

Obj 3 in Year 1

Prioritize management variables across the region

	Wilke Farm	Cook Agronomy Farm	Palouse Conservation	Hennings Farm	Troutman Farm	Jariva Farm (Ritzville)	Kambitsch Farm	Prosser Station	Pendleton Station	Boyd Family Farms	Moro Station
Site specific N management	■	■									
Crop intensification/diversification	■	■	■	■	■	■		■	■	■	■
Residue management		■		■		■	■	■	■	■	■
Rotational N cycling and management	■	■	■	■	■	■	■	■	■	■	■
Tillage, direct seeding							■		■		■
N fertility, recycled C, N byproducts									■		

Prediction: Market forces will drive win-win scenarios (and be more impactful than policy forces) for improving Climate Adaptation and Mitigation.

Action: We can accelerate these scenarios with applied research and extension that develop, test, document and promote BMPs of alt. systems, recommend policy

- ✓ **Direct seeding (energy, time savings, soil quality)**
- ✓ **Crop intensification (profit).**
- ✓ **Crop diversification (adjust to shifting markets)**
- ✓ **Improve N fert effic. (reduce largest input cost)**

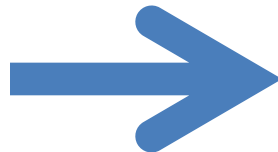
R&E of alternative system BMPs

**Taxpayer
forces and
project
funding**



**Policy
makers**

**Reduce
Disincentives**



**Increase
Incentives**



Market forces



**Wheat
Growers,
Industry**

**(different than
dairy farmers)**

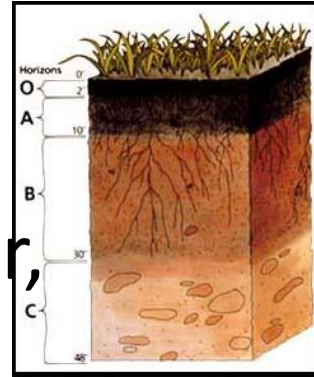
Main business of grain crop production and soil mgt are directly at the center of climate change mitigation and adaptation, milk production is not.

Obj 3 Research Questions

For C sequestration, can we re-build soil organic matter to original native soil levels? Cereal residue returns may not be the holy grail, but...

- ✓ Re-design sampling protocol
 - ✓ Assure metadata procedural tags to historical soil C data and modeling.
 - ✓ Account for decomposing residues in DS systems (duff layer C: see Aeschliman farm).
 - ✓ Conduct C fractionation: recalcitrant, bio active, light fraction <2 mm + **>2mm** on selected historical (e.g. Pendleton plots) and future samples
- ✓ Assess alternative crop residue contributions and recycled N to SOM, e.g. oilseeds.

World views of “duff”



- Homer: Its good beer
- Soil scientists: its not real soil organic matter, therefore we often don't sample it.
- Environmental advocates: “We are interested in this stuff, and we think you should be measuring it” –Patrick Mazza, Climate Solutions

A transdisciplinary discussion....

Huggins



Kruger > Mazza > Pan > Mazza > Stockle > Pan > Gollany

REACCH Some Research Questions

Can we diversify and intensify wheat cropping systems by growing more oilseeds and legumes in rotation? Define agronomic and variety optimization.

✓ *Adaptation:*

✓ *Short season winter crops; water/heat stress tolerance or avoidance. (Our guess reaction to climate predictions, needs to be confirmed with some modelling)*

✓ *Diesel replacement by biodiesel made from oilseeds, GHG emissions are reduced by an average 50% or higher for our region—EPA*

✓ *Legumes increase food productivity/ fertilizer N by not requiring fertilizer applications.*

REACCH Some Research Questions

Research question: *Can we improve regional N, water, energy use efficiency (grain yield/fertilizer or water or energy) by 10%-20%?*

Establish a baseline.

Mitigation:

