

RSA (lbs./A)

Field 1  Field 2  Field 3
Side Dressed  June 26  July 2  June 15

Total Nitrogen Applied

Fall  Fall + Sidedress

140  140 + 30  130  130 + 30  130  130 + 40
10668  10805  10324  11234  10402  11961

June 26  July 2  June 15
ACSC - Stephen, Mn

Gross Rev/A ($/A)

<table>
<thead>
<tr>
<th>Total Nitrogen Applied</th>
<th>Field 1</th>
<th>Field 2</th>
<th>Field 3</th>
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<tbody>
<tr>
<td>Side Dressed</td>
<td>Field 1</td>
<td>Field 2</td>
<td>Field 3</td>
</tr>
<tr>
<td></td>
<td>June 26</td>
<td>July 2</td>
<td>June 15</td>
</tr>
<tr>
<td></td>
<td>140 + 30</td>
<td>130 + 30</td>
<td>130 + 40</td>
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<tr>
<td>Total Nitrogen Applied</td>
<td>2113</td>
<td>2109</td>
<td>2039</td>
</tr>
<tr>
<td>Fall</td>
<td>2119</td>
<td>2304</td>
<td>2373</td>
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<tr>
<td>Fall + Sidedress</td>
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</tbody>
</table>

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Summary

ACSC Trials

• Successfully applied all nitrogen needs in season, to conserve seedbed moisture, with no effect on yield or quality
• Avg. increase of 1.8 T/A on side dressed trials
• Little to no effect on quality
• Increased Rev/A with side dress nitrogen
• Recommend not to prepile side dressed fields
• ACSC data contradicts University data
• Need more research
• **Only 1yr of data**
Summary
University

Sims
• Side dressed N had little effect on yield
• Side dressed N has a less negative effect on quality than high preplant broadcast applications

Smith
• Fall applied N at 140 lbs./A. maximized yield and rev/a
• With no nitrogen loss, side dressing did not improve yield or sugar
• With nitrogen loss, nitrogen applications at 6 lf sugarbeets was more beneficial than after row closure
Factors to Consider
Side Dressing

• Fall and Early Spring weather
• Planting Date
• Plant Populations
• Soil Test N
  – Low levels 2-4’, may utilize side dress N for late season growth
Conclusion

• Side dressing can improve nitrogen use efficiency
• Side dressing nitrogen in season, can reduce high rate spring preplant nitrogen applications
• Side dressing can be an effective practice to apply nitrogen in a stale seed bed planting situation
• Side dressing can remedy nitrogen loss due to environmental conditions
QUESTIONS ?