NORTHWEST CROPS & SOILS PROGRAM

2016 Dry Bean Planting Date Trial

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

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UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

2016 DRY BEAN PLANTING DATE 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 have requested stores offer more locally-produced foods, and dry beans are no exception. Farmers growing dry beans are trying to improve yields to meet these increased demands. Agronomic information for growing dry beans is geared towards major production regions outside of the northeastern region. Therefore, the University of Vermont Extension Northwest Crops and Soils Program (NWCS) is working with local farmers to develop best agronomic strategies for dry bean production in our problematic Northeastern climate. In 2016 as part of a USDA NE-SARE Partnership Grant (PG16-049), the NWCS program established a second year of dry bean planting date trials at Borderview Research Farm in Alburgh, VT, and at our partnering farm, Morningstar Farm in Glover, VT in order to determine optimal planting dates for dry bean production in the Northeast.

MATERIALS AND METHODS

The impact of planting date and seed treatment was evaluated for three dry bean types. The three dry bean types (King of the Early, Yellow Eye, and Black Turtle beans) were selected to represent types commonly grown in the northeast. In 2016, the trials were conducted at Borderview Research Farm in Alburgh, VT and at Morningstar Farm, Glover, VT.

Borderview Research Farm, Alburgh, VT

The experimental design was a randomized complete block split design with four replications. For each bean type, the main plots were planting date and subplots were seed treatment (Table 1). Planting dates were initiated on 20-May and continued approximately every week for 3 weeks (Table 2). Split plots were treated with the biofungicide MYCOSTOP® developed by Verdera Oy.

MYCOSTOP® (EPA# 64137-5) is a biofungicide)30% dried spores and mycelium of ray fungus Streptomyces griseoviridis Strain K61) used for the control of seed rot, root and stem rot and wilt caused by Fusarium, Alternaria and Phomopsis of container grown ornamentals, vegetables and tree and forest seedlings. Mycostop has also shown suppression of Botrytis Gray Mold and root rots of Pythium, Phytophthora and Rhizoctonia in the greenhouse.

Table 1. Seed varieties, sources and pre-plant germination for the dry bean planting date trial at Borderview Research Farm in Alburgh, VT, 2016.

Dry bean types	Seed source	Seeding rate	Seed germination
		seeds ac^{-1}	%
Black Turtle	Borderview Research Farm, Alburgh, VT	99,000	75.0
King of the Early	Borderview Research Farm, Alburgh, VT	78,000	95.0
Yellow Eye	Borderview Research Farm, Alburgh, VT	77,000	92.0

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. Before planting subsequent planting dates, the area to be planted was spike tooth harrowed. All plots were managed with practices similar to those used by producers in the surrounding areas (Table 3). Seed germination tests were done on dry bean varieties before planting by wrapping 25 seeds in 2 absorbent paper towels like a burrito, sufficiently wetting the wrap, placing it in a plastic bag, and storing it in the dark at room temperature for 5 days. Each variety was duplicated. The samples were checked daily, germinated seed was removed and additional water added as needed. On the fifth day, the number of seeds not germinated was counted and percent germination calculated. Plots were planted with a Monosem 2-row planter. Seeding rates were determined by calculating the desired target seeding rate and adjusting for percent germination. Prior to planting bean seed was treated with dry bean inoculant (*Rhizobium leguminosarum biovar phaseoli*).

The plots were 5'x 20', with 30-inch row spacing. At planting, a starter fertilizer was applied at 150 pounds to the acre of 10-20-20. Plots were mechanical cultivated with a four-row Brillion cultivator on 6-Jul and 11-Jul. Plant populations were taken on 23-Jun by counting the number of plants in a 17.5-foot section per plot.

Table 2. Dry bean planting and emergence dates at Borderview Research Farm in Alburgh, VT.

Planting date	Emergence
	Date
20-May	1-Jun
1-Jun	9-Jun
9-Jun	17-Jun

At the time of harvest, plant height and 10 pods from each plot were examined for the presence of disease. Plots were hand harvested and 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. Harvest occurred on 20-Sep in Alburgh.

