Farmed Smart Sustainable Ag Certification
NATIONAL SOIL HEALTH CHAMPION SHARES INSIGHTS

________Breakout Segment Title________

From the Perspective of

Farming the Palouse

by Tracy Eriksen
Rain Impacting Bare Soil

One Rain Drop
We have no control over when we receive rain;

however,

WE HAVE A LOT OF CONTROL OVER IT’S USE!
EARLY GOAL
— ‘STOP SOIL EROSION’ —
& Remove Fallow from our System

STARTED 1964 — ACCOMPLISHED 2014

1965 divides
1970 combining operations
1985 hire Blankenship
1992 bought AgPro
2012 shelb ULD-DS

(almost)
Until we stop this water, there will be erosion, loss of production, and pollution of the environment!
WHERE DOES OUR RAIN GO??

Robert Pappendick (WSU) & Robert Ramig (OSU)

- 1% — DEEP PERCOLATION
- 4% — RAN OFF THE SOIL SURFACE
- 12% — TRANSPIRES THROUGH THE PLANT
- 83% — EVAPORATES FROM SOIL SURFACE
EFFICIENCY OF SUMMER FALLOW

ROBERT PAPPENDICK (WSU) — ROBERT RAMIG (OSU)

• 34% — IN THE PNW
  • 66% Is not used by the crop

• 25% — IN THE NORTH EAST

• <20% — IN THE SOUTH EAST
Boundary Layer
We have moved to an Ultra-low Disturbance DS system [ULD-DS]

Success is SEEDING before the moisture leaves
WHY WE HAVE GONE TOO A ULD-DS SYSTEM!
( ultra-low disturbance direct seed )

• To maximize residue retention
• To minimize soil disturbance
  • Greatly reduces soil Erosion
  • Maximizes water retention
  • Moderates soil temperatures
  • Minimize weed competition
• To maximize plant emergence (CS)
• To increase growing season
• To reduce soil compaction
Residue is the **KING**
Snow Catch with Tall Standing Stubble

6” snow catch in 7” stubble.

< 12” snow catch in 18-21” stubble
Disturbance promotes weed growth
PLANT DIVERSITY IS ESSENTIAL
DIVERSITY, —HOW TO DETERMINE

• Quickest diversity comes by planting multi-specie cover crops in non cash crop years.
  • How do you decide on the mix?

• With cover crops you are really talking about soil microbiology.
  • How do you decide what they need?
  • Do a Biological Analysis of your Soil!
### Biological Analysis

**Report prepared for:**
Lehskov, Inc.
Tracy Eriksen
102 Eriksen Rd
St. John, WA 99171 USA

**Invoice Number:** 12054
**Sample Received:** 3/16/2015
**Sample Sent:** 3/26/2015
**Sample #:** 01-120388 | Submission: 01-024476
**Unique ID:** En-27s-Crop Rotation
**Plant:** Not Indicated

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#### Soil Data

<table>
<thead>
<tr>
<th>Organism Biomass Data</th>
<th>Dry Weight</th>
<th>Active Bacteria (µg/g)</th>
<th>Total Bacteria (µg/g)</th>
<th>Active Fungi (µg/g)</th>
<th>Total Fungi (µg/g)</th>
<th>Hyphal Diameter (µm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Results</strong></td>
<td>0.870</td>
<td>15.7</td>
<td>994</td>
<td>4.45</td>
<td>188</td>
<td>2.85</td>
</tr>
<tr>
<td><strong>Comments</strong></td>
<td>Above Range</td>
<td>Below range</td>
<td>Above range</td>
<td>Below range</td>
<td>Below range</td>
<td></td>
</tr>
</tbody>
</table>

**Expected Range**
- **Low:** 0.45
- **High:** 0.85

#### Protozoa (Numbers/g)

<table>
<thead>
<tr>
<th>Flagellates</th>
<th>Amoebae</th>
<th>Ciliates</th>
<th>Total Nematodes #/g</th>
<th>Mycorrhizal Colonization (%</th>
<th>ENDO</th>
<th>ECTO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Results</strong></td>
<td>3187</td>
<td>52942</td>
<td>0</td>
<td>1.87</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Comments</strong></td>
<td>Low</td>
<td>High</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Expected Range**
- **Low:** 5000
- **High:** 50000

