**Project Summary**

The Inland Pacific Northwest soils have been considered some of the richest soils of the world. Recently, soil quality concerns have developed, as there are reports of severely reduced soil pH levels (< 4.0 pH) in the uppermost 12” of the soil profile and cases of total production loss in some fields. It has been assumed that these are isolated cases and attributed to soils of high rainfall, formerly forested, or no-till soils and not representative of the general region. Following some previous intense and precise soil sampling in Columbia County Washington, results indicate that the problem may be more general than anticipated. The local Conservation District provided financial means to do an extensive soil sampling survey to test the hypothesis. A 2-year soil-sampling project identifying 76 production and non-farmed sites covering more than 150,000 acres was adopted. Locations were distributed across the county landscape so that all rainfall zones (12-16”, 16-20”, and > 20”) were represented as well as soil types and cropping systems. Soil samples were collected at stratified levels (0-3, 3-6, 6-12, and 12-24 inch layers). Each sample layer was analyzed for soil pH, available nutrients including aluminum. Results across all landscape and rainfall zones indicate 97% all fields with < 6.0 soil pH and 89% < 5.2 pH in the top 6 inches of soil profile and with high available aluminum exceeding 300 ppm compared to the native sites with pH values of 6.3 to 6.9.

**What we have learned so far**

- Observed soil pH levels (in the top 12 inches) have decreased significantly over time. Sample reports with soil pH as low as 4.2 in the (3-6”) seed zone.
- Soil pH levels have dropped significantly since Dr. Mahler’s survey work in 1980.
- Available Aluminum begins with a soil pH of about 5.3 and rapidly increases as the acidity increases.
- Native soils were much higher with levels near 6.5-7.0 pH.
- Many farmers are concerned about the declining soil pH levels.

**2013 and 2014 Field Collection Soil Sampling**

- Farmer Selected Fields and Locations
  - 76 field and native sites participated
  - Fields spread across county to cover all rainfall zones
  - Samples collected in the spring (April - May)
- WSU Graduate Student Soil Sampling Team
  - WSU Graduate students provide unbiased sampling
  - Sites GPS located
- Laboratory analysis and verification
  - 10% of samples validated by separate lab

<table>
<thead>
<tr>
<th>Soil pH</th>
<th>1980 Survey % of Fields</th>
<th>2014 Survey % of Fields</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 6.0</td>
<td>9%</td>
<td>3%</td>
<td>- 6</td>
</tr>
<tr>
<td>5.6 – 5.9</td>
<td>38%</td>
<td>8%</td>
<td>- 30</td>
</tr>
<tr>
<td>5.2 – 5.4</td>
<td>32%</td>
<td>66%</td>
<td>+ 34</td>
</tr>
<tr>
<td>&lt; 5.2</td>
<td>21%</td>
<td>23%</td>
<td>+ 2</td>
</tr>
</tbody>
</table>

**Changes in Soil pH Over 34 Year Period**

**Soil pH and Nutrient Availability**

<table>
<thead>
<tr>
<th>Soil pH</th>
<th>% Fertilizer Efficiency</th>
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</thead>
<tbody>
<tr>
<td>N</td>
<td>P</td>
</tr>
<tr>
<td>7.0</td>
<td>100</td>
</tr>
<tr>
<td>6.0</td>
<td>89</td>
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<tr>
<td>5.5</td>
<td>77</td>
</tr>
<tr>
<td>5.0</td>
<td>53</td>
</tr>
</tbody>
</table>

**Education and Demonstration Plans**

1. Slide presentations at grower meetings
2. Extension bulletins
3. Field days and tours
4. Soil sampling demonstrations
5. Lime application demonstration plots

**Project Sponsors and Supporters**

1. Columbia County Extension Office
2. Columbia Conservation District
3. Washington State Conservation Commission
4. Columbia County Ag Improvement, Inc.

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