NORTHWEST CROPS & SOILS PROGRAM

2018 Soybean Variety Trial

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2018 SOYBEAN VARIETY TRIAL
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In 2018, the University of Vermont Extension Northwest Crops and Soils Program evaluated yield and quality of short season soybean varieties at Borderview Research Farm in Alburgh, VT. Soybeans are grown for human consumption, animal feed, and biodiesel. As farmers look to reduce feed costs or diversify markets, soybean acreage across Vermont is increasing. Local research is needed to identify varieties that are best adapted to this region. In an effort to support and expand the local soybean market throughout the northeast, the University of Vermont Extension Northwest Crop and Soils (NWCS) Program, as part of a grant from the Eastern Soybean Board, established a trial in 2018 to evaluate yield and quality of short season soybean varieties.

MATERIALS AND METHODS

Several seed companies submitted varieties for evaluation (Table 1). Twenty-two soybean varieties were evaluated from maturity groups 0, 1, and 2. Details for the varieties including company, genetic traits, and maturity group are listed in Table 2.

Table 1. Participating companies and contact information.

C&M Seeds	Dyna-Gro (Crop Protection Services)	Mycogen	Seedway, LLC	Syngenta
6180 5th Lane Palmerson, ON, CA (888) 733-9432	Tom Barber East Aurora, NY (716) 912-5494	6383 Ethan Allen Hwy. St. Albans, VT 05478 802-363-2803	171 Ledgemere Point Bomoseen, VT 05732 (802)-338-6930	PO Box 18300 Greensboro, NC 27419 1-800-334-9481

The soil type at the Alburgh location was Benson rocky silt loam (Table 3). The seedbed was prepared using a moldboard plow and then disked prior to seeding. The previous crop was corn silage with a winter rye cover crop. Plots were planted on 25-May with a 4-row cone planter with John Deere row units fitted with Almaco seed distribution units (Nevada, IA). Starter fertilizer (9-18-9) was applied at a rate of 5 gal ac^{-1}. Plots were 20' long and consisted of two rows spaced at 30 inches. The seeding rate was 185,000 seeds ac^{-1}. The plot design was a randomized complete block with three replications. The treatments were 22 varieties that ranged in maturity group from 0.07 to 2.4.

The plots were also monitored for insect pests and disease symptoms throughout the season. A formal thorough scouting was not completed as in past years due to observing very low incidence of disease or pest pressure. On 12-Oct, the soybeans were harvested using an Almaco SPC50 small plot combine. Seed was cleaned with a small Clipper M2B cleaner (A.T. Ferrell, Bluffton, IN). They were then weighed for plot yield and tested for harvest moisture and test weight using a DICKEY-John Mini-GAC Plus moisture and test weight meter. Soybean oil was extruded on 15-Jan, 2019 using an AgOil M70 expeller press. Oil was collected and weighed to determine oil content and oil yield.

Table 2. Soybean varieties evaluated in Alburgh, VT, 2018.

Variety	Company	Traits	Maturity
CM16-6058	C&M Seeds	CONV	0.7
S09RY64	Dyna-Gro	RR2Y	0.9
S11XT78	Dyna-Gro	RR2X	1.1
S14XT98	Dyna-Gro	RR2X	1.4
S16XT58	Dyna-Gro	RR2X	1.6
SX18716XT	Dyna-Gro	RR2X	1.6
S18XT38	Dyna-Gro	RR2X	1.8
5N145R2	Mycogen	RR2Y	1.4
5N158R2	Mycogen	RR2Y	1.5
5N194RR	Mycogen	RR2Y	1.9
5N183R2	Mycogen	RR2Y	1.8
5N211R2	Mycogen	RR2Y	2.1
5B241R2	Mycogen	RR2Y	2.4
SG 0975	Seedway, LLC	RR2Y	0.9
SG 1055	Seedway, LLC	RR2Y	1.0
SG 1076	Seedway, LLC	RR2Y	1.0
SG 1311	Seedway, LLC	RR2Y	1.3
SG 1776	Seedway, LLC	RR2Y	1.7
SG 1863	Seedway, LLC	RR2X	1.8
SG 2125	Seedway, LLC	RR2Y	2.1
S007Y4	Syngenta	RR2Y	0.07
S07Q4X	Syngenta	RR2X	0.7

RR2X – Roundup Ready 2 Xtend soybeans are glyphosate and dicamba herbicide tolerant.
RR2Y – Roundup Ready 2 Yield soybeans contain genes to increase the number of 3, 4, and 5-bean pods per plant.
CONV – Conventional, no traits.

