2021 Impact of corn silage variety and seeding rate on interseeded cover crop establishment

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IMPACT OF CORN SILAGE VARIETY AND SEEDING RATE ON INTERSEEDED COVER CROP ESTABLISHMENT

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With increasing focus on minimizing environmental impacts from agriculture, farmers are looking for strategies that are good for both farm and environmental viability. Cover cropping is one strategy that has been promoted to help farms improve soil health and minimize soil and nutrient losses to the environment. However, with a short growing season it is often difficult to get an adequate cover crop established following corn silage harvest. Therefore, farmers are interested in using interseeding techniques to establish cover crops into an actively growing corn crop. Being successful with this practice will likely require changes to other aspects of the cropping system such as corn populations, corn relative maturity, and the timing of cover crop seeding. The University of Vermont Extension's Northwest Crops and Soils Team implemented replicated field experiments in 2021 to help identify best practices that support successful cover crop establishment without sacrificing corn silage yields.

MATERIALS AND METHODS

The field trials were conducted at Borderview Research Farm in Alburgh, VT and at Bridgeman View Farm in Franklin, VT (Table 1). The trials evaluated the impact of corn variety and population on cover crop establishment and corn yields. Six corn varieties were planted at populations ranging from 26,000 to 36,000. Varieties were selected for fixed and flex-ear characteristics as well as suitability to a northern climate and productivity. Manure was injected at the Franklin site at a rate of 7,159 gal ac^{-1} on 25-Apr. Corn was planted on 14-May and 17-May for the Alburgh and Franklin locations respectively, with the Alburgh site receiving 5 gal ac^{-1} 9-18-9 starter fertilizer at planting. The plots were interseeded with a cover crop mixture of annual ryegrass (60%), tillage radish (10%) and red clover (30%) when the corn reached the V6 growth stage on 14-Jun and 19-Jun in Alburgh and Franklin respectively.

Prior to harvest, corn populations were measured by counting the number of plants in the center two rows of each plot in Alburgh and the number of plants within random 17.5' transects in each plot in Franklin. Corn was harvested on 17-Sep in Alburgh using a John Deere 2-row corn chopper and collected in a wagon fitted with scales to weigh the yield of each plot. In Franklin, the host farmer harvested the trial on 23-Sep and weighed each plot using portable truck scales. At both sites, an approximate 1 lb subsample was collected, weighed, dried, and weighed again to determine dry matter content and calculate yield from each plot. The samples were then ground to 2mm using a Wiley sample mill and then to 1mm using a cyclone sample mill (UDY Corporation). The samples were analyzed for forage quality via Near Infrared Reflectance Spectroscopy at the E. E. Cummings Crop Testing Laboratory (Burlington, VT) using a FOSS DS2500 NIRS. Following corn harvest, cover crop ground cover and biomass were assessed on 28-Oct and 29-Oct for the Franklin and Alburgh sites respectively. Cover crop biomass was measured by harvesting the material in a 0.25m^2 area in each plot, weighing the material, and taking a subsample to be dried to determine dry matter content. Ground cover provided by the cover crop was measured using the Canopeo smartphone application.

Table 1. Trial management, 2021.

Location	Borderview Research Farm – Alburgh, VT	Bridgeman View Farm – Franklin, VT
Soil type	Cabot extremely stony fine sandy loam	Westbury stony fine sandy loam
Corn variety treatments (relative maturity)	B95M87AMXT (95 RM) B95V86AM (95 RM) B97F86AMXT (97 RM) DKC44-80 (94 RM) P38N85 (92 RM) P9608Q (96 RM)	B95M87AMXT (95 RM) B95V86AM (95 RM) B97F86AMXT (97 RM) DKC44-80 (94 RM) P38N85 (92 RM) P9608Q (96 RM)
Corn population treatments (seeds ac^{-1})	26,000 28,000 30,000 32,000 34,000 36,000	28,000 31,000 34,000
Corn planting date	14-May	17-May
Cover crop mixture	25 lbs ac^{-1} Annual ryegrass (60%) Red clover (30%) Tillage radish (10%)	25 lbs ac^{-1} Annual ryegrass (60%) Red clover (30%) Tillage radish (10%)
Cover crop planting date	14-Jun	19-Jun
Harvest date	17-Sep	23-Sep

