Project Title: 2022 Forage Barley Nitrogen Rate

Objective: To evaluate the agronomic performance of forage barley with different nitrogen fertilizer rates in environments and cropping systems representative of northwestern Montana

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Summary:

Forage barley was planted on April 29th, 2022 with four different nitrogen rates of 47, 114, 182, and 249 lbs/A (Table 1), and five different varieties (Table 2).

N rates had an influence on all aspects tested. Variety influenced the ADF %, NDF %, heading date, heading height, grain yield, grain protein, and test weight. The highest yielding variety was MT16F01601 at 182 lbs/A N, while the lowest averaging forage yield came from the five varieties given 47 lbs/A N. The lowest forage yield came from MT17M02507 at 182 lbs/A N, although it had the highest grian yield at 106.7 bu/A. The highest grain protein was 14.5% in Cowgirl at 249 lbs/A N, and the lowest was 9.3% from MT17M02507 at 47 lbs/A N (Table 2).

Forage yield increased with N plateauing at about 1.5 N (182 lbs N/ac) (Figure 1). Nitrates increased with N, however, most varieties had acceptable nitrates at and below 1.5 N (Figure 2). NDF and ADF were relatively stable across N treatments (Figure 3). If a grower could feed an awned line, then from the data MT17MO2507 performs well for forage yield and outperforms all other lines for grain yield.

Table 1. Management information

Seeding date:	4/29/2022	**Field Location:**	Y9
Julian date:	119	**Harvest date:**	8/18/2022
Seeding rate:	25 plants/ft^2	**Julian date:**	230
Previous crop:	Canola	**Soil type:**	Swims Silty Clay Loam
Herbicide:	Axial Bold + Cleansweep - 6/1/22	**Tillage:**	Conventional
Insecticide:	NA	**Soil residual nutrient (NO$_3^{-1}$, P, K lb/A):**	47-40-342-30s
Fungicide:	NA	**Nutrient fertilizer applied (lbs/A):**	0, 67, 135, 202 N

Table 2. Agronomic performance

Variety/Line	N treatment	Forage YLD[2] tons/A	Nitrate[2] mg/L	ADF[1,2]	NDF[1,3]	HD[1,3] julian	HT[1,2] cm	Grain YLD[1,2] bu/A	Grain PRO[1,2] %	Test WT[1,3] lbs/bu
Lavina	0x	2.4	0.0	34.4	61.1	185	55.5	28.5	11.3	46.9
Cowgirl	0x	2.1	0.0	35.4	61.0	**183**	61.6	24.6	11.9	46.9
MMT18F00803	0x	2.2	0.0	32.7	57.5	185	56.7	33.1	11.1	43.4
MT16F01601	0x	2.4	0.0	32.7	57.3	**_183_**	57.8	32.7	11.3	46.6
MT17M02507	0x	2.0	0.0	34.5	60.2	**_183_**	59.7	49.2	9.3	51.0
Lavina	1x	3.9	12.4	35.1	60.8	186	70.9	34.8	11.8	46.8
Cowgirl	1x	4.2	0.0	**36.5**	**_62.4_**	185	83.2	30.2	12.2	46.3
MMT18F00803	1x	4.5	55.1	33.0	57.2	186	80.7	41.7	12.0	45.0
'MT16F01601	1x	4.1	34.9	33.3	57.1	**_183_**	82.4	48.8	12.1	47.7
MT17M02507	1x	4.5	7.6	35.4	60.3	184	81.5	90.4	9.9	**52.0**
Lavina	1.5x	**5.2**	469.7	**36.6**	**_62.4_**	185	90.2	40.7	14.0	46.4
Cowgirl	1.5x	4.9	405.9	**36.4**	**61.6**	185	**96.5**	34.1	**14.4**	45.7
MMT18F00803	1.5x	4.8	142.5	33.4	58.0	187	85.1	53.6	13.5	44.9
'MT16F01601	1.5x	**_5.5_**	130.4	35.3	61.1	184	92.5	56.9	13.4	47.1
MT17M02507	1.5x	1.9	511.2	35.7	61.4	184	89.1	**_106.7_**	10.8	**_52.3_**
Lavina	2x	4.5	386.0	35.2	60.5	186	89.5	42.6	13.9	45.8
Cowgirl	2x	**5.3**	**_1066.5_**	**_36.8_**	**61.9**	185	**_99.9_**	46.9	**_14.5_**	45.9
MMT18F00803	2x	5.0	317.2	33.3	58.2	187	87.4	38.7	14.1	44.5
'MT16F01601	2x	**5.3**	510.4	34.3	59.0	**_183_**	90.8	57.5	**14.2**	46.3
MT17M02507	2x	**5.4**	603.9	36.1	**61.9**	184	91.5	**101.1**	11.0	**52.0**
MEAN		4.2	232.7	34.8	60.0	184	80.3	49.6	12.3	47.2
LSD		0.4	219.3	0.5	0.9	0.6	3.0	6.0	0.3	0.5
CV		16.1	148.8	2.3	2.3	0.5	5.9	19.2	4.1	1.6