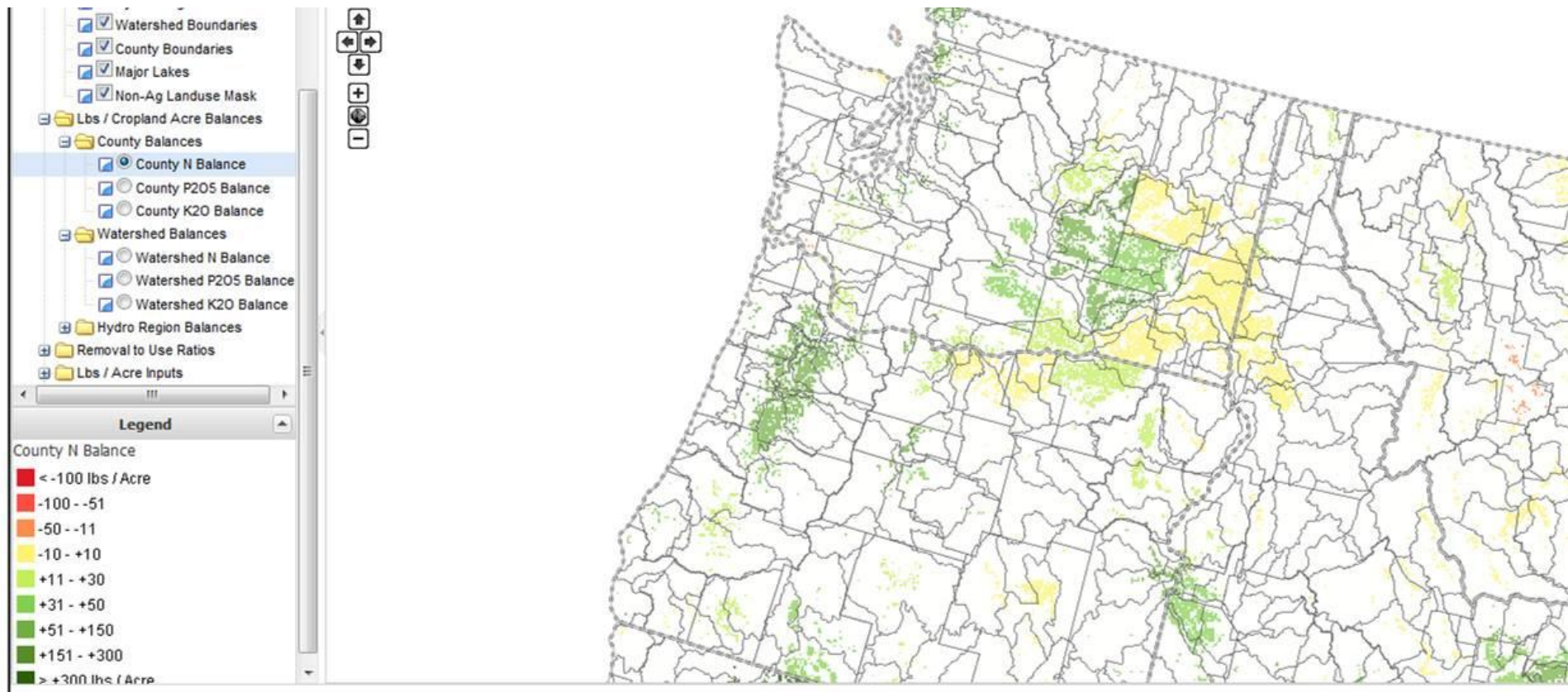
✓ **Reduce fertilizer use/unit grain produced. LCA analysis tells us:** Greatest GHG contributions occurs at the N fertilizer production plant.

Adaptation:

