2017 University of Delaware Snap Bean Variety Trials

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Introduction

The 2017 Snap Bean Variety Trials included twenty-one varieties from five participating companies. Varieties in the trial are listed below. Early and mid-season trials were planted. The purpose of the trials was to evaluate snap bean varieties for yield, quality characteristics, and heat tolerance in a once-over harvest situation.

Name	Entering Company
Camaro	Crites Seed, Inc./Pop Vriend Seeds
PV 857	Crites Seed, Inc./Pop Vriend Seeds
PV 905	Crites Seed, Inc./Pop Vriend Seeds
PV 888	Crites Seed, Inc./Pop Vriend Seeds
BA1001	Seminis
SV3231GG	Seminis
Affirmed	Seminis
Sybaris	Seminis
SV1286GW	Seminis
SVGG2050	Seminis
SVGG2053	Seminis

Name	Entering Company
BEX034 (BSC26)	Brotherton
Dinasty	Brotherton
BSC897	Brotherton
BEX138	Brotherton
Elba	Pure Line
F19	Pure Line
Antigua	Pure Line
Beau	Pure Line
Colter	Harris Moran
Caprice (*check*)	Harris Moran

Materials and Methods

Location

Field 25B at the University of Delaware Research and Education Center Farm, Georgetown, DE.

Cultural Practices

May 1-Planted Trial

Potassium was applied according to soil test results. The early trial was planted on May 1, 2017. Varieties were planted in single-row plots arranged in a randomized complete block design with four replications. Plots were twenty feet long. Border rows of the standard variety 'Caprice' were planted on the outside of the plot. The seeding rate was 8 seeds/foot, for an in-row spacing of 1.5 inches. Between row spacing was 30 inches.

A pre-emergence application of Dual at 1.25 pt/A and 49 lbs/A of nitrogen in the form of 30% UAN was made on May 5. The trial was cultivated and side-dressed with 33 lbs/A N on June 7, and cultivated again on July 3. Escaped weeds were pulled by hand and overall weed control in the plot was good.

The plot was overhead irrigated as necessary with a traveling linear system.

June 12-Planted Trial

Potassium was applied according to soil test results. The early trial was planted on June 12, 2017. Varieties were planted in single-row plots arranged in a randomized complete block design with four replications. Plots were twenty-eight feet long. Border rows of the standard variety 'Caprice' were

planted on the outside of the plot. The seeding rate was 8 seeds/foot, for an in-row spacing of 1.5 inches. Between row spacing was 30 inches.

A pre-emergence application of Dual at 1.25 pt/A and 49 lbs/A of nitrogen in the form of 30% UAN was made on June 12. The trial was cultivated on July 3 and cultivated and side-dressed with 33 lbs/A N on July 14. Escaped weeds were pulled by hand and overall weed control in the plot was good.

Warrior II at 2 fl oz/A and Hero at 10 fl oz/A were applied on July 17 to control leafhopper.

The plot was overhead irrigated as necessary with a traveling linear system.

Harvest

Harvest of the May 1-planted trial began on June 29 (59 DAP) and was completed on July 7, 2009 (67 DAP). Harvest of the June 12-planted trial began on August 1 (50 DAP) and was completed on August 21 (70 DAP). Most plots were harvested twice. Plants were pulled from a 5 foot section of each 20 foot plot and all pods were removed by hand. Pods were evaluated for quality based on the USDA standard and graded as U.S. Fancy, U.S. No. 1 or Cull. Fancy and No. 1 grade beans were considered marketable and were further graded by diameter sieve size. The beans in each quality and size grade were weighed. Pod length was recorded for 10 pods from marketable sieve size 3 pods. Seed length was measured for ten marketable pods from each diameter sieve size to assess maturity.

Results

Days to harvest, total yield, marketable yield (Fancy and No. 1 grades), U.S. Fancy grade yield, U.S. No. 1 grade yield and seed length by diameter size grade are reported in Table 1 for all harvests of the May 1 planted trial and in Table 2 for all harvests of the June 12-planted trial. Tables 3 and 4 include the same information but only for the harvest made at optimal maturity for each variety. Yields in Tables 1 through 4 are reported in pounds per acre. Tables 5 and 6 include the same information as Tables 3 and 4 but with yields converted to tons per acre. Similarly, Tables 7 and 8 have the yields converted to crates per acre (assuming 30 lbs/crate).

Table 9 reports the percent of yield in each quality grade for each variety in the May 1-planted trial and Table 10 includes the same information for the June 12-planted trial. Table 11 reports the percent of marketable pods in each sieve size by variety for both trials. Table 12 reports the pod length for each variety for both trials separately and also combined.

Discussion

The May 1 trial experienced significant stress from root rots and high temperatures. The June 12 trial experienced less stress from root diseases and produced higher yields but was still exposed to higher than optimal temperatures during flowering.

In the May 1 trial nine varieties produced a significantly higher marketable yield than the standard variety Caprice: F19, SVGG2050, PV 905, PV 857, BA1001, SVGG2053, BSC897, BEX138 and BEX034. F19 and SVGG2053 also produced a significantly higher marketable yield than Caprice in the June 12 planted trial. These varieties may have better ability to produce marketable quality pods under heat stress conditions.

Figure 1 is a photo of a pod sample from each of the varieties in the trial.

Appendix A contains temperature and rainfall data from the Georgetown REC weather station corresponding to the period from planting to final harvest of both of the trials.

