NORTHWEST CROPS & SOILS PROGRAM

2016 Soybean
Variety Trial

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UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

2016 SOYBEAN VARIETY TRIAL
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In 2016, 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. Due to the short growing season in Vermont, little research has been conducted on soybeans and the insects and diseases that can affect their harvest yield and quality. Soybeans are grown for human consumption, animal feed, and biodiesel. 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 2016 to evaluate soybean varieties under conventional management to see which varieties and characteristics thrive in our northern climate.

MATERIALS AND METHODS

Several seed companies submitted varieties for evaluation (Table 1). Twenty-six 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.

Albert Lea Seed	Channel	Dyna-Gro (Crop Production Services)	Seedway LLC
1414 W. Main, POB 127	800 N. Lindbergh Blvd.	Tom Barber	171 Ledgemere Point
Albert Lea, MN 56007	St. Louis, MO 63167	East Aurora, NY	Bomoseen, VT 05732
800-352-5247	814-571-8600	(716) 912-5494	802-338-6930

Table 2. Soybean varieties evaluated in Alburgh, VT, 2016.

Variety	Company	Traits	Maturity group
00717R2X	Channel	RR2X	0.07
0209R2	Channel	RR2	0.2
0317R2X	Channel	RR2X	0.3
S06RY47	Dyna-Gro (CPS)	RR2Y	0.6
0807R2	Channel	RR2	0.8
0906R2	Channel	RR2	0.9
S09RY64	Dyna-Gro (CPS)	RR2Y	0.9
0916R2X	Channel	RR2X	0.9
1017R2X	Channel	RR2X	1.0
1055	Seedway LLC	RR	1.0
1117R2X	Channel	RR2X	1.1
S12RY44	Dyna-Gro (CPS)	RR2Y	1.2
1311	Seedway LLC	RR	1.3
1405R2	Channel	RR2	1.4

S14RY95	Dyna-Gro (CPS)	RR2Y	1.4
1517R2X	Channel	RR2X	1.5
975	Seedway LLC	RR	1.5
Viking 1518N	Albert Lea Seed	None	1.5
S17RY06	Dyna-Gro (CPS)	RR2Y	1.7
S17RY67	Dyan-Gro (CPS)	RR2Y	1.7
1776	Seedway LLC	RR	1.7
Viking 1722N	Albert Lea Seed	None	1.7
1808R2	Channel	RR2	1.8
1816R2X	Channel	RR2X	1.8
Viking 1922N	Albert Lea Seed	None	1.8
2716R2X	Channel	RR2X	2.7

RR – Roundup Ready soybeans are glyphosate herbicide (Roundup®) tolerant.
RR2 – Roundup Ready soybeans are glyphosate herbicide (Roundup®, Touchdown®) tolerant.
RR2X – Roundup Ready 2 Xtend soybeans are glyphosate and dicamba herbicide tolerant.
RR2Y – Roundup Ready 2 Yield soybeans are genes to increase the number of 3, 4, and 5-bean pods per plant.

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 dry beans. Plots were planted on 27-May with a Monosem NG-Plus 2-row precision air planter (Edwardsville, KS). Starter fertilizer (10-20-20) was applied at a rate of 200 lbs ac^{-1}. Plots were 20' long and consisted of two rows spaced at 30 inches. The seeding rate was 150,000 seeds ac^{-1}. The plot design was a randomized complete block with three replications. The treatments were 26 varieties that ranged in maturity group from 0.07 to 2.7.

Table 3. Soybean trial specifics for Alburgh, VT, 2016.

	Borderview Research Farm Alburgh, VT
Soil types	Benson rocky silt loam 8-15% slope
Previous crop	Dry beans
Tillage operations	Moldboard plow and disc
Plot size (feet)	5 x 20
Row spacing (inches)	30
Replicates	3
Starter fertilizer (lbs ac^{-1})	200 lbs ac^{-1} 10-20-20
Planting date	27-May
Harvest date	12-Oct

The plots were also scouted for insect pests and disease symptoms on 7-Jul and 10-Aug using a 0.25 m^2 quadrat placed randomly in a plot. 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, tested for harvest moisture using a DICKEY-John M20P moisture meter, and evaluated for test weight using a Berckes Test Weight Scale.

