Variety/hybrid and location effects on soybean tissue and corn grain nutrient composition

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Effect of 8 corn hybrids on grain and silage nutrient content at Arlington ARS
Plot details

- Sampled in N x Hybrid study
- Plano silt loam
- Soil test levels

<table>
<thead>
<tr>
<th>Soil Test</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, ppm</td>
<td>107 (EH)</td>
<td>33 (EH)</td>
<td>91 (EH)</td>
</tr>
<tr>
<td>K, ppm</td>
<td>347 (EH)</td>
<td>163 (VH)</td>
<td>146 (H)</td>
</tr>
<tr>
<td>pH</td>
<td>7.1</td>
<td>6.9</td>
<td>7.1</td>
</tr>
<tr>
<td>OM, %</td>
<td>4.1</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>PPNT, lb N/a</td>
<td>69 (19 credit)</td>
<td>12 (0 credit)</td>
<td>37 (0 credit)</td>
</tr>
</tbody>
</table>

- 160 lb N/a was applied as UAN after emergence
Effect of corn hybrid on GRAIN N content at Arlington ARS

* 2008 was a different hybrid than 2009 & 2010
*** 2010 was a different hybrid than 2008 & 2009

IPNI: 0.9 lb N/bu
Effect of corn hybrid on SILAGE N content at Arlington ARS

* Hybrid were different between 2009 and 2010

IPNI: 9.7 lb N/T

* Hybrid were different between 2009 and 2010
Effect of corn hybrid on GRAIN $P_2O_5$ content at Arlington ARS

* 2008 was a different hybrid than 2009 & 2010
*** 2010 was a different hybrid than 2008 & 2009
Effect of corn hybrid on SILAGE $P_2O_5$ content at Arlington ARS

* Hybrid were different between 2009 and 2010
Effect of corn hybrid on GRAIN K₂O content at Arlington ARS

* 2008 was a different hybrid than 2009 & 2010
*** 2010 was a different hybrid than 2008 & 2009
Effect of corn hybrid on SILAGE $K_2O$ content at Arlington ARS

* Hybrid were different between 2009 and 2010
Effect of corn hybrid on GRAIN S content at Arlington ARS

* 2008 was a different hybrid than 2009 & 2010
*** 2010 was a different hybrid than 2008 & 2009
Effect of corn hybrid on SILAGE S content at Arlington ARS

* Hybrid were different between 2009 and 2010
Effect of corn hybrid on GRAIN Zn content at Arlington ARS

* 2008 was a different hybrid than 2009 & 2010
*** 2010 was a different hybrid than 2008 & 2009
Effect of corn hybrid on SILAGE Zn content at Arlington ARS

* Hybrid were different between 2009 and 2010

* Hybrid were different between 2009 and 2010
Conclusions

• Corn grain and silage nutrient removals vary by:
  – Hybrid
  – Year/environment

• Nutrient removals are often less than book values
  – Even though yield levels were generally very good
Effect soybean variety & location on R1 tissue nutrient concentrations
Sampling details

- Uppermost fully developed leaf at R1 sampled
- Sampled in Soybean Variety Trail Plots
  - Varieties sampled within a region are the same
  - Varieties were different between regions
- No visual deficiency symptoms
- Some maturity differences were evident
- Soil samples were also collected
  - Data not yet available
Effect of variety & location on soybean tissue N concentrations at R1, Southern WI

- Variety:
  - ARL
  - JAN
  - LAN

- Location:
  - UW

- Mean Loc

- N concentration, %

- Mean Var

- UW Sufficiency Range

Variety:
1  2  3  4  5  Mean Var
Effect of variety & location on soybean tissue N concentrations at R1, Central WI

![Graph showing the effect of variety and location on soybean tissue N concentrations at R1, Central WI. The graph compares N concentration (%) across different varieties (FdL, GAL, HAN) and locations (UW) at Sufficiency Range.]