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Table 1. May 1 Planted Trial Yield for All Harvests and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (lbs/A)	Marketable Yield (lbs/A)	Fancy Yield (lbs/A)	No. 1 Yield (lbs/A)	Seed Size (mm) by Diameter Size Grade			
						2	3	4	5
Camaro	59	2900 j-m	2075 i-m	864 f-i	1210 h-j		6.3	6.9	7.2
Camaro	67	5635 a-g	3834 b-h	1698 c-f	2136 a-h		6.9	10.8	13.9
PV 857	59	6008 a-f	4744 a-d	2708 a	2036 b-i		6.6	7.7	8.7
PV 857	67	6918 a-c	4898 a-c	2040 a-c	2858 a-c		10.4	11.9	10.1
PV 905	66	7479 a	5436 ab	2593 ab	2842 a-c		10.8	11.8	
PV 888	59	4648 d-j	3492 c-j	1867 a-d	1625 e-i		7.1	7.8	7.4
PV 888	67	6023 a-f	4037 b-g	2113 a-c	1925 b-i		8.7	12.1	
BA1001	66	6600 a-d	4671 a-d	1763 b-e	2908 ab		8.4	10.1	9.7
SV3231GG	59	2136 k-m	1709 k-m	588 hi	1122 h-j		6.0	7.1	7.8
SV3231GG	67	4537 d-j	3503 c-j	1763 b-e	1740 d-i		6.4	8.6	12.9
Affirmed	59	3135 i-m	2451 g-m	922 e-i	1529 f-j		4.8	5.5	6.6
Affirmed	67	3999 f-l	2562 f-l	830 f-i	1733 d-i		8.2	8.7	
Sybaris	59	4168 e-k	2324 h-m	784 g-i	1540 f-j		6.6	7.4	7.8
Sybaris	67	5294 b-h	3154 d-l	1256 c-h	1898 b-i		6.4	11.7	12.8
SV1286GW	66	2009 lm	1637 lm	292 i	1345 h-j		6.7	10.3	
SVGG2050	59	4145 e-l	3542 c-j	1787 b-e	1756 d-i		6.8	7.7	
SVGG2050	67	6799 a-c	5440 ab	2708 a	2731 a-d		10.2	12.4	
SVGG2053	59	4614 d-j	3653 c-i	1898 a-c	1755 d-i		6.7	7.7	
SVGG2053	67	6142 a-e	4406 a-d	2032 a-c	2374 a-g		10.4	12.0	
BEX034	66	5632 a-g	4145 a-f	1514 c-g	2632 a-e		10.0	11.3	
Dinasty	66	5723 a-g	3941 b-h	1475 c-g	2466 a-f		8.2	9.9	
BSC897	66	5674 a-g	4349 a-e	1756 b-e	2593 a-e		8.1	9.3	11.0
BEX138	59	4133 e-l	3331 c-k	1944 a-c	1387 g-j		6.2	7.0	
BEX138	67	5570 a-g	4176 a-f	2040 a-c	2136 a-h		9.5	11.5	
Elba	59	1510 m	857 m	292 i	565 j	5.3	6.7		
Elba	67	3054 i-m	1744 k-m	680 g-i	1064 ij	5.4	10.4	13.4	
F19	59	3358 h-m	2701 e-l	987 d-i	1713 e-i			8.6	9.3
F19	67	7399 ab	5789 a	2670 a	3119 a			11.6	13.9
Antigua	66	4421 e-j	3146 d-l	1253 c-h	1894 b-i		8.9	11.6	
Beau	66	4472 e-j	1944 j-m	381 hi	1564 f-j		8.5	10.1	12.6
Colter	59	5071 c-i	3592 c-j	1709 c-f	1882 c-i		7.1	8.0	8.5
Colter	67	5113 c-i	3500 c-j	1514 c-g	1986 b-i		11.9	13.1	
Caprice	59	3753 g-l	2659 f-l	987 d-i	1671 e-i			6.3	7.0
Caprice	67	4371 e-j	2532 f-m	960 e-i	1571 f-j		9.0	10.5	12.5
p-value		***<0.0001***	***<0.0001***	***<0.0001***	***0.0001***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**2138.2**	**1675.9**	**880.15**	**1017.6**				
Tukey's HSD		**4232.8**	**3317.6**	**1742.4**	**2014.5**				
Coefficient of Variation		**31.90**	**35.02**	**42.10**	**37.76**				

