

# Soil Health Update 2013

## Tools for Building Soil

**Cover Crop Cocktails attempt to mimic nature by increasing plant diversity in farmed soil ecosystems**



Last summer we continued to experiment with cover crops and no-till farming on 45 acres of sprinkler irrigated land on the Woodson Ranch.

This 5 year trial is intended to increase local knowledge of progressive farming technologies that are receiving national attention for restoring soil and reducing farming costs.

No-till farming is the practice of using herbicide, machinery, or livestock to terminate crops, and

then seeding directly into the soil without plowing or otherwise disturbing the ground.

Limiting soil disturbance preserves soil structure and organic matter, which has implications for future nutrient mineralization, infiltration, and water holding capacity. No-till also reduces tractor time, fuel costs and labor.

Cover crop cocktails are diverse mixtures of annual crop species that are chosen to meet prede-

termined needs of the land and land manager.

Cover crop cocktails are complementary to no-till and can be used as a tool for building organic matter, improving soil structure, fixing nitrogen, breaking up compaction, fighting pests, and attracting pollinators.

2013 presented weed and weather challenges in the trial plots, but we continued to harvest valuable information for local producers.

*“A thing is right only when it tends to preserve the integrity, stability, and beauty of the community, and the community includes the soil, waters, fauna, and flora, as well as people.”*

—Aldo Leopold

## New Lab Test Quantifies Soil Health

This year we worked with the Agricultural Research Service (ARS) in Temple Texas to take a deeper look at soil nutrients.

Traditional soil tests quantify currently available soil nutrients to make fertilizer recommendations. While an important first step, these tests only paint part of the nutrient picture and often overlook the value of soil biota.

Healthy soils are teeming with life and therefore represent a

large pool of organic “slow-release” nutrients. Dr. Rick Haney and others have developed a new soil test that helps quantify this organic pool and evaluate the nitrogen, phosphorous and potassium that will be available during the growing season.

This work supports assertions by soil building farmers that they have reduced their need for commercial fertilizer despite

large input recommendations from traditional tests.

The results of our first sample are shown below. The numbers are a little confusing, in part since fertilizer was already applied to some plots. The high level of nutrients in the cover crop plot is very encouraging, and validates the use of this practice for building soil. We will continue to evaluate nutrient trends in coming years.

## 2013 ARS Soil Test Results from the Woodson Ranch

	N lbs/acre	P2O5 lbs/acre	K2O lbs/acre	Nutrient value/acre
<b>No Fertilizer</b>				
Cover Crop-2 years	83.72	20.29	121.16	\$137.13
No Till Barley/Peas-2 years	56.78	13.88	66.82	\$83.88
No Till Barley-2 years	58.48	15.86	97.50	\$104.69
Conventionally Tilled Barley-2 years	46.30	16.79	94.51	\$96.24
<b>With Conventional Fertilizer</b>				
Existing Hay	37.94	16.97	46.54	\$62.57
Cover Crop-2 years	107.12	32.64	89.57	\$140.86
No Till Barley/Peas-2 years	91.25	25.29	66.56	\$112.39
No Till Barley-2 years	99.73	23.83	66.43	\$116.38
Conventionally Tilled Barley-2 years	116.71	34.83	78.52	\$141.51

## 5 Things We Have Learned So Far...

**No-Till Requires Patience** as crops tend to come on slower than conventionally planted fields, likely due to cooler soil temperatures and less of a nitrogen “bump” from tillage operations. Although not as quick out of the gates, no-till yields can still match conventional fields and they cost less to produce.

**Forage Peas** are a great first step to increasing diversity in cropping systems. They have grown well at the Woodson’s when mixed with hay barley, triticale and in the cover crop.

Peas fix free nitrogen, make good hay and attract pollinators.

**Radishes Volunteer Readily** and could potentially become weedy if allowed to go to seed. This year we found radishes in the new alfalfa planting. It is not a concern since it will be hayed, preventing any more seed production, but some folks might not want it in their annual crops.

**High Carbon Species** are needed to keep the soil covered in winter. The cover crop mixes have decayed so fast (and been

eaten by so many deer) that there is too much bare ground come spring. Increasing high carbon species like oats, wheat and corn can help keep the soil covered.

**Warm Season Species** such as millet and sorghum/sudangrass are great for the soil but can be limited by our short growing season. They have done well 2 out of 3 years but maturity is not guaranteed due to early frost. When successful, they make great cattle forage and excellent food and cover for birds.



**Arvika Forage Peas planted at 50 lbs/acre, along with 50 lbs of hay barley or triticale, have made excellent hay on the Woodson Ranch.**

## Organic Matter Critical for Drought Management

Whether it is El Nino, Climate Change, the Pacific Decadal Oscillation, or just some oddball weather, agriculture is often at the mercy of mother nature, and she seems a little unpredictable lately.

It just makes sense to do everything we can to improve resilience to increasingly erratic weather, and building soil organic matter is likely the best place to start.

OM is closely tied to soil’s water holding capacity. Therefore, high levels of organic matter provide a buffer against drought in pasture, hayfields and rangeland.

Studies have shown a 1% increase in organic matter will allow the soil to hold an additional 3 gallons of water per cubic yard, or over 15,000 gal/acre (Jones, 2010). This is because stable forms of soil carbon, such as humus, can hold 7

times their weight in water.

Organic matter and biological processes are also responsible for building or maintaining soil structure that allows for water to infiltrate into the profile rather than running down the creek.

For these, and many other benefits, make sure building organic matter is part of your farm or ranch management plan.

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## Is Soil Health Catching On?



No-till grain sprouts in an old hay field near Twin Bridges.

RHF Soil Health outreach efforts have reached a large number of agricultural producers in the valley and across the state. Although difficult to quantify, we are confident that our experience has helped encourage folks to try new farming methods.

Over the past few years we have seen a dramatic increase in no-till farming throughout Madison County, often with ex-

cellent results. Equally encouraging, is the increase in awareness regarding soil health principles. No doubt, this is due in part to the work done at the Woodson Ranch Soil Health trial site.

We expect that if we are able to continue to demonstrate the economic benefits of soil health practices in a 5 year rotation, more people will give them a try.



No-till turnips in grain stubble near Sheridan