KEY PIECES START

ALLOWING THE CHANGING PRACTICES
$15 an acre in seed = 15 bu
Residue removal = We need to treat as a second crop?
FLYPAPER EFFECT
MIKE BREDeson GRADSTUDENT SDSU
RESULTING IN INSECTICIDE REDUCTION
Starting to create challenges as we run out of space
Relay cropping & the start of Companion cropping
$20 seed cost......2 crops

June 15, 2016
Are we happy yet?

If Calendar allows
<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop water need (mm/total growing period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>800-1600</td>
</tr>
<tr>
<td>Banana</td>
<td>1200-2200</td>
</tr>
<tr>
<td>Barley/Oats/Wheat</td>
<td>450-650</td>
</tr>
<tr>
<td>Bean</td>
<td>300-500</td>
</tr>
<tr>
<td>Cabbage</td>
<td>350-500</td>
</tr>
<tr>
<td>Citrus</td>
<td>900-1200</td>
</tr>
<tr>
<td>Cotton</td>
<td>700-1300</td>
</tr>
<tr>
<td>Maize</td>
<td>500-800</td>
</tr>
<tr>
<td>Melon</td>
<td>400-600</td>
</tr>
<tr>
<td>Onion</td>
<td>350-550</td>
</tr>
<tr>
<td>Peanut</td>
<td>500-700</td>
</tr>
<tr>
<td>Pea</td>
<td>350-500</td>
</tr>
<tr>
<td>Pepper</td>
<td>600-900</td>
</tr>
<tr>
<td>Potato</td>
<td>500-700</td>
</tr>
<tr>
<td>Rice (paddy)</td>
<td>450-700</td>
</tr>
<tr>
<td>Sorghum/Millet</td>
<td>450-650</td>
</tr>
<tr>
<td>Soybean</td>
<td>450-700</td>
</tr>
<tr>
<td>Sugarbeet</td>
<td>550-750</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1500-2500</td>
</tr>
<tr>
<td>Sunflower</td>
<td>600-1000</td>
</tr>
<tr>
<td>Tomato</td>
<td>400-800</td>
</tr>
</tbody>
</table>

**Fig. 6 Major climatic factors influencing crop water needs**
Breakeven on RyeBuckSoy
30bu Rye x $10 = $300
30bu Soy x $12 = 400
400# buckwheat x $.30 = $120

$820 per acre revenue
Or equivalent to 200 bpa @$4.10

History would show...I could easily double these numbers

Soybeans are factoring in a NonGMO premium
Breakeven on MaltBarley/Soy
50bu Malt Barley x $8 = $400
30bu Soy x $12 = 400

$800 per acre revenue

Seed cost on both $24 acre
$20 herbicide/fungicide
Breakeven on WheatSoy
50bu Wheat x $6=$300
40bu Soy x $12=480

$780 per acre revenue

30 unit of N/24d upfront
Been avoiding fungicide…
What is rotational Benefit? To Corn?
Nutrient Density

Many of us talk about it....How Many are doing something about it

What are your levels in Grain/Produce?

Simple example: China insist on 35-36% soybeans
Brazilian 2108 exports average 36.83% protein down from 37.14%
Argentina averaged 35.4% which is up from 34.6%
USA averaged 34.2% in same period?

FLOLOfarms 2018 soybeans came in @ 39.65% protein
Commodity production = low cost producer

Long story short = quality pays
Why grow commodity or feed grade?
Yield becomes somewhat irrelevant when

We become the low cost producer while producing quality products.
2018
Cereal Rye / Soybeans with companion clover

40 bu of 99% germ Cereal Rye
60 bu Food Grade Tofu soybeans
Conservatively $12 a bushel
$100 seed/chem/fert
$100 equipment…. Plant 2x Harvest 2x

$1000 per acre for Land cost and Management

We as farmers get paid to run Equipment and Manage…..
@FLOLOfarms 2020 vision
<table>
<thead>
<tr>
<th>Load &amp; Helen's North 80</th>
<th>Accrued</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (lb/acre)</td>
<td>236.2</td>
<td>23.2</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>23.7</td>
<td>23.5</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>12.2</td>
<td>42003</td>
</tr>
<tr>
<td>Potassium</td>
<td>211</td>
<td>9.4</td>
</tr>
</tbody>
</table>
Loss/Acre
$23.25
OK, so... what happens when Mother Nature doesn’t cooperate? DELAYED TERMINATION or RELAY?
The fine line of testing

WE CAN GO TO FAR........SOMETIMES
@FLOLOfarms 2020 vision
40# of Nitrogen

80# of Nitrogen
About $8 acre herbicide program

AGAIN....EXTENDING THE CARBON SEQUESTRATION PERIOD
Fields 1.
Date of Sampling: 6/14/19
Lat./Long: 42.954928, -91.834878
Soil Series: Kenyon loam
Topsoil Thickness: Greater than 30 cm
Topsoil Transition:
Soil Organic Matter: 4.31%
Stable Aggregates: 88.68%
Dry Bulk Density: 1.07 g/cm³
Earthworm count: 4
Infiltration: 15 min for first inch of water
- Infiltration measurements are influenced by the amount of recent precipitation; Your fields were tested right after a rain event, so the times given may be higher than what is typical.

Penetration Test

Field 1
Field 2

% Stable Aggregates (upper 3 inches)

0
80.3
76.1
86.7
86.6
53.3

Average Soil Organic Matter (upper 3 inches)

4.4
3.6
4.3
4.6
2.8

Dry Bulk Density (g/cm³)

(upper 3-5 inches)

1.21
1.07
1.22
1.27

Soils with high aggregate stability will be more resistant to erosion and more porous, improving infiltration, root growth, and oxygenation which reduces the chance of pathogen development.
High aggregate stability is promoted by reduced tillage, increased cover, and reduced inputs, because these practices support the healthy microorganism populations that secrete the organic glues that bind soil aggregates together.

