2016

Dry Bean Planter Type Trial

Heather Darby
University of Vermont, heather.darby@uvm.edu

Erica Cummings
University of Vermont

NORTHWEST CROPS & SOILS PROGRAM

2016 Dry Bean Planter Type Trial

Dr. Heather Darby, UVM Extension Agronomist
Erica Cummings, UVM Extension Crops and Soils Coordinator
(802) 524-6501

Visit us on the web at http://www.uvm.edu/extension/cropsoil

UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

2016 DRY BEAN PLANTER TYPE TRIAL

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

Dry beans (Phaseolus vulgaris), a high-protein pulse crop, have been grown in the Northeast since the 1800's. As the local food movement expands, consumers are requesting more and more locally produced foods, and heirloom dry beans are no exception. Currently, the demand for heirloom dry beans has exceeded the supply. In an effort to support and expand the local bean market throughout the northeast, the University of Vermont Extension Northwest Crops and Soils Program established a trial to evaluate the impact of planter type on dry bean yield. This project was funded as part of a USDA NE-SARE Partnership Grant (PG16-049).

MATERIALS AND METHODS

The trial was conducted in 2016 at Borderview Research Farm in Alburgh, VT. The experimental design was a randomized complete block design with six replications. The treatment compared dry beans seeded with a precision vacuum seeder (Monosem) or a planter fitted with bean cups (John Deere 1750).

The soil type at the project site was a Benson rocky silt loam. The seedbed was prepared by spring plow, followed by disk and spike tooth harrow. All plots were managed with practices similar to those used by producers in the surrounding areas (Table 1).

Table 1. Dry bean planter type trial specifics in Alburgh, VT, 2016.

Trial information	Borderview Research Farm Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Sod
Tillage operations	Spring plow, disk, and spike tooth harrow
Plot size (ft)	10 x 20
Row spacing (in)	30
Replicates	6
Variety	Yellow Eye
Starter Fertilizer (lbs ac^{-1})	150 (10-20-20)
Planting date	17-Jun
Cultivation	4-Row Brillion: 6-Jul and 11-Jul
Harvest date	26-Sep

The variety used for this trial was Yellow Eye. Plots were planted on 17-Jun with a Monosem 2-row planter at a rate of seven seeds per foot (121,968 seeds per acre), or a John Deere 1750 with soybean cups (16-Driver/24-Driven) at a rate of 77,000 seeds per acre. Prior to planting, bean seed was treated with dry bean inoculant (*Rhizobium leguminosarum biovar phaseoli*). Additionally, a starter fertilizer was applied at 150 lbs ac^{-1} of 10-20-20 at the time of planting. The plots were 10'x 20', with 30-inch row spacing. Plots were mechanical cultivated with a four-row Brillion cultivator on 6-Jul and 11-Jul. At the time of harvest, plant height, and 10 pods from each plot were examined for the presence of disease. Plots were

hand harvested in Alburgh on 26-Sep and were then threshed with a portable thresher with a rasp bar rotor. Beans were then weighed to calculate yields and a DICKEY-John MINI GAC Plus meter was used to determine bean moisture content and test weight.

Data was analyzed using mixed model analysis using the mixed procedure of SAS (SAS Institute, 1999). Replications were treated as random effects and treatments were treated as fixed. 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 varieties 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 (e.g. yield). Least Significant Differences at the 10% level of probability are shown. Where the difference between two varieties within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two varieties. In the example below, variety A is significantly different from variety C, but not from variety B. The difference between A and B is equal to 725, which is less than the LSD value of 889. This means that these varieties did not differ in yield. The difference between A and C is equal to 1454, which is greater than the LSD value of 889. This means that the yields of these varieties were significantly different from one another. The asterisk indicates that variety B was not significantly lower than the top yielding variety.

Variety	Yield
A	3161
B	3886*
C	**4615***
LSD	889

RESULTS AND DISCUSSION

Seasonal precipitation and temperature recorded at a weather station in close proximity to the Alburgh trial site are shown in Table 2. The weather during the 2016 growing season was warmer and drier than average. Below average rainfall was recorded in June, July, August, and September totaled 5.35 inches below the 30-year average. There was an accumulation of 2222 Growing Degree Days (GDDs), which is 195 GDDs above the 30-year average.

Table 2. Temperature and precipitation summary for Alburgh, VT, 2016.

Alburgh, VT	Jun	Jul	Aug	Sep
Average temperature (°F)	65.8	70.7	71.6	63.4
Departure from normal	0.01	0.13	2.85	2.90
Precipitation (inches)	2.81	1.79	2.98	2.47
Departure from normal	-0.88	-2.37	-0.93	-1.17
Growing Degree Days (50-86°F)	481	640	663	438
Departure from normal	7.2	1.4	81.9	104

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger.
Historical averages are for 30 years of data provided by the NOAA (1981-2010) for Burlington, VT. Alburgh precipitation data from 8/17/16-10/31/16 was missing and replaced by data provided by the NOAA for Highgate, VT.

Plant height was significantly different between planter types (Table 3). Yellow Eyes planted with the Monosem 2-row planter were the tallest (44.0 cm), while the beans planted with the John Deere 1750 were shortest (38.1 cm). There were no significant differences in pod disease, dry matter yield, harvest moisture and test weight between the planter types. The beans planted with the John Deere 1750 had the lowest pod disease. Overall, the amount of pod disease on the beans planted with either planter was relatively low. The higher seeding rate and therefore plant populations of the Monosem 2-row planter may have impacted pod disease by restricting airflow. Yellow Eyes planted with the Monosem 2-row planter yielded the highest (1525 lbs ac^{-1}). The harvest moistures for the beans planted with either planter type were above the recommended storage moisture of 13%, and therefore all samples had to be dried down. Additionally, neither of the treatments met industry standards of 60 lbs bu^{-1} for test weight.

Table 3. Pre-harvest measurements and yield by planter type.

Planter type	Plant height	Pod disease	Dry matter yield	Harvest moisture	Test weight
	cm	%	lb ac^{-1}	%	lbs bu^{-1}
John Deere 1750	38.1	**5.00**	1390	21.7	**56.5**
Monosem	**44.0***	10.0	**1525**	**21.4**	55.9
LSD (0.10)	3.43	NS	NS	NS	NS
Trial Mean	41.1	7.50	1458	21.6	56.2

*Treatments that did not perform significantly different than the top-performing treatment shown in **bold** in a particular column by dry bean type are indicated with an asterisk.
NS-Treatments were not significantly different from one another.

ACKNOWLEDGEMENTS

The UVM Extension Northwest Crops and Soils Program would like to thank the Borderview Research Farm and the UVM Plant Diagnostic Clinic for their generous help with the trials, as well as acknowledge the USDA Northeast Sustainable Agriculture Research and Education (NE-SARE) program for their financial support. We would like to acknowledge Nate Brigham, Julija Cubins, Kelly Drollette, Hillary Emick, Abha Gupta, Julian Post, Lindsey Ruhl, Xiaohe "Danny" Yang, and Sara Ziegler for their assistance with data collection and entry. This information is presented with the understanding that no product discrimination is intended and neither endorsement of any product mentioned, nor criticism of unnamed products, is implied.

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