Table 3. Dry bean planting date 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, & spike tooth harrow
Plot size (feet)	5 x 20
Row spacing (inches)	30
Replicates	4
Starter Fertilizer (lbs ac^{-1})	150 - (10-20-20)
Seeding rate	7 seed ft^2 (~122,000 seeds ac^{-1})
Planter	Monosem 2 row planter
Tineweed	None
Cultivation	4-Row Brillion: 6-Jul and 11-Jul
Harvest date	20-Sep

Morningstar Farm, Glover, VT

For each bean type the experimental design was a randomized complete block design with three replications. The treatments were planting date (Table 4). Planting dates were initiated on 20-May and continued approximately every week for 3 weeks with a White 140 planter using the red seeding plates (Table 5). The bean types were selected based upon varieties commonly grown on Morningstar Farm and relative maturity (Table 4). Prior to planting, bean seed were treated with dry bean inoculant (*Rhizobium leguminosarum biovar phaseoli*). An organic approved fertilizer called MicroSTART 60 (3-2-3) was applied as a starter fertilizer at 400 lbs ac^{-1}. Morningstar Farm is certified organic through Vermont Organic Farmers, LLC.

Table 4. Seed varieties and seed sources for the dry bean planting date trial at Morningstar Farm in Glover, VT.

Dry bean varieties	Seed source	Seeding rate	Seed germination
		seeds ac^{-1}	%
King of the Early	Borderview Research Farm, Alburgh, VT	78,000	95.0
Yellow Eye	Borderview Research Farm, Alburgh, VT	77,000	92.0

Table 5. Dry bean planting and dates at Morningstar Farm in Glover, VT.

Planting dates
20-May
1-Jun
8-Jun

The soil texture at the project site was a sandy loam. The seedbed was prepared by spring moldboard plowed followed by disk harrow. Before planting subsequent planting dates, the area to be planted was disk harrowed. All plots were managed with practices similar to those used by producers in the surrounding areas (Table 6). The plots were 5'x 12', with 30-inch row spacing. At the Glover location, plots were tine weeded prior to bean emergence and a John Deere 4-row C-shank with crop shields was used to cultivate weekly for four weeks starting 28-Jun. The plots were also hand weeded in mid-July.

Table 6. Dry bean planting date trial specifics in Glover, VT, 2016.

Trial information	Morningstar Farm Glover, VT
Soil type	Sandy loam
Previous crop	Mixed vegetables and sod
Tillage operations	Moldboard plow & disk harrow
Plot size (feet)	5 x 12
Row spacing (inches)	30
Replicates	3
Starter Fertilizer (lbs ac^{-1})	400 – MicroSTART 60 (3-2-3)
Seeding rate	7 seeds per foot (~122,000 seeds ac^{-1})
Planter	White 140 plate planter
Tineweed	Pre-emergence
Cultivation	John Deere 4-row C-shank w/ crop shields: weekly for 4 weeks starting 28-Jun
Harvest date	6-Oct

At the time of harvest, plant height and 10 pods from each plot were examined for the presence of disease. Plots were hand harvested and 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. Harvest occurred on 6-Oct in Glover, VT.

Data were 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 this example, 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

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

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.

RESULTS

Seasonal precipitation and temperature recorded at a weather station in close proximity to the Alburgh trial site is shown in Table 3. 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. In Alburgh, there was an accumulation of 2562 Growing Degree Days (GDDs), which is 268 GDDs above the 30-year average.

Table 7. Temperature and precipitation summary for Alburgh, VT, 2016.

Alburgh, VT	May	June	July	August	Sept
Average temperature (°F)	58.1	65.8	70.7	71.6	63.4
Departure from normal	1.84	0.01	0.13	2.85	2.90
Precipitation (inches)	1.53	2.81	1.79	2.98	2.47
Departure from normal	-1.92	-0.88	-2.37	-0.93	-1.17
Growing Degree Days (50-86°F)	340	481	640	663	438
Departure from normal	73.5	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.

Seasonal precipitation and temperature recorded at a weather station in close proximity to the Glover trial site is shown in Table 8. The 2016 growing season at the Glover location brought a warm May followed by cooler than average temperatures in June and July followed by ending with warmer temperatures in August, September, and October. Above average rainfall was recorded in the months of June, July, and August that totaled three inches higher the 30-year average. Below average rainfall was recorded in September and October. In Glover, there was an accumulation of 2378 Growing Degree Days (GDDs), which is 122 GDDs above the 30-year average.

