MONTANA STATE UNIVERSITY | MONTANA AGRICULTURAL EXPERIMENT STATION

Northwestern Agricultural Research Center

FIELD DAY

Thursday, July 11, 2024

11:00 am **Registration & Introductions**

11:30 Ken McAlpin – NWARC Farmer Advisory Chair
11:35 Dr. Jessica A. Torrion – MSU Department of Research Centers Department Head
11:45 Dr. Darrin Boss – MSU Associate Director of MAES

12:00 pm **Lunch**

12:30 Dr. Eric Belasco – Updates, Montana Economic Outlook – MSU Ag Economics & Econ.
12:45 Andy Lybeck – CHS General Update

1:00 pm **Field Tours** **Pages**

Northwestern Ag Research Center Faculty and Staff

Pictured from left to right: Ashley Goodman, Gabby Crozier, Saurabha Koirala, Marilyn Dalen, Dan Porter, Dr. Jessica Torrion, Moose Larson, Jordan Penney, Dr. Joseph Jensen, Callie Snow, Liz Khmelev, Reese Whitehead, Charlene Kazmier. Not pictured: Kyla Hays

Advisory Committee Members

Wendy Carr, Mackenzie Dey, Toby Hook, Bridgett Lake-Cheff, Andy Lybeck, Patrick Mangan, Ken McAlpin, Taylor Mullen, Kenny Smith, Chuck Stephens, Terry Stephens

Thank you to our sponsors:

CHS | Mountain West Co-op

AgWest FARM CREDIT

RDO EQUIPMENT CO.

JOHN DEERE

MONTANA FARMERS UNION

Whitefish CREDIT UNION

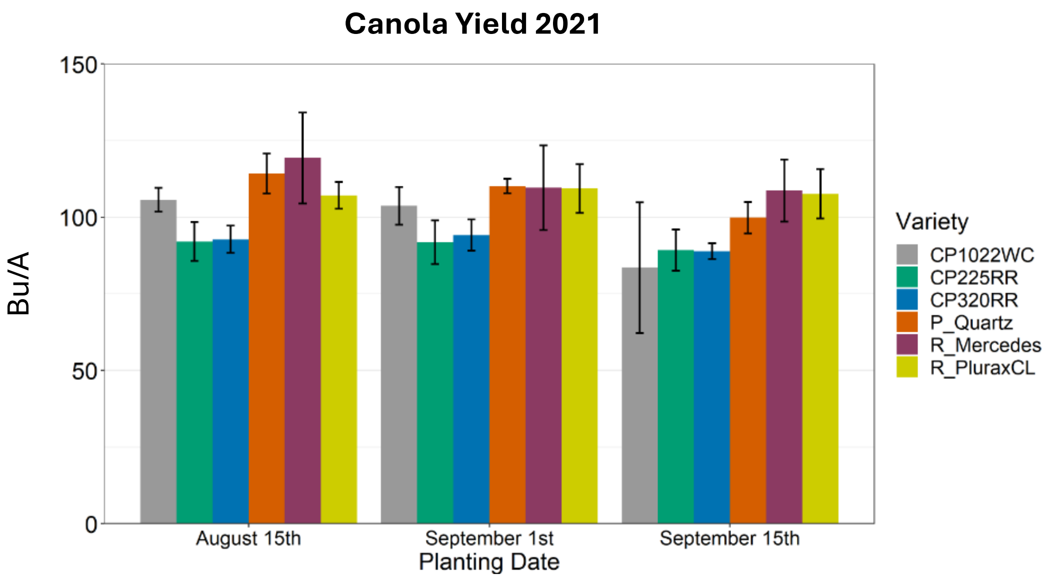
MILLER A HUBER COMPANY

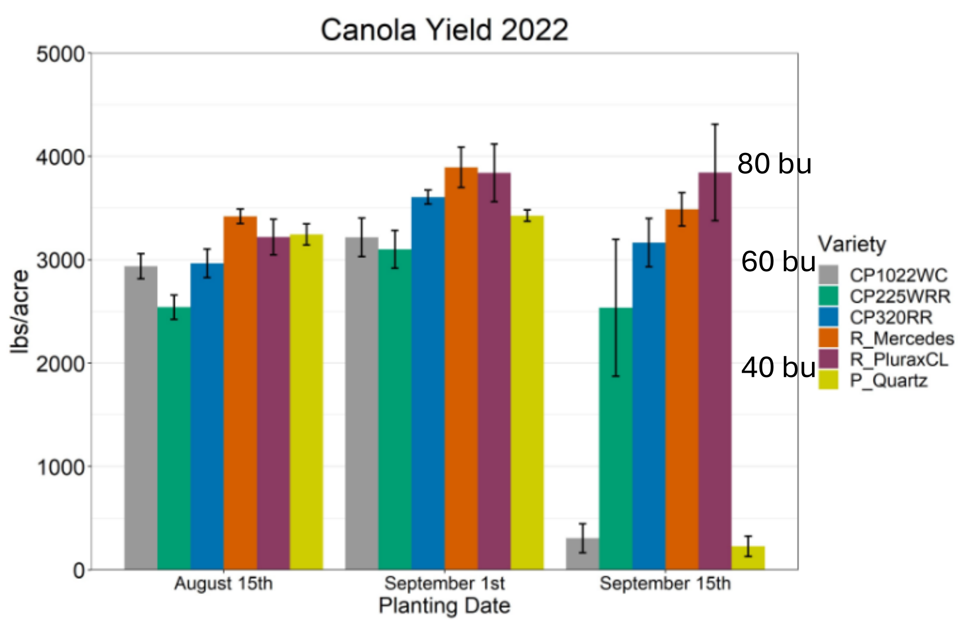
Winter Canola Participatory Discussion

Jessica A. Torrion, Joe Jensen, and Dave Weaver

Stand Reduction by Planting Dates

Dates	% Stand Reductions		
	2021	**2022**	**2023**
15 Aug	23	20	46
01 Sept	18	31	61
12 Sept	42	79	84





Canola Yield 2023: No significant difference with planting dates with average yield of only 24 bushels/A or 1,200 lbs/A

Silicon nitrogen application (M.S Dalen, J.A Torrion and D. Porter)

Objective: To evaluate the effects of silicon and nitrogen fertilization on wheat production in Montana.