Mixtures of true proteins, composed of amino acids, and non-protein nitrogen make up the crude protein content of forages. The bulky characteristics of forage come from fiber. Forage feeding values are negatively associated with fiber since the less digestible portions of the plant are contained in the fiber fraction. The detergent fiber analysis system separates forages into two parts: cell contents, which include sugars, starches, proteins, non-protein nitrogen, fats and other highly digestible compounds; and the less digestible components found in the fiber fraction. The total fiber content of forage is contained in the neutral detergent fiber (aNDFom) which includes cellulose, hemicellulose, and lignin. This measure indicates the bulky characteristic of the forage and therefore is negatively correlated with animal dry matter intake. The portion of the NDF fraction that is estimated to be digestible after 30 hours of fermentation in rumen fluid is represented by the NDF digestibility (NDFD30). The portion of the NDF that is left undigested after 240 hours of fermentation in rumen fluid is represented by uNDF240. The acid detergent fraction (ADF) is composed of highly indigestible fiber and therefore, is negatively correlated with digestibility. The portion of the total dry matter (DM) that contains digestible nutrients is represented by the total digestible nutrients (TDN). The estimated energy available for bodily maintenance plus lactation by a ruminant consuming the forage is represented by the net energy of lactation (NEL) which is expressed on a per pound of dry matter basis. Several forage quality metrics are combined to estimate the milk yield produced by feeding the forage to cattle and is expressed both on a per ton of dry matter and per acre basis.

Data were analyzed using mixed model analysis using the mixed procedure of SAS (SAS Institute, 1999). Replications in the trials were treated as random effects and treatments were treated as fixed. Mean comparisons were made when the F-test was considered significant ($p<0.10$).

RESULTS

Weather data was recorded with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at each trial site (Tables 2 and 3). Conditions throughout the season were generally hotter and drier than normal although July was cooler than normal. The region experienced drought conditions categorized at “abnormally dry” or “moderate drought” throughout the duration of the trial (Drought.gov). In total, precipitation was 6.27 inches and 7.63 inches below normal for May-Sep in Alburgh and Franklin respectively. A total of 2613 and 2494 Growing Degree Days (GDDs) were accumulated during the season in Alburgh and Franklin respectively. These were 64 and 143 more than the 30-year normal for these locations respectively.

Table 2. 2021 weather data for Alburgh, VT.

	May	Jun	Jul	Aug	Sep
Average temperature (°F)	58.4	70.3	68.1	74.0	62.8
Departure from normal	-0.03	2.81	-4.31	3.25	0.14
Precipitation (inches)	0.66	3.06	2.92	2.29	4.09
Departure from normal	-3.10	-1.20	-1.14	-1.25	0.42
Growing Degree Days (base 50°F)	334	597	561	727	394
Departure from normal	33	73	-134	85	7

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.

Table 3. 2021 weather data for Franklin, VT.

	May	Jun	Jul	Aug	Sep
Average temperature (°F)	59.6	69.3	67.6	72.1	62.9
Departure from normal	1.21	1.83	-4.84	1.39	0.19
Precipitation (inches)	0.71	2.61	2.44	2.77	2.65
Departure from normal	-2.68	-1.02	-1.78	-1.14	-1.01
Growing Degree Days (base 50°F)	298	580	544	685	387
Departure from normal	6	93	-86	103	27

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.

Interactions

There were very few significant interactions between main effects (Table 4 and 5). At the Franklin location, there was a corn seeding rate by variety interaction for cover crop yield and corn crude protein. The interaction suggests that the varieties response to altered seeding rates changed the effect on cover crop biomass and corn crude protein (Figure 1 and 2). For most varieties, cover crop biomass was highest at the middle seeding rate and decreased at the highest seeding rate. However, varieties DKC44-80 and P38N85 did not follow this trend. This may be due to plant architecture. Corn crude protein response fluctuated with some varieties increasing as seeding rates increased, some decreased as seeding rates increased, and some increased or decreased only at the middle seeding rate. We'd expect flex-ear varieties (B97F86AMXT, DKC44-80, and P9608Q) to contribute to higher protein levels at lower seeding rates as the plants are able to take advantage of limited competition by producing larger ears and therefore higher silage protein. However, this wasn't true for all flex-ear varieties. Similarly, for fixed-ear varieties we'd expect higher protein levels at higher populations as these varieties are better adapted to these high competition situations and can maintain ear size and therefore silage protein content. Again, not all fixed-ear varieties followed this trend. These data suggest that other varietal performance factors that are impacted by seeding rate may contribute to protein content. The lack of other significant interactions indicates that corn varieties responded similarly in terms of yield and quality parameters when planted at different seeding rates.

