
# 2023 Integrating Solar Corridors into Corn Silage Production Systems

Dr. Heather Darby, UVM Extension Agronomist
Ivy Krezinski and Sara Ziegler
UVM Extension Crops and Soils Technicians
(802) 524-6501

Visit us on the web at [http://www.uvm.edu/nwcrops](http://www.uvm.edu/nwcrops)



THE UNIVERSITY OF VERMONT EXTENSION

**2023 INTEGRATING SOLAR CORRIDORS INTO CORN SILAGE PRODUCTION SYSTEMS**

**Dr. Heather Darby, University of Vermont Extension**
**heather.darby[at]uvm.edu**

Interseeding is a strategy to plant cover crops directly into a growing crop of corn silage providing for earlier planting to hopefully maximize the conservation and ecological benefits of the cover crop. However, there are several challenges limiting farmer adoption of interseeding cover crops. Interseeding when corn is between the V2 to V6 growth stage is preferable because after corn has reached the V6 stage, most seeding equipment is not tall enough, increasing the risk of damaging the corn crop. This requires owning or having access to specialized cover crop interseeding equipment. Another challenge is that typical row spacings create shade that limits cover crop establishment and growth. The solar corridor system is an alternative cropping system that is designed to increase the availability of sunlight to all rows, which can improve crop growth and nutrient cycling in the soil.

Since 2019, the UVM Extension Northwest Crops and Soils (NWCS) program has conducted research trials to investigate the impact of increased corn row spacing on corn yield and cover crop establishment and has found that cover crops consistently perform better in 60” rows compared to 30” rows. Increasing the row width of corn silage may improve interseeded cover crop growth, but it is still important to maintain cash crop yields. Based on past year’s research done at Borderview Research Farm, increasing corn row width to 60” can result in yield reductions, likely due to decreased plant populations on a per acre basis. When planting in wider rows, seeding rates need to be increased to achieve the same number of plants per acre. For example, to achieve 30,000 plants $ac^{-1}$ in 60” rows, the seeding rate must be doubled to 60,000 seeds $ac^{-1}$. It can be challenging to achieve these high seeding rates, which can result in a lower plant population at harvest and therefore reduced yields. Increasing corn row widths to 36” or 40” may minimize the yield loss while achieving the desired corn population. There is increasing interest from producers to incorporate alternative cropping systems, but these practices need to be fine-tuned, to maintain crop productivity. In 2023, the UVM Extension NWCS program initiated two trials to investigate 1) the impact of corn row spacing, and 2) the impact of corn row spacing and population on corn silage yield and quality.

# MATERIALS AND METHODS

The trials were conducted at Borderview Research Farm in Alburgh, VT in 2023. Trial 1 evaluated the impact of five corn row widths on silage yield and quality. Trial 2 evaluated the impact of corn row width and population on corn yield and quality.

***Trial 1- The impact of corn row width on silage productivity***

The experimental design for Trial 1 was a randomized complete block design where the treatments were corn row widths (20”, 30”, 36”, 40” and 60” row spacings) and were replicated four times (Table 1). Plots were 40’ long and consisted of 4 rows. To accommodate wider row spacing, plot size was adjusted based on the corn row width. Plots were 7’, 10’, 12’, 14’ and 20’ wide for 20”, 30”, 36”, 40” and 60” spacing respectively. Corn was planted on 16-May. The 30” and 60” plots were planted using a 4-row cone planter with John Deere row units fitted with Almaco seed distribution units (Nevada, IA). The 20”, 36” and 40” plots were planted with a custom-made planter that included John Deere plate row-units on an adjustable tool bar. All plots were planted to meet a target population of 30,000 plants $ac^{-1}$. To control weeds, all plots were treated with 1 qt $ac^{-1}$ of Cornerstone® and 1.5 oz $ac^{-1}$ of Resolve® Q on 10-Jun. On 20-Jun, plots were top-dressed with 46-0-0 plus the inhibitor ContaiN MAX™ at a rate of 250 lbs $ac^{-1}$. All plots were interseeded with a cover crop mixture of annual ryegrass (60%), red clover (30%) and tillage radish (10%). Light intensity was measured using HOBO® pendant temperature and light sensors from Onset Computer Corporation (Bourne, MA). Sensors were set to log the light information every two hours and report light intensity in lumens $ft^{-2}$. Sensors were placed just above the soil surface between rows of corn and a control was placed outside of the corn rows. Corn was harvested on 27-Sep using a John Deere 2-row corn chopper and collected in a wagon fitted with scales to weigh the yield of each plot. An approximate 1 lb subsample was collected, weighed, dried, and weighed again to determine dry matter content and calculate yield. Cover crop biomass was not measured in this trial.