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

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

between C and B is equal to 1.5, 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. Missing precipitation data from 17-Aug through 31-Oct was supplemented using data provided by the NOAA from Highgate, VT. May through September was unusually dry, accumulating 7.27 inches less rain than in a usual year (Table 4). Despite the lack of rain, June and July were close to the average temperature. However, late summer and early fall were hotter than the average. Overall, there were an accumulated 2708 GDDs this season, approximately 302 more than the historical 30-year average.

Table 4. Weather data for Alburgh, VT, 2016.

Alburgh, VT	May	June	July	August	September	October
Average temperature (°F)	58.1	65.8	70.7	71.6	63.4	50.0
Departure from normal	1.80	0.00	0.10	2.90	2.90	1.90
Precipitation (inches)	1.5	2.8	1.8	3.0	2.5	5.0
Departure from normal	-1.92	-0.88	-2.37	-0.93	-1.17	1.39
Growing Degree Days (base 50°F)	340	481	640	663	438	146
Departure from normal	74	7	1	82	104	34

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. Alburgh precipitation data from 8/17/16-10/31/16 was missing and was replaced by data provided by the NOAA for Highgate, VT.

Soybean Scouting

The plots were scouted twice during the growing season to identify pest pressure on soybeans in the region (Table 5). Japanese beetles and their feeding damage were found on all varieties in this trial. Feeding damage is characterized by heavy leaf feeding and defoliation. Red headed flea beetles and potato leafhoppers were found on the majority of plots. Many varieties showed symptoms of sunscald, which is caused by excessive exposure to sunlight, and bacterial leaf blight. Downy mildew and frogeye leaf spot were also observed on plants in the trial, but were less prevalent. Only the presence of pests were recorded and based on observation, the overall severity was low and likely did not contribute to yield loss. Further assessment would need to be conducted to determine pest impact on yields.

Table 5. 2016 soybean pests and diseases identified over two scouting dates in Alburgh, VT.

Variety	Company	Red Headed Flea Beetle	Potato Leafhopper	Japanese Beetle	Sunscald	Bacterial Leaf Blight	Frogeye Leaf Spot	Downy Mildew
00717R2X	Channel	X	X	X	X			
0209R2	Channel	X	X	X			X	
0317R2X	Channel	X		X	X	X		
S06RY47	Dyna-Gro (CPS)	X	X	X				
0807R2	Channel	X	X	X		X		
0906R2	Channel	X	X	X				
0916R2X	Channel	X	X	X		X		
S09RY64	Dyna-Gro (CPS)	X	X	X		X		
1017R2X	Channel	X		X	X			
1055	Seedway LLC	X	X	X	X	X		
1117R2X	Channel	X	X	X	X			
S12RY44	Dyna-Gro (CPS)	X	X	X				
1311	Seedway LLC	X	X	X	X	X		
1405R2	Channel	X	X	X				
S14RY95	Dyna-Gro (CPS)	X	X	X	X	X		
1517R2X	Channel	X	X	X	X	X		
975	Seedway LLC	X	X	X	X	X		
Viking 1518N	Albert Lea Seed	X	X	X	X	X		
S17RY06	Dyna-Gro (CPS)	X	X	X		X		
S17RY67	Dyna-Gro (CPS)			X				
1776	Seedway LLC	X	X	X	X			
Viking 1722N	Albert Lea Seed	X	X	X		X		
1808R2	Channel	X	X	X				
1816R2X	Channel	X	X	X		X		X
Viking 1922N	Albert Lea Seed	X	X	X			X	
2716R2X	Channel	X	X	X				

Soybean Harvest

Soybeans were harvested on 12-Oct, harvest results are shown in Table 6. The average harvest moisture was 13.2%, which is very close to the optimal 13.0%. No varieties reached the optimal test weight of 60 lbs bu^{-1}; the average test weight was 57.6 lbs bu^{-1}. The top performing variety was Seedway LLC variety

1776, which yielded 5541.3 lbs ac^{-1}, or 92.5 bu ac^{-1}. Varieties that were not statistically significant from the top performing variety were Channel varieties 1405R2, 1808R2, and 2716R2X (Figure 1).