Table 2. June 12 Trial Yield for All Harvests and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (lbs/A)	Marketable Yield (lbs/A)	Fancy Yield (lbs/A)	No. 1 Yield (lbs/A)	Seed Size (mm) by Diameter Size Grade			
						2	3	4	5
Camaro	57	3540 h-k	2603 i-o	1456 h-m	1147 g-m	4.52	5.7	8.74	
Camaro	64	8862 a-d	7180 a-d	4952 ab	2228 c-h		6.02	8.64	
PV 857	50	4268 e-j	3672 f-m	1894 f-k	1779 e-k		6.96	8.04	
PV 857	57	7721 a-g	6438 a-f	3284 b-g	3154 a-e		9.92	7.7	
PV 905	57	1882 i-k	1636 l-o	1083 i-m	553 k-m	4.86	6.1	9.79	
PV 905	64	5140 d-i	4083 e-l	2378 d-j	1706 f-l	7.45	8.74	8.07	
PV 888	57	2501 i-k	1806 l-o	1007 i-m	799 i-m		5.49	7.06	
PV 888	64	7771 a-f	5586 b-i	3296 b-f	2290 c-h		8.21	7.62	
BA1001	57	4091 f-k	3577 f-m	1928 f-k	1648 f-l		4.95	6.21	
BA1001	64	9942 ab	7756 a-d	4356 a-c	3400 a-c		7.53	6.42	
SV3231GG	57	3133 h-k	2652 i-o	1437 h-m	1216 g-m			7.17	10.5
SV3231GG	64	9818 ab	8282 a-c	5082 a	3200 a-d			8.16	11.7
Affirmed	50	407 k	235 o	38 m	196 m		5.34	5.73	
Affirmed	57	4598 e-j	3346 g-n	1521 h-m	1825 d-k		5.56	8.18	
Sybaris	50	492 k	392 no	100 lm	292 lm		6.3	7.13	
Sybaris	57	4623 e-j	3513 f-m	1525 g-m	1988 c-j		5.06	6.33	
SV1286GW	64	4775 e-j	3688 f-m	1752 f-m	1936 d-k	4.65	7.13		
SV1286GW	70	5232 c-i	3999 e-m	2147 d-k	1852 d-k	7.31	9.39		
SVGG2050	57	4844 e-j	4172 e-l	1936 f-k	2236 c-h		6.21	9.12	
SVGG2050	64	10264 ab	8324 a-c	3795 a-e	4529 a		7.56	11	
SVGG2053	57	5032 e-i	4061 e-l	1641 f-m	2420 c-h		5.9	9.92	
SVGG2053	64	10848 a	8597 a	4226 a-c	4371 ab		6.93	10.5	
BEX034	64	5286 c-i	4160 e-l	2697 c-i	1464 g-m		8.47	9.49	
BEX034	70	6849 b-h	5332 c-j	2962 c-h	2370 c-h	6.37	10.8		
Dinasty	57	3476 h-k	2382 j-o	1030 i-m	1352 g-m	3.71	4.79		
Dinasty	64	8931 a-c	6707 a-e	3722 a-e	2985 b-f	4.02	6.82	9.66	
BSC897	50	2750 i-k	2055 k-o	872 j-m	1183 g-m		7.01	7.35	
BSC897	57	4614 e-j	3335 g-n	1371 h-m	1963 d-k		6.06	9.96	
BEX138	50	1235 jk	1008 m-o	409 k-m	599 j-m		6.46	7.38	
BEX138	57	3357 h-k	2403 j-o	1187 i-m	1216 g-m		5.4	9.41	
Elba	64	4698 e-j	3911 e-m	2251 d-j	1659 f-l	4.92	7.48		
Elba	70	7867 a-e	5916 a-h	2950 c-h	2965 b-f	7.68	9.98		
p-value		***<0.0001***	***<0.0001***	***<0.0001***	***<0.0001***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**3767**	**2994**	**1760**	**1418**				
Tukey's HSD		**7637**	**6070**	**3567**	**2875**				
Coefficient of Variation		**50.23**	**50.82**	**56.14**	**51.43**				

Table continues on next page.

Table 2. June 12 Trial Yield for All Harvests and Average Seed Size by Diameter Size Grade ***continued***

Variety	Days to Harvest	Total Yield (lbs/A)	Marketable Yield (lbs/A)	Fancy Yield (lbs/A)	No. 1 Yield (lbs/A)	Seed Size (mm) by Diameter Size Grade			
						2	3	4	5
F19	57	3446 h-k	2993 h-o	1729 f-m	1264 g-m		6.11	7.82	
F19	64	10913 a	8436 ab	5432 a	3004 b-f		7.28	9.2	
Antigua	63	3139 h-k	2681 i-o	1879 f-k	803 i-m	3.92	4.77	5.9	
Antigua	70	7502 a-g	6288 a-g	3907 a-d	2382 c-h	6.22	8.07		
Beau	57	3995 g-k	2877 i-o	1337 h-m	1537 g-m		6.31	9.69	
Beau	64	10397 ab	8046 a-c	3743 a-e	4302 ab		7.83	8.08	
Colter	50	2777 i-k	2262 k-o	1041 i-m	1222 g-m		7.1	7.76	
Colter	57	5374 c-i	4179 e-l	2063 e-k	2117 c-i		5.98	10	
Caprice	57	1971 i-k	1398 l-o	361 k-m	1037 h-m	4.03	5.39	6.8	
Caprice	64	6699 b-h	4836 d-k	2274 d-j	2563 c-g		5.47	7.85	
p-value		***<0.0001***	***<0.0001***	***<0.0001***	***<0.0001***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**3767**	**2994**	**1760**	**1418**				
Tukey's HSD		**7637**	**6070**	**3567**	**2875**				
Coefficient of Variation		**50.23**	**50.82**	**56.14**	**51.43**				