**Table 1. Management details for Trial 1, Alburgh, VT, 2023.**

| Location | Borderview Research Farm - Alburgh, VT |
|---|---|
| **Soil type** | Benson rocky silt loam, over shaly limestone, 3-8% slopes |
| **Previous crop** | Grain corn |
| **Replicates** | 4 |
| **Corn variety (Relative maturity)** | Pioneer P9608Q (96 RM) |
| **Corn planting date** | 16-May |
| **Tillage operations** | Pottinger TerraDisc |
| **Corn row widths (inches)** | 20, 30, 36, 40, 60 |
| **Target corn population (plants $ac^{-1}$)** | 30,000 |
| **Herbicide ($ac^{-1}$)** | Cornerstone® (1qt.) & Resolve®Q (1.5 oz.); 10-Jun |
| **Top dress fertilizer (lbs $ac^{-1}$)** | 46-0-0 (250) plus ContaiN MAX™; 20-Jun |
| **Date of interseeding** | 20-Jun |
| **Cover crop seeding rate (lbs $ac^{-1}$)** | |
| **Cover crop mixture** | Annual ryegrass (60%)<br>Red clover (30%)<br>Tillage radish (10%) |
| **Corn harvest date** | 27-Sep |

The dried forage subsamples were ground to 2mm using a Wiley sample mill and then to 1mm using a cyclone sample mill (UDY Corporation). The samples were analyzed at the E. E. Cummings Crop Testing Laboratory at the University of Vermont (Burlington, VT) with a FOSS NIRS (near infrared reflectance spectroscopy) DS2500 Feed and Forage analyzer. The NIR procedures and corn silage calibration from Dairy One Forage Laboratories (Geneva, NY) were used to determine crude protein (CP), starch, lignin, acid detergent fiber (ADF), ash corrected neutral detergent fiber (aNDFom), total digestible nutrients (TDN), net energy lactation ($NE_L$), non-fiber carbohydrates (NFC), undigestible neutral detergent fiber (uNDFom; 30h), and neutral detergent fiber digestibility (NDFD; 30h). Milk per acre and milk per ton of harvested feed are two measurements used to combine yield with quality and arrive at a benchmark number indicating how much revenue in milk can be produced from an acre or a ton of corn silage. This calculation relies heavily on the $NE_L$ calculation and can be used to generalize about data, but other considerations should be analyzed when including milk per ton or milk per acre in the decision-making process.

***Trial 2- The impact of corn row width and population on silage productivity***

The experimental design for Trial 2 was a randomized complete block with three replicates (Table 2). Corn was planted in 30" and 60" rows at populations ranging from 22,000 to 32,000 seeds $ac^{-1}$. Each plot was assigned a row width and a target population. Treatment descriptions are in Table 3. Plots were 20' long and consisted of 4 rows. To accommodate wider row spacing, plot size was adjusted based on the corn row width. Plots were 10' wide for 30" row spacing and 20' wide for 60" row spacing.