Table 4. Significance of main effects and main effect interactions, corn characteristics.

	Alburgh location			Franklin location		
	Seeding rate	Variety	Rate x Variety	Seeding rate	Variety	Rate x Variety
Corn yield	*†	NS	NS	**	**	NS
Corn dry matter	NS‡	***	NS	NS	***	NS
Corn crude protein	NS	*	NS	NS	***	***
Corn ADF	NS	**	NS	NS	NS	NS
Corn aNDFom	NS	**	NS	NS	NS	NS
Corn lignin	NS	NS	NS	NS	NS	NS
Corn fat	NS	NS	NS	NS	NS	NS
Corn starch	NS	**	NS	NS	NS	NS
Corn uNDF240	NS	***	NS	NS	NS	NS
Corn TDN	NS	NS	NS	NS	NS	NS
Corn NEL	NS	NS	NS	NS	NS	NS
Milk yield (lbs ton^{-1})	NS	NS	NS	NS	NS	NS
Milk yield (lbs ac^{-1})	*	NS	NS	*	**	NS

Table 5. Significance of main effects and main effect interaction, cover crop characteristics.

	Alburgh location			Franklin location		
	Seeding rate	Variety	Rate x Variety	Seeding rate	Variety	Rate x Variety
Fall ground cover	NS	**	NS	NS	NS	NS
Cover crop yield	NS	x	NS	NS	NS	**
Ear proportion	N/A	N/A	N/A	NS	NS	NS
Ryegrass proportion	N/A	N/A	N/A	NS	NS	NS
Radish proportion	N/A	N/A	N/A	NS	NS	NS
Clover proportion	N/A	N/A	N/A	NS	NS	NS
Weeds proportion	N/A	N/A	N/A	NS	NS	NS

†* 0.1 < p > 0.05; ** 0.05 < p > 0.01; *** p < 0.01

‡NS; Not statistically significant.

¥N/A; not measured at that location.

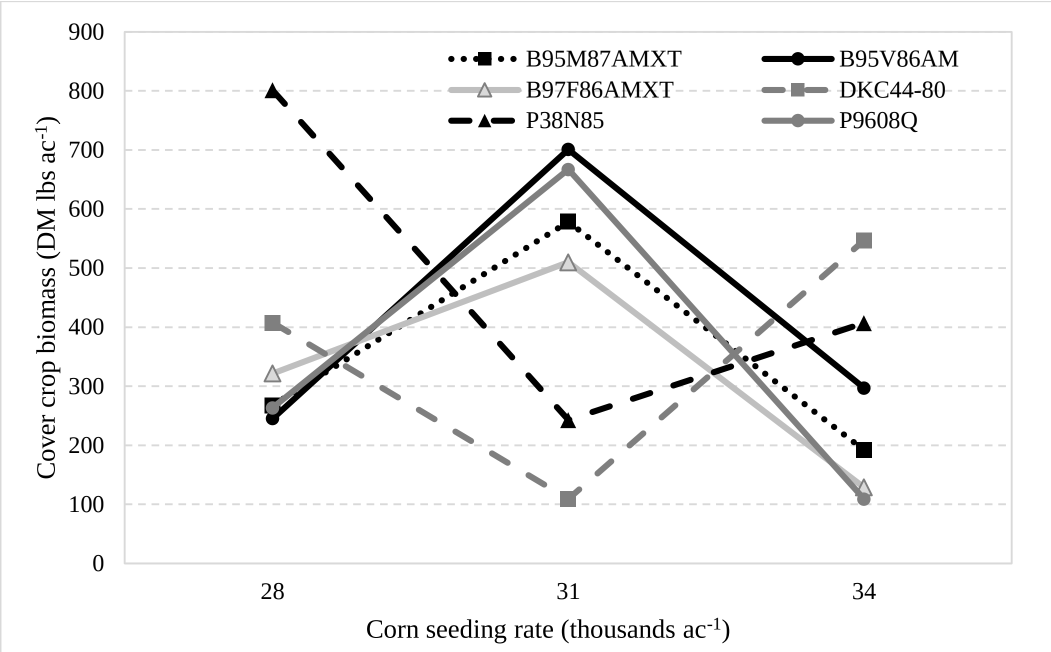

Figure 1. Seeding rate x variety interaction for cover crop dry matter yield, Franklin location.

