

# SOIL HEALTH WHERE ARE WE HEADING

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BUILDING **SOIL HEALTH** MAY SEEM LIKE AN IMPOSSIBLE TASK, BUT WE HAVE THE TOOLS TO DO IT.



# AREAS OF FOCUS

- Consultation
  - Promote the 5 Principles of Building Soil Health



# 5 PRINCIPLES TO IMPROVE SOIL HEALTH

1. Armor the Soil
  2. Minimize Disturbance
  3. Plant Diversity
  4. Keep a Living Root Year Round
  5. Livestock Integration
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# 1 ARMOR THE SOIL

- Prevents Erosion
- Lowers Soil Temperatures
- Limits Water Loss from Evaporation
- Increases Water Infiltration
- Reduces Compaction
- Carbon to build OM
- Food for Microbes
- Fuels the Nutrient Cycle



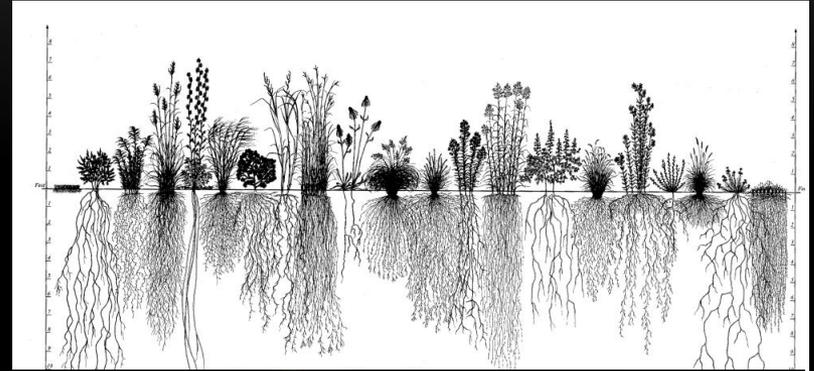
# 2 MINIMIZE DISTURBANCE

- Goal Minimize Disturbance the Physical, Chemical, or Biological of the soil
- Healthy soils have “good” structure, balanced fungal/bacteria pop., plentiful earthworms, and OM
- \* Example: Tillage destroys soil structure, creates plow pans, alters fungal/bacteria ratio, kills earthworms, and uses-up OM
  - Impairs Water & Nutrient Cycle



# 3 PLANT DIVERSITY

- Allows for a more diverse underground community
- Plants attract Microbiology with root exudate
- -Legumes/Rhizobium,
- -Big Bluestem/Mycorrhizae
- Each plant Species exude diff. root exudates
- Reduces risk from adverse weather – something in a mix should still do good



Safflower, Small Grain, Rape, Buckwheat, Turnips

# 4 KEEP A LIVING ROOT YEAR ROUND

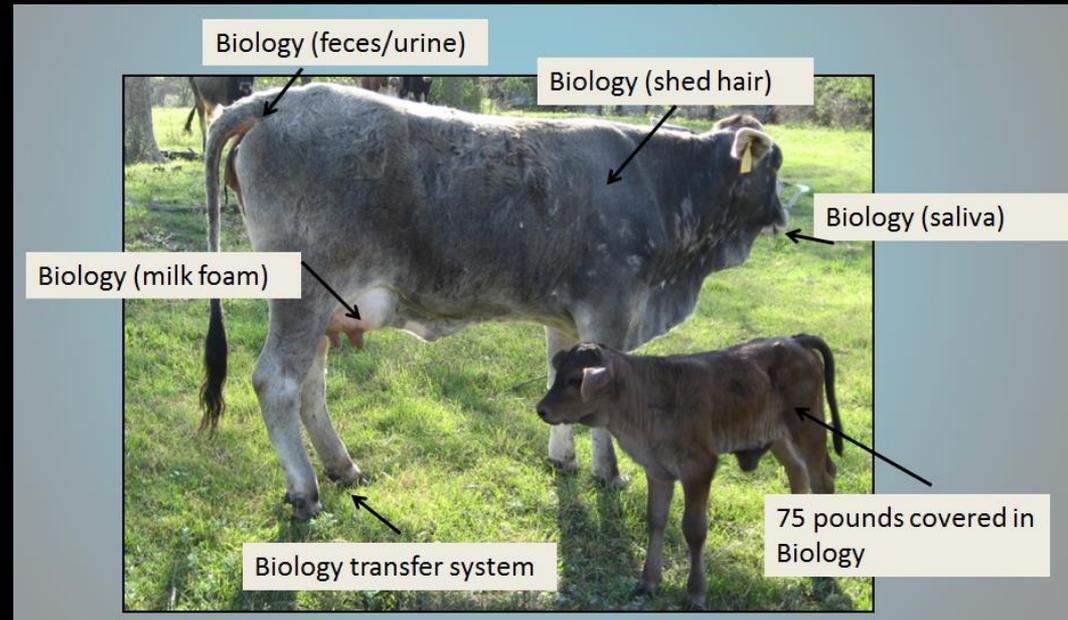
- Each part of the root exude different exudates. Different plants give off different exudates.
- Diverse amounts of actively growing roots foster diverse Microbiology year round.
  - As microbes grow and die they release nutrients.
  - Therefore, the nutrient cycle is working year round!
- Tap roots and fibrous roots each contribute to good soil structure in their own way.



# 5 LIVESTOCK INTEGRATION

- Livestock Integration is the use of Livestock (Horses, goats, sheep, hogs, chickens, ducks, turkeys, (Buffalo, llamas, and even cattle?)) to accomplish **Specific Objectives**.

