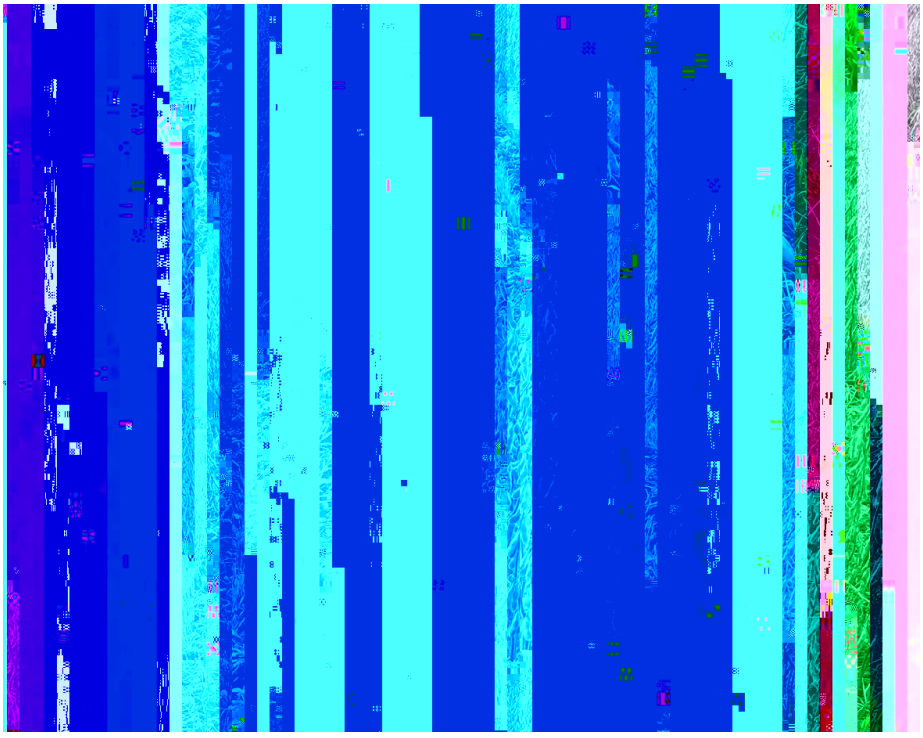
2020 Soybean Cover Crop Trial



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

2020 SOYBEAN COVER CROP TRIAL

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

In 2020, the University of Vermont Extension Northwest Crops and Soils Program investigated the impact of various cover crop mixtures on the subsequent soybean crop's yield and quality at Borderview Research Farm in Alburgh, VT. Soybeans are grown for human consumption, animal feed, and biodiesel and can be a useful rotational crop in corn silage and grass production systems. As cover cropping expands throughout Vermont, it is important to understand the potential benefits, consequences, and risks associated with growing cover crops in various cropping systems. In an effort to support the local soybean market and to gain a better understanding of cover cropping in soybean production systems, the University of Vermont Extension Northwest Crop and Soils (NWCS) Program, as part of a grant from the Eastern Soybean Board, conducted a trial in 2019-2020 to investigate the impacts on soybean yield and quality following annual cover crop mixtures with a soybean crop.

MATERIALS AND METHODS

The trial was conducted at Borderview Research Farm, Alburgh, VT in the 2019-2020 season. The experimental design was a complete randomized block with four replications (Table 1). The treatments were 10 cover crop monocultures or mixtures planted on 20-Aug 2019. Treatments consisted of cover crops that would over winter and others that would be terminated by winter conditions. Cover crop treatments and seeding rates are listed in Table 2. Fall biomass samples were collected on 29-Oct 2019 from a 0.25m^2 area in each plot. Samples were weighed prior to and after drying to determine dry matter content and calculate yield. On 28-Apr 2020, cover crop height and ground cover were measured in all plots. Ground cover was assessed using the beaded string method allowing for distinction between living and dead cover (Sloneker and Moldenhauer, 1977). Soil health samples were also collected from all plots and air-dried prior to being sent to the Cornell Soil Health Laboratory (Ithaca, NY) for analysis. On 5-May, cover crop biomass was measured for plots containing living cover crop biomass using the same sampling protocol as in the fall. All cover crop treatments were terminated in the spring, just prior to soybean planting using a moldboard plow and disc harrow.

Table 1. Trial management details, 2019-2020.

	Borderview Research Farm-Alburgh, VT
Soil types	Benson rocky silt loam
Previous crop	Winter wheat
Tillage operations	Moldboard plow and disc
Plot size (feet)	5 x 20
Row spacing (inches)	30
Replicates	4
Starter fertilizer (gal ac^{-1})	5 gal ac^{-1} 9-18-9
Planting dates	Cover crops: 20-Aug 2019 Soybeans: 12-Jun 2020
Weed control	1 qt. ac^{-1} Roundup PowerMAX® applied 13-May 2020
Harvest date	15-Oct 2020

On 12-Jun 2020, the soybeans were planted into the terminated cover crop treatments using a John Deere 1750 corn planter at 185,000 seeds ac^{-1} treated with soybean inoculant and with 5 gal ac^{-1} starter fertilizer (9-18-9). The variety SG0975 (maturity group 0.9, Genuity® RoundUp Ready 2 Yield) soybean was obtained from Seedway, LLC (Hall, NY) for the trial. Soybeans were sprayed with Roundup PowerMAX® herbicide following planting to control weeds. On 15-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/test weight meter.