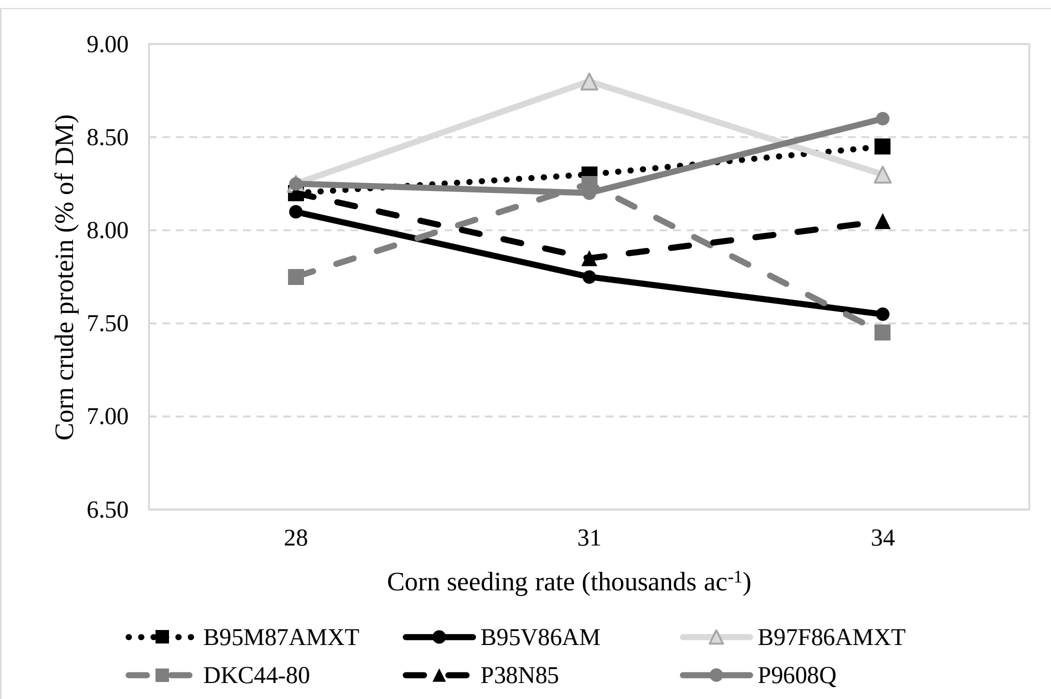

Figure 2. Seeding rate x variety interaction for corn crude protein content, Franklin location.

Impact of Corn Seeding Rate

As anticipated, seeding rate significantly impacted corn populations at harvest in both locations (Tables 6 and 7). At the Alburgh location, populations aligned well with the seeding rate treatments leading to significantly different harvest populations between each seeding rate treatment. At the Franklin site, where fewer seeding rates were imposed, populations were significantly higher in the 34,000 seeds ac^{-1} treatment, however the 31,000 and 28,000 seeds ac^{-1} treatments ultimately had statistically similar harvest populations around 28,000 plants ac^{-1}. These differences also translated into statistically differing yields at both locations. In Alburgh, the highest yield of 22.7 tons ac^{-1} was obtained from the 36,000 seeds ac^{-1} treatment. However, this was statistically similar to the 30,000 and 26,000 seeds ac^{-1} treatments, indicating that no additional yield benefit was gained by seeding at a rate greater than 26,000 seeds ac^{-1}. As discussed in the previous section, there was no significant interaction between ear type (fixed vs flex) and seeding rate for yield indicating that no additional yield benefit was seen increasing seeding rates beyond 26,000 seeds ac^{-1} for either ear-type. At the Franklin site, the highest yield was obtained by the 31,000 seeds ac^{-1} treatment which yielded 23.7 tons ac^{-1}. As this was statistically similar to the 34,000 seeds ac^{-1} treatment, no additional yield benefit was gained by seeding above 31,000 seeds ac^{-1}.