Table 8. Temperatures and precipitation summary for Glover, VT, 2016.

Saint Johnsbury, VT	May	Jun	Jul	Aug	Sep	Oct
Average temperature (°F)	56.9	63.8	69.3	69.2	61.6	49.0
Departure from normal	0.54	-1.81	-0.62	1.35	1.60	1.80
Precipitation (inches)	3.04	4.63	5.19	5.54	1.50	3.35
Departure from normal	-0.32	0.62	1.07	1.32	-1.89	-0.52
Growing Degree Days (50-86°F)	329	431	597	591	401	151
Departure from normal	39.1	-37.3	-21.2	39.1	72.5	30.2

Based on National Weather Service data from cooperative observation stations in Saint Johnsbury, VT.
Historical averages are for 30 years of NOAA data (1981-2010) from St. Johnsbury, VT.

Borderview Research Farm, Alburgh, VT

Interactions of Black Turtle Beans x Seed Treatment (MYCOSTOP)

There were significant interactions between Black Turtle beans treated and not treated with MYCOSTOP for plant height, percent diseased pods, and test weight. These interactions indicate that seed treatment had different results across the planting dates. The black bean plant heights were consistent between the first and second planting dates regardless of seed treatment. On the 3rd planting date, seed that was treated resulted in plants with greater height (Figure 1). The seed treatment may have given the black bean plants an emergence and subsequent height advantage in the 3rd planting date. This makes sense due to the fact that one heavy rainstorm after planting on 9-Jun led to soil saturation and ponding in some areas of the black bean field. The seed treatment may have helped overcome disease issues in the saturated soil. Further research is needed.

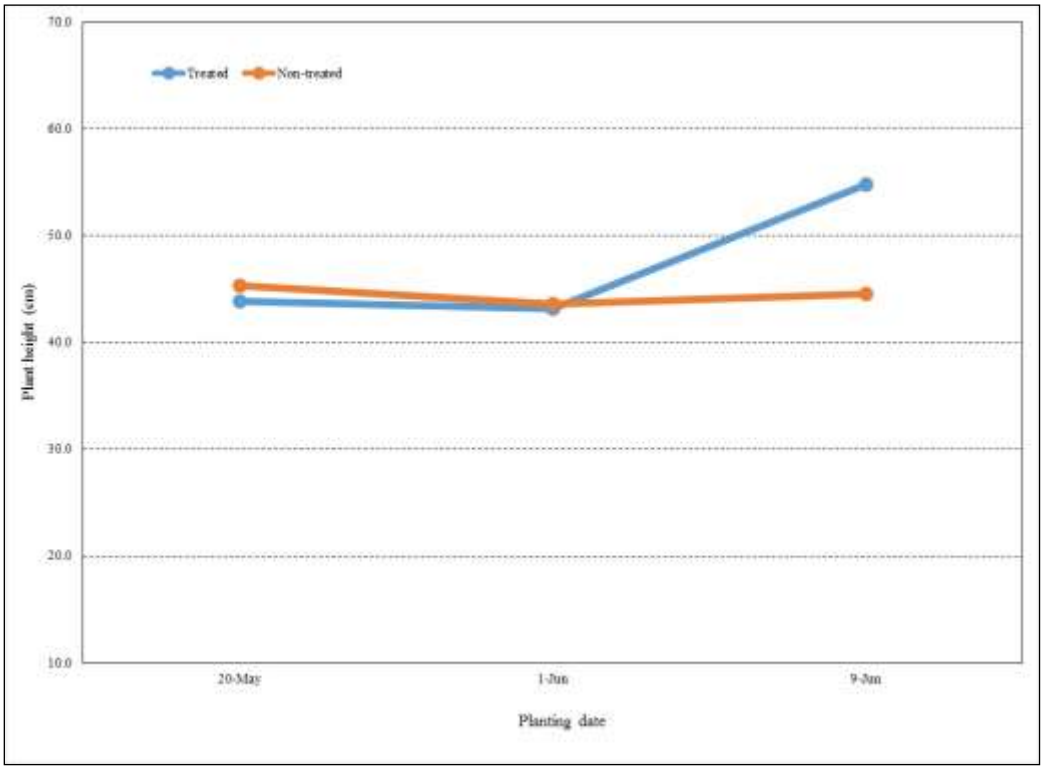

Figure 1. Interaction of treated and non-treated Black Turtle beans on plant height across planting dates, Alburgh, VT, 2016.