Table 2. Annual cover crop mixture treatments grown in 2019 prior to soybeans in 2020.

Species	**Variety**	**Over-winters?**	**Seeding rate** lbs. ac^{-1}
Annual ryegrass	Centurion	No	25

RESULTS

Weather data were recorded throughout the season with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at Borderview Research Farm in Alburgh, VT (Table 3). The

Table 4. Cover crop and soybean harvest characteristics, 2019-2020.

Cover crop treatment	Over-winters	Dry matter yield		Soybean harvest 2020	
		Fall 2019	Spring 2020	Yield at 13% moisture	Test weight
		tons ac^{-1}		lbs. ac^{-1}	lbs. bu^{-1}

No cover	No	2.53[c]	5.07

Table 6. Soybean yield by cover crop type, Alburgh, VT.

Overwinter	**Soybean yield** (bu. ac^{-1})			
	2017	2018	2019	2020
Yes	60.4	61.1	72.3	65.9
No	**67.9**	**63.9**	**79.0**	**66.1**
p value	0.007	§NS	NS	NS
Trial mean	64.2	62.6	76.3	

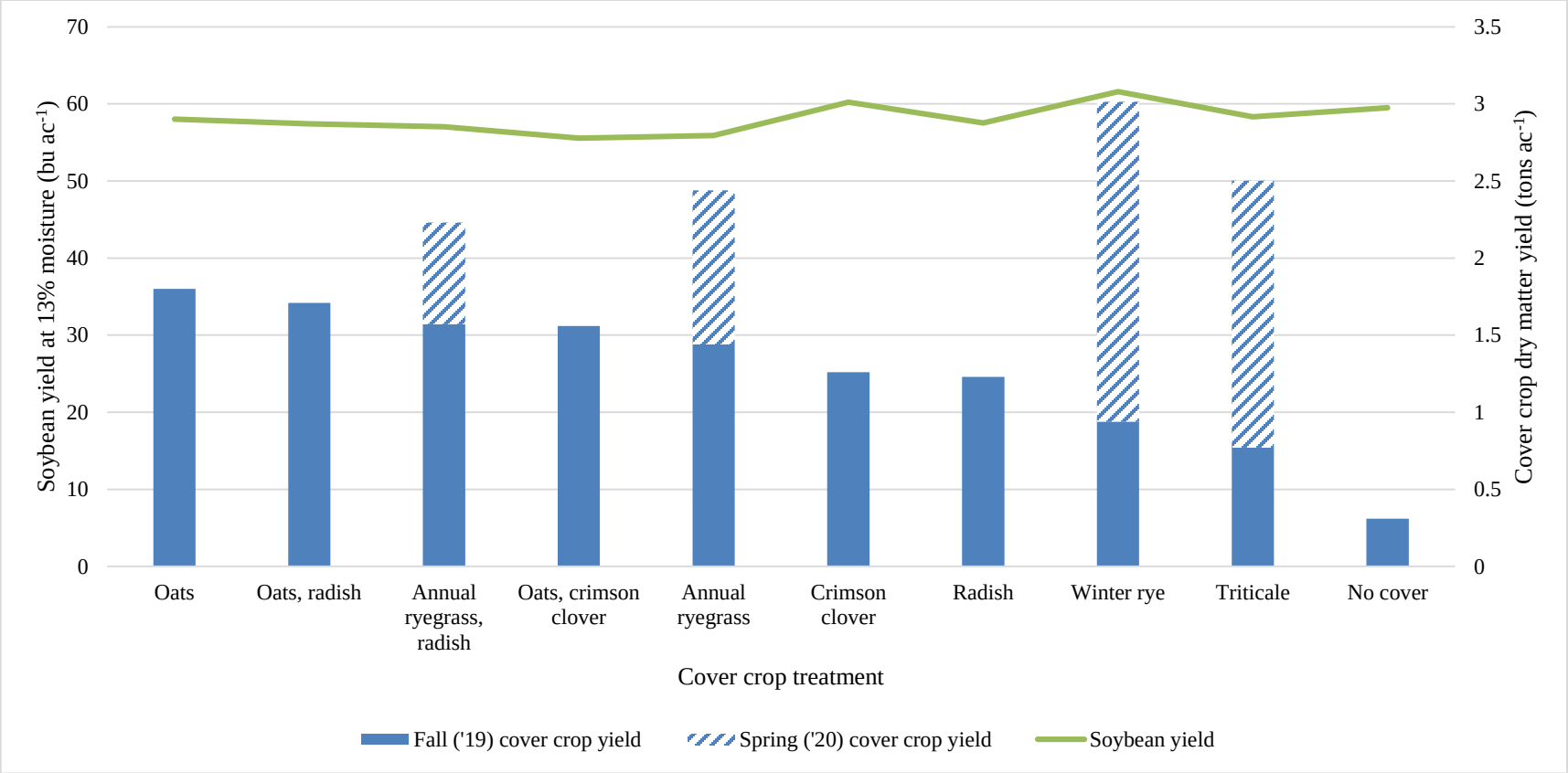


Figure 2. Cover crop biomass and soybean yield by cover crop treatment, 2020.