2023 Conventional Soybean Variety Trial

Dr. Heather Darby, UVM Extension Agronomist
Ivy Krezinski and Sara Ziegler

2023 CONVENTIONAL SOYBEAN VARIETY TRIAL

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

In 2023, 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 trials in 2023 to evaluate yield and quality of soybean varieties appropriate for the region.

MATERIALS AND METHODS

Four seed companies submitted varieties for evaluation (Table 1). Twenty-nine soybean varieties were evaluated from maturity groups 00, 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) 9125494	Rachel Tomko Bomoseen, VT 05732 (802) 338-6930

The soil type at the Alburgh, VT location was a Benson rocky silt loam, over shaly limestone, 3-8% slopes (Table 3). The seedbed was prepared using a Pottinger Terra Disc prior to seeding. Soybeans were planted at a seeding rate of 185,000 seeds ac^{-1} on 26-May with a 4-row cone planter with John Deere row units fitted with Almaco seed distribution units (Nevada, IA). Plots were 20 feet long and consisted of two rows spaced at 30 inches. The plot design was a randomized complete block with four replications and the treatments were 29 varieties that ranged in maturity group from 0.0 to 2.2. Plots were monitored for disease pressure throughout the season and on 16-Aug, plots were assessed for severity of infection with downy mildew (*Peronospora manshurica),* bacterial blight (*Pseudomonas syringae pv. glycinea*), Septoria brown spot (*Septoria glycines*), frogeye leaf spot (*Cercospora sojina*), Cercospora leaf blight (*Cercospora kikuchii*), and anthracnose (*Colletotrichum truncatum*). 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 10-Oct, the soybeans were harvested using an Almaco SPC50 small plot combine, and 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.

Table 2. Soybean varieties evaluated in Alburgh, VT, 2023.

Company	Variety	Traits	Maturity
Brevant	B0090EE	ENLIST E3	0.9
Seedway, LLC	SG0643XTF	XtendFlex	0.6
Seedway, LLC	SG 0720XT	RR2X	0.7
Asgrow	AG07XF4	XtendFlex	0.7
Brevant	B091EE	ENLIST E3	0.9
Seedway, LLC	SG 1023E3	ENLIST E3	1.0
Seedway, LLC	SG 1077	RR2X	1.0
Asgrow	AG10XF4	XtendFlex	1.0
Seedway, LLC	SG 1143XTF	XtendFlex	1.1
Brevant			

Table 3. Soybean trial specifics for Alburgh, VT, 2023.

1.5 to 20 inches per event.

Table 5. Harvest characteristics of soybean varieties – Alburgh, VT, 2023.

Company	Variety	Relative maturity	Harvest moisture	Test weight	Yield @ 13% moisture	
			%	lbs bu^{1}	lbs ac^{1}	bu ac^{1}
Brevant	B0090EE	00.9	14.3*	56.2*	3179	53.0

Table 6. Disease

DISCUSSION

The 2023 soybean growing season was challenging due to a number of unfavorable weather conditions. Lack of precipitation in May resulted in a very dry seed bed at the time of soybean planting. Cool temperatures persisted from May through August. Excessive rainfall, however, was the biggest challenge during this season. In July alone, Alburgh, VT received 10 inches of rain. Mild downy mildew and frogeye leaf spot infections were common due to the cool and wet conditions, but there were a few varieties of soybeans that had particularly greater severity ratings compared to the rest. SG 1023E3 and SG 0720XT had statistically higher downy mildew infection than all other varieties. And frogeye leaf spot infection was statistically highest in AG07XF4 and S14XF43. Other diseases like bacterial blight, anthracnose, Cercospora leaf blight, and Septoria brown spot were present but overall severity was low.

Even with the poor weather conditions, overall soybean yields were good with a trial average of 3801 lbs or 63.4 bu ac^{-1}. Soybean yields were 473 lb or 7.8 bu ac^{-1} lower this year compared to 2022. The average moisture at harvest was 14.6%, so little additional drying was needed to attain a safe storage temperature. The average test weight was 56 lbs bu^{-1}, which is less than the industry standard of 60 lbs bu^{-1}. AG22XF3 had the highest yield, but eleven varieties performed statistically similar. These top performing varieties ranged in maturity from 0.9 to 2.2. These results suggest that good soybean yields can be achieved from varieties within a range of relative maturities (0, 1, and 2), under conventional management in northern Vermont. Although it is important to note that six of the twelve top performing varieties had a relative maturity of 1.8 to 2.2, and only one had a relative maturity of less than 1. Also, some of the earliest maturing varieties (00.9 to 0.7) had some of the lowest yields in this year's trial.

Figure 1 below summarizes soybean yields by variety compared to the trial average and data are organized in order of relative maturity. Environmental stress during the reproductive stages of development can result in reduced soybean yields. Plants are particularly susceptible, especially during pod formation and seed fill. Depending on the variety, pod formation occurs around late July through mid-August and seed fill from around early-August to mid-September. It is possible that the very early maturing varieties were more vulnerable to the excessive rain and cool temperatures in July and August compared to later maturing varieties that did not reach those growth stages until September when conditions were warmer and drier. Plant lodging later in the season because of saturated soils and wind can also lead to decreased yields, especially in those early maturing varieties. 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.

Figure 1. Soybean yields by variety