Table 3. May 1 Planted Trial Yield in Pounds Per Acre for Harvest at Optimal Maturity and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (lbs/A)	Marketable Yield (lbs/A)	Fancy Yield (lbs/A)	No. 1 Yield (lbs/A)	Culls (lbs/A)	Seed Size (mm) by Diameter Size Grade			
							2	3	4	5
F19	67	7399 a	5789 a	2670 a	3119 a	1610 bcd			11.6	13.9
SVGG2050	67	6799 ab	5440 ab	2708 a	2731 abcd	1360 bcd		10.2	12.4	
PV 905	66	7479 a	5436 ab	2593 ab	2842 abc	2044 abc		10.8	11.8	
PV 857	67	6918 ab	4898 abc	2040 abc	2858 abc	2021 abc		10.4	11.9	10.1
BA1001	66	6600 ab	4671 abcd	1763 bcd	2908 ab	1928 abc		8.4	10.1	9.7
SVGG2053	67	6142 abc	4406 abcd	2032 abc	2374 abcde	1736 abcd		10.4	12.0	
BSC897	66	5674 abcd	4349 abcd	1756 bcd	2593 abcd	1325 bcd		8.1	9.3	11.0
BEX138	67	5570 abcd	4176 bcd	2040 abc	2136 abcdef	1394 bcd		9.5	11.5	
BEX034	66	5632 abcd	4145 bcd	1514 cdef	2632 abcd	1486 bcd		10.0	11.3	
PV 888	67	6023 abcd	4037 bcde	2113 abc	1925 bcdefg	1986 abc		8.7	12.1	
Dinasty	66	5723 abcd	3941 bcde	1475 cdef	2466 abcde	1783 abcd		8.2	9.9	
Camaro	67	5635 abcd	3834 cde	1698 cde	2136 abcdef	1802 abcd		6.9	10.8	13.9
Colter	59	5071 bcde	3592 cde	1709 cd	1882 cdefg	1479 bcd		7.1	8.0	8.5
SV3231GG	67	4537 cde	3503 cdef	1763 bcd	1740 defg	1033 de		6.4	8.6	12.9
Sybaris	67	5294 bcd	3154 defg	1256 cdef	1898 cdefg	2140 ab		6.4	11.7	12.8
Antigua	66	4421 cde	3146 defg	1253 cdef	1894 cdefg	1275 cd		8.9	11.6	
Affirmed	67	3999 def	2562 efg	830 efg	1733 defg	1437 bcd		8.2	8.7	
Caprice	67	4371 cde	2532 efg	960 defg	1571 efg	1840 abcd		9.0	10.5	12.5
Beau	66	4472 cde	1944 fg	381 g	1564 efg	2527 a		8.5	10.1	12.6
Elba	67	3054 ef	1744 g	680 fg	1064 g	1310 bcd	5.4	10.4	13.4	
SV1286GW	66	2009 f	1637 g	292 g	1345 fg	373 e		6.7	10.3	
p-value		***<0.0001***	***<0.0001***	***<0.0001***	***0.0024***	***0.0075***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**2050**	**1574**	**871**	**1002**	**857**				
Tukey's HSD		**3827**	**2939**	**1626**	**1871**	**1599**				
Coefficient of Variation		**26.98**	**29.61**	**38.57**	**32.78**	**37.53**				

Table 4. June 12 Planted Trial Yield in Pounds Per Acre for Harvest at Optimal Maturity and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (lbs/A)	Marketable Yield (lbs/A)	Fancy Yield (lbs/A)	No. 1 Yield (lbs/A)	Culls (lbs/A)	Seed Size (mm) by Diameter Size Grade			
							2	3	4	5
SVGG2053	64	10848 a	8597 a	4226 abcde	4371 a	2251 a		6.9	10	
F19	64	10913 a	8436 a	5432 a	3004 abc	2478 a		7.3	9.2	
SVGG2050	64	10264 a	8324 ab	3795 abcdef	4529 a	1940 a		7.6	11	
SV3231GG	64	9818 ab	8282 ab	5082 ab	3200 abc	1537 a			8.2	12
Beau	64	10397 a	8046 ab	3743 abcdef	4302 a	2351 a		7.8	8.1	
BA1001	64	9942 a	7756 ab	4356 abcd	3400 ab	2186 a		7.5	6.4	
Camaro	64	8862 abc	7180 abc	4952 abc	2228 bcd	1683 a		6	8.6	
Dinasty	64	8931 abc	6707 abcd	3722 abcdef	2985 abc	2224 a	4	6.8	9.7	
PV 857	57	7721 abcd	6438 abcd	3284 bcdefg	3154 abc	1283 a		9.9	7.7	
Antigua	70	7502 abcd	6288 abcd	3907 abcdef	2382 bcd	1214 a	6.2	8.1		
Elba	70	7867 abcd	5916 abcde	2950 cdefg	2965 abc	1952 a	7.7	10		
PV 888	64	7771 abcd	5586 abcde	3296 bcdefg	2290 bcd	2186 a		8.2	7.6	
BEX034	70	6849 abcd	5332 abcde	2962 cdefg	2370 bcd	1517 a	6.4	11		
Caprice	64	6699 abcd	4836 bcde	2274 defg	2563 bcd	1863 a		5.5	7.8	
Colter	57	5374 bcd	4179 cde	2063 fg	2117 bcd	1195 a		6	10	
PV 905	64	5140 cd	4083 cde	2378 defg	1706 cd	1057 a	7.4	8.7	8.1	
SV1286GW	70	5232 cd	3999 cde	2147 efg	1852 bcd	1233 a	7.3	9.4		
Sybaris	57	4623 cd	3513 de	1525 g	1988 bcd	1110 a		5.1	6.3	
Affirmed	57	4598 cd	3346 de	1521 g	1825 bcd	1252 a		5.6	8.2	
BSC897	57	4614 cd	3335 de	1371 g	1963 bcd	1279 a		6.1	10	
BEX138	57	3357 d	2403 e	1187 g	1216 d	953 a		5.4	9.4	
p-value		***0.0101***	***0.0033***	***0.0008***	***0.0046***	***0.1125***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**4536**	**3542**	**2119**	**1659**	**NA**				
Tukey's HSD		**8469**	**6613**	**3957**	**3097**	**NA**				
Coefficient of Variation		**42.81**	**42.90**	**47.55**	**43.66**	**48.36**				