Table 6. Corn and cover crop characteristics by seeding rate, Alburgh location.

Seeding Rate	Population	Corn yield@ 35% DM	Corn DM	Ground cover	Cover crop yield
seeds ac^{-1}	plants ac^{-1}	tons ac^{-1}	%	%	DM lbs ac^{-1}
26000	24611f†	22.6a	43.9	63.6	1525
28000	26426e	20.0c	45.3	62.4	1495
30000	27540d	22.2ab	46.3	61.2	1474
32000	30492c	20.3bc	46.9	64.9	1481
34000	32355b	20.0c	46.7	63.3	1822
36000	33565a	22.7a	46.8	62.4	1522
LSD (*p*=0.10) ‡	676	2.11	NS¥	NS	NS
Trial mean	29165	21.3	46.0	63.0	1553

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Table 7. Corn characteristics by seeding rate, Franklin location.

Seeding Rate	Population	Corn yield@ 35% DM	Corn DM	Ear proportion
seeds ac^{-1}	plants ac^{-1}	tons ac^{-1}	%	%
28000	27629b	20.5b†	49.4	47.6
31000	28708b	23.7a	50.8	47.3
34000	31363a	21.9ab	50.5	47.9
LSD (*p*=0.10) ‡	1665	2.11	NS¥	NS
Trial mean	29234	22.0	50.2	47.6

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

At the Franklin location, plants were also divided into ear and stover fractions. The proportion of the total plant dry matter that was in the ear fraction averaged 47.6% and did not differ by seeding rate treatment. At both sites following corn harvest, cover crop ground cover and biomass were assessed. In Franklin, additionally the samples were sorted into ryegrass, radish, clover, and weed fractions. Neither location saw a significant difference in ground cover or cover crop biomass (Tables 6 and 8). Sorting from the Franklin site indicated that the cover crop mixture was dominated by annual ryegrass followed by radish and weeds. Virtually no clover was found. However, this composition did not vary by seeding rate treatment indicating that, even at lower seeding rates, which allow more light to penetrate the corn canopy, a similar cover crop yield and composition could be expected.

Table 8. Cover crop characteristics by seeding rate, Franklin location.

Seeding Rate	Ground cover	Cover crop yield	Ryegrass	Radish	Clover	Weeds
seeds ac^{-1}	%	DM lbs ac^{-1}	% of DM			
28000	30.0	384	77.1	16.2	0.136	6.52
31000	33.7	468	79.2	8.92	0.166	11.7
34000	29.7	280	89.4	7.72	0.130	2.80
LSD (*p*=0.10) ‡	NS¥	NS	NS	NS	NS	NS
Trial mean	31.1	378	81.9	10.9	0.144	7.02

‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Corn quality characteristics did not differ significantly by seeding rate in either location (Tables 9 and 10). The only parameter that did differ was predicted milk yield per acre. This is due to the significant differences observed in yield between the seeding rates, not forage quality differences. Although some of the varieties included in the trial possessed flex-ear characteristics which would allow them to form larger ears at lower populations, these did not translate into significant impacts on corn silage quality parameters.

Table 9. Corn quality characteristics by seeding rate, Alburgh location.

Seeding Rate	CP	ADF	aNDFom	Lignin	Starch	TDN	NEL	240-hr uNDF	30-hr NDFD	Milk yield	
seeds ac^{-1}	% of DM						Mcal lb^{-1}	% of NDF		lbs ton^{-1}	lbs ac^{-1}
26000	8.25	20.1	36.5	2.29	38.7	65.4	0.690	9.64	58.2	3432	27158a†
28000	8.18	19.5	35.4	2.19	39.8	65.8	0.697	9.49	57.9	3453	24128b
30000	8.06	20.4	37.0	2.28	38.9	65.3	0.686	9.94	57.7	3397	26475ab
32000	7.86	20.8	37.3	2.31	38.6	65.2	0.684	9.90	57.7	3391	24000b
34000	7.83	19.5	35.3	2.19	40.7	65.7	0.695	9.39	56.9	3431	24046b
36000	7.87	20.1	36.3	2.14	40.2	65.7	0.694	9.71	57.0	3422	27200a
LSD (*p*=0.10) ‡	NS¥	NS	NS	NS	NS	NS	NS	NS	NS	NS	2568
Trial mean	8.01	20.1	36.3	2.24	39.5	65.5	0.691	9.68	57.6	3421	25501

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Table 10. Corn quality characteristics by seeding rate, Franklin location.