Table 3. Soybean trial specifics for Alburgh, VT, 2018.

	Borderview Research Farm Alburgh, VT
Soil types	Benson rocky silt loam 8-15% slope
Previous crop	Corn silage with winter rye cover crop
Tillage operations	Moldboard plow and disc
Plot size (feet)	5 x 20
Row spacing (inches)	30
Replicates	3
Starter fertilizer (gal ac^{-1})	5 gal ac^{-1} (9-18-9)
Planting date	25-May
Harvest date	12-Oct

Yield data and stand characteristics were analyzed using mixed model analysis using the mixed procedure of SAS (SAS Institute, 1999). Replications within trials were treated as random effects, and hybrids were

treated as fixed. Hybrid mean comparisons were made using the Least Significant Difference (LSD) procedure when the F-test was considered significant (p<0.10).

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 hybrids 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 (LSDs) at the 0.10 level of significance are shown. Where the difference between two hybrids within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure that for 9 out of 10 times, there is a real difference between the two hybrids. In this example, hybrid C is significantly different from hybrid A but not from hybrid B. The difference between C and B is equal to 1.5,

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

which is less than the LSD value of 2.0. This means that these hybrids did not differ in yield. The difference between C and A is equal to 3.0, which is greater than the LSD value of 2.0. This means that the yields of these hybrids were significantly different from one another.

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. Overall, the season was hotter and dryer than normal. A total of 15 inches of rain fell during the soybean-growing season. Precipitation was approximately 60% of normal. Throughout the growing season, there were only six rain events that produced more than 0.75 inches of accumulation. These six events constituted approximately 36% of the total rainfall. There were several extended periods with very little to no rainfall. The longest period was approximately 25 days with no rainfall >0.25". Temperatures were above normal Jul-Sep. Overall, 2379 growing degree days (GDDs) were accumulated June-October, 366 above the 30-year normal.

Table 4. Weather data for Alburgh, VT, 2017.

Alburgh, VT	June	July	August	September	October
Average temperature (°F)	64.4	74.1	72.8	63.4	45.8
Departure from normal	-1.38	3.51	3.96	2.76	-2.36
Precipitation (inches)	3.7	2.4	3.0	3.5	3.5
Departure from normal	0.05	-1.72	-0.95	-0.16	-0.07
Growing Degree Days (base 50°F)	447	728	696	427	81
Departure from normal	-27	88	115	109	81

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.

Soybeans were harvested on 12-Oct. Harvest results are shown in Table 5. Despite dry weather through most of the season, the soybeans performed very well resulting in yields ranging 35.7 to 79.4 bu ac^{-1}. The top yielding variety was S11XT78 which produced 4764 lbs ac^{-1}. This was statistically similar to six other varieties: S09RY62, 5B241R2, S18XT38, SG 1863, 5N211R2, and SG 1776.

Table 5. Harvest characteristics of soybean varieties – Alburgh, VT, 2018.

