Recap of farm testing 2023

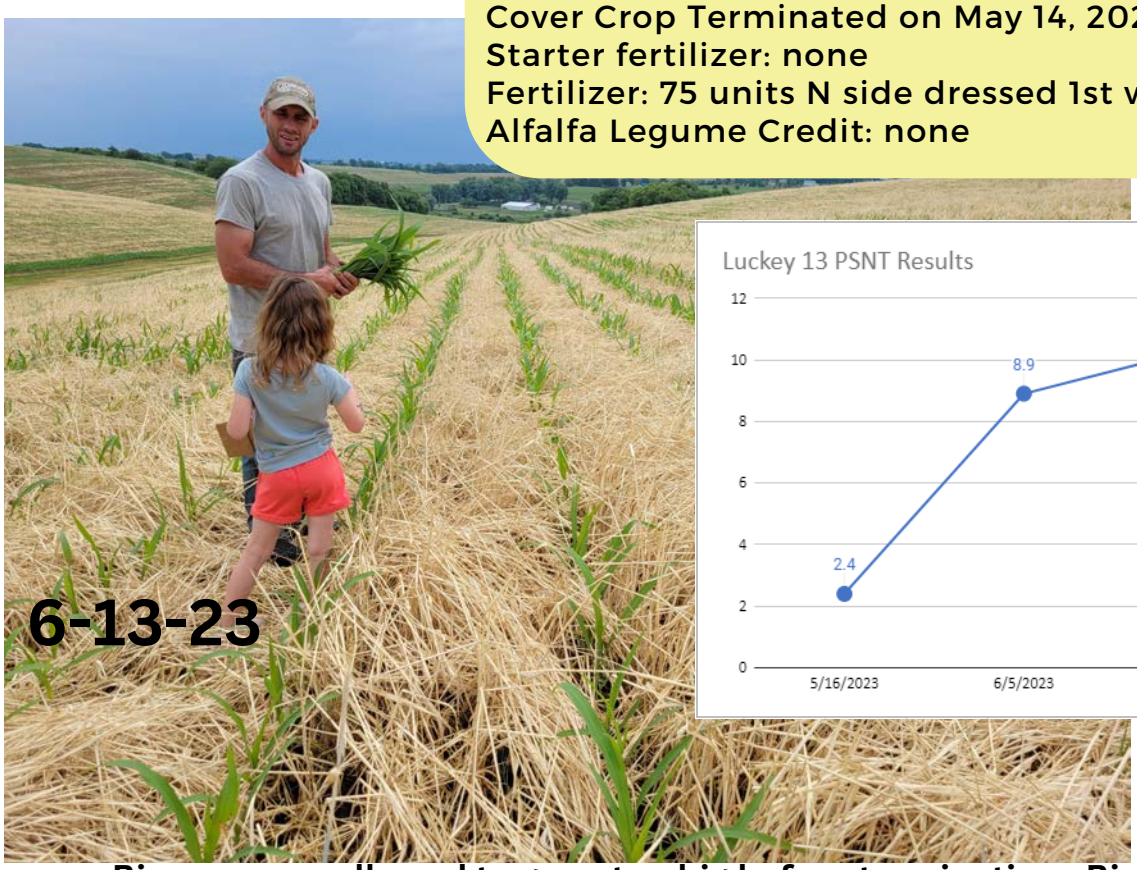
JEREMY LUCKEY

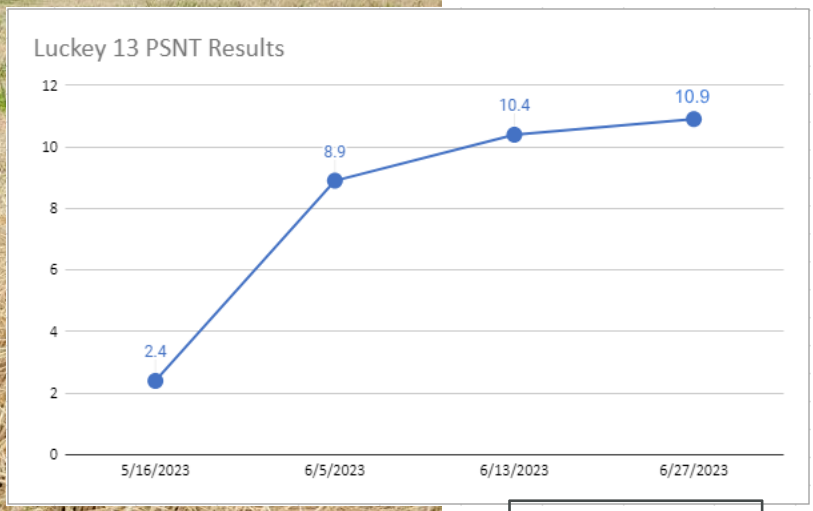
17 tons/ac fresh biomass on May 9, 2023 (2.2 tons/ac dry)