Silicon (Si) is a naturally occurring element in the soil and the second most abundant element in the earth's crust. While it is prevalent in the soil, Si primarily exists as silica (SiO_2) which is not available for plant uptake. It is not an essential nutrient for all plants, but it is considered a beneficial nutrient for many species. Perhaps one of the most studied and greatest benefits of Si is its role in reducing effects of abiotic and biotic stresses in plants.

Treatments:
Silicon application rate: 0, 0.5, 1.0, 2.0, and 4.0 t/Ac
Silicon Source: Silicate slag, wollastonite, volcanic ash
Nitrogen application rate: Control (residual, 42.5 N/Ac) and 150 lbs N/Ac (residual + added N)
Variety: Dagmar and Vida

Preliminary results:

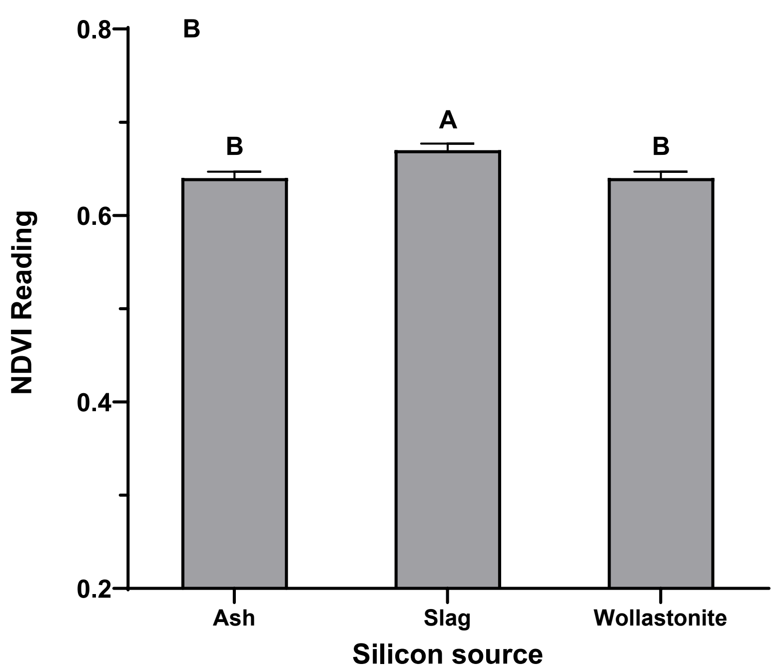


Figure 1. NDVI reading of wheat in response to different source of silicon material. Letters that have the same letter assignment are not statistically different.