Seeding Rate	CP	ADF	aNDFom	Lignin	Starch	TDN	NEL	240-hr uNDF	30-hr NDFD	Milk yield	
seeds ac^{-1}	% of DM						Mcal lb^{-1}	% of NDF		lbs ton^{-1}	lbs ac^{-1}
28000	8.13	19.6	35.5	2.19	38.6	67.0	0.711	11.1	56.3	3496	25094b†
31000	8.19	20.0	36.2	2.23	38.3	66.5	0.704	10.0	57.4	3471	28725a
34000	8.07	19.7	35.4	2.25	38.9	66.8	0.707	11.0	56.0	3468	26624ab
LSD (p=0.10) ‡	NS¥	NS	NS	NS	NS	NS	NS	NS	NS	NS	2629
Trial mean	8.13	19.7	35.7	2.22	38.6	66.8	0.707	10.7	56.6	3478	26815

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Impact of Corn Variety

Corn variety significantly impacted corn harvest characteristics at both locations (Tables 11 and 12). At both sites, variety P38N85 produced one of the lowest populations. This could be due to differences in seed size and shape, complicating accurate planting in comparison to the other varieties. Corn yield varied significantly by variety at only the Franklin site. Variety DKC44-80 was the top yielder at both locations. This was statistically similar to four other varieties at the Franklin site. At both sites variety P38N85 was the lowest yielding which matches the trend observed in harvest populations. Corn dry matter content also varied across varieties at both locations. In Alburgh, all varieties had dry matter contents around 45% except for P38N85 which was significantly higher at 49.9%. This indicates that this variety matured earlier than the other varieties at this location. This also is to be expected as P38N85 has the shortest relative maturity in the trial.

Table 11. Corn and cover crop characteristics by variety, Alburgh location.

Variety	Population	Corn yield@ 35% DM	Corn DM	Ground cover	Cover crop yield
	plants ac^{-1}	tons ac^{-1}	%	%	DM lbs ac^{-1}
B95M87AMXT	29693a†	21.0	45.6a	58.0c	1311
B95V86AM	28314c	20.9	46.0a	65.1ab	1580
B97F86AMXT	29379ab	21.1	44.7a	59.6bc	1573
DKC44-80	29064ab	22.8	44.7a	70.2a	1898
P38N85	28919bc	20.2	49.9b	59.2bc	1579
P9608Q	29621a	21.8	45.0a	65.9ab	1378
LSD (p=0.10) ‡	676	NS¥	2.25	6.77	NS
Trial mean	29165	21.3	46.0	63.0	1553

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

In Franklin, variety B97F86AMXT had a dry matter content of 46.3% which was significantly lower than the other varieties that were all above 50%. B97F86AMXT had the longest relative maturity in the trial. Overall, these dry matter contents are significantly higher than the target of 35%. Extreme drought conditions throughout the season likely contributed to expedited maturation and dry down prior to being able to harvest the trials. In Franklin, corn plants were also separated into ear and stover fractions. The proportion of the plant allocated to the ear fraction did not differ significantly between varieties, averaging 47.6% of the total dry matter.

Table 12. Corn characteristics by variety, Franklin location.