✓ Store more winter precipitation with high residue crops, better soil quality

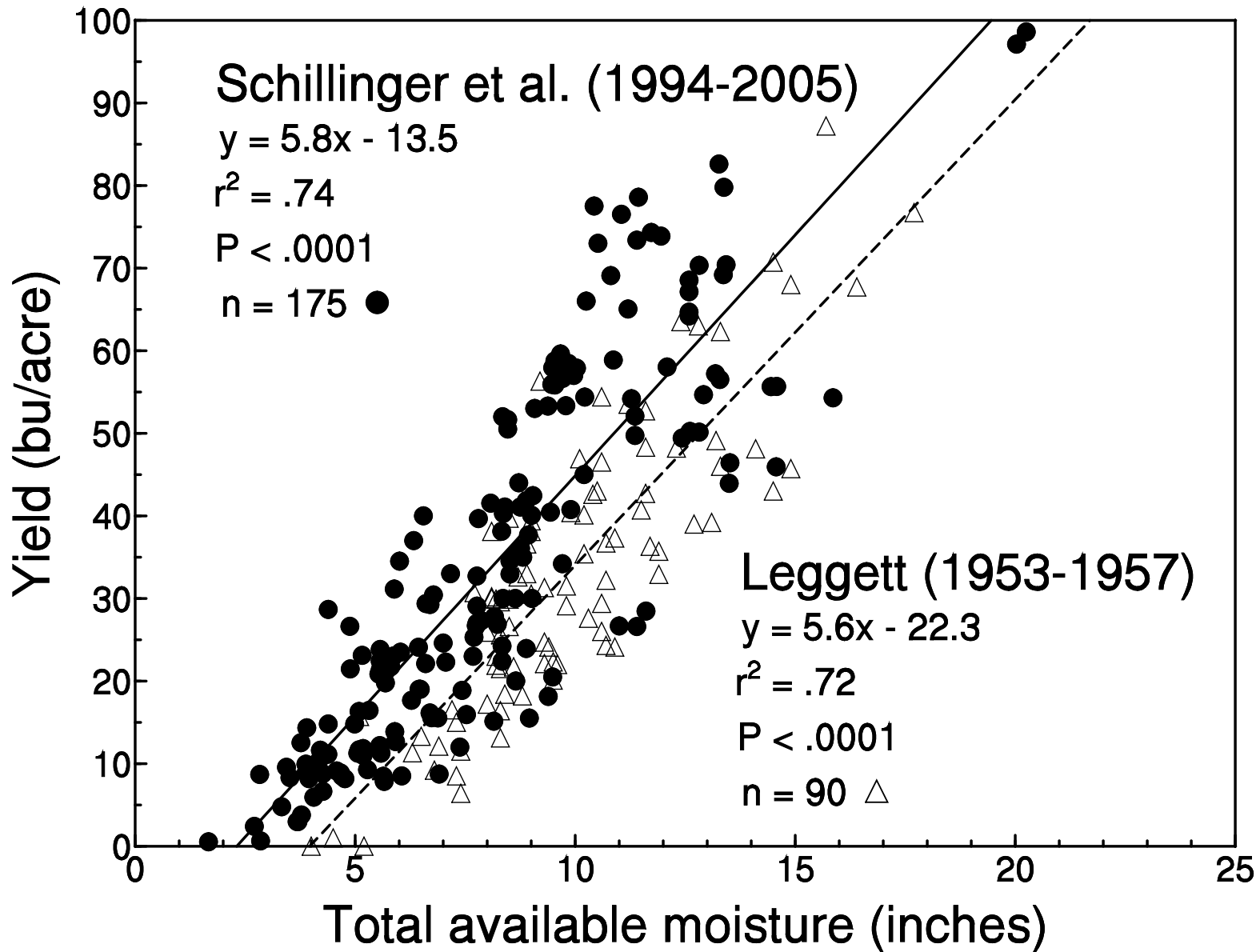
✓ Minimize high reactive N going into winter rainfall period

Establish water, N, energy use baselines, e.g. N Balance (N Harvest/N Fertilizer) Baseline by IPNI



Data taken from NuGIS should be cited as: "IPNI. 2012. A Nutrient Use Information System (NuGIS) for the U.S. Norcross, GA. January 12, 2012. Available on line >www.ipni.net/nugis<".

NuGIS © 2012 International Plant Nutrition Institute IPNI | 3500 Parkway Lane, Suite 550, Norcross, GA 30092 USA



Update, improve for wheat, and other crops

CS Experiment Data

- **Historical Data and Findings, Operations metadata**
- **Harvest:**
 - Grain yield, quality, C, N
 - Residue biomass, C, N
 - Soil rooting depth: water, nitrate and ammonium
- **Pre-plant**
 - General soil test on 0-6"
 - Residue biomass, C, N
 - Soil rooting depth: water, nitrate and ammonium
 - Temperature, moisture sensors at appropriate experiments
- **Growing season**
 - Stand, Growth stage
 - Water stress measurements of key experiments and treatments
 - **Biota sampling at key experiments**
- **Spring**
 - SOM fractionation rooting zone depth (with surface duff layer)
 - Bulk density

Obj 3 cross cutting research questions

- ✓ How will alternative management practices affect pests, pathogens, weeds and **soil microbes**? – **Dave Barton, Pat Binns** (Proposal: Collins-AEZ 2,4; Kennedy-1,3?)
- ✓ How are earthworms affected by management systems?
- ✓ We need to develop a consolidated sustainability index/portfolio/strategic packaged plan of management practices for policy interests and land managers? –**Kirk Cook, Pat Binns**
- ✓ ~~Should~~ How do we best promote (extend) knowledge and adoption of climate CS mitigation and adaptation strategies to the growers?
- ✓ Short term economics on everything to keep growers in business – Jim Fitzgerald, Lori PNDSA
- ✓ International - **Pat Binns**: partner with **WSU Int Programs**-Chris Pannkuk, **CIMMYT, ICRISAT**