The amount of pod disease was zero across planting dates that had black bean seed treated with MYCOSTOP. However the non-treated black beans had higher levels of pod diseases on the 20-May and 9-Jun planting dates (Figure 2). This is likely the case considering cooler soil temperatures in May and saturated soil in the last planting date. Seed treatment again may have helped overcome adverse soil conditions in the black beans.

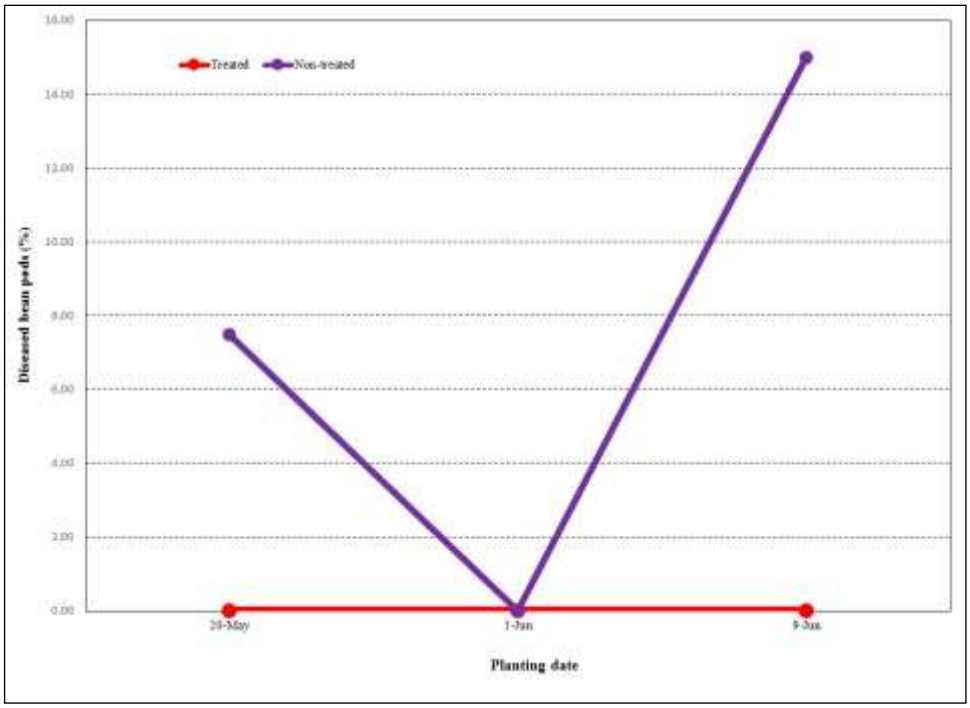

Figure 2. The interaction of treated and non-treated Black Turtle beans on the percent of diseases pods across planting dates, Alburgh, VT, 2016.

The test weight of the black beans was higher in treated seed than the non-treated seed during the first two planting dates. This difference was most notable in the 20-May planting date which makes sense due to far cooler soils at this planting date (Figure 3).

