NORTHWEST CROPS & SOILS PROGRAM

2020 Forage Oat Seeding Rate Trial

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2020 FALL FORAGE OAT SEEDING RATE TRIAL

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In 2020, the University of Vermont Extension's Northwest Crop and Soils Program evaluated the performance of forage oats planted at various seeding rates. In the Northeast, cool season perennial grasses dominate pastures and hay meadows that farmers rely on. Often times during the fall months, the perennial pasture will decline in yield and quality. The addition of cool season annual forages, such as oats, into the grazing system during this time may help improve the quality and quantity of forage. To maximize fall forage yields, farmers want to know if they should increase seeding rates. To determine if higher seeding rates of oats will boost fall forage production, a trial was initiated in the fall of 2020 to evaluate oat seeding rates from 75 to 200 lbs per acre.

MATERIALS AND METHODS

The trial was established at Borderview Research Farm in Alburgh, VT, and the plot design was a randomized complete block with four replications (Table 1). The soil type was Benson rocky silt loam with 5 to 8 percent slopes. Previous crops in the 2020 field season were barley and oats harvest for grain. Six seeding rates of the forage oat variety Everleaf 126 were the treatments.

Table 1. Forage oat seeding rate trial management, Alburgh, VT, 2020.

Location	Borderview Research Farm – Alburgh, VT
Soil type	Benson rocky silt loam with 5 to 8% slopes
Previous crop	Spring barley and oats
Tillage operations	Chisel plow, disk and spike tooth harrow
Planting equipment	Great Plains Cone seeder
Treatments (seeding rates in lbs ac^{-1})	75 100 125 150 175 200
Replications	4
Plot size (ft)	5 x 20
Planting date	20-Aug
Harvest date	14-Oct

The seedbed was chisel plowed, disked, and finished with a spike tooth harrow. The trial was planted with a cone seeder on 20-Aug into 5' x 20' plots. On 14-Oct, oat height was measured in three random locations in each plot. The plots were then harvested using a Carter flail forage harvester equipped with a scale in a 3' x 20' area and the plot weight recorded. An approximate 1 lb subsample of the harvested material was collected and dried to determine dry matter content and calculate dry matter yield.

Variations in yield and quality can occur because of variations in genetics, soil, weather and other growing conditions. Statistical analysis makes it possible to determine whether a difference among varieties is real, or whether it might have occurred due to other variations in the field. At the bottom of each table, a LSD value is presented for each variable (i.e. yield). Least Significant differences (LSD's) at the 10% level of probability are shown. Where the difference between two varieties within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two varieties. Treatments that were not significantly lower in performance than the highest value in a particular column are indicated with an asterisk. In this example, A is significantly different from C but not from B. The difference between A and B is equal to 1.5, which is less than the LSD value of 2.0. This means that these varieties did not differ in yield. The difference between A and C is equal to 3.0, which is greater than the LSD value of 2.0. This means that the yields of these varieties were significantly different from one another. The asterisk indicates that B was not significantly lower than the top yielding variety.

Variety	Yield
A	6.0
B	7.5*
C	**9.0***
LSD	2.0

RESULTS

Weather data was recorded with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at Borderview Research Farm in Alburgh, VT (Table 2).

Table 2. Weather data for Alburgh, VT, 2020.

	August	September	October
Average temperature (°F)	68.8	59.2	48.3
Departure from normal	0.01	-1.33	0.19
Precipitation (inches)	6.77	2.75	3.56
Departure from normal	2.86	-0.91	0.00
Growing Degree Days (base 41°F)	860	564	291
Departure from normal	5	-27	-1

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger.
Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.

Temperatures were approximately normal in August and October, but were slightly below average in September. Although the earlier summer months had been very hot and dry, rainfall finally arrived in August with 2.86 inches above normal accumulating. Following these rain events, rainfall was approximately average in September and October. From August through October, there were an accumulated 1715 Growing Degree Days (GDDs) at a base temperature of 41° F, which is 23 fewer GDDs than the 30-year normal. In general, conditions were favorable for forage growth.

Planting forage oats at seeding rates ranging from 75 lbs ac^{-1} up to 200 lbs ac^{-1} performed statistically similarly in terms of height, dry matter content, and yield (Table 3). The average dry matter yield was 1.14 tons ac^{-1} with no significant difference between any of the treatments, even when the seeding rate was more than doubled. Increasing seeding rate also did not impact oat growth or maturity with heights averaging

51.5cm and dry matter content averaging 13.0% with no differences between individual seeding rates. These data suggest that, for planting a fall forage oat monoculture, a seeding rate of 75 lbs ac^{-1} is sufficient to produce optimal yields.

Table 3. Harvest characteristics of six forage oat seeding rates, 2020.

Seeding rate lbs ac^{-1}	Height cm	Dry matter %	Dry matter yield tons ac^{-1}
75	**55.1**	**12.8**	1.09
100	47.5	12.9	1.12
125	54.5	12.9	1.16
150	48.9	13.7	**1.23**
175	51.8	12.9	1.19
200	51.1	13.0	1.03
LSD (p = 0.1)	NS	NS	NS
Trial mean	51.5	13.0	1.14

NS- Not statistically significant.

DISCUSSION

Seeding fall forage oats can help extend the grazing season providing supplemental high-quality forage late in the season. When planting at an optimal time in our region, approximately in mid to late August, yields of approximately 1 ton of dry matter per acre can be attained from seeding rates as low as 75 lbs ac^{-1}. No additional yield benefit was observed from increasing the seeding rate, even to levels more than double that rate. However, it is important to note that under scenarios of delayed planting beyond mid to late August or sub-optimal soil fertility, higher seeding rates may provide additional benefit but these scenarios were outside the scope of this trial.

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