Variety	Company	Maturity group	Harvest moisture %	Test weight lbs bu^{-1}	Yield @ 13% moisture lbs ac^{-1}	Yield @ 13% moisture bu ac^{-1}	Oil content %	Oil yield lbs ac^{-1}	Oil yield gal ac^{-1}
CM16-6058	C&M Seeds	0.7	20.7	54.7	2144	35.7	6.83	143	18.7
S09RY64	Dyna-Gro	0.9	**18.4**	54.4	4252*	70.9*	8.83	384	50.3
S11XT78	Dyna-Gro	1.1	20.3	54.3	**4764***	**79.4***	11.9	485	63.5
S14XT98	Dyna-Gro	1.4	20.4	53.7	3067	51.1	11.1	318	41.2
S16XT58	Dyna-Gro	1.6	20.8	53.7	3335	55.6	10.3	349	45.7
SX18716XT	Dyna-Gro	1.6	20.6	54.7	3423	57.0	11.3	390	51.1
S18XT38	Dyna-Gro	1.8	21.8	54.4	4165*	69.4*	12.0	523	68.6
5N145R2	Mycogen	1.4	20.2	54.4	3827	63.8	8.02	305	39.9
5N158R2	Mycogen	1.5	20.3	54.9	3280	54.7	9.05	281	36.9
5N194RR	Mycogen	1.9	20.4	**55.0**	3785	63.1	10.7	415	54.4
5N183R2	Mycogen	1.8	22.8	53.6	3650	60.8	9.52	351	46.0
5N211R2	Mycogen	2.1	20.9	54.8	4052*	67.5*	10.2	413	54.1
5B241R2	Mycogen	2.4	23.2	53.2	4198*	70.0*	10.3	429	56.2
SG 0975	Seedway, LLC	0.9	20.7	54.7	3875	64.6	9.81	392	51.3
SG 1055	Seedway, LLC	1.0	21.1	54.5	3521	58.7	**16.2**	**572**	**75.0**
SG 1076	Seedway, LLC	1.0	21.8	53.6	3744	62.4*	8.61	328	43.0
SG 1311	Seedway, LLC	1.3	20.3	54.7	3668	61.1	10.3	374	49.0
SG 1776	Seedway, LLC	1.7	20.7	54.7	3946*	65.8	7.51	296	38.7
SG 1863	Seedway, LLC	1.8	21.1	53.9	4152*	69.2*	7.53	303	39.7
SG 2125	Seedway, LLC	2.1	21.2	54.4	3477	58.0	10.4	355	46.5
S007Y4	Syngenta	0.07	21.8	53.5	2921	48.7	11.0	316	41.3
S07Q4X	Syngenta	0.70	19.4	54.8	3248	54.1	8.18	264	34.6
	LSD ($p = 0.10$)		NS	NS	886	14.8	NS	NS	NS
	Trial Mean		20.9	54.3	3659	61.0	9.98	363	47.5

The top performing variety is indicated in **bold**.
*Varieties that were not significantly different from the top performing variety are indicated with an asterisk.
NS, not statistically significant.

Varieties did not statistically differ in harvest moisture or test weight. All varieties were above 18% moisture and required drying prior to storage. None of the varieties reached the standard test weight of 60 lbs bu^{-1}. The highest test weight was 55.0 lbs bu^{-1} and the average for the trial was 54.3 lb bu^{-1}. This was likely due to the lack of moisture throughout the season, especially during seed fill. Oil content ranged from 6.83 to 16.2% and averaged 9.98% across the trial. However, as these oil contents did not vary statistically neither did oil yields. Very little disease or insect pressure was observed throughout the season. Very low populations of Japanese beetles and flea beetles were documented and minimal damage was observed on soybean leaves. Very low incidence of Bacterial blight (*Pseudomonas syringae pv. glycinea*) was recorded on lower leaves of the soybeans (Figure 1).

Figure 1. Bacterial blight

DISCUSSION

Despite drought conditions throughout much of the season, the soybeans performed well with an average yield of 3659 lbs ac^{-1} or 61.0 bu ac^{-1}, approximately the same as 2017. The six highest yielding varieties were S11XT78, S09RY62, 5B241R2, S18XT38, SG 1863, 5N211R2, and SG 1776. All these varieties produced over 3700 lbs ac^{-1}. The lowest yielding varieties were also those that had the shortest maturity ranging from 0.07 to 0.70 (Figure 2). These differences highlight the importance of careful varietal selection and monitoring to identify varieties that perform well in a variety of conditions on your farm. This report presents data from only one year in one location and should not alone be used in making management decisions. At the time this report was written, oil content and yield data were not yet available. When this data is available, the report will be updated.