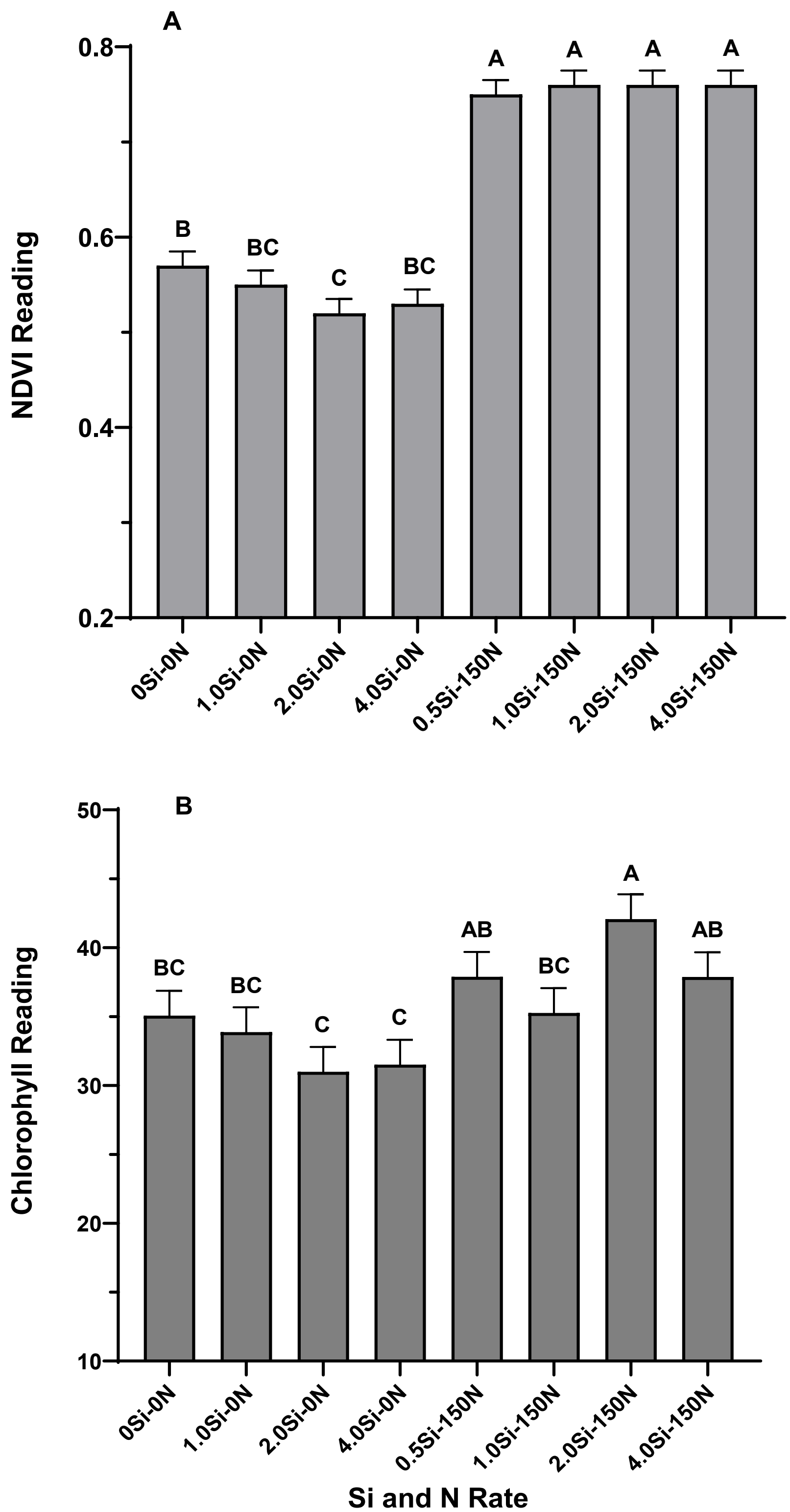


Figure 2. NDVI (2A) and chlorophyll (2B) reading of wheat in response to different silicon and nitrogen application. Letters that have the same letter assignment are not statistically different.

Split nitrogen application and varieties (M.S Dalen, J.A Torrion and D. Porter)

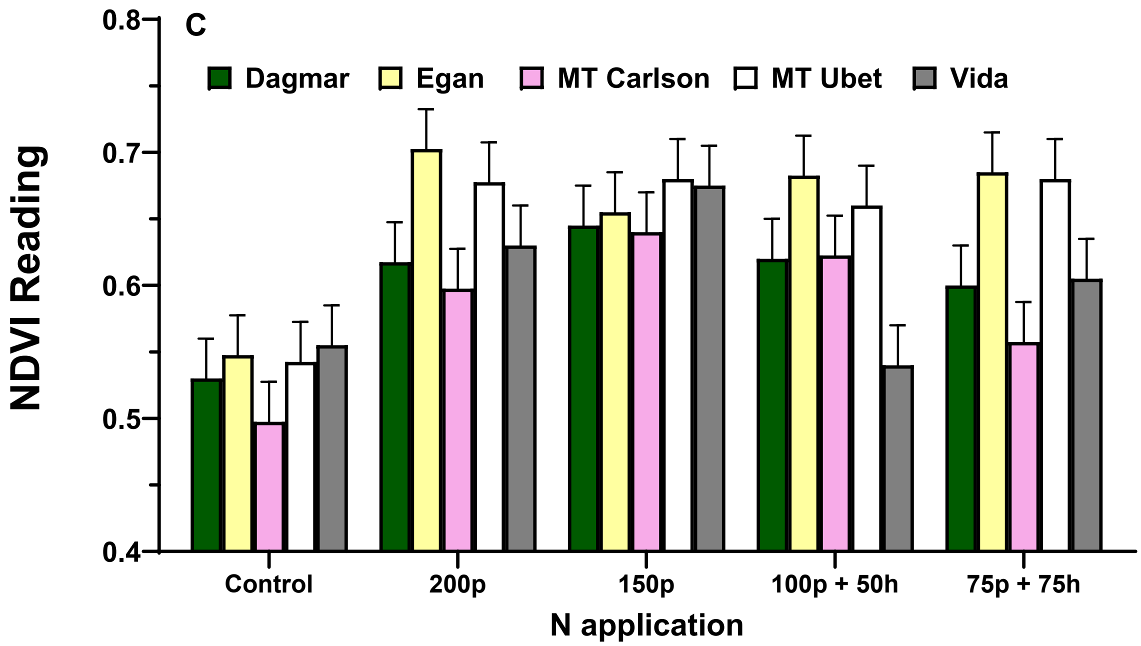
Objective: To assess the effects of nitrogen split application on quality and yield performance of five elite spring wheat varieties.

Treatments:

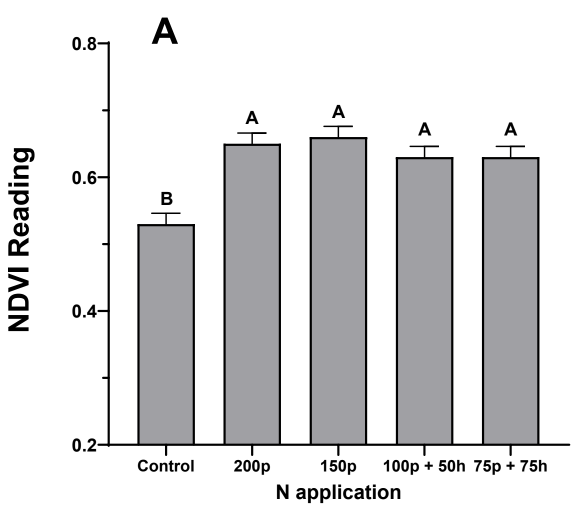
Nitrogen application rate: Control (residual, 43.5 lbs N/Ac), 200 lbs N/Ac at planting (residual + added N), 150 lbs N/Ac at planting (residual + added N), 100 lbs N/Ac at planting; 50 lbs N/Ac at heading (residual + added N), and 75 lbs N/Ac at planting; 75 lbs N/Ac at heading (residual + added N)