- Assist with the Termination of a Cover Crop
- Stomp-in plant material
- Add Biological Diversity
- Manage Plant Communities
- Leave adequate residue amounts
- Plan to provide adequate recovery



# AREAS OF FOCUS

- Consultation
- **Workshops & Demonstrations**



# WORKSHOPS



# DEMONSTRATIONS

**Seed Cost: \$27/acre**

**Seed Mix:**

**Legumes - Cowpeas, soybeans (40%)**

**Grasses - prothro millet, browntop millet, pearl millet, sorghum-sudan (60%)**

# DATA:

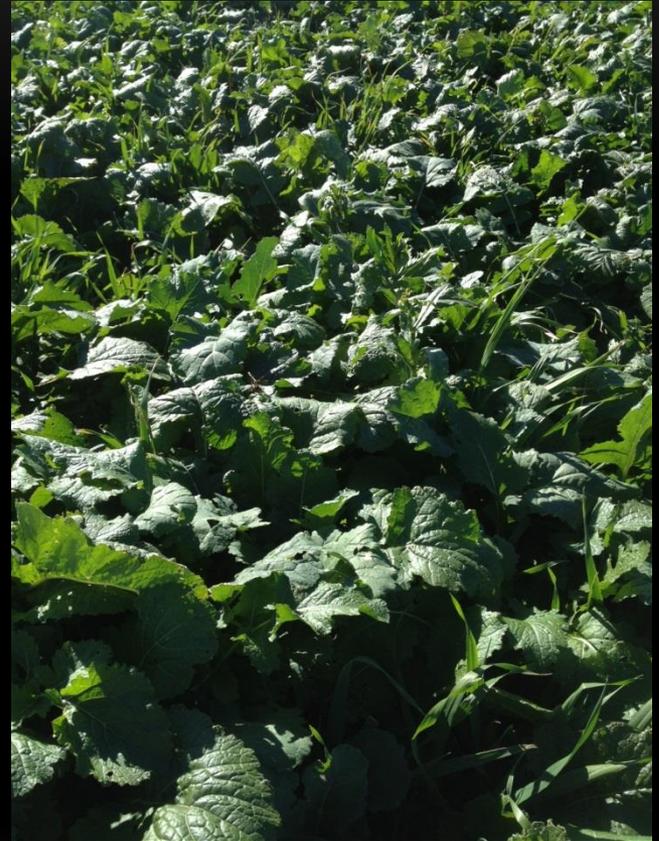
- Turned out 200 – 695 lb heifers on Aug. 1
- Rotated on 30 acres (7 paddocks) for 20 days
- Gained 2.45 lbs/hd/day with no supplement, implant, or fertilizer

**2.45 ADG in August with heifers!**

- Received 140 fresh 400-lb heifers in August

# AREAS OF FOCUS

- Consultation
- Workshops & Demonstrations
- **Applied Research**



# APPLIED RESEARCH

- No-Till
- Cover Crops
- Grazing



# AREAS OF FOCUS

- Consultation
- Workshops & Demonstrations
- Applied Research
- **Basic Discovery Research**



# BASIC DISCOVERY RESEARCH

- Dr. Kelly Craven
  - Relationship between plants and fungus (symbiotic relationships)
  - Symbiotic microbes – stress, weather , drought



# AREAS OF FOCUS

- Consultation
- Workshops & Demonstrations
- Applied Research
- Basic Discovery Research
- **Partnerships & Collaborations**

Cover Crop Mix Potential Ratings (scale of 1-10)										
C:N Ratio	Grazing	Drought	Frost	Winter	Diversity	Salinity				
30	6.6	6.5	5.7	7.0	7.1	9.3	5.8			
Type	Full Rate	lbs per acre	% full rate	% by wt	% by # seed	Effect %	Seeds/lb	seeds per acre	Cost per lb	
<b>TOTALS</b>		<b>89</b>	<b>104%</b>						<b>3,014,000</b>	
<b>Legumes</b>										
Mung Beans	WS-B	20	2	30%	5%	3%	7,000	14,000	\$1.10	
<b>Grasses</b>										
				79%	54%	67%				
Brown Top Millet	WS-G	15	0.5	3%	1%	4%	120,000	60,000	0.80	
Winter Sorghum	CS-G	80	8	11%	23%	18%	18,000	162,000	50.30	
Winter Wheat (soft)	CS-G	80	12	13%	31%	17%	14,000	168,000	50.20	
Corn - Winter (Belt)	CS-G	100	9	9%	23%	18%	18,000	162,000	50.30	
<b>Brassicas</b>										
				6%	17%	27%				
Rapeseed	CS-B	6	1	1%	3%	17%	170,000	170,000	51.00	
Turnip (purple top)	CS-B	6	1.2	20%	3%	20%	170,000	204,000	52.00	
<b>Other Broadleaves</b>										
				10%	7%	4%				
Leafhopper	WS-B	12	1	8%	3%	2%	15,000	15,000	50.80	
Blackberry	WS-B	10	3	10%	8%	5%	18,000	18,000	50.75	
Seed Cost/acre: 117.83 Total Cost per Acre:										
Name: Patsy Nichols Phone: City, State, Zip: Acres to plant: 250.00										
Date: 8/20/13 Total Pounds of Green Cover SmartMix Needed: %										
Total Seed Cost of Green Cover SmartMix: \$4.4										
Subtotal: \$1.83										
Inoculant cost (per pound): \$0.45										
Mixing cost (per pound): \$0.45										

# PARTNERSHIPS & COLLABORATIONS

- Producers

- NRCS
- ARS
- Green Cover Seed
- GLCI
- NCTC
- Dixon Water Foundation
- No-Till on the Plains
- SARE



# HOW ARE WE GOING TO MEASURE SUCCESS?

Questions ?

Questions ?

Questions ?

