NORTHWEST CROPS & SOILS PROGRAM

2022 Conventional Soybean Variety Trial

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

THE UNIVERSITY OF VERMONT
EXTENSION

2022 CONVENTIONAL SOYBEAN VARIETY TRIAL
Dr. Heather Darby, University of Vermont Extension
heather.darby[at]uvm.edu

In 2022, the University of Vermont Extension Northwest Crops and Soils Team evaluated yield and quality of short season soybean varieties at Borderview Research Farm in Alburgh, VT. Soybeans can be grown for human consumption, animal feed, and biodiesel production. 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 2022 to evaluate yield and quality of soybean varieties appropriate for the region.

MATERIALS AND METHODS

Four seed companies submitted varieties for evaluation (Table 1). Thirty-one soybean varieties were evaluated from maturity groups 0, 1, and 2. Details for the varieties including company, genetic traits, and relative maturity are listed in Table 2.

Table 1. Participating companies and contact information.

Asgrow Seed Co., LLC	Brevant	Nutrien Ag Solutions	Seedway, LLC
Nathan Holt Bayer Crop Science Canandaigua, NY	Claude Fortin St. Albans, VT 05478 802-363-2803	Tom Barber East Aurora, NY (716) 912-5494	Rachel Tomko Bomoseen, VT 05732 (802) 338-6930

The soil type at the Alburgh location was a Covington silty clay loam (Table 3). On 9-May, 200 lbs ac^{-1} of 7-18-36 was applied to the whole field. The seedbed was prepared using a Pottinger Terra Disc prior to seeding. The previous crop was corn. Plots were planted on 23-May with a 4-row cone planter with John Deere row units fitted with Almaco seed distribution units (Nevada, IA). 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 31 varieties that ranged in maturity group from 0.6 to 2.3. On 15-Jun, plots were sprayed with Roundup Power Max at a rate of 1 qt ac^{-1} to control weeds. Plots were monitored for pest and disease pressure throughout the season. On 2-Sep, plots were assessed for severity of infection with downy mildew (*Peronospora manshurica),* bacterial blight (*Pseudomonas syringae pv. glycinea*), brown spot (*Septoria glycines*), and frogeye leaf spot (*Cercospora sojina*). These were the only pests and diseases observed in the trial. Assessments were made by inspecting each plot and assigning a rating (0-10), where 0 equated to damage/infection not present and 10 equated to infection or damage present on 100% of leaf area. On 11-Oct and 21-Oct, the soybeans were harvested using an Almaco SPC50 small plot combine. The later maturing varieties AG22XF3 and B202EE were harvested 10 days later than the other varieties to obtain a harvestable moisture. 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. An approximate one-pound subsample was retained to determine oil content.

Table 2. Soybean varieties evaluated in Alburgh, VT, 2022.

Company	Variety	Traits	Maturity
Brevant	B061EE	ENLIST E3	0.6
Seedway, LLC	SG 0720XT	RR2X	0.7
Seedway, LLC	SG 0822XTF	XtendFlex	0.8
Asgrow	AG08XF3	XtendFlex	0.8
Brevant	B091EE	ENLIST E3	0.9
Asgrow	AG09XF3	XtendFlex	0.9
Seedway, LLC	SG 1077XT	RR2X	1.0
Nutrien Ag Solutions	S12EN72	ENLIST E3	1.2
Seedway, LLC	SG 1302E3	ENLIST E3	1.3
Brevant	B131EE	ENLIST E3	1.3
Asgrow	AG13XF0	XtendFlex	1.3
Nutrien Ag Solutions	S14EN22	ENLIST E3	1.4
Nutrien Ag Solutions	S14XF43	XtendFlex	1.4
Seedway, LLC	SG 1432XTF	RR2X	1.4
Brevant	B149EE	ENLIST E3	1.4
Brevant	B141EE	ENLIST E3	1.4
Asgrow	AG15XF2	XtendFlex	1.5
Nutrien Ag Solution	S16EN42	ENLIST E3	1.6
Asgrow	AG16XF3	XtendFlex	1.6
Nutrien Ag Solution	S17XF02	XtendFlex	1.7
Seedway, LLC	SG 1708GT/LL	GT LL	1.7
Asgrow	AG17XF2	XtendFlex	1.7
Nutrien Ag Solutions	S18EN52	ENLIST E3	1.8
Seedway, LLC	SG 1822XTF	XtendFlex	1.8
Brevent	B182EE	ENLIST E3	1.8
Asgrow	AG18XF1	XtendFlex	1.8
Nutrien Ag Solutions	S19XF62	XtendFlex	1.9
Asgrow	AG19XF3	XtendFlex	1.9
Seedway, LLC	SG 20SSXT	RR2X	2.0
Brevant	B202EE	ENLIST E3	2.0
Asgrow	AG22XF3	XtendFlex	2.3

