From Mapping to VR Application and Beyond

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Field Technology

Knowledge Acquired • Intelligence Applied

- Agronomy
  - Electronic RECs and label Checking
  - SS Fertilizer and Chemical Applications
- Records
  - Scouting
  - Fieldman to Corporate
- Asset Management/Tracking
- Work Orders
- Traceability
And...

...It all needs to be done on the Internet...

...using a Browser!
Components of Yield

Knowledge Acquired • Intelligence Applied

\[ y = f(x_1, x_2, x_3, x_4, \ldots, x_{10}) \]

- NPK, Macros
- Weather
- Moisture
- Genetics
- Light

- Zn B Fe, Micros
- Management
- CO\(_2\)
- Pests
- Other
Field Variability

Field Location
Fertilizer Recommendation
Knowledge Acquired • Intelligence Applied

Table 4. Phosphorus fertilizer rates for total season application based on pre-plant soil test concentrations (0 to 12 inch depth) for Russet Burbank potato produced in the Columbia Basin.

<table>
<thead>
<tr>
<th>Soil test P (sodium bicarbonate)</th>
<th>Application Rate (lb/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ppm P)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>12 to 20</td>
<td></td>
</tr>
<tr>
<td>Above 20</td>
<td></td>
</tr>
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</table>

Table 5. Potassium application based on soil test P (0 to 12 inch depth) produced in the Columbia Basin.

<table>
<thead>
<tr>
<th>Soil test P (sodium bicarbonate)</th>
<th>Application Rate (lb/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ppm P)</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
</tr>
<tr>
<td>240</td>
<td></td>
</tr>
<tr>
<td>&gt;240</td>
<td></td>
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</tbody>
</table>

Table 6. Phosphorus application rates based on soil test P and free lime content

<table>
<thead>
<tr>
<th>Soil test P (0 to 12 inch)</th>
<th>Free lime content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ppm P)</td>
<td>0 5 10 15</td>
</tr>
<tr>
<td>0</td>
<td>240 280 320 360</td>
</tr>
<tr>
<td>5</td>
<td>160 200 240 280</td>
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<tr>
<td>10</td>
<td>80 120 160 200</td>
</tr>
<tr>
<td>15</td>
<td>0 40 80 120</td>
</tr>
<tr>
<td>20</td>
<td>0 0 0 40</td>
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</tbody>
</table>

fertilizer rates for total season application based on residual soil concentrations of Russet Burbank potato and potential yield of Russet Burbank potato produced in the Columbia Basin.

Table 5. Potassium application based on soil test P (0 to 12 inch depth) produced in the Columbia Basin.

<table>
<thead>
<tr>
<th>Soil test K (sodium bicarbonate)</th>
<th>A1</th>
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<tr>
<td>(ppm)</td>
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<td>240</td>
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<tr>
<td>&gt;240</td>
<td></td>
</tr>
</tbody>
</table>

*To convert K₂O to K multiply by 0.83.

**Recommended & conditions such as irrigation & therefore, apply needs.

Potential yield (ton/acre)

20 25 30 35

N Application Rate (lb/acre)

200 250 300 350

160 170 220 270

80 130 180 230

Does not include N needed for microbial decomposition of previous crop residue or from mineralized soil organic matter. Assumes ppm x 40 lbs/acre may be adjusted for different soil bulk densities.
Field Variability

P Fertilizer Application

Field Location

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Information on each point in the field
Site-Specific Nutrient Management

Knowledge Acquired • Intelligence Applied

• Where to sample
  – Map the variability
  – Best way to map

• Sample

• Create a recommendation
  – Nutrient need
  – Yields
  – Size of area
  – Technology to Spread

• Monitor
Soil Mapping
Knowledge Acquired • Intelligence Applied

• Where can we take a soil sample that gives us the most information to develop a sound site-specific fertilizer recommendation.
### 3 Acre Grid

Knowledge Acquired • Intelligence Applied
1 Acre Grid
Knowledge Acquired • Intelligence Applied
Make each sample point a "field"
Soil Mapping