Biomass sampling results:

	Nitrogen	Phosphorus	Potassium	Calcium	Magnesiu	C:N Ratio	
Date	N	P2O5	K2O	Ca	Mg	C:N	height
2-May	85.5	24.2	117.9	12	5.8	22.3	20"
9-May-23	126.3	36.8	190.1	27.8	10.9	15.8	29"

Location: Luckey 13
Soil: Dodgeville silt loam
Soil yield potential: medium
Field Slope: 12-20%.
Soil organic matter: 5.6%.
Cover crop: cereal rye, vetch, red clover
Manure applied: 7,600 gallons applied Sept 2022
Crop planted: Corn planted May 4, 2023
Cover Crop Terminated on May 14, 2023
Starter fertilizer: none
Fertilizer: 75 units N side dressed 1st week July
Alfalfa Legume Credit: none





PSNTs are less reliable during drought conditions.

Lesson: Biomass was allowed to grow too big before termination. Biomass volume exploded- taking up moisture and nitrogen, then tying up nitrogen to break the cover crop down, so not enough N was available for the planted corn crop (as seen in PSNT results). Even though lots of residue, another herbicide pass was needed due to lack of canopy. The crop was profitable despite the low inputs (105 units of N).

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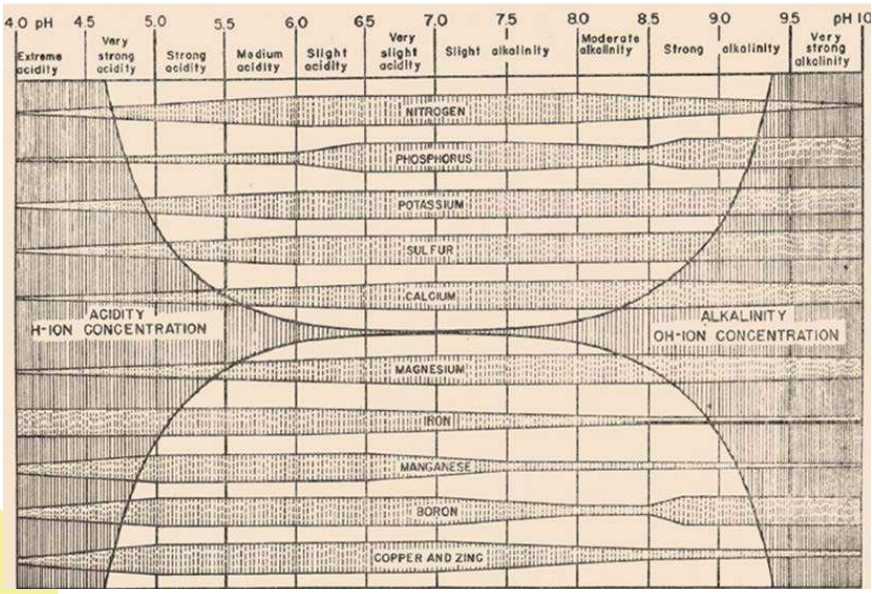
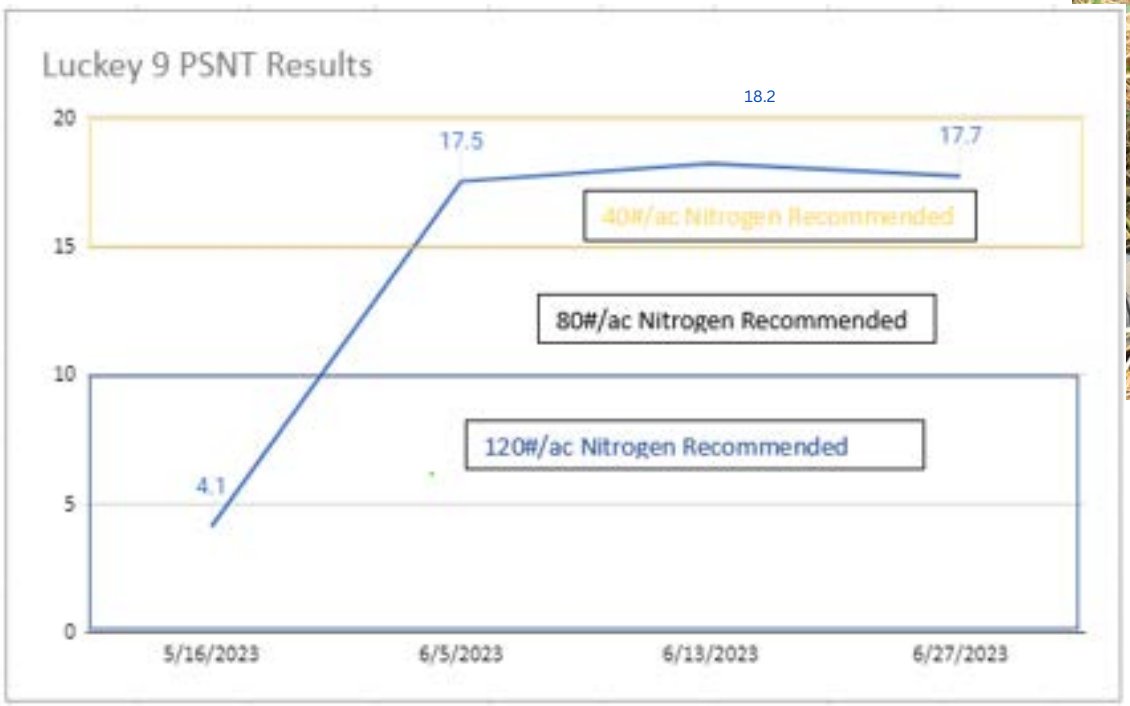
Routine Soil Test Results					
Field sample	date	soil pH	OM %	P (ppm)	K (ppm)
9	9/24/21	7.5	5.6	52	228
9	5/9/23	7.6	6.8	46	516
12	9/24/21	7.3	6.5	15	109
12	5/9/23	7.3	8.4	12	297
13	9/24/21	7.3	6.5	15	109
13	5/9/23	6.3	4.5	29	209