Variety	Population	Corn yield@ 35% DM	Corn DM	Ear proportion
	plants ac^{-1}	tons ac^{-1}	%	%
B95M87AMXT	30865a†	19.4b	50.5b	50.6
B95V86AM	29206a	22.2ab	50.3b	49.1
B97F86AMXT	30036a	22.6a	46.3a	44.9
DKC44-80	28708a	24.7a	50.0b	48.4
P38N85	25721b	19.5b	53.6c	47.4
P9608Q	30865a	23.8a	50.5b	45.4
LSD (*p*=0.10) ‡	2355	2.98	2.07	NS¥
Trial mean	29234	22.0	50.2	47.6

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Post-harvest ground cover varied across varieties only at the Alburgh site (Table 11). The highest ground cover of 70.2% was observed in plots with variety DKC44-80. This was statistically similar to two other varieties. This higher ground cover led to almost 1 ton ac^{-1} dry matter biomass but was not statistically different from the other varieties. Ground cover and biomass were substantially lower at the Franklin site and did not vary across varieties (Table 13). Composition of the cover crop was dominated by annual ryegrass followed by radish and weeds. Virtually no clover biomass was found. The composition of the cover crop did not vary across the different varieties.

Table 13. Cover crop characteristics by variety, Franklin location.

Variety	Ground cover	Cover crop yield	Ryegrass	Radish	Clover	Weeds
	%	DM lbs ac^{-1}	% of DM			
B95M87AMXT	29.5	346	86.7	10.0	0.133	3.13
B95V86AM	34.6	414	92.0	7.62	0.000	0.329
B97F86AMXT	42.1	320	94.0	2.57	0.000	3.43
DKC44-80	19.4	354	74.3	6.75	0.630	18.3
P38N85	36.5	484	62.5	24.5	0.074	12.9
P9608Q	24.8	346	81.8	14.2	0.028	3.94
LSD (*p*=0.10) ‡	NS¥	NS	NS	NS	NS	NS
Trial mean	31.1	378	81.9	10.9	0.144	7.02

‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Corn variety did significantly impact some corn quality parameters at both sites (Tables 14 and 15). Crude protein levels were significantly lower in varieties DKC44-80 and B95V86AM at both sites. At the Alburgh site, ADF, aNDFom, Starch, and 240-hr uNDF also varied significantly. Variety B95V86AM, despite the lower protein content, had significantly lower ADF and aNDFom contents and had significantly higher starch. Despite these differences in single quality parameters, the predicted milk yields per ton of corn silage, which combines multiple quality characteristics into on metric, did not vary across varieties. The significant differences in milk yield per acres at the Franklin site are due to the significant differences in yield per acre, not quality parameters.

Table 14. Corn quality characteristics by variety, Alburgh location.

Variety	CP	ADF	aNDFom	Lignin	Starch	TDN	NEL	240-hr uNDF	30-hr NDFD	Milk yield	
	% of DM						Mcal lb^{-1}	% of NDF		lbs ton^{-1}	lbs ac^{-1}
B95M87AMXT	7.91b†	21.0bc	38.2b	2.27	38.1cd	65.3	0.684	10.2d	57.5	3380	24849
B95V86AM	7.88b	18.9a	34.4a	2.20	41.6a	65.4	0.697	8.97ab	57.5	3431	25106
B97F86AMXT	7.99b	20.2abc	36.6ab	2.24	39.0bcd	65.8	0.694	9.97cd	58.0	3437	25339
DKC44-80	7.86b	19.0a	34.6a	2.11	41.4ab	65.8	0.697	8.87a	57.9	3444	27438
P38N85	8.06ab	21.6c	38.5b	2.33	37.1d	65.0	0.678	10.5d	57.3	3383	23889
P9608Q	8.36a	19.6ab	35.5a	2.26	39.7abc	65.8	0.696	9.54bc	57.2	3452	26387
LSD (*p*=0.10) ‡	0.307	1.58	2.50	NS¥	2.52	NS	NS	0.627	NS	NS	NS
Trial mean	8.01	20.1	36.3	2.24	39.5	65.5	0.691	9.68	57.6	3421	25501

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant.

Table 15. Corn quality characteristics by variety, Franklin location.