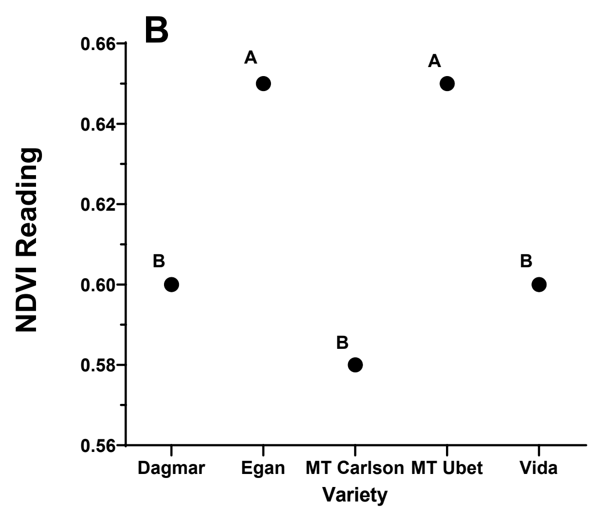
Variety: Dagmar, Egan, MT Carlson, MT Ubet and Vida

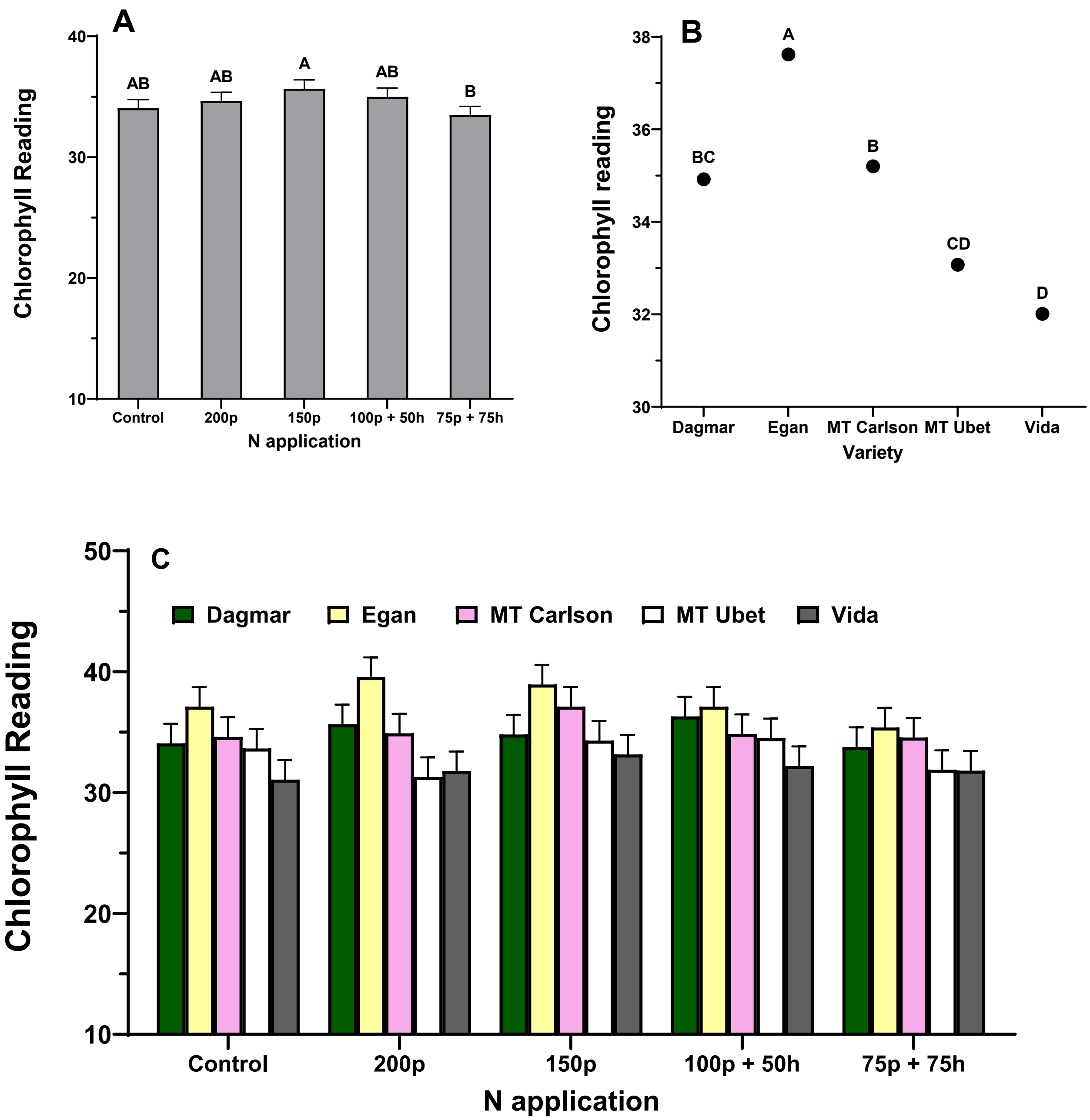
Preliminary results:



Figures 1A, 1B and 1C. NDVI reading of the five elite wheat varieties in response to nitrogen application. Letters that have same letter assignment are not statistically different.