Corn was planted on 12-May using a 4-row cone planter with John Deere row units fitted with Almaco seed distribution units (Nevada, IA). All plots were interseeded with a cover crop mixture of annual ryegrass (60%), red clover (30%) and tillage radish (10%). To control weeds, all plots were treated with 1 qt $ac^{-1}$ of Cornerstone® and 1.5 oz $ac^{-1}$ of Resolve® Q on 10-Jun. On 20-Jun, plots were top-dressed with 46-0-0 plus the inhibitor ContaiN MAX™ at a rate of 250 lbs $ac^{-1}$. Corn plant population at harvest was assessed by counting the number of plants in the center two rows of each plot. Cover crop biomass was not measured in this trial. On 21-Sep, corn from Trial 2 was harvested as noted in Trial 1. An approximate 1 lb representative subsample was collected for each row width, weighed, dried, and weighed again to determine dry matter content. The dried forage subsamples were ground and analyzed as described in Trial 1.

**Table 2. Trial management details for Trial 2, Alburgh, VT, 2023.**

| **Location** | **Borderview Research Farm - Alburgh, VT** |
|---|---|
| **Soil type** | Benson rocky silt loam, over shaly limestone, 3-8% slopes |
| **Previous crop** | Grain corn |
| **Replicates** | 3 |
| **Corn variety (Relative maturity)** | Pioneer P8820Q (88 RM) |
| **Corn planting date** | 12-May |
| **Tillage operations** | Pottinger TerraDisc |
| **Herbicide ($ac^{-1}$)** | Cornerstone® (1qt.) & Resolve®Q (1.5 oz.); 10-Jun |
| **Top dress fertilizer (lbs $ac^{-1}$)** | 46-0-0 (250) plus ContaiN MAX™; 20-Jun |
| **Date of interseeding** | 20-Jun |
| **Cover crop seeding rate (lbs $ac^{-1}$)** | |
| **Cover crop mixture** | Annual ryegrass (60%)<br>Red clover (30%)<br>Tillage radish (10%) |
| **Corn harvest date** | 21-Sep |

**Table 3. Corn row spacing by population treatment descriptions.**

| Treatment | Row width<br>inches | Target population<br>plants ac$^{-1}$ |
|---|---|---|
| 30 - 22,000 | 30 | 22,000 |
| 30 - 25,000 | | 25,000 |
| 30 - 28,000 | | 28,000 |
| 30 - 30,000 | | 30,000 |
| 30 - 32,000 | | 32,000 |
| 60 - 22,000 | 60 | 22,000 |
| 60 - 25,000 | | 25,000 |
| 60 - 28,000 | | 28,000 |
| 60 - 30,000 | | 30,000 |
| 60 - 32,000 | | 32,000 |

Data were analyzed using a general linear model procedure of SAS (SAS Institute, 1999). Replications were treated as random effects, and treatments were treated as fixed. Mean comparisons were made using the Least Significant Difference (LSD) procedure where the F-test was considered significant, at $p<0.10$. Variations in genetics, soil, weather, and other growing conditions can result in variations in yield and quality. Statistical analysis makes it possible to determine whether a difference between treatments is significant or whether it is due to natural variations in the plant or field. At the bottom of each table, an LSD value is presented for each variable (i.e., yield). Least Significant Differences (LSDs) at the 0.10 level of significance are shown. This means that when the difference between two treatments within a column is equal to or greater to the LSD value for the column, there is a real difference between the treatments 90% of the time. Treatments within a column that have the same letter are statistically similar. In this example, treatment C was significantly different from treatment A, but not from treatment B. The difference between C and B is 1.5, which is less than the LSD value of 2.0 and so these treatments were not significantly different in yield. The difference between C and A is equal to 3.0, which is greater than the LSD value of 2.0 indicating the yields of these treatments were significantly different from one another. The letter ‘a’ indicates that treatment B was not significantly lower than the top yielding treatment, indicated in bold.