[1]Trait variance due to variety P<.001, [2]Trait variance due to N Treatment P<.00001, [3]P<0.05

Bold = top performer, **Bold** = statistically equivalent to the top performer, ADF = acid detergent fiber, NDF = neutral detergent fiber, YLD = yield, HD = heading date, HT = height, PRO = protein, WT = weight
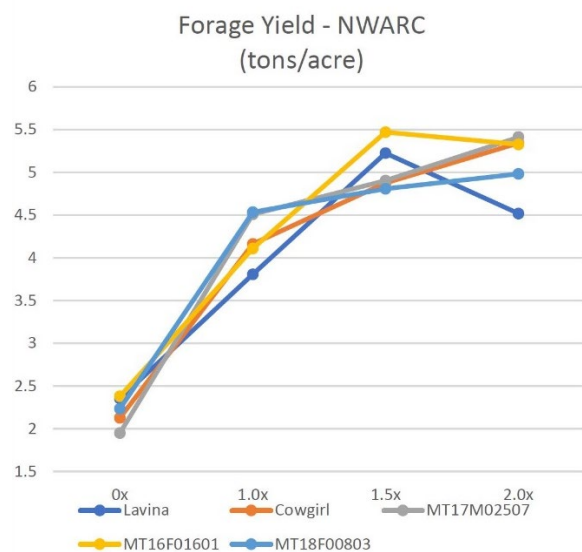
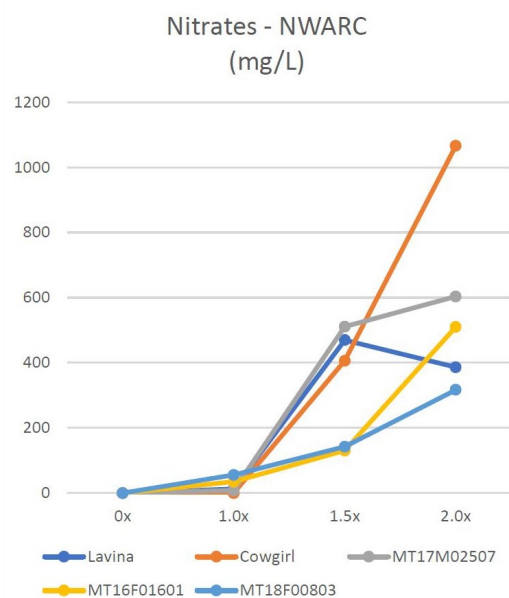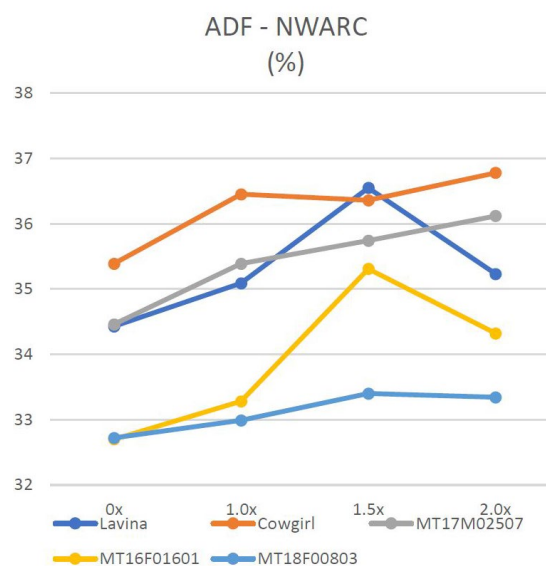**Figure 1.** Forage yield with N treatment

Figure 2. Nitrate with N treatment

Figure 3. Acid detergent fiber with N treatment