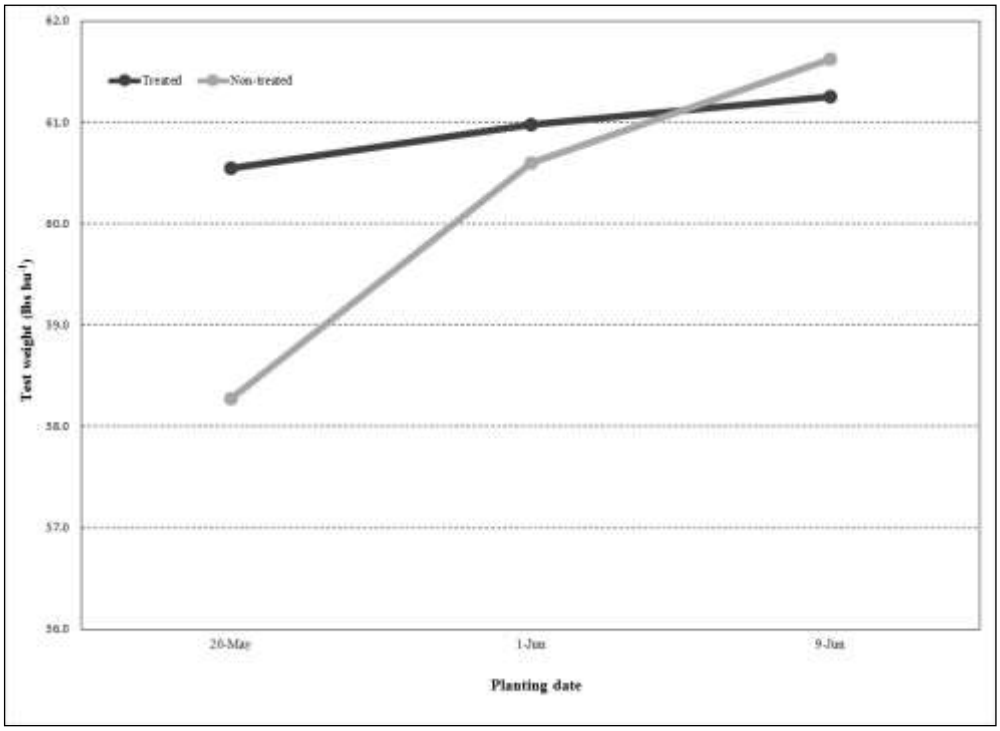

Figure 3. The interaction of treated and non-treated Black Turtle beans on test weight across planting dates, Alburgh, VT, 2016.

Impact of Planting Date on Black Turtle Beans

Planting date had a significant impact on black bean plant height, diseased pods, dry matter yield, harvest moisture, and test weight (Table 9).

Table 9. Black Turtle bean harvest and quality results across planting dates, Alburgh, VT.

Planting Date	Populations	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	number ac^{-1}	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
20-May	134040	44.6	3.75	2386*	25.2	59.4
1-Jun	112883	43.4	**0.00***	1763	21.8*	60.8*
9-Jun	174862	**49.7***	7.50	**2568***	**21.6***	**61.4***
LSD (0.10)	NS	3.86	2.73	537	2.78	1.02
Trial Mean	140595	45.9	3.75	2239	22.9	60.5

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

The third planting date (9-Jun) had the tallest plant height (49.7 cm), the highest yields (2568 lbs ac-1), lowest harvest moisture (21.6%) and the highest test weight (61.4 lbs bu^{-1}) (Figure 4). All of the harvest moistures were above 14%, the recommended moisture for long-term storage, and therefore all planting dates had to be dried down. All except the first planting date (20-May) had test weights that met or exceeded industry standards for test weight of 60 lbs bu^{-1}.

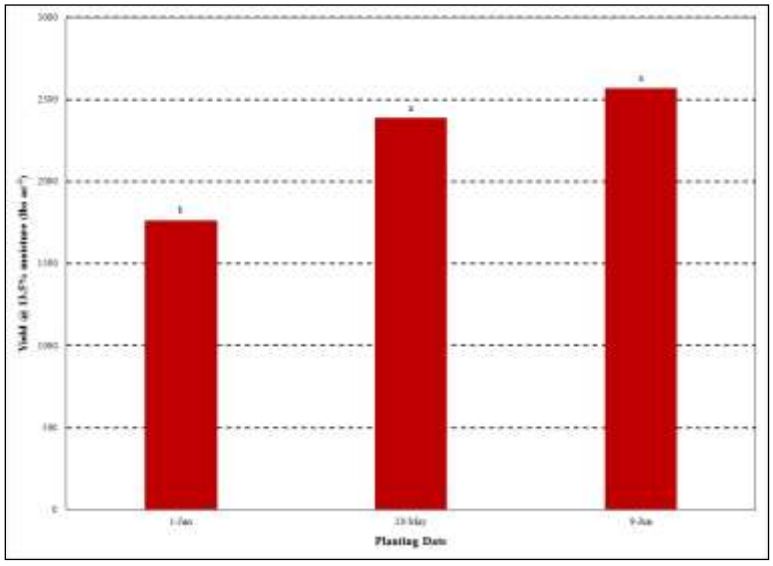

Figure 4. Impact of planting date on Black Turtle bean yields in Alburgh, VT, 2016.
Treatments that share a letter did not differ significantly by planting date.