Table 5. May 1 Planted Trial Yield in Tons Per Acre for Harvest at Optimal Maturity and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (T/A)	Marketable Yield (T/A)	Fancy Yield (T/A)	No. 1 Yield (T/A)	Culls (T/A)	Seed Size (mm) by Diameter Size Grade			
							2	3	4	5
F19	67	3.70 a	2.89 a	1.33 a	1.56 a	0.80 bcd			11.6	13.9
SVGG2050	67	3.40 ab	2.72 ab	1.35 a	1.37 abcd	0.68 bcd		10.2	12.4	
PV 905	66	3.74 a	2.72 ab	1.30 ab	1.42 abc	1.02 abc		10.8	11.8	
PV 857	67	3.46 ab	2.45 abc	1.02 abc	1.43 abc	1.01 abc		10.4	11.9	10.1
BA1001	66	3.30 ab	2.34 abcd	0.88 bcd	1.45 ab	0.96 abc		8.4	10.1	9.7
SVGG2053	67	3.07 abc	2.20 abcd	1.02 abc	1.19 abcde	0.87 abcd		10.4	12.0	
BSC897	66	2.84 abcd	2.17 abcd	0.88 bcd	1.30 abcd	0.66 bcd		8.1	9.3	11.0
BEX138	67	2.79 abcd	2.09 bcd	1.02 abc	1.07 abcdef	0.70 bcd		9.5	11.5	
BEX034	66	2.82 abcd	2.07 bcd	0.76 cdef	1.32 abcd	0.74 bcd		10.0	11.3	
PV 888	67	3.01 abcd	2.02 bcde	1.06 abc	0.96 bcdefg	0.99 abc		8.7	12.1	
Dinasty	66	2.86 abcd	1.97 bcde	0.74 cdef	1.23 abcde	0.89 abcd		8.2	9.9	
Camaro	67	2.82 abcd	1.92 cde	0.85 cde	1.07 abcdef	0.90 abcd		6.9	10.8	13.9
Colter	59	2.54 bcde	1.80 cde	0.85 cd	0.94 cdefg	0.74 bcd		7.1	8.0	8.5
SV3231GG	67	2.27 cde	1.75 cdef	0.88 bcd	0.87 defg	0.52 de		6.4	8.6	12.9
Sybaris	67	2.65 bcd	1.58 defg	0.63 cdef	0.95 cdefg	1.07 ab		6.4	11.7	12.8
Antigua	66	2.21 cde	1.57 defg	0.63 cdef	0.95 cdefg	0.64 cd		8.9	11.6	
Affirmed	67	2.00 def	1.28 efg	0.41 efg	0.87 defg	0.72 bcd		8.2	8.7	
Caprice	67	2.19 cde	1.27 efg	0.48 defg	0.79 efg	0.92 abcd		9.0	10.5	12.5
Beau	66	2.24 cde	0.97 fg	0.19 g	0.78 efg	1.26 a		8.5	10.1	12.6
Elba	67	1.53 ef	0.87 g	0.34 fg	0.53 g	0.66 bcd	5.4	10.4	13.4	
SV1286GW	66	1.00 f	0.82 g	0.15 g	0.67 fg	0.19 e		6.7	10.3	
p-value		***<0.0001***	***<0.0001***	***<0.0001***	***0.0024***	***0.0075***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**1.025**	**0.787**	**0.435**	**0.501**	**0.428**				
Tukey's HSD		**1.914**	**1.470**	**0.813**	**0.936**	**0.800**				
Coefficient of Variation		**26.98**	**29.61**	**38.57**	**32.78**	**37.53**				

