Arnall’s Adaptive Sampling Strategy

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Info Ag

• I love INFOAG
• It's here that I get to field test some ideas
• Between the Beer and the BS good things happen.
Zones

• Zones:
  • Make sense
  • Easy on application
  • Reduced sampling

• What variable/layer will you use
• What is you limiting variable
• How to handle, Everything else
Grid

- Grid-
  - Multiple Independent Layers
Grid

• Grid-
  • Multiple Independent Layers

• Spatial Resolution

Microvariability in Soil Test, Plant Nutrient, and Yield Parameters in Bermudagrass. 1997
W. R. Raun et al.
Vol. 62 No. 3, p. 683-690
Grid

- Grid-
  - Multiple Independent Layers

- Spatial Resolution
- Course applications
• I requested grid sample data straight from producers.
• Have entered 330 fields
• The data you see is 300+ Fields, 9,000+ samples
• Multiple Labs
• Still Requesting data
## Overview

<table>
<thead>
<tr>
<th></th>
<th>Soil pH</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Count</strong></td>
<td>Mean</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>5.99</td>
<td>1.87</td>
<td>28.3</td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>4.6</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>8.12</td>
<td>92.7</td>
<td>544</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>OM</th>
<th>Ca</th>
<th>Mg</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td><strong>Count</strong></td>
<td>Mean</td>
<td>Range</td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>1.77</td>
<td>1.2</td>
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<tr>
<td><strong>Min</strong></td>
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<td>396.1</td>
<td>45.5</td>
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<td><strong>Max</strong></td>
<td>3.5</td>
<td>5099</td>
<td>1208</td>
<td>87</td>
</tr>
</tbody>
</table>
Grid Sample and VRT P/K

• Soil test results drive recommendations.
• Do they really?

• How do “they” do it?

• Grid/Zone Sample, Yield Goal 3-5 yr
• Grid/Zone, Multi Year Yield, 3 yr
• Grid/Zone, Update Yield each year.
One Company's Math

• Equation for soils below optimum is:
  \[ P_{Rec} = (\text{Optimum P} - \text{Observed P}) \times 16 / \text{build years} + \text{Crop Removal} \]

• For soils test in the optimum range:
  \[ \text{Prec} = \text{Crop Removal} \]

• For Soils in High Range
  \[ \text{Prec} = \text{Crop Removal} \times ((\text{Optimum P level} + 12.5) - \text{observed P})/7.5) \]
  • This gradually tapers the rec to 0 once we are 12.5 ppm above optimum

• Optimum Range is 22.5-27.5 ppm for Row Crops, 20-25 ppm for cool season grass and similar, 15-20 ppm for Warm Season grass and similar
Adaptive Sampling Strategy

- Same number of samples from Grid.
  - Decrease Spatial increase Temporal
    - We cant sample for space
- Sample the same 20’ x 20 foot area every year.
- In a Build/Maintain we are fertilizing to or for a goal.
  - Target STP
- Watch what the soil test values are doing in the sampled area.
Adaptive Sampling Strategy

• Watch what the soil test values are doing in the sampled area.
  • If Rate of decrease or increase is outside of planned rate
  • Change the rate.
• All soils don’t hold or release nutrients at the same rate.
• If you can figure out and area, change to a new spot, check original from time to time.
More things at the wall

• Why not Check/Reference Strips.
Nutrient Rich/Check Strips

Use Your Cover Crops

Create Prescription Scripts for Applicators
Take Home

• Understand your data and the data source.
• Know the Strengths and Limitations
Thank You

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