Impact of Seed Treatment (MYCOSTOP) on Black Turtle Beans

There were significant differences in the percent of diseased pods and harvest moistures between the MYCOSTOP treated and non-treated Black Turtle beans (Table 10). The MYCOSTOP treated black beans had the highest plant populations (152,419 plants ac^{-1}), the tallest plant heights (47.3 cm), the lowest percent diseased pods (0.00%) and harvest moisture (21.7%). Seed treatment did not impact black bean yields.

Table 10. The impact of treated and non-treated Black Turtle beans across planting dates, Alburgh, VT.

Treatment	Populations	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	number ac^{-1}	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
Non-treated control	128772	44.5	7.50	2243	24.1	60.2
MYCOSTOP	152419	47.3	**0.00***	2234	**21.7***	60.9
LSD (0.10)	NS	NS	2.23	NS	2.27	NS
Trial Mean	140595	45.9	3.75	2239	22.9	60.5

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

Interaction of King of the Early Beans x Seed Treatment (MYCOSTOP)

There were no significant interactions between treated and non-treated King of the Early dry beans across planting dates. This indicates that the King of the Early beans responded similarly across planting dates regardless of if they were treated or not.

Impact of Planting Date on King of the Early Beans

Planting date did not significantly impact plant populations, plant height, diseased pods, and harvest moisture of King of the Early beans (Table 11). All King of the Early planting dates, except for the first (20-May), had harvest moistures below 14%. All of the test weights met or exceeded industry standard for dry bean test weights of 60 lbs ac^{-1}. The first planting date (20-May) had the lowest percent of pod disease (22.5%) compared to the other dates.

Table 11. King of the Early bean harvest and quality results across planting dates, Alburgh, VT.

Planting Date	Populations	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	number ac^{-1}	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
20-May	61108	34.2	**22.5***	1237	14.3	60.5
1-Jun	249163	36.1	51.7	1489	12.0*	61.9
9-Jun	89609	**42.5***	40.0	1537	**11.8***	61.3
LSD (0.10)	94152	***	***	NS	0.84	NS
Trial Mean	133294	37.1	36.8	1421	12.7	61.2

* Treatments that did not perform significantly lower than the top performing treatment shown in **bold** in a particular column Are indicated with an asterisk.
NS-Treatments were not significantly different from one another.
******* Indicates significant differences (0.10)

Impact of Seed Treatment (MYCOSTOP) on King of the Early Beans

There were significant differences in dry matter yield and harvest moisture between the MYCOSTOP treated and non-treated King of the Early beans (Table 12). Plant populations, plant height, pod disease, and test weight did not differ significantly (Table 12). The non-treated beans had the lowest harvest moisture (12.3%) and the highest yield (1538 lbs ac^{-1}). Both the treated and non-treated King of the Early beans had moistures below 14% and therefore did not need additional drying. The test weights for both treated and non-treated were above or exceeded industry standards of 60 lbs bu^{-1}.

Table 12. The impact of treated and non-treated King of the Early beans across planting dates, Alburgh, VT.

Treatment	Populations	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	number ac^{-1}	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
Non-treated control	137981	38.0	32.7	**1538***	**12.3***	61.6
MYCOSTOP	128606	36.3	40.9	1304	13.0	60.9
LSD (0.10)	NS	NS	NS	225	0.69	NS
Trial Mean	133294	37.1	36.8	1421	12.7	61.2

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

Interaction of Yellow Eye Beans x Seed Treatment (MYCOSTOP)

There were significant interactions between planting date and treated and non-treated Yellow Eye beans for percent diseased pods. This interaction indicates that the seed treatment had varying responses by planting date. Seed treated with MYCOSTOP had lower levels of pod disease on the 20-May and 9-Jun planting dates when compared to no seed treatment (Figure 5). However the 1-Jun planting date resulted in similar levels of pod disease regardless of seed treatment. Again this was likely due to adverse soil conditions on the 10-May and 9-Jun.