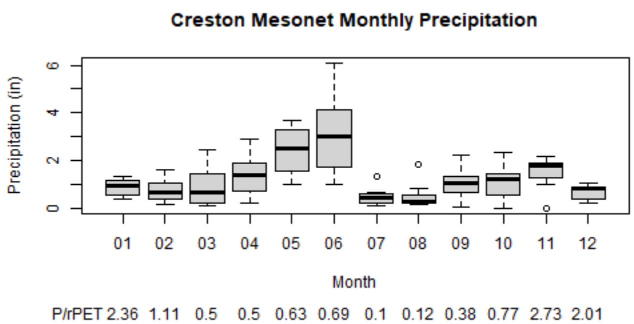


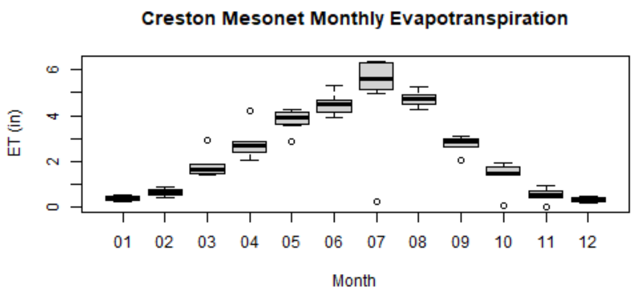


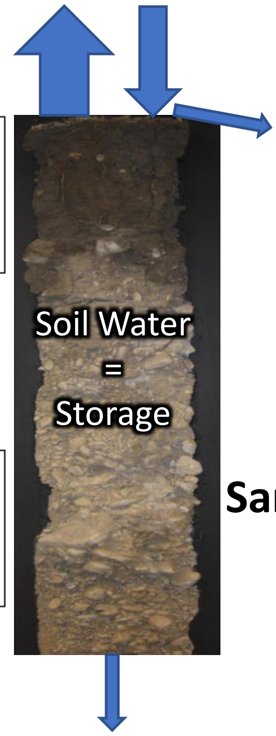


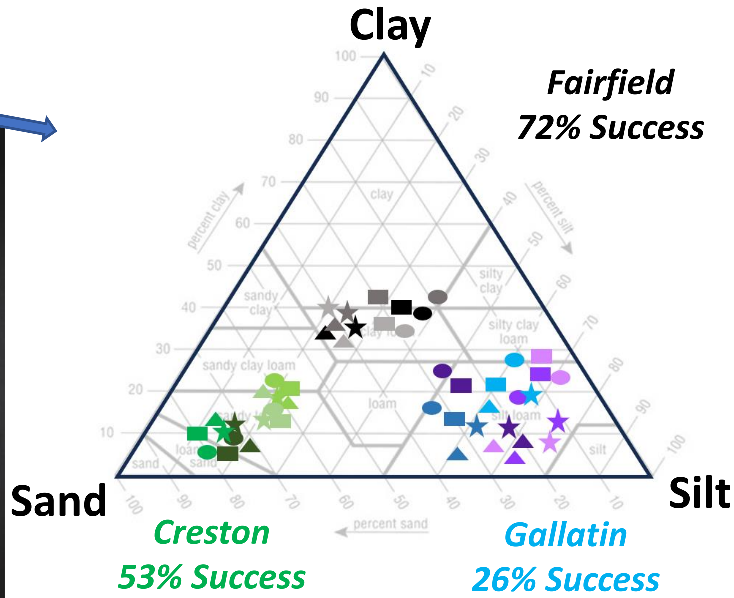
Figures 2A, 1B and 1C. Chlorophyll reading of the five elite wheat varieties in response to nitrogen application. Letters that have same letter assignment are not statistically different.

NWARC Field Day - Sensors and Precision Agriculture
Soil Water Holding Capacity and Precision Irrigation Research
Meghan Robinson and Adam Sigler