| Treatment | Yield |
|---|---|
| A | 6.0$^{b}$ |
| B | 7.5$^{ab}$ |
| C | **9.0$^{a}$** |
| LSD | 2.0 |

# RESULTS

Weather data were recorded with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at Borderview Research Farm in Alburgh, VT (Table 4). Temperatures were below average during most of the growing season. In particular, the monthly average temperature in August was 3.73 degrees cooler than normal. In May around the time of corn planting, soil conditions were quite dry due to decreased precipitation. But excessive rainfall persisted from June through August and there was a total of 25.8 inches of precipitation, 6.5 inches above average. There was a total of 2487 accumulated Growing Degree Days (GDDs), which is 61 GDDs less than the 30-year average.

**Table 4. Weather data for Alburgh, VT, 2023.**

| **Alburgh, VT** | May | June | July | August | Sept |
|---|---|---|---|---|---|
| Average temperature (°F) | 57.1 | 65.7 | 72.2 | 67.0 | 63.7 |
| Departure from normal | -1.28 | -1.76 | -0.24 | -3.73 | 1.03 |
| | | | | | |
| Precipitation (inches) | 1.98 | 4.40 | 10.8 | 6.27 | 2.40 |
| Departure from normal | -1.78 | 0.14 | 6.69 | 2.73 | -1.27 |
| | | | | | |
| Growing Degree Days (50-86°F) | 303 | 483 | 712 | 540 | 449 |
| Departure from normal | 1 | -41 | 17 | -101 | 62 |

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger.
Historical averages are for 30 years of NOAA data (1991-2020) from Burlington, VT.

## ***Trial 1- The impact of corn row width on silage productivity***

Corn harvest characteristics for Trial 1 are summarized in Table 5 below. The average dry matter at harvest was 37.6%, and there were no significant differences between treatments. Corn silage yield was significantly greater in the 20” plots with an average yield of 30.1 tons ac$^{-1}$. This was not statistically different from the 40” plots, which had an average yield of 26.5 tons ac$^{-1}$. Silage yields were lowest in the 60” plots, but were not statistically different from the 36” plots.

**Table 5. Corn harvest characteristics for Trial 1, Alburgh, VT, 2023.**

| **Row width** | **Dry matter** | **Yield, 35% DM** |
|---|---|---|
| inches | % | tons ac$^{-1}$ |
| 20 | 39.1 | 30.1$^{a}$† |
| 30 | 35.5 | 25.4$^{b}$ |
| 36 | 37.3 | 25.0$^{bc}$ |
| 40 | 37.7 | 26.5$^{ab}$ |
| 60 | 38.1 | 20.7$^{c}$ |
| LSD (*p*=0.10)‡ | NS§ | 4.47 |
| Trial mean | 37.6 | 25.6 |

†Within a column, treatments marked with the same letter are statistically similar (p=0.10); top performer is in **bold**.
‡LSD; least significant difference at the p=0.10.
§NS; no significant difference between treatments.

There were very few significant differences in quality between treatments (Table 6). The average crude protein was 7.61%. Silage in the 36” plots had the greatest crude protein, 7.90%, but this was not statistically different from the 20”, 30”, or 40” plots. Silage in the 60” plots had significantly lower crude protein than the other four row widths. The average estimated milk per ton of feed was 3284 lbs, and there were no statistical differences between the treatments. The 20” plots had the highest estimated milk per acre, 34,575 lbs. This was not statistically different from the 30” and 40” plots.