Table 6. Harvest characteristics of soybean varieties – Alburgh, VT, 2016.

Variety	Company	Maturity Group	Harvest moisture	Test weight	Yield @ 13% moisture	Yield @ 13% moisture
			%	lbs bu^{-1}	lbs ac^{-1}	bu ac^{-1}
00717R2X	Channel	0.07	13.5*	**58.5**	2361	39.4
0209R2	Channel	0.2	**13.0**	57.3	3695	61.7
0317R2X	Channel	0.3	13.1*	57.2	3481	58.1
S06RY47	Dyna-Gro (CPS)	0.6	13.2*	58.5*	3707	61.9
0807R2	Channel	0.8	**13.0**	57.6	3765	62.9
0906R2	Channel	0.9	12.8*	57.1	3570	59.6
0916R2X	Channel	0.9	13.3*	57.1	3107	51.9
S09RY64	Dyna-Gro (CPS)	0.9	**13.0**	58.2*	4239	70.8
1017R2X	Channel	1.0	13.2*	57.1	3905	65.2
1055	Seedway LLC	1.0	13.3*	57.5	3780	63.1
1117R2X	Channel	1.1	**13.0**	58.2	3962	66.2
S12RY44	Dyna-Gro (CPS)	1.2	12.9*	58.3*	4124	68.9
1311	Seedway LLC	1.3	12.6*	58.4*	4143	69.2
1405R2	Channel	1.4	12.9*	57.1	5074*	84.7*
S14RY95	Dyna-Gro (CPS)	1.4	13.2*	57.2	3590	60.0
1517R2X	Channel	1.5	13.1*	56.7	4147	69.3
975	Seedway LLC	1.5	**13.0**	57.1	4315	72.1
Viking 1518N	Albert Lea Seed	1.5	13.1*	57.3	3469	57.9
S17RY06	Dyna-Gro (CPS)	1.7	**13.0**	57.0	3651	61.0
S17RY67	Dyan-Gro (CPS)	1.7	13.1*	58.1	3741	62.5
1776	Seedway LLC	1.7	12.7*	58.2*	**5541***	**92.5***
Viking 1722N	Albert Lea Seed	1.7	12.9*	57.6	2113	35.3
1808R2	Channel	1.8	13.6	57.6	4931*	82.4*
1816R2X	Channel	1.8	13.5*	56.7	4533	75.7
Viking 1922N	Albert Lea Seed	1.8	13.3*	58.3*	2534	42.3
2716R2X	Channel	2.7	14.7	56.8	4609*	77.0*
	LSD (0.10)		0.55	1.79	964	16.1
	Trial Mean		13.2	57.6	3850	64.3