#### Organism Biomass Ratios

<table>
<thead>
<tr>
<th>Total Fungi to Tot. Bacteria</th>
<th>Active to Total Fungi</th>
<th>Active to Total Bacteria</th>
<th>Active Fungi to Act. Bacteria</th>
<th>Nitrogen Cycling Potential (lbs/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Results</strong></td>
<td>0.19</td>
<td>0.02</td>
<td>0.02</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Comments</strong></td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Expected Range**
- **Low:** 1
- **High:** 2

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For interpretation of this report, please contact:
Earthfort Labs
info@earthfort.com
(541) 257-2612

Consulting fees may apply

**Nematode detail (# per gram or # per mL)**
- Classified by type and identified to genus.
- (If section is blank, no nematodes identified.)

<table>
<thead>
<tr>
<th>Bacterial Feeders</th>
<th>Cephalobus</th>
<th>Cervidellus</th>
<th>Plactus</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.42</td>
<td>0.05</td>
<td>0.21</td>
<td>0.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fungal Feeders</th>
<th>Aporcelaimus</th>
<th>Thorus</th>
<th>Fungal/Root Feeders</th>
<th>Aphenelenchus</th>
<th>Aphenelenchus</th>
<th>Ditylenchus</th>
<th>Filenchus</th>
<th>Root Feeders</th>
<th>Xiphinema</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>0.05</td>
<td>0.05</td>
<td>1.30</td>
<td>0.42</td>
<td>0.57</td>
<td>0.21</td>
<td>0.10</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**Nitrogen Cycling Potential (lbs/ac)**
- 100-150
• The Biological Test tells you what is present and in what numbers.

• Bacteria & Fungi

• Protozoa (flagellates, amoebae, ciliates) (Slate Test)

• Nematodes (types and numbers)

• Various ratios of bacteria/fungi

• Mycorrhizal colonization (%)

• Nitrogen cycling ability of the sample
Examples on Biological Report Summary

- **Dry Wt:** Add OM to build structure and water holding capacity

- **Active Bacteria:** Low, foods may be required.

- **Active Fungi:** Low, need food and *may need biology*

- **Protozoa:** Lacking diversity

- **TF/TB:** Too bacterial for most plants

- **Total Nematodes:** Low numbers, OK diversity.

- **Mycorrhizal Col:** Low, needs food
OK! We have problems. How does this help us make crop or cover crop selection?

WELL? — IT DOESN’T!

Now you need to learn some basics on plant types, and capabilities, and where you want to be in plant succession.

(weeds ←(B/F) → rain forests)
Dr. Elaine Ingham

took "Life in the Soil" class
taking "Microscopy" class
Report—

Total Fungi: Low fungal biomass, foods and biology may be required.

— May Require Biology? —

This means spreading or spraying material that contains the biological life you need/want!
WILL THIS STOP WATER FROM LEAVING THE FIELD?
NEW GOAL

REMOVE COMMERCIAL INPUTS AND MAINTAIN OR IMPROVE YIELDS BY ACCELERATING THE BUILD UP OF SOIL ORGANIC MATTER AND BALANCING THE MICROBIOLOGY OF OUR SOIL
Parting Thoughts

• Reconsider our tolerance to weeds
• Consider doing something
• Consider more dynamic rotations
• For major change to One’s operation:
  • do in manageable steps (don’t bet the farm)
Ultimate Goal: Improve Crop Yields -and- Eliminate Commercial Inputs

- Residue is **KING**
Ultimate Goal: Improve Crop Yields  -and-  Eliminate Commercial Inputs

• Residue is  —KING—
Ultimate Goal: Improve Crop Yields -and- Eliminate Commercial Inputs

● Residue is —KING—