Farmers should keep an eye on the pH of the soil. Sometimes it creeps up past 7, some nutrients become less available. See the thickness of the bars in the chart to the right- it shows the availability of the nutrient at different pH's.



Location: Luckey 9
Soil: 1180C2 New Glarus- Dunbarton silt loam.
Soil yield potential: medium
Field Slope: 6-12%.
Soil organic matter: 6.8%.
Cover crop: Rye into established 2yr old alfalfa
Manure applied: 7,600 gallons applied Sept 2022
Crop planted: Corn planted May 4, 2023
Alfalfa Terminated on May 14, 2023
Starter fertilizer: none
Fertilizer: none
Alfalfa Legume Credit: Minimum of 130 lb per acre

PSNT is in theory explaining both the manure and legume credit. However, the difference in Field 13 and 9 indicate that a majority of the N credit is due to the legume cover crop or the interaction of the two.
The consistent level of nitrate throughout June would indicate there is an active release of N throughout June, as the crop would be actively utilizing the soil nitrate as it grew.

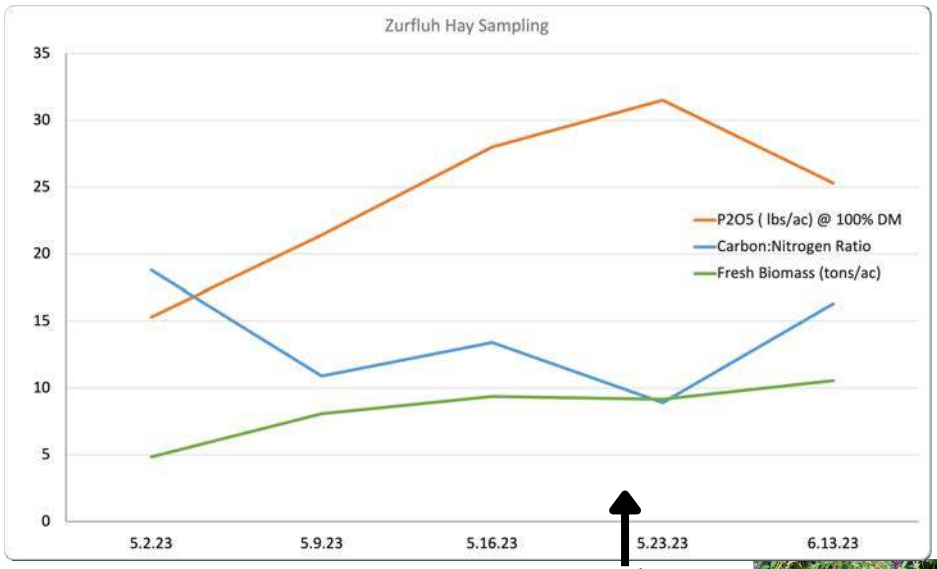


Legume credit (Poor alfalfa stand > 8") and PSNT results showed enough N was available, so no more N was added to the system.