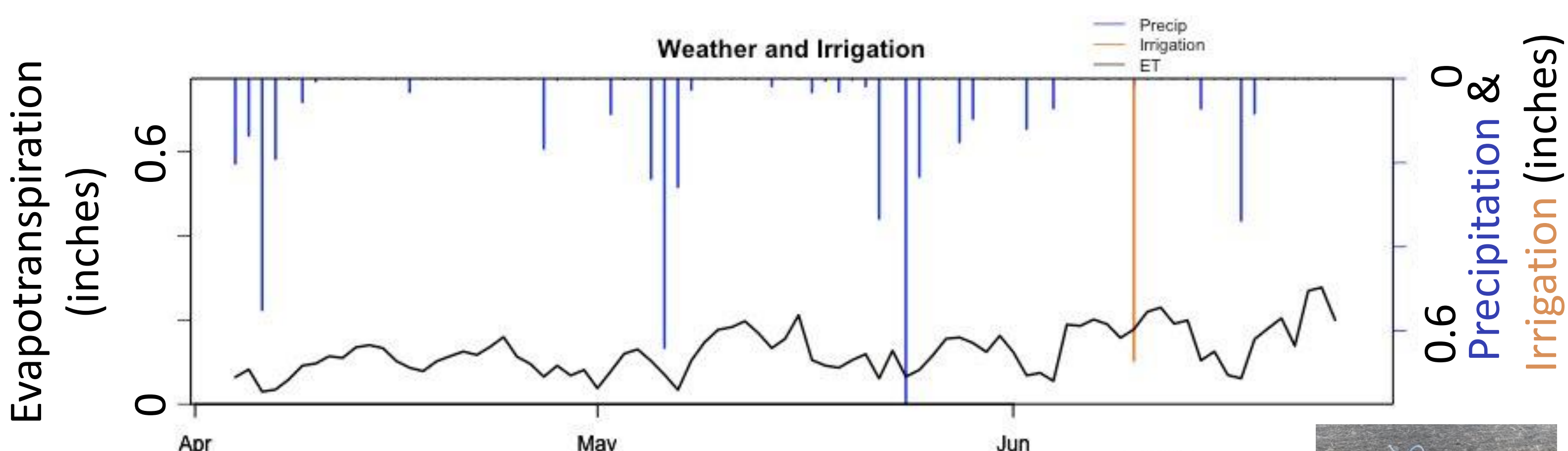


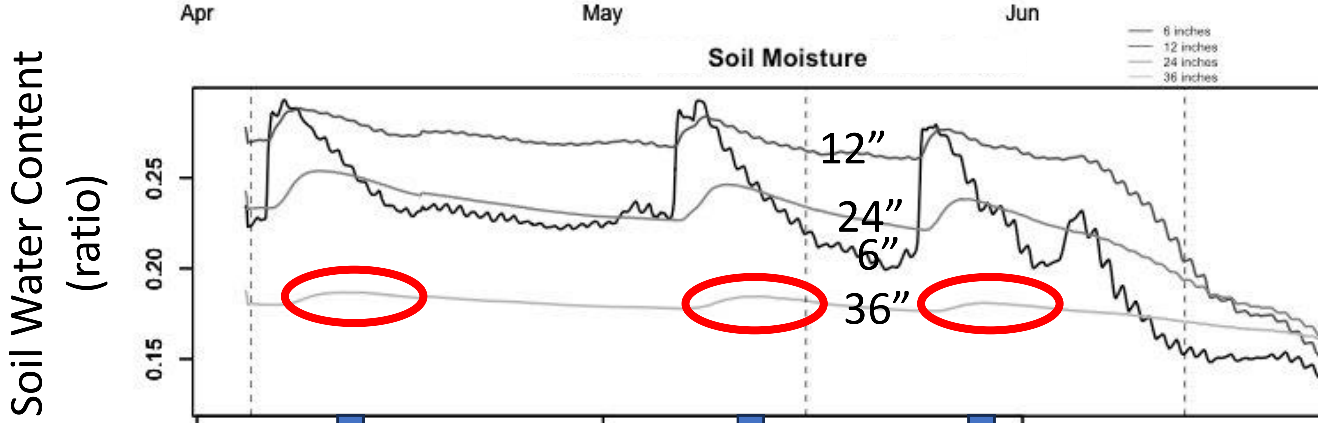






Inches of water storage capacity per foot of soil	
	Sand = 0.1
	Silt = 1.7
	Clay = 2.8



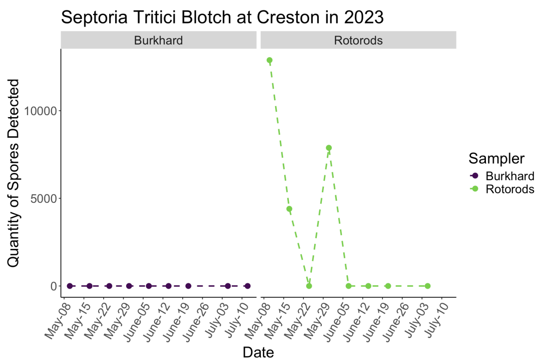


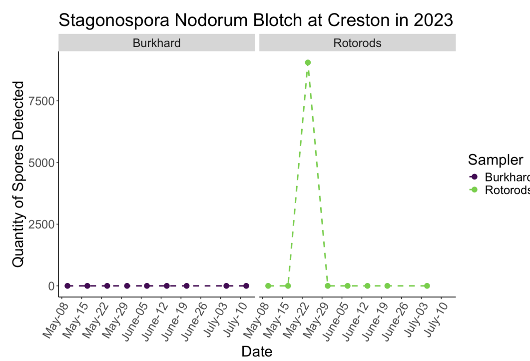
Deep Water Movement

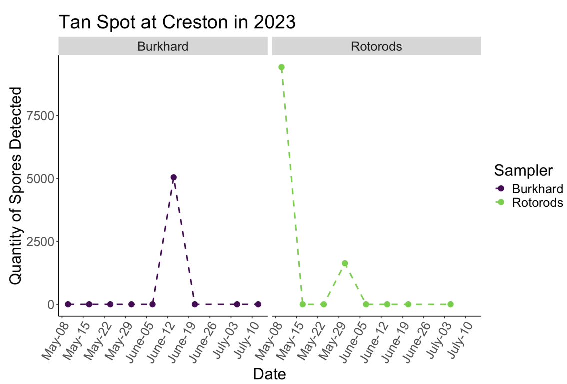
Using Spore Traps to Predict the Risk for Foliar Disease Development in Winter Wheat

Dr. Linda Hebb (postdoc) and Dr. Uta McKelvey (PI), MSU Extension Plant Pathology

Montana growers can expect to find foliar leaf spot diseases and rusts in their wheat fields most years, but the severity of these diseases can vary greatly from year to year depending on weather conditions. The McKelvey lab has placed spore traps in winter wheat fields at research stations with a known history of disease to measure the timing of fungal spore presence across the growing season. We are combining fungal spore presence with disease ratings and weather conditions across the growing season to put together a predictive modeling tool for growers to assess disease risk based on weather conditions within a certain growing season. This will allow for the timely application of fungicides when foliar fungal disease risk has the potential to affect yields.