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UVM Extension helps individuals and communities put research-based knowledge to work.
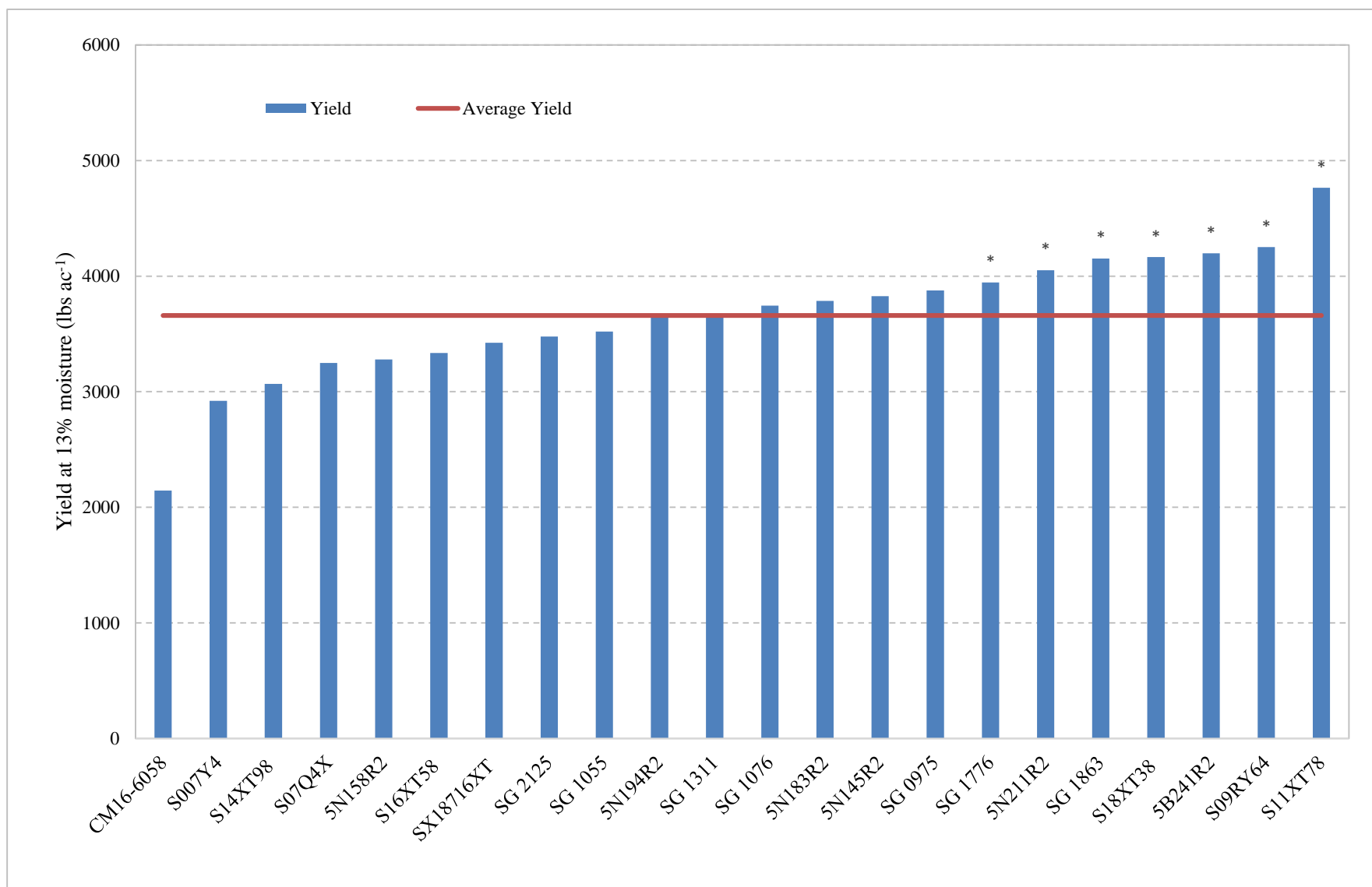
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Figure 2. Seed yield at 13% moisture for 22 soybean varieties. The red line indicates the average yield.
Varieties that did not perform significantly different than the top performing variety are indicated with an asterisk.