

Teton Mountain Ranch: Transition to Irrigated No-Till Barley

Teton Mountain Ranch is a 5th generation family-owned and -operated farm and ranch raising livestock (cattle and elk) and forage (hay and barley). In 2018, Teton Mountain Ranch began a multi-year farmer-led research project to transition one 32-acre parcel into a no-till system while keeping an adjacent 31-acre parcel conventional till. The primary goal of this project was to gain familiarity with adopting a no-till system for an irrigated barley crop and to establish baseline soil health data between a conventionally managed barley crop and a reduced or no-till barley crop.



Teton Mountain Ranch seeded the entire 63-acre field in Copeland malt barley using an end-wheel seed drill. All inputs were the same on the no-till parcel (treatment) and conventional parcel (control). The entire field was harvested on September 6 and barley yield was uniform across the entire parcel at approximately 80-90 bushels/acre. After harvesting grain, the straw was baled, and the entire parcel was irrigated to encourage volunteer grain growth. Volunteer grain growth was grazed supporting 50 head for 5-6 days.

Soil Health Tests

2018 was the first year of a multiple year comparison between no-till and conventional till irrigated barley cash crop. The data presented below provides information to establish baseline soil health data and will be compared to future data annually.

Water Infiltration Rates

The average water infiltration rate was 4.3 inches per hour indicating that the soil can, on average, absorb up to 4.3 inches of water per hour. Water infiltration rates ranged from a minimum of 1.7 inches per hour to a maximum of 5 inches per hour.

Water Infiltration Rates (inches/hour)		
	North (Control)	South (Treatment)
Minimum	1.7	1.7
Median	4.3	11
Maximum	51	53

Soil Compaction

Soil compaction was similar on both the north and south parcel when the demonstration project was started. These results will be compared to 2019 soil compaction results, 1 year after the change in management.

Soil Compaction (feet of penetration)		
	North (Control)	South (Treatment)
Minimum	0.81	0.83
Mean	0.91	0.93
Maximum	1.09	1.03

Seeding Notes

Field Preparation - Conventional: spring 2018 moldboard plow and disked 3 times

Field Preparation - Reduced Till: spring 2018 moldboard plow and disked 2 times

Inputs: 42 lb/acre nitrogen, 49 lb/acre of sulfur, herbicide, fungicide

Seeding Method: end-wheel seed drill

Seeding Date: May 14th

Seeding Rate: 110 lb/acre

Variety: Copeland malt barley

Haney Test

The average soil health calculations on both parcels were above 7. This is likely due to good organic matter content, slightly below to slightly above average microbial activity, good organic carbon and nitrogen, and carbon to nitrogen ratio for good microbial productivity.

Field	Organic Matter % LOI	Soil Respiration (CO ₂ - C) ppm C	Organic C ppm C	Organic N ppm N	Organic C:N	Soil Health Calculation
North Minimum	3.6	8.0	172	13.0	12.7	5.59
North Median	4.05	23.6	187	13.75	13.8	7.455
North Maximum	4.3	55.3	209	14.2	15.0	11.11
South Minimum	4.1	67.9	182	12.4	11.4	7.99
South Median	4.25	42.8	175.5	13.75	12.55	8.27
South Maximum	4.5	30.1	155	15.3	13.4	11.71

Next Steps

In 2019, the north field was converted to a no-till system and the 2018 soil health and crop productivity results on Teton Mountain Ranch provided baseline data to track changes in overall soil health and productivity. Comparisons will be made on soil compaction, Haney Soil Test results, water infiltration rates, crop stand and weed counts, and financial returns.



Photo by Camrin Dengel