Location	1st Rating	Feekes	2nd Rating	Feekes	3rd Rating	Feekes
NWARC	5-Jun	10.0-10.5	14-Jun	10.5-10.5.3	1-Jul	10.5.4
SARC	31-May	9-10.1	11-Jun	10.5-10.5.2	26-Jun	11.1
Post Farm	24-Jun	10.5-10.5.1	2-Jul	10.5.1-10.5.3		
EARC	12-Jun	10.4	21-Jun	10.5.3-10.5.4	27-Jun	10.5.4-11.1

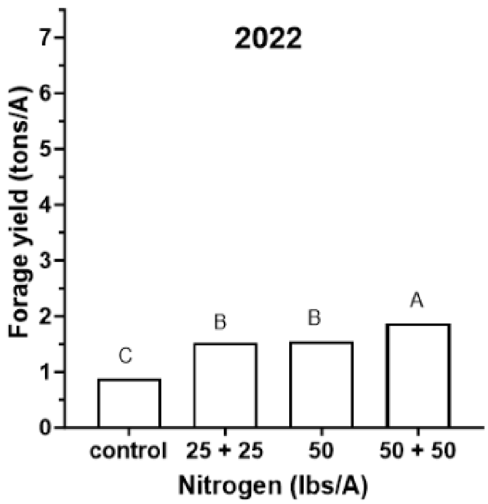
https://www.montana.edu/extension/plantpath/resources/

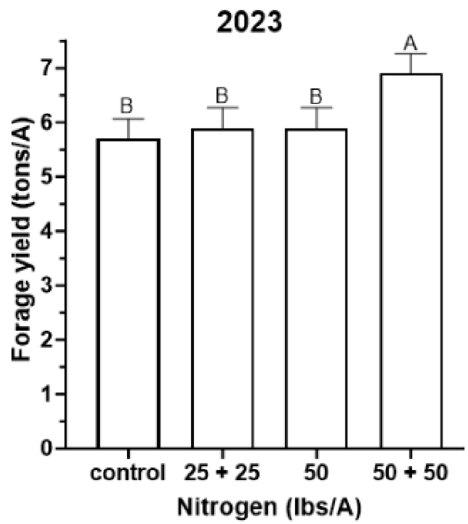
https://www.montana.edu/extension/diagnostics/index.html

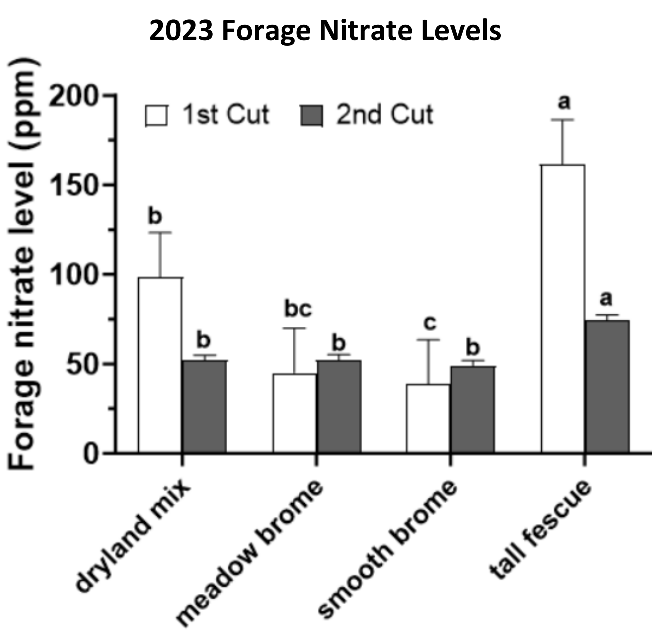
Perennial Grass Forages

Hayes Goosey, Jessica Torrion, and Peggy Lamb

Nitrogen levels: 1) Control (No added N), 2) 50 lbs N/A at planting, 3) 25 lbs N/A at tiller + 25 lbs N/A after first cut, 4) 50 lbs N/A at tiller + 50 lbs N/A after first cut.