Table 6. June 12 Planted Trial Yield in Tons Per Acre for Harvest at Optimal Maturity and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (T/A)	Marketable Yield (T/A)	Fancy Yield (T/A)	No. 1 Yield (T/A)	Culls (T/A)	Seed Size (mm) by Diameter Size Grade			
							2	3	4	5
SVGG2053	64	5.42 a	4.30 a	2.11 abcde	2.19 a	1.13 a		6.9	10	
F19	64	5.46 a	4.22 a	2.72 a	1.50 abc	1.24 a		7.3	9.2	
SVGG2050	64	5.13 a	4.16 ab	1.90 abcdef	2.26 a	0.97 a		7.6	11	
SV3231GG	64	4.91 ab	4.14 ab	2.54 ab	1.60 abc	0.77 a			8.2	12
Beau	64	5.20 a	4.02 ab	1.87 abcdef	2.15 a	1.18 a		7.8	8.1	
BA1001	64	4.97 a	3.88 ab	2.18 abcd	1.70 ab	1.09 a		7.5	6.4	
Camaro	64	4.43 abc	3.59 abc	2.48 abc	1.11 bcd	0.84 a		6	8.6	
Dinasty	64	4.47 abc	3.35 abcd	1.86 abcdef	1.49 abc	1.11 a	4	6.8	9.7	
PV 857	57	3.86 abcd	3.22 abcd	1.64 bcdefg	1.58 abc	0.64 a		9.9	7.7	
Antigua	70	3.75 abcd	3.14 abcd	1.95 abcdef	1.19 bcd	0.61 a	6.2	8.1		
Elba	70	3.93 abcd	2.96 abcde	1.48 cdefg	1.48 abc	0.98 a	7.7	10		
PV 888	64	3.89 abcd	2.79 abcde	1.65 bcdefg	1.14 bcd	1.09 a		8.2	7.6	
BEX034	70	3.42 abcd	2.67 abcde	1.48 cdefg	1.19 bcd	0.76 a	6.4	11		
Caprice	64	3.35 abcd	2.42 bcde	1.14 defg	1.28 bcd	0.93 a		5.5	7.8	
Colter	57	2.69 bcd	2.09 cde	1.03 fg	1.06 bcd	0.60 a		6	10	
PV 905	64	2.57 cd	2.04 cde	1.19 defg	0.85 cd	0.53 a	7.4	8.7	8.1	
SV1286GW	70	2.62 cd	2.00 cde	1.07 efg	0.93 bcd	0.62 a	7.3	9.4		
Sybaris	57	2.31 cd	1.76 de	0.76 g	0.99 bcd	0.56 a		5.1	6.3	
Affirmed	57	2.30 cd	1.67 de	0.76 g	0.91 bcd	0.63 a		5.6	8.2	
BSC897	57	2.31 cd	1.67 de	0.69 g	0.98 bcd	0.64 a		6.1	10	
BEX138	57	1.68 d	1.20 e	0.59 g	0.61 d	0.48 a		5.4	9.4	
p-value		***0.0101***	***0.0033***	***0.0008***	***0.0046***	***0.1125***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**2.268**	**1.771**	**1.060**	**0.830**	**NA**				
Tukey's HSD		**4.234**	**3.307**	**1.978**	**1.549**	**NA**				
Coefficient of Variation		**42.81**	**42.90**	**47.55**	**43.66**	**48.36**				

Table 7. May 1 Planted Trial Yield in Crates (30 lbs) Per Acre for Harvest at Optimal Maturity and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (crates/A)	Marketable Yield (crates/A)	Fancy Yield (crates/A)	No. 1 Yield (crates/A)	Culls (crates/A)	Seed Size (mm) by Diameter Size Grade			
							2	3	4	5
F19	67	247 a	193 a	89 a	104 a	54 bcd			11.6	13.9
SVGG2050	67	227 ab	181 ab	90 a	91 abcd	45 bcd		10.2	12.4	
PV 905	66	249 a	181 ab	86 ab	95 abc	68 abc		10.8	11.8	
PV 857	67	231 ab	163 abc	68 abc	95 abc	67 abc		10.4	11.9	10.1
BA1001	66	220 ab	156 abcd	59 bcd	97 ab	64 abc		8.4	10.1	9.7
SVGG2053	67	205 abc	147 abcd	68 abc	79 abcde	58 abcd		10.4	12.0	
BSC897	66	189 abcd	145 abcd	59 bcd	86 abcd	44 bcd		8.1	9.3	11.0
BEX138	67	186 abcd	139 bcd	68 abc	71 abcdef	46 bcd		9.5	11.5	
BEX034	66	188 abcd	138 bcd	50 cdef	88 abcd	50 bcd		10.0	11.3	
PV 888	67	201 abcd	135 bcde	70 abc	64 bcdefg	66 abc		8.7	12.1	
Dinasty	66	191 abcd	131 bcde	49 cdef	82 abcde	59 abcd		8.2	9.9	
Camaro	67	188 abcd	128 cde	57 cde	71 abcdef	60 abcd		6.9	10.8	13.9
Colter	59	169 bcde	120 cde	57 cd	63 cdefg	49 bcd		7.1	8.0	8.5
SV3231GG	67	151 cde	117 cdef	59 bcd	58 defg	34 de		6.4	8.6	12.9
Sybaris	67	176 bcd	105 defg	42 cdef	63 cdefg	71 ab		6.4	11.7	12.8
Antigua	66	147 cde	105 defg	42 cdef	63 cdefg	43 cd		8.9	11.6	
Affirmed	67	133 def	85 efg	28 efg	58 defg	48 bcd		8.2	8.7	
Caprice	67	146 cde	84 efg	32 defg	52 efg	61 abcd		9.0	10.5	12.5
Beau	66	149 cde	65 fg	13 g	52 efg	84 a		8.5	10.1	12.6
Elba	67	102 ef	58 g	23 fg	35 g	44 bcd	5.4	10.4	13.4	
SV1286GW	66	67 f	55 g	10 g	45 fg	12 e		6.7	10.3	
p-value		***<0.0001***	***<0.0001***	***<0.0001***	***0.0024***	***0.0075***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**68.3**	**52.5**	**29.0**	**33.4**	**28.6**				
Tukey's HSD		**127.6**	**98.0**	**54.2**	**62.4**	**53.3**				
Coefficient of Variation		**26.98**	**29.61**	**38.57**	**32.78**	**37.53**				

Table 8. June 12 Planted Trial Yield in Crates (30 lbs) Per Acre for Harvest at Optimal Maturity and Average Seed Size by Diameter Size Grade