Recap of farm testing 2023

BOB ZURFLUH

Location: Zurfluh Hay
Soil: Whalan silt loam.
Soil yield potential: medium
Field Slope: 2-6%.
Soil organic matter: 2.1%.
Previous crop: Alfalfa established 2019
Chemically Terminated on May 21, 2023
Corn planted May 30, 2023
Alfalfa Legume Credit: Minimum of 130 lb per acre
Starter fertilizer: none
Fertilizer: none



Field produced low quality corn silage- little to no grain. In hindsight, farmer would have put on more manure to help with seedling emergence (and not have a drought!).

terminated most of field. sampled in unsprayed area to see what could have been produced if waited to terminate

biomass results

Date	Nitrogen N	Phosphoru P2O5	Potassium K2O	Calcium Ca	Magnesiur Mg	Sodium Na	Sulfur S	Zinc Zn	Manganes Mn	Copper Cu	Iron Fe	Boron B	Aluminum Al	Carbon C	C:N Ratio C:N	Fresh Biom As cut tons	Dry Biomas 100% dry t
5/2/23	55.2	15.3	62.8	12.9	4.9	0.4	4.7	0.08	0.08	0.02	0.4	0.04	0.42	1035	18.8	4.83	1.01
5/9/23	95.5	21.4	80.7	21.1	7.6	0.7	7.1	0.1	0.1	0.02	0.39	0.07	0.3	1043.1	10.9	8.07	1.11
5/16/23	114	28	100.9	33.5	11.9	1.1	10.6	0.14	0.1	0.03	0.61	0.13	0.46	1526.6	13.4	9.36	1.61
5/23/23	138.3	31.5	131.6	48.9	14.9	1	14.9	0.16	0.11	0.04	0.63	0.2	0.41	1228.8	8.9	9.15	1.91
6/13/23	174.6	25.3	54.5	164.7	33.8	2.6	16.9	0.14	0.21	0.07	0.53	0.35	0.46	2846	16.3	10.55	2.91

Hay

Routine Soil Fertility Results					
Sample ID	Organic Matter (%)	pH		P(ppm)	K(ppm)
Sampled May 16, 2023	2.1	7.6		5	97
SnapPlus 12/21/2020	2.3	7.1		15	77

Soil organic matter is lower than expected for SW WI silt loam soils. Plant available phosphorus and potassium levels should be managed to optimum levels and are both low. Seasonal sampling variations may occur spring vs. fall. These interpretations are based on a corn grain crop. pH is high for a common dairy crop rotation. The pH should be managed for the appropriate crop; for alfalfa this is 6.8, and for corn 6.0. pH is nearly impossible to lower so no lime or alike material should be applied to this field.

Rye

Routine Soil Fertility Results					
Sample ID	Organic Matter (%)	pH		P(ppm)	K(ppm)
Sampled May 16, 2023	2.3	7.4		6	158
SnapPlus 11/25/15	2.2	6.7		20	90

PSNT Soil Results	
Sample ID	Nitrate (ppm)
Sampled 6/5/2023	4.9
Sampled 6/13/2023	9.6

The PSNT provides a direct estimate of the manure nitrogen credit likely to be released during the growing season. Results- Since most of the results indicate available nitrate is below 10 ppm, no nitrogen credit is available according to test results. This PSNT result common but not expected when alfalfa is the previous crop, essentially the microbes have not fully cycled the organic soil nitrogen into the inorganic nitrogen pool. 2023 drought conditions likely affected this. Potential testing later in July could show the release and availability of nitrate from alfalfa.