The top performing variety is indicated in **bold**.
*Varieties that did not perform significantly lower than the top performing variety are indicated with an asterisk.
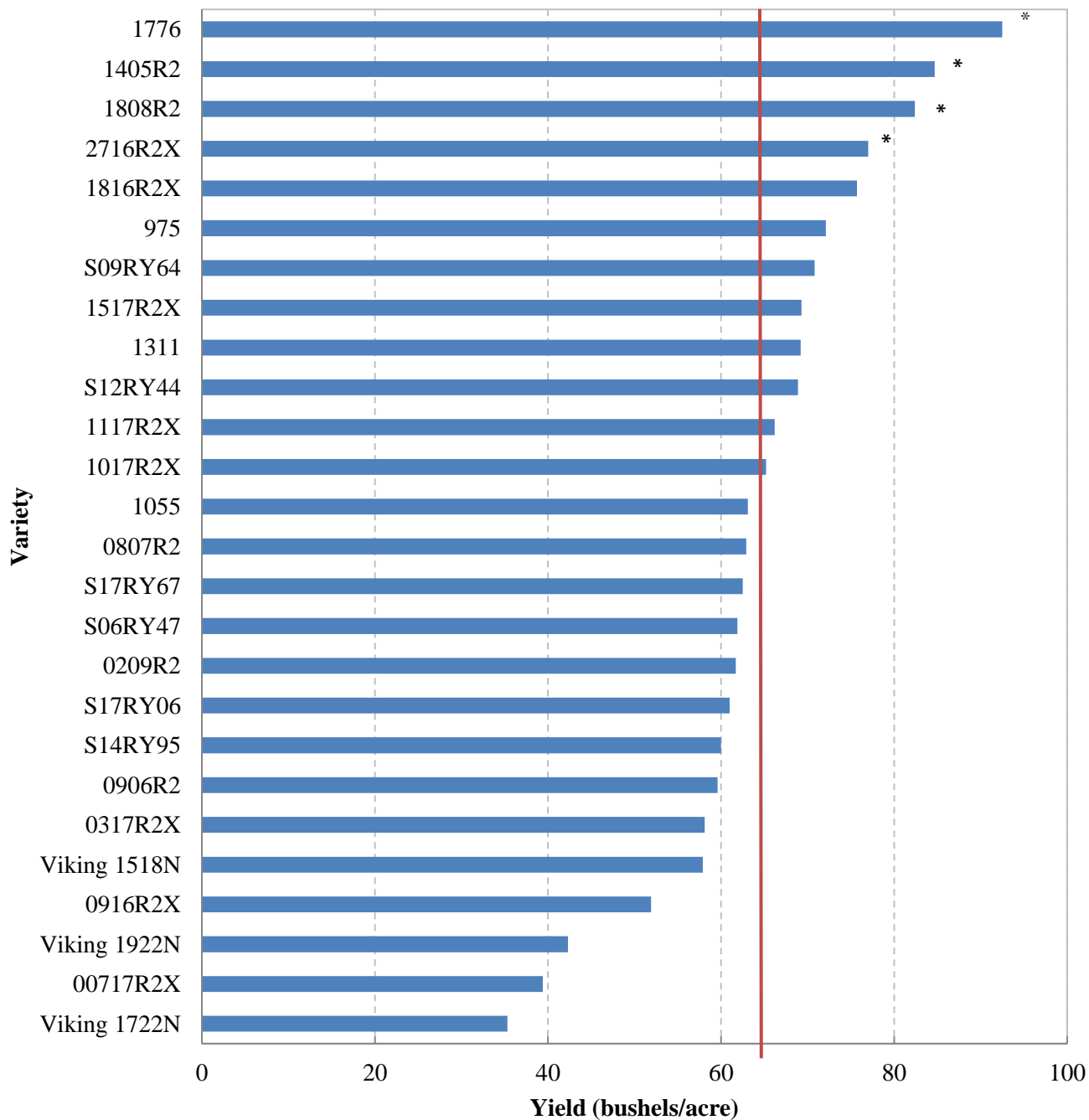
Figure 1. Yield at 13% moisture for 26 soybean varieties. The red line indicates the average yield. *Varieties that did not perform significantly lower than the top performing variety are indicated with an asterisk.*

DISCUSSION

It is important to remember that the results only represent one year of data. The lack of rain during the 2016 growing season was very challenging to the growth of field crops. These soybeans yielded very well, however test weight may have been impacted by dry conditions. Varieties differed significantly in yield and ranged from a low of 35.3 and a high of 92.5 bushel per acre, which indicates the importance of varietal selection to maximize yield for the growing region and seasonal conditions. Pest pressure was present in the trial but severity was observed to be low and likely had little influence on yields.

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