Variety	Days to Harvest	Total Yield (crates/A)	Marketable Yield (crates/A)	Fancy Yield (crates/A)	No. 1 Yield (crates/A)	Culls (crates/A)	Seed Size (mm) by Diameter Size Grade			
							2	3	4	5
SVGG2053	64	362 a	287 a	141 abcde	146 a	75 a		6.9	10	
F19	64	364 a	281 a	181 a	100 abc	83 a		7.3	9.2	
SVGG2050	64	342 a	277 ab	127 abcdef	151 a	65 a		7.6	11	
SV3231GG	64	327 ab	276 ab	169 ab	107 abc	51 a			8.2	12
Beau	64	347 a	268 ab	125 abcdef	143 a	78 a		7.8	8.1	
BA1001	64	331 a	259 ab	145 abcd	113 ab	73 a		7.5	6.4	
Camaro	64	295 abc	239 abc	165 abc	74 bcd	56 a		6	8.6	
Dinasty	64	298 abc	224 abcd	124 abcdef	99 abc	74 a	4	6.8	9.7	
PV 857	57	257 abcd	215 abcd	109 bcdefg	105 abc	43 a		9.9	7.7	
Antigua	70	250 abcd	210 abcd	130 abcdef	79 bcd	40 a	6.2	8.1		
Elba	70	262 abcd	197 abcde	98 cdefg	99 abc	65 a	7.7	10		
PV 888	64	259 abcd	186 abcde	110 bcdefg	76 bcd	73 a		8.2	7.6	
BEX034	70	228 abcd	178 abcde	99 cdefg	79 bcd	51 a	6.4	11		
Caprice	64	223 abcd	161 bcde	76 defg	85 bcd	62 a		5.5	7.8	
Colter	57	179 bcd	139 cde	69 fg	71 bcd	40 a		6	10	
PV 905	64	171 cd	136 cde	79 defg	57 cd	35 a	7.4	8.7	8.1	
SV1286GW	70	174 cd	133 cde	72 efg	62 bcd	41 a	7.3	9.4		
Sybaris	57	154 cd	117 de	51 g	66 bcd	37 a		5.1	6.3	
Affirmed	57	153 cd	112 de	51 g	61 bcd	42 a		5.6	8.2	
BSC897	57	154 cd	111 de	46 g	65 bcd	43 a		6.1	10	
BEX138	57	112 d	80 e	40 g	41 d	32 a		5.4	9.4	
p-value		***0.0101***	***0.0033***	***0.0008***	***0.0046***	***0.1125***	[1]Means followed by the same letter are not significantly different according to Fisher's LSD.			
Fisher's LSD[1]		**151.2**	**118.1**	**70.6**	**55.3**	**NA**				
Tukey's HSD		**282.3**	**220.4**	**131.9**	**103.2**	**NA**				
Coefficient of Variation		**42.81**	**42.90**	**47.55**	**43.66**	**48.36**				

Table 9. May 1 Planted Trial Percent of Yield in Each Quality Grade

Variety	% Marketable	% Fancy	% No. 1	% Cull
SV1286GW	80 a	22 ef	58 a	20 g
SVGG2050	79 ab	39 a	40 a	21 fg
F19	77 abc	36 abc	41 a	23 efg
SV3231GG	77 abc	38 a	39 a	23 efg
BSC897	76 abc	28 abcdef	48 a	24 efg
BEX138	75 abc	37 ab	38 a	25 efg
BEX034	74 abc	26 bcdef	48 a	26 efg
PV 905	73 abc	34 abcd	38 a	27 efg
Antigua	72 abcd	29 abcdef	43 a	28 defg
SVGG2053	72 abcd	33 abcde	39 a	28 defg
Colter	71 abcde	34 abcd	37 a	29 cdefg
BA1001	71 abcde	27 bcdef	44 a	29 cdefg
PV 857	70 abcde	29 abcdef	41 a	30 cdefg
Camaro	68 bcdef	31 abcdef	38 a	32 bcdef
Dinasty	67 cdef	23 def	44 a	33 bcde
PV 888	67 cdef	35 abc	32 a	33 bcde
Affirmed	62 def	20 fg	42 a	38 bcd
Sybaris	61 ef	27 bcdef	34 a	39 bc
Caprice	58 f	25 cdef	33 a	42 b
Elba	58 f	22 ef	36 a	42 b
Beau	44 g	10 g	34 a	56 a
p-value	**<0.0001**	**0.0002**	**0.1155**	**<0.0001**
Fisher's LSD[1]	**10.9**	**11.3**	**NA**	**10.9**
Tukey's HSD	**20.3**	**21.1**	**NA**	**20.3**
Coefficient of Variation	**11.15**	**27.66**	**24.13**	**24.93**

[1]Means followed by the same letter are not significantly different according to Fisher's LSD.