High soil organic matter (SOM) promotes the growth of a healthy microbial community, improving pathogen resistance and aggregate stability (see left). The use of manure can increase SOM but may not lead to improved aggregation if the microbiome is not healthy.
Managing soils to increase SOM helps remove carbon dioxide from the atmosphere and may soon become eligible for carbon credit payments.

Low dry bulk density indicates porous soil, which promotes infiltration, aeration, and root growth. Tillage can temporarily decrease density, but tilled soils will actually become more compacted over time as they lose their organic matter content and stable aggregates. Reduced tillage and cover crops can increase density by increasing soil organic matter, promoting microbial health, and improving soil aggregation.

Perennial system

This soil from an undisturbed hardwood forest on the Luther College campus represents a native perennial system for comparison to the agricultural systems in this study. The forest is on Fayette silt loam, a comparable soil type to many of those found in the study's agricultural field sites.

Multicrop system

The multicrop average in the graphs above is composed of 4 fields sampled in this study that have been under no till, crop rotation, and multi-cropping techniques for 4 years or more. (Fields 1 and 2 are part of this average.)

Reduced till system

This average is composed of 16 of the fields sampled in this study. The majority of the fields have been in no till bean and strip or vertical till corn for 5 years or more, with varying cover cropping practices. Soil health in the study farm average likely already exceeds that of conventional tillage systems.

These findings suggest that within as few as 4 years, multi-cropping systems can significantly close the soil health gap between agricultural and native perennial systems.
The Triple Bottom Line:
Profitability, Sustainability, & Feeding the World:

Variable Sunlight Harvest Experiment
Companion Crops Benefit from Additional Sunlight

Steinlage Plots, 60” opening
23 Sep 2017

Steinlage Plots, 30” opening
23 Sep 2017
InnerSeeding and Equipment Relay & Companion cropping Understanding indicator species Suppression Techniques

All are leading to a new door opening? Organic NoTill
Creating a sufficient nitrogen environment….yet starved enough to keep the system hungry via a living Legume?

Nitrogen to corn is like Crack…..once it gets a taste it wants more
How do we find Balance? Or do we need to?
Aka Quorum Sensing per Dr Christine Jones?
Simulated Organic Plot

Only expenses/inputs

Seed/donated PenPack Swine manure & equipment

Corn on Corn

147bpa @$10 organic corn
$1470 per acre?

Showing enough promise we’re going for year 3 & starting plot at home if it overwinters
THEN IF WE’RE RESOURCEFUL

We will take it to the next level
Managing a living Mulch system

SETTING UP FOR A CONTINUOUS CARBON STREAM
8:1
Water:Carbon
Every Gram of Carbon
In the soil
8 grams of water
Saturation test
100g of soil weighed out and saturated, then weighed

Held -- Practice

68g or 40% -- Corn with 32 way Innerseed mix
59.5g or 37% -- monocrop Barley w/ Covers
55g or 35% -- Relay19 Corn w/delay terminate Clover
38g or 27% -- no-till corn into soy w/NH3
72.5g or 42% -- current Relay Rye/Soybean
64g or 39% -- delay terminated rye Soybean with InnerSeed
66g or 39.75% -- delay terminated Corn with InnerSeed
COMMON DENOMINATOR

MANAGEMENT MAKES THE DIFFERENCE
CARBON SINK TIMELINE

= PEAK CARBON SINK PERIOD

Special thanks to: Dr Kris Nichols
For triggering this series

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND

months

SOYBEAN

CORN

SOYBEAN
CARBON SINK TIMELINE

= PEAK CARBON SINK PERIOD

CEREAL GRAIN

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND

SOYBEAN

CORN

SOYBEAN
CARBON SINK TIMELINE

= PEAK CARBON SINK PERIOD

CEREAL GRAIN

SOYBEAN

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND

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CORN

SOYBEAN
CARBON SINK TIMELINE

= PEAK CARBON SINK PERIOD

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND

CEREAL GRAIN

SOYBEAN

SOYBEAN

BUCK WHEAT

CORN

SOYBEAN
CARBON SINK TIMELINE

= PEAK CARBON SINK PERIOD

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND
CARBON SINK TIMELINE

= PEAK CARBON SINK PERIOD
CARBON SINK TIMELINE

CEREAL GRAIN

SOYBEAN

CORN

Volunteer grain/COVER

Overwintering INNERSEED MIX

CORN OR SOY?

= PEAK CARBON SINK PERIOD

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND

CEREAL GRAIN

SOYBEAN

CORN

SOYBEAN
CARBON SINK TIMELINE

perennial CLOVER from 2017

= PEAK CARBON SINK PERIOD

Suppression not Termination time?
For Max Carbon sequestration

CEREAL GRAIN

SOYBEAN

Volunteer grain/COVER

buckwheat

Overwintering INNERSEED MIX

corn

CORN OR SOY?

SOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND
I’ll leave you with this thought
WHEN THINKING ABOUT

LAW OF THE MINIMUM

ARE YOU FOCUSED ON THE STAVES?
HOW’S THE CONDITION OF YOUR BARREL?

CARBON CAN PLUG THE LEAKY SYSTEM/BARREL
WE HAVE A LEAKY SYSTEM

MAXIMIZING SUN/CARBON CAPTURE HELPS US PLUG THE LEAKS
HOW SOMETHING APPEARS IS ALWAYS A MATTER OF PERSPECTIVE...
Loran Steinlage or @FLOLOfarms

(563)380-1149