ENLIST E3- These soybeans are resistant to 2, 4-D, glyphosate, and glufosinate herbicides.
GT LL- These soybeans are resistant to glyphosate and glufosinate herbicides.
RR2X – Roundup Ready 2 Xtend soybeans are resistant to glyphosate and dicamba herbicides.
XtendFlex- These soybeans are resistant to dicamba, glyphosate, and glufosinate herbicides.

Table 3. Soybean trial specifics for Alburgh, VT, 2022.

	Borderview Research Farm Alburgh, VT
Soil type	Covington silty clay loam
Previous crop	Silage corn
Tillage operations	Pottinger Terra Disc
Plot size (feet)	5 x 20
Row spacing (inches)	30
Fertilizer (lbs ac^{-1})	200 (7-18-36); 9-May
Weed control	Roundup Power Max 1 qt ac^{-1};15-Jun
Planting date	23-May
Harvest date	11-Oct & 21-Oct

Yield and stand characteristic data were analyzed using the mixed model procedure of SAS (SAS Institute, 1999). Replications within trials were treated as random effects, and hybrids were treated as fixed. Hybrid mean comparisons for harvest characteristics and disease data were made using the Least Significant Difference (LSD) procedure when the F-test was considered significant (p<0.10). Hybrid mean pairwise comparisons for yield were made using the Tukey-Kramer adjustment. Treatments were considered different at the 0.10 level of significance.

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 (Table 4). This season, May was 2 degrees warmer than normal, but cooler temperatures persisted from June through September. June and September were both about 2 degrees cooler than average. October was 1.24 degrees warmer than the 30-year normal. A total of 2684 Growing Degree Days (GDDs) accumulated from May through October, which aligns with the 30-year average number of GDDs for this location. This year, the accumulated rainfall from May through October was 26.4 inches, which is 3.33 inches more than the 30-year normal. This is compared to other regions in Vermont, particularly the central and southern areas, that experienced Abnormally Dry (D0) or Moderate Drought (D1) conditions through most of the season, according to the U.S Drought Monitor.

Table 4. Weather data for Alburgh, VT, 2022.

Alburgh, VT	May	Jun	Jul	Aug	Sep	Oct
Average temperature (°F)	60.5	65.3	71.9	70.5	60.7	51.5
Departure from normal	2.09	-2.18	-0.54	-0.20	-1.99	1.24
Precipitation (inches)	3.36	8.19	3.00	4.94	4.40	2.56
Departure from normal	-0.40	3.93	-1.06	1.40	0.73	-1.27
Growing Degree Days (50-86°F)	394	459	674	630	343	184
Departure from normal	93	-64	-20	-11	-44	46

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.

Soybeans were harvested on 11-Oct. Harvest results are shown in Table 5. The average moisture at harvest for the trial was 15.1%. The variety, SG 0720XT from Seedway, LLC had the lowest moisture at harvest, 13.2%. This was statistically similar to 15 other varieties. The average test weight this season was 54.3 lbs bu^{-1} and ranged from 51.1 lbs bu^{-1} to 56.1 lbs bu^{-1}, all of which were below the industry standard of 60 lbs bu^{-1}. This could be due to the cool temperatures from June through September, resulting in stress conditions during seed fill. Yields ranged from 3670 to 5132 lbs ac^{-1} or 61.2 to 85.5 bu ac^{-1} and averaged 4274 lbs ac^{-1} or 71.2 bu ac^{-1}. There was no statistically significant difference between the yields of the soybean varieties this year. The yields this season were 900 lbs ac^{-1} greater than yields observed in 2021. These data suggest that soybeans from maturity groups 1-2 can produce high yields in northern climates. However, it is important to note differences between varieties even within similar relative maturities. For example, the top performer with relative maturity 1.8 had a yield of 85.5 bu ac^{-1}, compared to the lowest yield variety with a relative maturity of 1.7 and a yield of 61.2 bu ac^{-1}. These data highlight the importance of utilizing local variety trial data to inform variety selection.