Knowledge Acquired • Intelligence Applied

• Topography
Soil Mapping

Knowledge Acquired • Intelligence Applied

- Topography
- Remote Sensing
Crop Canopy

- Information
  - Soil Texture
  - Yield Potential
- Uses:
  - Herbicide application
  - Growth Regulator
  - Fertilizer
  - Scouting
Wild Oat Control

- Two rates of Buccaneer
  - On
  - Off

High Pressure

Low Pressure
Trimble GreenSeeker
Soil Mapping

Knowledge Acquired • Intelligence Applied

- Topography
- Remote Sensing
- Soil Maps
Soil Mapping
Knowledge Acquired • Intelligence Applied

- Topography
- Remote Sensing
- Soil Maps
- Yield
Soil Mapping

Knowledge Acquired • Intelligence Applied

• Topography
• Remote Sensing
• Soil Maps
• Yield
• Grower
Soil Mapping

Knowledge Acquired • Intelligence Applied

- Topography
- Remote Sensing
- Soil Maps
- Yield
- Grower
- Electrical Conductivity
Soil EC Mapping....
Information on each point in the field

Sample Summary

<table>
<thead>
<tr>
<th>Location</th>
<th>Grower</th>
<th>Farm</th>
<th>Field</th>
<th>Area</th>
<th>Centroid</th>
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<tbody>
<tr>
<td>Pasco/Umatilla</td>
<td>BASIN FARMING LLC</td>
<td>Wallula</td>
<td>W-01</td>
<td>124.63 acres</td>
<td>46.004401, -118.883779</td>
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<table>
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<th>Sample Date: 12/2/2008</th>
<th>Soil Lab: Kuo Testing</th>
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<th>Sample ID</th>
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<th>Mg</th>
<th>Ca</th>
<th>WpH</th>
<th>B</th>
<th>Zn</th>
<th>Mn</th>
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<td>7</td>
<td>0.04</td>
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</tbody>
</table>
Fertilizer Recommendations

Knowledge Acquired • Intelligence Applied

• Phosphate
  
  $P < 10 \text{ ppm} – 200 \text{ lb}$
  
  $P \geq 10 \text{ and } < 25 \text{ ppm} –$
  
  $[(25 – ST \text{ P}) \times 10 + 50]$  
  
  $P \geq 25 – 0$

• Potash
  
  $K < 80 \text{ ppm} – 400 \text{ lb}$
  
  $K \geq 80 \text{ and } < 200 \text{ ppm} –$
  
  $[(200 – ST \text{ K}) \times 2.5 + 100]$  
  
  $K > 200 – 40 \text{ lb}$

Account for:
• Yield Potential
• Soil Classes
• Varieties/hybrids
• Replants
VR Application Load Sheet

11-52-0 Fertilizer Application

Grower: BASIN FARMING LLC
Farm: Wallula
Field(s): W-01
Acres: 123.71
Crop: Potatoes
Equation: Doug Strebin
Yield Goal: 1
Variety: 2009
Type: Wallula
Tgt pH: Default pH

*Additional Info:

<table>
<thead>
<tr>
<th>Application</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Cost</td>
</tr>
<tr>
<td>Addition/Deduction(lbs/ac):</td>
<td>None Entered</td>
</tr>
<tr>
<td>Percent of Original App:</td>
<td>100%</td>
</tr>
<tr>
<td>Minimum Application Rate:</td>
<td>40.0 lbs/A</td>
</tr>
<tr>
<td>Maximum Application Rate:</td>
<td>380.0 lbs/A</td>
</tr>
<tr>
<td>Field Average Rate:</td>
<td>260.63 lbs/A</td>
</tr>
<tr>
<td>Total Applied Acreage:</td>
<td>118.30</td>
</tr>
</tbody>
</table>
Find applicator
Knowledge Acquired • Intelligence Applied
Soil Test P

P Fertilizer Application

Soil Sample Point

Soil Test P

1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20
VR vs. Uniform Application

- Under Application: 150 lb 15%, 50 lb 23%
- Right Rate: 0 lb 27%
- Over Application: 150 lb 15%, 50 lb 16%

Overall 4%
THANKS FOR YOUR TIME

Knowledge Acquired • Intelligence Applied