**Table 6. Corn quality characteristics for Trial 1, Alburgh, VT, 2023.**

| Treatment | CP | ADF | aNDFom | Lignin | NFC | Starch | TDN | 30-hr uNDFom | 30-hr NDFD | $NE_L$ | Milk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | --------------% of DM---------------- | | | | | | | | % of NDF | Mcal lb$^{-1}$ | lbs. ton$^{-1}$ | lbs. ac$^{-1}$ |
| 20 | 7.58[a]† | 22.4 | 38.3 | 2.83 | 46.1 | 36.5 | 64.0 | 17.4 | 54.6 | 0.667 | 3285 | **34575[a]** |
| 30 | 7.73[a] | 21.6 | 37.0 | 2.75 | 47.0 | 37.4 | 63.8 | 16.7 | 55.0 | 0.673 | 3288 | 29276[abc] |
| 36 | **7.90[a]** | 23.4 | 39.3 | 2.95 | 44.4 | 34.9 | 63.5 | 17.9 | 54.6 | 0.659 | 3266 | 28664[bc] |
| 40 | 7.68[a] | 22.1 | 37.7 | 2.78 | 46.8 | 37.4 | 64.0 | 17.2 | 54.3 | 0.670 | 3281 | 30491[ab] |
| 60 | 7.15[b] | 21.8 | 37.1 | 2.83 | 47.2 | 37.4 | 63.5 | 17.0 | 54.2 | 0.667 | 3299 | 23940[c] |
| LSD ($p$ = 0.10)‡ | 0.41 | NS§ | NS | NS | NS | NS | NS | NS | NS | NS | NS | 5340 |
| Trial mean | 7.61 | 22.3 | 37.9 | 2.83 | 46.3 | 36.7 | 63.8 | 17.2 | 54.5 | 0.667 | 3284 | 29389 |

†Within a column, treatments marked with the same letter are statistically similar (p=0.10); top performer is in **bold**.
‡LSD; least significant difference at the p=0.10.
§NS; no significant difference between treatments.

Light sensors were placed in between the rows of corn to measure the intensity of light reaching the soil surface, and a control was placed outside of the corn rows. The light intensity, measured in accumulated lumens ft$^{-2}$, is shown in Figure 1 below. This figure provides a visualization of light intensity but does not, however, state that these differences are statistically significant. By mid-July, approximately two months after planting, light intensity was highest in the 60” plot and the control outside of the plots. The amount of light reaching the soil surface was similar between the 36” and 40” plots and between the 20” 30” plots.