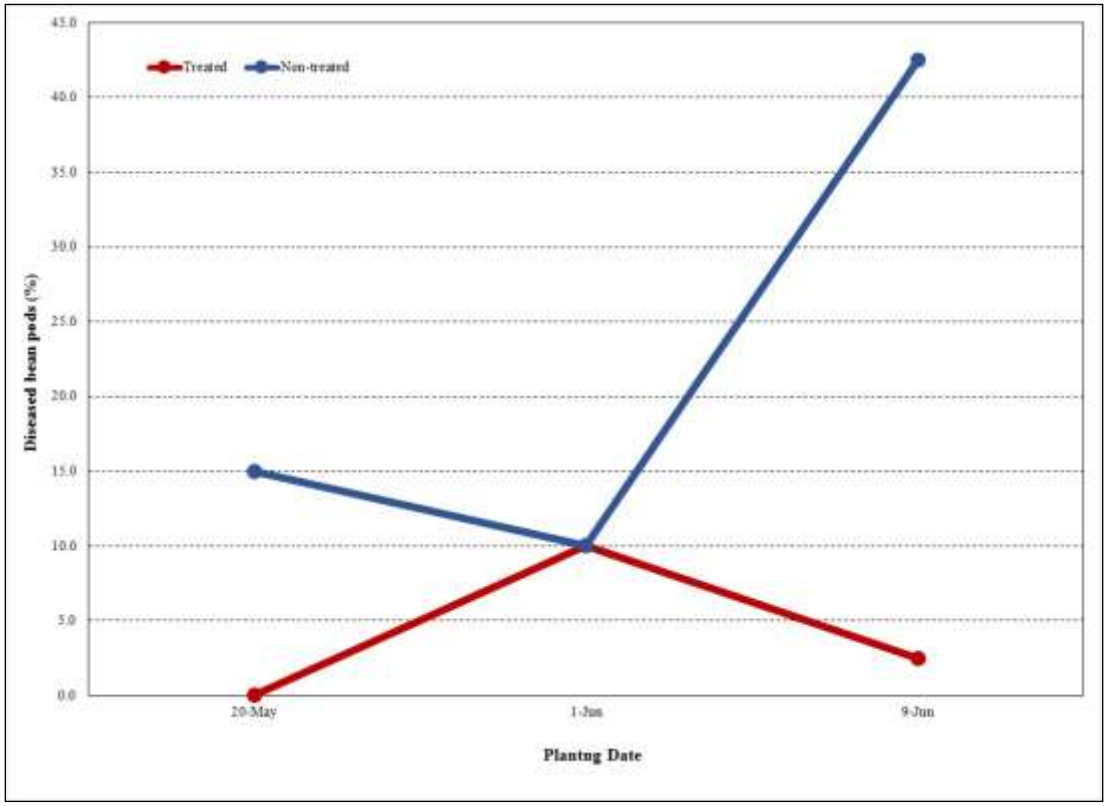

Figure 5. The interaction of treated and non-treated Yellow Eye beans on the percent diseased pods across planting dates, Alburgh, VT, 2016.

Impact of Planting Date on Yellow Eye Beans

Yellow Eye bean percent diseased pods, harvest moisture, and test weight differed significantly by planting date (Table 13). There were no significant differences in plant populations, plant height, and dry matter yield. The first planting date (20-May) had the lowest amount of diseased pods (7.50%) conversely; the third planting date (9-Jun) had the highest percent of diseased pods (22.5%). The third planting date (9-Jun) had the highest test weight (63.7 lbs bu^{-1}), and the lowest harvest moisture (19.2%). All of the Yellow Eye harvest moistures across planting dates were above 14% and therefore had to be dried down before storage. Test weight of the Yellow Eye bean planning dates met or exceeded industry standards of 60 lbs bu^{-1} for test weight.

Table 13. Yellow Eye bean harvest and quality results across planting dates, Alburgh, VT.