Mean Varieties

Variety

- FdL
- GAL
- HAN

Mean Locations

- UW

Sufficiency Range

N concentration, %

Variety

1 2 3 4 5 Mean Var

UW Sufficiency Range

Mean Var

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Effect of variety & location on soybean tissue N concentrations at R1, N. Central WI

![Graph showing the effect of variety and location on soybean tissue N concentrations at R1 in N. Central WI. The graph includes columns for CF, MAR, SEY, and Mean Loc, with a sufficiency range marked as a dashed line.](image-url)
Effect of variety & location on soybean tissue N concentrations at R1, Northern WI
Effect of variety & location on soybean tissue P concentrations at R1, Southern WI

Variety

<table>
<thead>
<tr>
<th>Variety</th>
<th>Mean Var</th>
<th>ARL</th>
<th>JAN</th>
<th>LAN</th>
<th>Mean Loc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
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<td>4</td>
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</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UW Sufficiency Range

P concentration, %

Mean Var

Variety

0.7

0.6

0.5

0.4

0.3

0.2

0.1

0
Effect of variety & location on soybean tissue P concentrations at R1, Central WI
Effect of variety & location on soybean tissue P concentrations at R1, N. Central WI

Variety
CF
MAR
SEY
SEY
Mean Loc

Mean Var

P concentration, %

0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

1
2
3
4
5
Mean Var

UW Sufficiency Range
Effect of variety & location on soybean tissue P concentrations at R1, Northern WI

- Variety SPO
- Variety UW

Sufficiency Range: 0.3 to 0.7

Variety

1 2 3 4 5 Mean Var

P concentration, %

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7
Effect of variety & location on soybean tissue K concentrations at R1, Southern WI

![Graph showing the effect of variety and location on soybean tissue K concentrations at R1, Southern WI. The graph compares different varieties (ARL, JAN, LAN) across various locations (UW) and indicates the mean K concentration.](image-url)
Effect of variety & location on soybean tissue K concentrations at R1, Central WI
Effect of variety & location on soybean tissue K concentrations at R1, N. Central WI

![Bar chart showing the effect of variety & location on soybean tissue K concentrations at R1, N. Central WI.](chart.png)

- Variety: CF, MAR, SEY
- Mean Loc: UW
- Mean Var
- K concentration, %
- Variety

UW Sufficiency Range
Effect of variety & location on soybean tissue K concentrations at R1, Northern WI

![Bar graph showing K concentration for different varieties and their mean values, with a sufficiency range indicated.]
Effect of variety & location on soybean tissue S concentrations at R1, Southern WI

- Variety: ARL, JAN, LAN
- Location: UW

Mean S concentration range: 0.05 to 0.5

UW Sufficiency Range

Variety:

- Variety 1
- Variety 2
- Variety 3
- Variety 4
- Variety 5
- Mean Var
Effect of variety & location on soybean tissue S concentrations at R1, Central WI.
Effect of variety & location on soybean tissue S concentrations at R1, N. Central WI
Effect of variety & location on soybean tissue S concentrations at R1, Northern WI

![Bar chart showing S concentration by variety and location.](chart.png)

- Variety: SPO, UW
- S Sufficiency Range
- Mean Var

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Effect of variety & location on soybean tissue Mn concentrations at R1, Southern WI

Variety

Mean Var

Mn concentration, ppm

0 10 20 30 40 50

UW Sufficiency Range

300

Mean Loc

LAN

JAN

ARL
Effect of variety & location on soybean tissue Mn concentrations at R1, Central WI
Effect of variety & location on soybean tissue Mn concentrations at R1, N. Cent. WI

![Graph showing Mn concentrations for different varieties and locations.](attachment:graph.png)
Effect of variety & location on soybean tissue Mn concentrations at R1, Northern WI
Effect of soybean variety on yield

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield, bu/ha</th>
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<tbody>
<tr>
<td></td>
<td>ARL</td>
<td>JAN</td>
<td>LAN</td>
<td>FdL</td>
<td>GAL</td>
<td>HAN</td>
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<tr>
<td>1</td>
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<table>
<thead>
<tr>
<th></th>
<th>CF</th>
<th>MAR</th>
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<th>SPO</th>
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<td>5</td>
<td>49.8</td>
<td>59.6</td>
<td>50.6</td>
<td>45.3</td>
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Conclusions

• At a given location, soybean variety will effect R1 tissue nutrient concentrations
• For a given variety, location will effect R1 tissue nutrient concentrations
• Additional data analysis is needed to correlate R1 & R3 tissue nutrient concentrations, seed nutrient concentration, and yield
Questions?

Thanks to:

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• Wisconsin Fertilizer Research Program

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