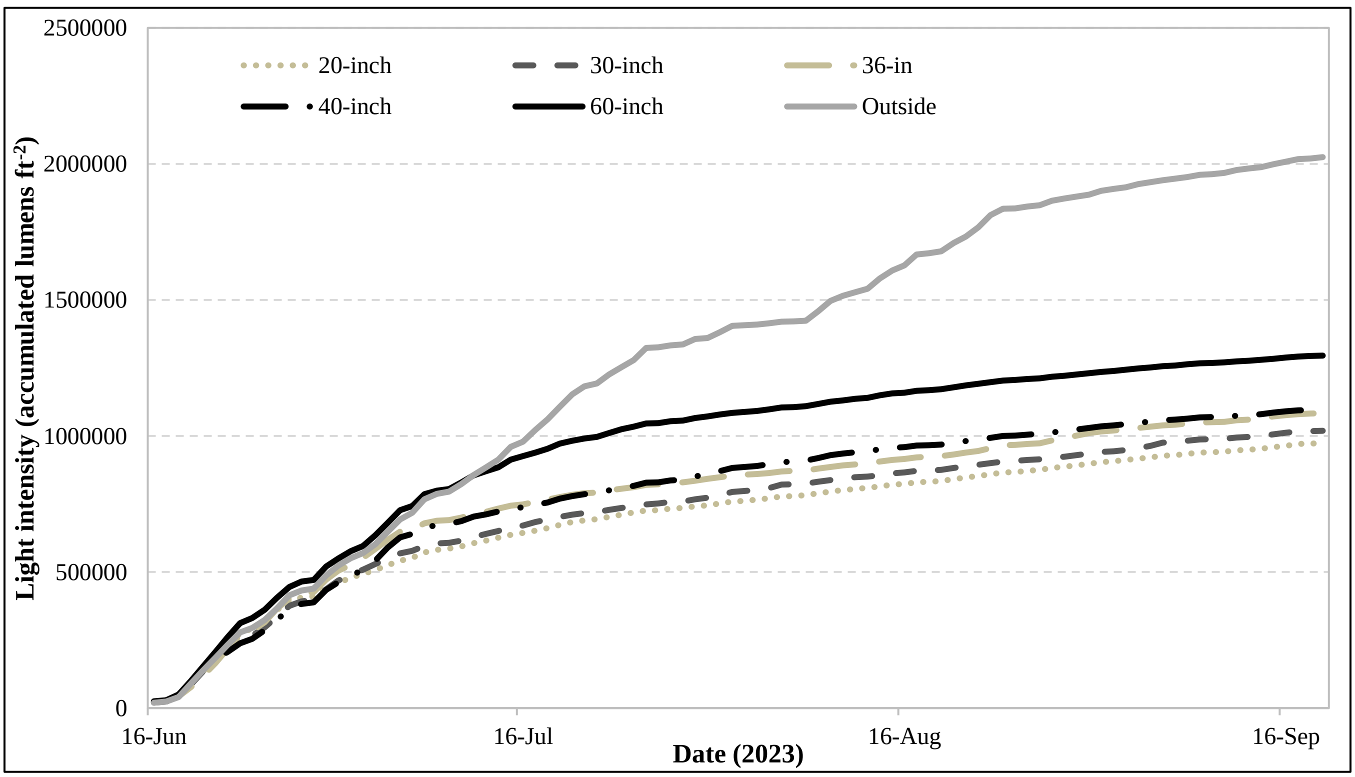


**Figure 1. Light intensity at the soil surface by row width compared to a control in Trial 1, Alburgh, VT, 2023.**

***Trial 2- The impact of corn row width and population on silage productivity***

There were significant differences in harvest populations between treatments (Table 7). The 30”-32,000 plants ac$^{-1}$ treatment had the greatest harvest population (33,251 plants ac$^{-1}$), but was not statistically different from the 60”-32,000 plants ac$^{-1}$ treatment. Harvest populations in the 30”-30,000 plants ac$^{-1}$ treatment were statistically greater than in the 60”-30,000 plants ac$^{-1}$ treatment. For the 22-, 25-, and 28,000 plants ac$^{-1}$ treatments, the harvest populations were not statistically different between the 30” and 60” row width. The trial average dry matter was 45.1% and the average corn yield at 35% dry matter was 22.8 tons ac$^{-1}$. Despite significant differences in harvest populations, there were no statistical differences in corn yield between treatments.

**Table 7. Corn harvest characteristics, Alburgh, VT, 2023.**

| Treatment | Harvest population | Dry matter | Yield, 35% DM |
|---|---|---|---|
| | plants ac$^{-1}$ | % | tons ac$^{-1}$ |
| 30 – 22,000 | 21635[e]† | 45.0 | 28.5 |
| 30 – 25,000 | 24974[d] | 46.4 | 24.1 |
| 30 – 28,000 | 28459[c] | 43.1 | 22.4 |
| 30 – 30,000 | 30492[b] | 45.5 | 20.3 |
| 30 – 32,000 | **33251[a]** | 45.2 | 30.0 |
| 60 – 22,000 | 22869[e] | 47.1 | 18.6 |
| 60 – 25,000 | 24757[d] | 42.3 | 19.4 |
| 60 – 28,000 | 27951[c] | 45.5 | 22.5 |
| 60 – 30,000 | 27806[c] | 45.3 | 21.7 |
| 60 – 32,000 | 33106[a] | 45.6 | 20.6 |
| LSD (*p*=0.10)‡ | 1820 | NS§ | NS |
| Trial mean | 27530 | 45.1 | 22.8 |

†Within a column, treatments marked with the same letter are statistically similar (p=0.10); top performer is in **bold**.
‡LSD; least significant difference at the p=0.10.
§NS; no significant difference between treatments.