Soybeans experienced relatively low pest and disease pressure this season (Table 6). Bacterial blight had the highest average infection rating, 2.49 out of 10. The Seedway variety, SG 1077XT, had the highest bacterial blight rating, but was statistically similar to 5 other varieties. Severity of downy mildew infection ranged widely with rankings from 0.00-4.67, but was still relatively low. There were 10 varieties that had ratings of 1 or less. Infections of frogeye leaf spot were also low, and the trial average was 0.462 out of 10. The variety, SG 0822XTF (Seedway, LLC), had the highest rating of 1.67 out of 10. The trial average for infections of Septoria brown spot was 1.13 out of 10, and there was no significant difference between the varieties. Although disease ratings were low this year, differences in disease susceptibility are important to consider when selecting a variety, as performance may be more severely impacted in years with conducive weather and higher disease pressure.

Table 5. Harvest characteristics of soybean varieties – Alburgh, VT, 2022.

Company	Variety	Relative maturity	Harvest moisture %	Test weight lbs bu⁻¹	Yield @ 13% moisture lbs ac⁻¹	bu ac⁻¹
Brevant	B061EE	0.6	14.1*	55.6	3775	62.9
Seedway, LLC	SG 0720XT	0.7	**13.2**	54.8	3844	64.1
Seedway, LLC	SG 0822XTF	0.8	14.9*	53.6	3826	63.8
Asgrow	AG08XF3	0.8	13.3*	55.6	3833	63.9
Brevant	B091EE	0.9	14.7	55.9	4104	68.4
Asgrow	AG09XF3	0.9	13.3*	55.7	3790	63.2
Seedway, LLC	SG 1077XT	1	13.5*	55.9	3949	65.8
Nutrien Ag Solutions	S12EN72	1.2	15.6	54.2	4486	74.8
Seedway, LLC	SG 1302E3	1.3	14.9*	53.0	4068	67.8
Brevant	B131EE	1.3	14.6*	54.6	4315	71.9
Asgrow	AG13XF0	1.3	13.5*	56.0	4535	75.6
Nutrien Ag Solutions	S14EN22	1.4	15.9	54.7	4164	69.4
Nutrien Ag Solutions	S14XF43	1.4	15.0*	53.2	3849	64.2
Seedway, LLC	SG 1432XTF	1.4	15.1*	55.2	4615	76.9
Brevant	B149EE	1.4	14.2*	54.7	4182	69.7
Brevant	B141EE	1.4	15.5	**56.1**	4568	76.1
Asgrow	AG15XF2	1.5	16.0	51.1	4304	71.7
Nutrien Ag Solution	S16EN42	1.6	17.0	53.0	4726	78.8
Asgrow	AG16XF3	1.6	13.9*	54.6	3801	63.4
Nutrien Ag Solution	S17XF02	1.7	15.3	54.3	3670	61.2
Seedway, LLC	SG 1708GT/LL	1.7	15.5	53.7	4585	76.4
Asgrow	AG17XF2	1.7	13.6*	55.6	4152	69.2
Nutrien Ag Solutions	S18EN52	1.8	15.8	54.6	**5132**	**85.5**
Seedway, LLC	SG 1822XTF	1.8	19.3	52.2	4289	71.5
Brevent	B182EE	1.8	16.5	52.7	4522	75.4
Asgrow	AG18XF1	1.8	15.4	53.6	4134	68.9
Nutrien Ag Solutions	S19XF62	1.9	14.8*	54.9	4601	76.7
Asgrow	AG19XF3	1.9	17.7	53.7	4720	78.7
Seedway, LLC	SG 20SSXT	2.0	17.1	52.6	4753	79.2
Brevant	B202EE	2.0	15.6	54.6	4709	78.5
Asgrow	AG22XF3	2.3	14.1*	54.4	4501	75.0
LSD (*p* = 0.10) ‡			1.87	NS§	NS	NS
Trial mean			15.1	54.3	4274	71.2

†Values in **bold** indicate the top performer for the production metric and varieties with an asterisk * performed statistically similarly to the top performer.