Planting Date	Populations	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	number ac^{-1}	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
20-May	50530	35.3	**7.50***	1087	24.6	60.3
1-Jun	52023	37.8	10.0*	1211	20.3*	62.4*
9-Jun	43809	38.2	22.5	1247	**19.2***	**63.7***
LSD (0.10)	NS	NS	7.30	NS	2.06	2.09
Trial Mean	48787	37.1	13.3	1182	21.4	62.1

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

Impact of Seed Treatment (MYCOSTOP) on Yellow Eye Beans

There were significant differences between treated and non-treated Yellow Eye beans in plant height and percent diseased pods (Table 14). The treated and non-treated Yellow Eye beans did not differ significantly in plant populations, dry matter yield, harvest moisture, and test weight. The non-treated Yellow Eyes had the highest plant population (48,870 plant ac^{-1}), the tallest plant height (38.4 cm) and was the highest yielding (1240 lbs ac^{-1}). The MYCOSTOP treated plots had the lowest amount of pod disease (4.17%). Both the treated and non-treated Yellow Eye beans had moistures above 14% and therefore had to be dried down. Both treatments had test weights that exceeded industry standards.

Table 14. The impact of treated and non-treated Yellow Eye beans across planting dates, Alburgh, VT.

Treatment	Populations	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	number ac^{-1}	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
Non-treated control	48870	**38.4***	22.5	1240	22.0	62.1
MYCOSTOP	48704	35.8	**4.17***	1123	20.7	62.2
LSD (0.10)	NS	2.62	5.96	NS	NS	NS
Trial Mean	48787	37.1	13.3	1182	21.4	62.1

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

Morningstar Farm

Impact of Planting Date on King of the Early Beans

Planting date did not impact disease, yields, moisture, or test weight of King of the Early dry beans (Table 15). All planting dates had harvest moistures greater than 14%, necessary for proper storage, and therefore had to be dried down. The King of the Early planting date test weights were all below the industry standard of 60 lbs bu^{-1}.

Table 15. King of the Early bean harvest and quality results across planting dates, Glover, VT.

Planting Date	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
25-May	45.9	16.7	1561	26.8	57.3
1-Jun	37.4	30.0	1275	25.6	53.6
8-Jun	40.1	36.7	1127	25.4	55.6
LSD (0.10)	NS	NS	NS	NS	NS
Trial Mean	41.1	27.8	1321	26.0	55.5

Values shown in **bold** are of the highest value or top performing.
NS-Treatments were not significantly different from one another.

Impact of Planting Date on Yellow Eye Beans

Planting date had a significant impact on plant height and pod disease in Yellow Eye beans (Table 16). There were no significant differences by planting date in yield, harvest moisture, and test weight of Yellow Eye beans. The first and second planting dates had the tallest plant height (50.7 cm). The third planting date (8-Jun) had the lowest amount of pod disease. All of the Yellow Eyes had harvest moisture above 14% and therefore needed to be dried down. None of the Yellow Eye beans at any of the planting dates attained the industry standard for test weight of 60 lbs bu^{-1}.

Table 16. Yellow Eye bean harvest and quality results across planting dates, Glover, VT.

Planting Date	Plant height	Diseased pods	Dry matter yield	Harvest moisture	Test weight
	cm	%	lbs ac^{-1}	%	lbs bu^{-1}
25-May	**50.7***	40.0	742	29.4	53.8
1-Jun	40.2*	6.67*	725	26.3	56.2
8-Jun	35.7	**3.33***	542	29.3	54.9
LSD (0.10)	10.6	22.5	NS	NS	NS
Trial Mean	42.2	16.7	670	28.3	55.0

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

DISCUSSION

The overall warmer and drier conditions throughout the 2016 growing season, in both trial locations, resulted in higher dry bean yields and quality than were observed in 2015. Weed pressure was minimal at the Alburgh and Glover location because timely cultivation was possible this season.

The third planting (9-Jun) date in Alburgh yielded the highest for all bean types. Interestingly, the first planting date (25-May) yielded the highest for both bean types grown at the Glover site. This could be due to the warmer than average temperatures in May allowing the beans to germinate relatively quickly. The cooler temperatures in June may have impacted germination in the June planting dates. This data indicates that dry bean planting should occur when the soil temperatures have reached at least 60 degrees. The dry beans matured when planted from 20-May to 9-Jun indicating that this planting range would be adequate in most years.

Even though plant and root disease was minimal this season, the MYCOSTOP did appear to have some efficacy in reducing the amount of pod disease and in some cases may have improved bean quality. The application of the MYCOSTOP seed treatment did not improve yields at any planting date or for any bean type. Further work across multiple years and environments would be necessary to further elucidate the benefit of investing in this organic seed treatment.

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