Corn quality characteristics are summarized in Table 8. Crude protein, aNDFom, starch, 30-hr uNDFom, 30-hr NDFD, milk per acre, and milk per ton were not statistically different between treatments. ADF was greatest in the 30”-28,000 plants ac$^{-1}$ treatment, with 28.5%, but this was statistically similar to five other treatments. The 60”-32,000 plants ac$^{-1}$ treatment had the highest lignin, 3.5%, and was not significantly different from the 30”-28,000 or 60”-25,000 plants ac$^{-1}$ treatments. NFC was highest in the 30”-25,000 plants ac$^{-1}$ treatment, 44.3%, but was statistically similar to four other treatments. The 30”-25,000, 60”-22,000, and 60”-28,000 plants ac$^{-1}$ treatments had the greatest TDN, 63%, and were not statistically different from four other treatments. $NE_L$ was highest in the 30”-25,000 plant ac$^{-1}$ treatment, 0.655 Mcal lb$^{-1}$, but was statistically similar to five other treatments.

**Table 8. Corn quality characteristics, Alburgh, VT, 2023.**

| Treatment | CP | ADF | aNDFom | Lignin | NFC | Starch | TDN | 30-hr uNDFom | 30-hr NDFD | $NE_L$ | Milk | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | -------------% of DM--------------- | | | | | | | | % of NDF | Mcal lb$^{-1}$ | lbs. ton$^{-1}$ | lbs. ac$^{-1}$ |
| 30 – 22,000 | 7.30 | 26.1[abc]† | 43.7 | 3.10[bc] | 40.5[bcde] | 32.7 | 62.3[ab] | 20.0 | 54.3 | 0.636[abc] | 3146 | 31356 |
| 30 – 25,000 | 7.87 | 23.2[c] | 40.1 | 3.00[c] | **44.3[a]** | 35.7 | **63.0[a]** | 18.8 | 52.9 | **0.655[a]** | 3223 | 27121 |
| 30 – 28,000 | 7.97 | **28.5[a]** | 45.0 | 3.43[a] | 37.0[ef] | 27.6 | 61.0[c] | 21.1 | 53.1 | 0.614[cd] | 3074 | 24270 |
| 30 – 30,000 | 7.30 | 26.0[abc] | 43.3 | 3.13[bc] | 41.4[abcd] | 33.7 | 62.3[ab] | 20.5 | 52.6 | 0.639[ab] | 3141 | 22231 |
| 30 – 32,000 | 7.30 | 24.1[bc] | 41.1 | 3.07[bc] | 43.9[ab] | 35.3 | 62.7[a] | 18.8 | 54.3 | 0.648[ab] | 3183 | 33393 |
| 60 – 22,000 | 7.83 | 24.6[bc] | 41.3 | 3.07[bc] | 42.3[abc] | 33.6 | **63.0[a]** | 18.8 | 54.5 | 0.649[ab] | 3222 | 20950 |
| 60 – 25,000 | 7.57 | 28.3[a] | 45.9 | 3.33[ab] | 36.1[f] | 26.8 | 61.3[bc] | 21.8 | 53.0 | 0.610[d] | 3083 | 20873 |
| 60 – 28,000 | 7.90 | 23.8[bc] | 39.8 | 3.07[bc] | 43.5[abc] | 34.6 | **63.0[a]** | 19.4 | 51.2 | 0.654[ab] | 3227 | 25412 |
| 60 – 30,000 | 7.83 | 26.5[ab] | 43.7 | 3.13[bc] | 40.2[cde] | 31.8 | 62.0[abc] | 20.8 | 52.4 | 0.631[bcd] | 3112 | 23589 |
| 60 – 32,000 | 7.77 | 28.2[a] | 45.3 | **3.50[a]** | 38.3[def] | 28.3 | 61.3[bc] | 22.0 | 51.3 | 0.614[cd] | 3055 | 21995 |
| LSD ($p$ = 0.10)‡ | NS§ | 3.16 | NS | 0.30 | 3.68 | NS | 1.15 | NS | NS | 0.024 | NS | NS |
| Trial mean | 7.66 | 25.9 | 42.9 | 3.18 | 40.8 | 32.0 | 62.2 | 20.2 | 53.0 | 0.635 | 3147 | 25119 |