‡LSD –Least significant difference at p=0.10.

§NS- No statistical difference between varieties for the performance metric.

Table 6. Disease and stand characteristics of soybean varieties – Alburgh, VT, 2022.

Company	Variety	Relative Maturity	Bacterial blight	Downy mildew	Frogeye leaf spot	Septoria brown spot
				0-10 scale†		
Brevant	B061EE	0.6	3.67*	1.33	0.33	1.00
Seedway, LLC	SG 0720XT	0.7	4.00*	**4.67**	0.00	1.67
Seedway, LLC	SG 0822XTF	0.8	3.33*	0.00	**1.67**	0.67
Asgrow	AG08XF3	0.8	2.33	1.67	1.00	1.33
Brevant	B091EE	0.9	1.33	1.00	0.33	0.33
Asgrow	AG09XF3	0.9	3.00	2.67	1.00	1.67
Seedway, LLC	SG 1077XT	1.0	**4.33**‡	3.00	0.33	1.67
Nutrien Ag Solutions	S12EN72	1.2	2.67	1.67	0.67	0.67
Seedway, LLC	SG 1302E3	1.3	2.67	2.00	0.00	1.33
Brevant	B131EE	1.3	2.67	0.00	0.00	1.00
Asgrow	AG13XF0	1.3	3.33*	1.33	0.00	0.67
Nutrien Ag Solutions	S14EN22	1.4	3.00	2.33	0.33	1.00
Nutrien Ag Solutions	S14XF43	1.4	2.00	0.67	1.00	1.00
Seedway, LLC	SG 1432XTF	1.4	2.00	0.00	0.33	0.67
Brevant	B149EE	1.4	2.00	3.67*	1.00	0.67
Brevant	B141EE	1.4	1.67	0.00	0.00	0.67
Asgrow	AG15XF2	1.5	2.67	3.00	0.67	2.33
Nutrien Ag Solution	S16EN42	1.6	1.33	0.33	1.00	1.00
Asgrow	AG16XF3	1.6	2.00	2.67	0.00	1.33
Nutrien Ag Solution	S17XF02	1.7	3.00	1.67	0.67	0.33
Seedway, LLC	SG 1708GT/LL	1.7	2.67	0.67	0.33	1.00
Asgrow	AG17XF2	1.7	3.33*	0.33	0.67	1.67
Nutrien Ag Solutions	S18EN52	1.8	2.00	2.00	0.00	0.00
Seedway, LLC	SG 1822XTF	1.8	2.67	1.33	1.00	1.00
Brevent	B182EE	1.8	1.00	2.67	0.00	0.67
Asgrow	AG18XF1	1.8	3.00	3.00	0.00	2.33
Nutrien Ag Solutions	S19XF62	1.9	2.00	1.67	1.33*	0.67
Asgrow	AG19XF3	1.9	1.67	2.33	0.00	2.00
Seedway, LLC	SG 20SSXT	2	2.67	0.33	0.33	1.67
Brevant	B202EE	2	0.67	0.33	0.00	0.67
Asgrow	AG22XF3	2.3	2.67	1.00	0.33	2.33
LSD (*p* = 0.10) §			1.26	1.31	0.594	NS¥
Trial Mean			2.49	1.59	0.462	1.13

†0 to 10 scale; rating of 0 = no infection or damage and rating of 10 = 100% infection or damage.
‡Values in **bold** indicate the top performer for the production metric and varieties with an asterisk * performed statistically similarly to the top performer.
§LSD –Least significant difference at p=0.10.
¥NS- No statistical difference between varieties for the performance metric.

DISCUSSION

Overall, soybean varieties performed well averaging over 70 bu ac^{-1} this year. Under these conditions, all soybean varieties, ranging in relative maturity from 0.7 to 2.8, reached maturity and a harvestable moisture, but all required additional drying in order to be stored safely. Although little pest and disease pressure was observed, some differences were still observed and highlight the importance of local variety evaluation in soybean variety selection. Overall, these data suggest that soybeans in maturity groups 0, 1, and 2 can produce high yields under conventional management in Vermont's northern climate. It is important to remember that these data only represent one year at one location and therefore should not solely be used to make management decisions.

ACKNOWLEDGEMENTS

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

THE UNIVERSITY OF VERMONT
EXTENSION