Variety	CP	ADF	aNDFom	Lignin	Starch	TDN	NEL	240-hr uNDF	30-hr NDFD	Milk yield	
	% of DM						Mcal lb^{-1}	% of NDF		lbs ton^{-1}	lbs ac^{-1}
B95M87AMXT	8.32a†	19.5	35.2	2.17	39.0	67.2	0.713	10.7	57.1	3505	23818cd
B95V86AM	7.80c	20.4	36.7	2.20	38.7	66.0	0.696	11.1	55.7	3408	26424bcd
B97F86AMXT	8.45a	19.1	34.7	2.23	38.8	66.7	0.708	8.88	57.9	3476	27509abc
DKC44-80	7.82c	19.3	35.2	2.18	39.1	67.0	0.711	10.8	56.2	3497	30250a
P38N85	8.03b	20.3	36.8	2.22	37.8	67.0	0.705	11.8	55.3	3467	23641d
P9608Q	8.35a	19.7	35.8	2.33	38.0	66.8	0.711	10.9	57.2	3517	29245ab
LSD (*p*=0.10) ‡	0.190	NS¥	NS	NS	NS	NS	NS	NS	NS	NS	3718
Trial mean	8.13	19.7	35.7	2.22	38.6	66.8	0.707	10.7	56.6	3478	26815

†Treatments that share a letter performed statistically similarly to one another.
‡LSD; least significant difference at the p=0.10 level.
¥NS; not statistically significant

Figure 3 shows corn and cover crop yields by variety for the Alburgh location. For interseeding to be an acceptable and widely adopted practice, corn yields and cover crop yields must both be supported simultaneously. Some varieties may possess characteristics which make them more suitable for use in a system that utilizes interseeding. For example, variety DKC44-80 supported high cover crop yield of almost 1 ton ac^{-1} while also supporting the highest corn yield of almost 23 tons ac^{-1}. Conversely, while variety P38N85 supported high cover crop yields, it came at the expense of corn yield which was only 20 tons ac^{-1}.

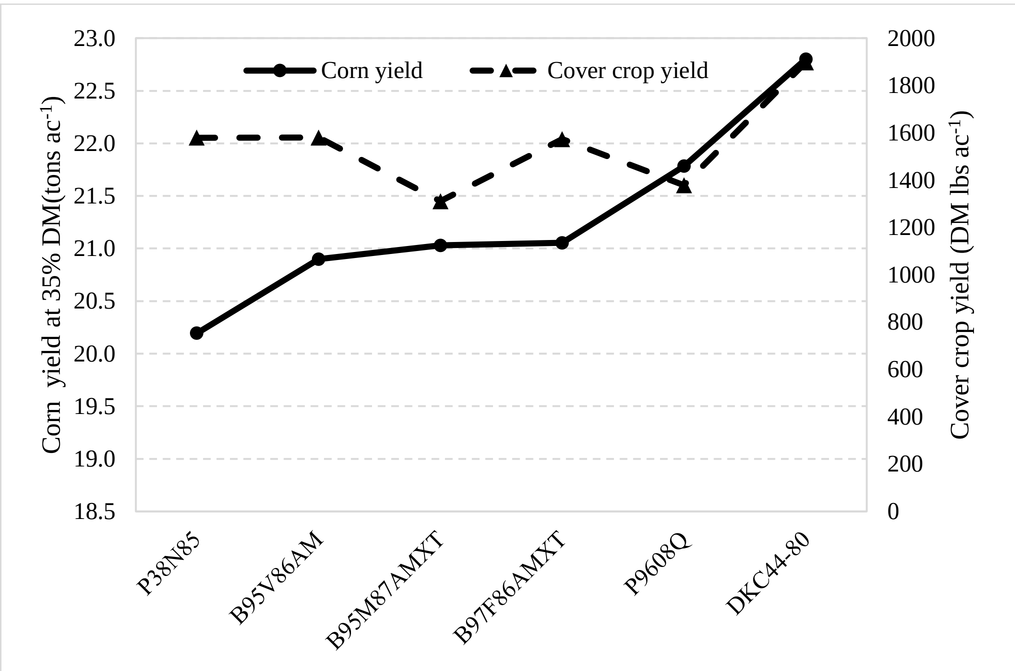

Figure 3. Corn silage and cover crop yield by variety, Alburgh location.

DISCUSSION

Interseeding cover crops into corn silage systems is challenging and may have higher success given changes to corn variety selection, populations, and the timing of interseeding. Determining the best combination of characteristics that support high yielding corn crops and successful cover crops requires multiple years of data to better understand how these variables interact under varying conditions. More data needs to be collected to better understand the interaction of these corn hybrid characteristics with crop management.

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