2022 Forage Nitrate level: 50-450 ppm depending on the N treatment levels.

Total Irrigation Applied: 2.75 inches in 2022 and in 5.5 inches 2023

Winter forage barley, what to look forward to and future releases

2023 Winter Barley Intrastate Forage Trials

	Bozeman					NWARC				
Lines	Biomass Ton/ac	ADF	NDF	Forage Protein	Grain Yield	Biomass T/ac	ADF	NDF	Forage Protein	Grain Yield
MTWF6(F2)_50-5	5.9^{bcde}	35^{ab}	60.4^{ab}	10.5^{ab}	65.4^{bc}	**7.69**^{a}	36.3^{bcd}	62.5^{bcd}	**11.7**^{a}	89.3^{bcd}
MTWF6(F3)_50-11	6.3^{bcd}	34.2^{ab}	57.8^{bc}	8.8^{de}	58.8^{bcd}	7.44^{ab}	36.8^{bc}	63.4^{bc}	10.3^{ab}	47.5^{e}
MTWF5(F3)_27-1	5.6^{cde}	34.5^{ab}	59.1^{ab}	10.6^{ab}	61.8^{bcd}	7.11^{abc}	34.6^{bcd}	59.5^{cd}	10.8^{ab}	64.1^{de}
MTWF6(F2)_50-7	4.8^{ef}	34.2^{ab}	58.3^{bc}	9.7^{bcd}	62.9^{bc}	6.23^{abcd}	35.6^{bcd}	62^{cd}	10.5^{ab}	77^{bcde}
MTF20189-WW	**9.4**^{a}	33.6^{ab}	53.7^{c}	8.1^{e}	NA	6.16^{abcd}	41^{a}	68.2ab	10.1^{b}	156.3^{a}
Saturn	5^{def}	**26.4**^{c}	**48.4**^{d}	**11.6**^{a}	**124.8**^{a}	5^{cde}	**27.8**^{f}	**51.3**^{e}	11.5^{a}	**164.4**^{a}
MTWF5(F3)_29-2	5.7^{cde}	34.7^{ab}	59.3^{ab}	10.2^{bc}	57^{cd}	5.88^{abcde}	36.5^{bcd}	62.4^{bcd}	10.9^{ab}	60.6^{de}
MTWF5(F3)_28-1	3.9^{f}	33.1^{b}	57.3^{bc}	11.5^{a}	54.5^{cd}	5.69^{abcde}	29.6^{ef}	52.6^{e}	11.2^{ab}	86.5^{bcd}
MTWF6(F2)_50-2	6.2^{bcd}	36.4^{a}	63.6^{a}	9^{cde}	33.8^{d}	5.31^{bcde}	36.5^{bcd}	63.9^{abc}	11^{ab}	100.2^{b}
MTWF6(F2) 50-1	5.7^{cde}	35^{ab}	60.1^{ab}	9.6^{bcd}	65.3^{bc}	5.29^{bcde}	34.6^{bcd}	59.1^{cd}	10.6^{ab}	65.3^{cde}
MTWF6(F3)_50-13	5.8^{bcde}	34.1^{ab}	57.9^{bc}	9.1^{cde}	57.4^{cd}	5.12^{cde}	34.1^{cd}	59.4^{cd}	11.2^{ab}	77.9^{bcde}
MTWF7 19-7	7.1^{b}	34.2^{ab}	59.9^{ab}	8.9^{cde}	68^{bc}	5.09^{cde}	38^{ab}	69.6^{a}	11.6^{a}	88.7^{bcd}
MTWF6(F2) 51-5	4.6^{ef}	34.4^{ab}	59.1^{ab}	10.5^{ab}	86^{b}	5.02^{cde}	35.5^{bcd}	61.8^{cd}	11.5^{a}	99^{bc}
MTWF5(F3)_27-2	6.6^{bc}	33.1^{b}	56.5^{bc}	9.4^{bcde}	72.9^{bc}	4.71^{de}	37.2^{bc}	63.6^{bc}	10.1^{b}	91.9^{bcd}
MTWF6(F3)_50-12	5.9^{bcde}	34.1^{ab}	57.5^{bc}	9.1^{cde}	59.2^{bcd}	4.67^{de}	33.1^{de}	56.8^{de}	11.2^{ab}	52.1^{e}
MTWF6(F2)_51-9	4.7^{ef}	36.4^{a}	63.5^{a}	10.5^{ab}	61.2^{bcd}	3.91^{e}	37.1^{bc}	63.8^{abc}	11.4^{ab}	75.8^{bcde}
Mean	5.82	33.95	58.27	9.82	61.81	5.64	35.27	61.25	10.98	87.29
CV (%)	13.2	5	5.2	7.7	27.2	22.7	5.6	5.3	6.9	23.1

2024 NWARC Biomass

Line	Biomass (tons/ac)
MTWF6(F2)_50-1_6r	7.16^{a}
MTWF7_19-7	6.8^{ab}
MTWF6(F2)_50-2	6.65^{ab}
MTF20189-WW	6.63^{ab}
MTWF6(F3)_50-11	6.39^{ab}
MTWF6(F3)_50-13	6.13^{ab}
MTWF6(F2)_50-7	6.03^{ab}
MTWF5(F3)_28-1	5.85^{ab}
Saturn	5.7^{ab}
MTWF5(F3)_27-2	5.66^{ab}
MTWF6(F2)_50-5	5.62^{ab}
MTWF5(F3)_27-1	5.37^{ab}
MTWF6(F2)_51-5_6r	5.33^{ab}
MTWF5(F3)_29-2	5.21^{ab}
MTWF6(F3)_50-12	5.17^{ab}
MTWF6(F2)_51-9_6r	4.55^{b}
Mean	5.89
CV (%)	22.9

The tables show our most advanced winter forage germplasm. While the increase in biomass is not as drastic in high moisture environments compared to spring barley the yield is comparable and harvest times are much earlier. For the three years this trial has been grown at NWARC we have also not seen any significant winter kill for these 16 experimental lines.

Spring Barley releases

MT Cowgirl is a high-performance forage barley with taller plant height, contributing to higher hay yields. Earlier heading and later maturity extends harvest flexibility and increases seed size. Certified seed available.

MT Boy Howdy is a two-row, high performing feed barley variety for Montana and surrounding regions. MT Boy Howdy has extended grain-fill due to early heading, resulting in high yields and plump seed. MT Boy Howdy out yielded most lines in the Western Regional Trial, during the drought of 2021, potentially related to root architecture. Smooth awns and fewer hairs increase grower comfort. Certified seed available through MSU Foundation Seed in 2024.

Buzz is a two-row, malt barley variety with high plumps and low grain protein across environments and management practices. Shorter than Hockett, reducing lodging. Good malt quality with high extract, low β glucan with reduced steeps. Certified seed is available through MSU Foundation Seed.

MT Endurance is a two-row, high performing malt barley variety, with extended grain-fill due to early heading that results in high plumps and low grain protein, particularly in dryland. Stable malt quality during drought of 2021. 3% higher malt extract than controls. Irrigation can result in malt with elevated β glucans. Slower to modify than Buzz but faster than Hockett. Can have acceptable malt quality with either two or three steeps. Certified seed available through MSU Foundation Seed in 2024.