Recap of farm testing 2023

BOB ZURFLUH

Location: Zurfluh Rye
Soil: Whalan silt loam.
Soil yield potential: medium
Field Slope: 6-12%.
Soil organic matter: 2.3%.
Cover crop: Aroostook Rye
Surface residue cover: 85%
Starter fertilizer: none
Fertilizer: none
Crop Planted: Food Grade Soybeans May 10, 2023
Rye Terminated: June 12, 2023 by roller crimper

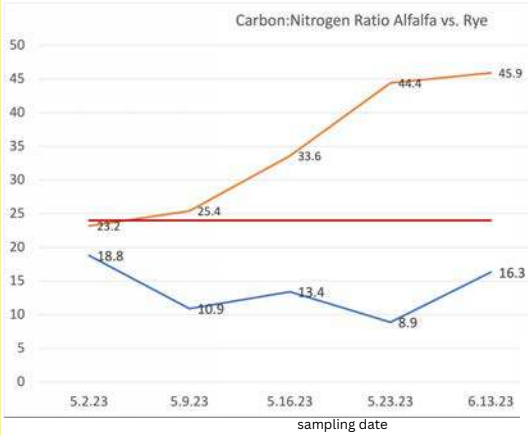
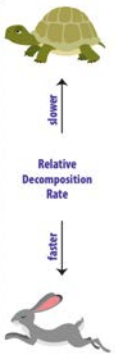


Table 1. Carbon to nitrogen ratios of crop residues and other organic materials

Material	C:N Ratio
rye straw	82:1
wheat straw	80:1
oat straw	70:1
corn stover	57:1
rye cover crop (anthesis)	37:1
pea straw	29:1
rye cover crop (vegetative)	26:1
mature alfalfa hay	25:1
Ideal Microbial Diet	**24:1**
rotted barnyard manure	20:1
legume hay	17:1
beef manure	17:1
young alfalfa hay	13:1
hairy vetch cover crop	11:1
soil microbes (average)	8:1



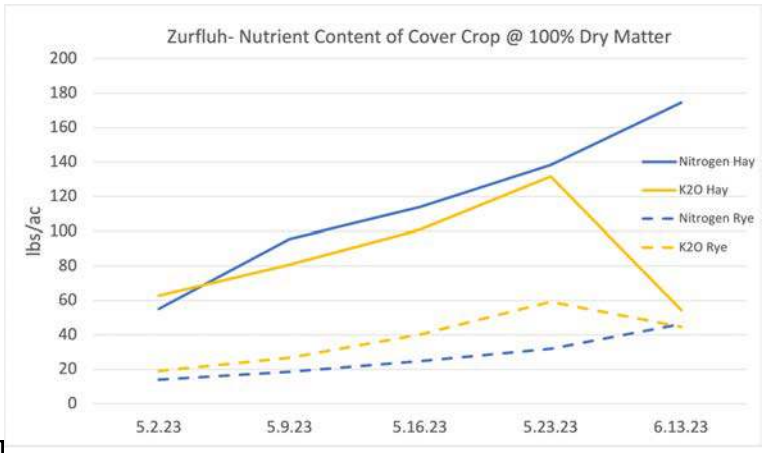
High C:N ratio from rye biomass is ok in soybeans, but will take nitrogen to break down the residue. This is why terminating rye early is important in corn systems.

Cover Crop Biomass Nutrient Analysis

Sample ID	Date	N	P2O5	K2O	Ca	Mg	Na	S	Zn	Mn	Cu	Fe	B	Al	C	C:N	As cut tons/ac	100% dry tons/ac
Zurfluh Rye	5/2/2023	14	4.7	19	2.9	1.3	0.1	1.3	0.03	0.02	0	0.09	0.01	0.11	323.3	23.2	1.26	0.31
Zurfluh Rye	5/9/2023	18.5	7.2	26.8	2.9	1.5	0.1	1.6	0.03	0.03	0.01	0.1	0.01	0.17	469.1	25.4	2.31	0.45
Zurfluh Rye	5/16/2023	24.8	11.3	40.2	4.3	2.3	0.2	2.1	0.04	0.04	0.01	0.11	0.01	0.28	832.9	33.6	3.4	0.82
Zurfluh Rye	5/23/2023	31.9	16.6	59.2	8.3	3.8	0.4	3.2	0.05	0.06	0.01	0.18	0.03	0.43	1415.6	44.4	3.16	1.34
Zurfluh Rye	6/13/2023	46.3	19.8	44.7	11	5.5	0.5	4.3	0.11	0.08	0.02	0.26	0.03	0.5	2121.7	45.9	4.46	1.96

PSNT Soil Results	
Sample ID	**Nitrate (ppm)**
Sampled 6/5/2023	3.2
Sampled 6/13/2023	6.8

PSNT levels below 10, no credit for available nitrogen in the soil. This test was taken for research purposes only and has no implications on soybean management.



Soybeans had a poor yield due mostly to lack of moisture/ drought.

Nutrient uptake of cover crop depends on biomass and nutrient content. Zurfluh's fields demonstrate how a well-established alfalfa crop with a ton more dry biomass contains more nitrogen and potassium compared to rye.