†Within a column, treatments marked with the same letter are statistically similar (p=0.10); top performer is in **bold**.
‡LSD; least significant difference at the p=0.10.
§NS; no significant difference between treatments.

# DISCUSSION

During the 2023 growing season, cool temperatures persisted from May through August. There was a total of 2487 accumulated Growing Degree Days, which is slightly less than the 30-year average of 2584 Growing Degree Days. Soil conditions around planting were dry because of below average rainfall in May, but excessive rainfall in July and August resulted in a total of 25.8 inches of precipitation. This is 6.5 inches more than normal. Despite sub-optimal conditions, corn yields were good. The average in Trial 1 was 25.6 tons ac$^{-1}$ and the average in Trial 2 was 22.8 tons ac$^{-1}$, which is comparable to the average yield of the short season corn silage trial at Borderview Research Farm this season, 25.2 tons ac$^{-1}$.

Trial 1 investigated the productivity of corn silage grown in 20”, 30”, 36”, 40”, and 60” rows. All plots were planted at the target population of 30,000 plants ac$^{-1}$, but there were statistical differences in yield between treatments. Corn silage yields were greatest in the 20” and 40” row width treatments, and the 60” row treatment had the lowest silage yields. These statistical differences in silage yields resulted in statistically significant differences in milk yield on a per acre basis. Crude protein was significantly reduced in the 60-inch row widths. To achieve a target population of 30,000 plants ac$^{-1}$ with 60” row widths, corn is planted at a seeding rate of 60,000 seeds ac$^{-1}$, increasing the density of plants within a row. Corn plants may grow taller in these dense rows, increasing the amount of stem to leaf material, resulting in lower crude protein. While the number of plants on a per acre basis is the same (i.e. 30,000 plants ac$^{-1}$), there are 2X as many plants within a 60” compared to a 30” row. The high plant density in 60” rows may also have reduced over plant and ear size, resulting in lower silage yields.

Trial 2 investigated the impact of row width and population on silage productivity. Corn silage yield and dry matter were not significantly different between treatments. For all the target populations, except 30,000 plants ac$^{-1}$, there were no statistical differences in harvest populations between the 30" and 60" row widths. These data suggest that the same harvest population can be achieved in 30" and 60" rows when the target populations range from 22 to 32,000 plants ac$^{-1}$. These corn populations are lower than the typical recommended seeding rate for corn silage, which ranges from 30 to 35,000 seeds ac$^{-1}$, but planting at a lower seeding rate may allow farmers to incorporate the wide row spacings and cover crops into their production system, while still achieving good corn silage yields. It is important to remember that these data represent only one year at one location, and the UVM Extension NWCS program intends to repeat these trials again in 2024.

## ACKNOWLEDGEMENTS

This material is based upon work supported by the USDA National Institute of Food and Agriculture under award number 2022-68008-36514, by the USDA National Institute of Food and Agriculture NE SARE under award number ONE21-386. A special thanks to Roger Rainville and the staff at Borderview Research Farm for their generous help with this research trial as well as Anna Brown, John Bruce, Kellie Damann, Catherine Davidson, Hillary Emick, Lindsey Ruhl, Laura Sullivan, and Sophia Wilcox Warren for their assistance with data collection and entry. The information is presented with the understanding that no product discrimination is intended, and no endorsement of any product mentioned, or criticism of unnamed products is implied.

*UVM Extension helps individuals and communities put research-based knowledge to work.*

THE UNIVERSITY OF VERMONT EXTENSION