Table 10. June 12 Planted Trial Percent of Yield in Each Quality Grade

Variety	% Marketable	% Fancy	% No. 1	% Cull
SV3231GG	84 a	50 abc	34 defg	16 f
PV 857	84 a	43 bcde	41 abcd	16 f
Antigua	84 a	52 ab	32 efg	16 f
PV 905	81 ab	49 abc	33 defg	19 ef
SVGG2050	80 ab	36 efg	45 a	20 ef
SVGG2053	80 abc	39 def	41 abcd	21 def
BA1001	79 abcd	45 abcd	35 cdefg	21 cdef
BEX034	78 abcde	43 cde	35 cdefg	22 bcdef
SV1286GW	78 abcde	42 cdef	36 bcdefg	23 bcdef
F19	78 abcde	50 abc	28 gh	23 bcdef
Beau	78 abcde	38 def	40 abcde	23 bcdef
Colter	78 abcde	38 def	41 abcd	23 bcdef
Sybaris	76 bcdef	34 fg	43 abc	24 abcde
Camaro	76 bcdef	54 a	22 h	24 abcde
Elba	76 bcdef	38 def	38 abcdef	24 abcde
Dinasty	75 bcdef	43 cde	32 efg	25 abcde
BSC897	73 cdef	29 g	44 ab	28 abcd
PV 888	72 def	43 cde	30 fgh	28 abc
Caprice	72 def	34 fg	39 abcde	28 abc
Affirmed	71 ef	34 fg	37 abcdef	30 ab
BEX138	69 f	35 efg	35 cdefg	31 a
p-value	***0.0022***	***<0.0001***	***<0.0001***	***0.0025***
Fisher's LSD[1]	**7.6**	**9.0**	**8.4**	**7.6**
Tukey's HSD	**14.2**	**16.8**	**15.6**	**14.2**
Coefficient of Variation	**6.98**	**15.41**	**16.47**	**23.43**

[1]Means followed by the same letter are not significantly different according to Fisher's LSD.

Table 11. Varieties by Percent of Marketable Pods in Each Diameter Size Grade

Variety	Percent Grade 5		Percent Grade 4		Percent Grade 3		Percent Grade 2	
BA1001	**37.5**	a	**35.5**	cdef	**23.0**	e	**4.03**	c
SV3231GG	**32.6**	ab	**35.4**	cdef	**27.2**	de	**4.79**	c
Beau	**30.0**	ab	**34.4**	def	**30.8**	cde	**4.82**	c
F19	**27.4**	b	**40.3**	bcdef	**28.2**	cde	**4.04**	c
PV 857	**16.1**	c	**59.2**	a	**23.6**	e	**1.12**	c
Colter	**4.3**	de	**51.1**	ab	**40.5**	bcd	**4.09**	c
Affirmed	**4.0**	e	**47.8**	abc	**41.6**	bcd	**6.54**	c
PV 888	**8.5**	cde	**47.0**	abcd	**40.9**	bcd	**3.58**	c
Caprice	**15.1**	c	**44.5**	bcde	**37.3**	cde	**3.08**	c
Sybaris	**6.6**	cde	**44.4**	bcde	**41.6**	bcd	**7.41**	c
BSC897	**1.1**	e	**44.4**	bcde	**49.6**	abc	**4.88**	c
Camaro	**13.9**	cd	**43.5**	bcde	**35.2**	cde	**7.32**	c
PV 905	**14.2**	c	**42.6**	bcde	**39.0**	bcd	**4.23**	c
SVGG2050	**3.8**	e	**39.3**	bcdef	**53.1**	ab	**3.77**	c
Antigua	**2.1**	e	**35.7**	cdef	**38.5**	cd	**23.71**	b
SVGG2053	**2.3**	e	**33.4**	ef	**59.2**	a	**5.19**	c
BEX138	**0.4**	e	**29.6**	fg	**63.9**	a	**6.11**	c
Dinasty	**0.6**	e	**27.7**	fg	**62.6**	a	**9.09**	c
BEX034	**0.0**	e	**19.0**	gh	**57.2**	a	**23.80**	b
SV1286GW	**0.2**	e	**10.1**	hi	**40.9**	bcd	**48.87**	a
Elba	**0.0**	e	**3.6**	i	**56.4**	a	**39.92**	a
p-value	***<0.0001***		***<0.0001***		***<0.0001***		***<0.0001***	

[1]Means followed by the same letter are not significantly different according to Fisher's LSD.

Table 12. Pod Length in Centimeters of Marketable Grade 3 Pods

Variety	May 1 Planted Trial Pod Length (cm)	June 12 Planted Trial Pod Length (cm)	Combined Trial Data Pod Length (cm)
F19	12.9 a	14.5 a	13.7 a
BEX034	12.0 b	13.8 b	12.9 b
PV 905	11.8 bc	12.8 cd	12.3 c
Elba	12.0 b	12.5 cde	12.3 c
SVGG2050	12.1 b	12.1 efg	12.1 c
SVGG2053	11.8 bc	12.4 def	12.1 c
BA1001	10.4 hij	13.0 c	11.7 d
Camaro	11.6 bcd	11.6 ghijk	11.6 de
BSC897	11.1 def	11.9 fgh	11.5 def
BEX138	11.3 cde	11.6 ghij	11.5 def
Sybaris	11.2 def	11.7 ghi	11.4 defg
Dinasty	10.7 fgh	12.0 fgh	11.3 defg
Affirmed	11.3 cde	11.2 ijkl	11.3 efg
Caprice	10.8 fgh	11.5 hijkl	11.1 fgh
PV 888	10.9 efg	11.3 ijkl	11.1 gh
PV 857	10.8 fgh	11.4 hijkl	11.1 gh
Colter	10.3 hij	11.3 ijkl	10.8 hi
SV3231GG	10.5 ghi	11.1 jkl	10.8 hi
Beau	10.0 ij	11.6 ghijk	10.8 hi
Antigua	9.9 j	11.1 kl	10.5 i
SV1286GW	9.9 j	11.0 l	10.4 i
p-value	***<0.0001***	***<0.0001***	***<0.0001***

[1]Means followed by the same letter are not significantly different according to Fisher's LSD.

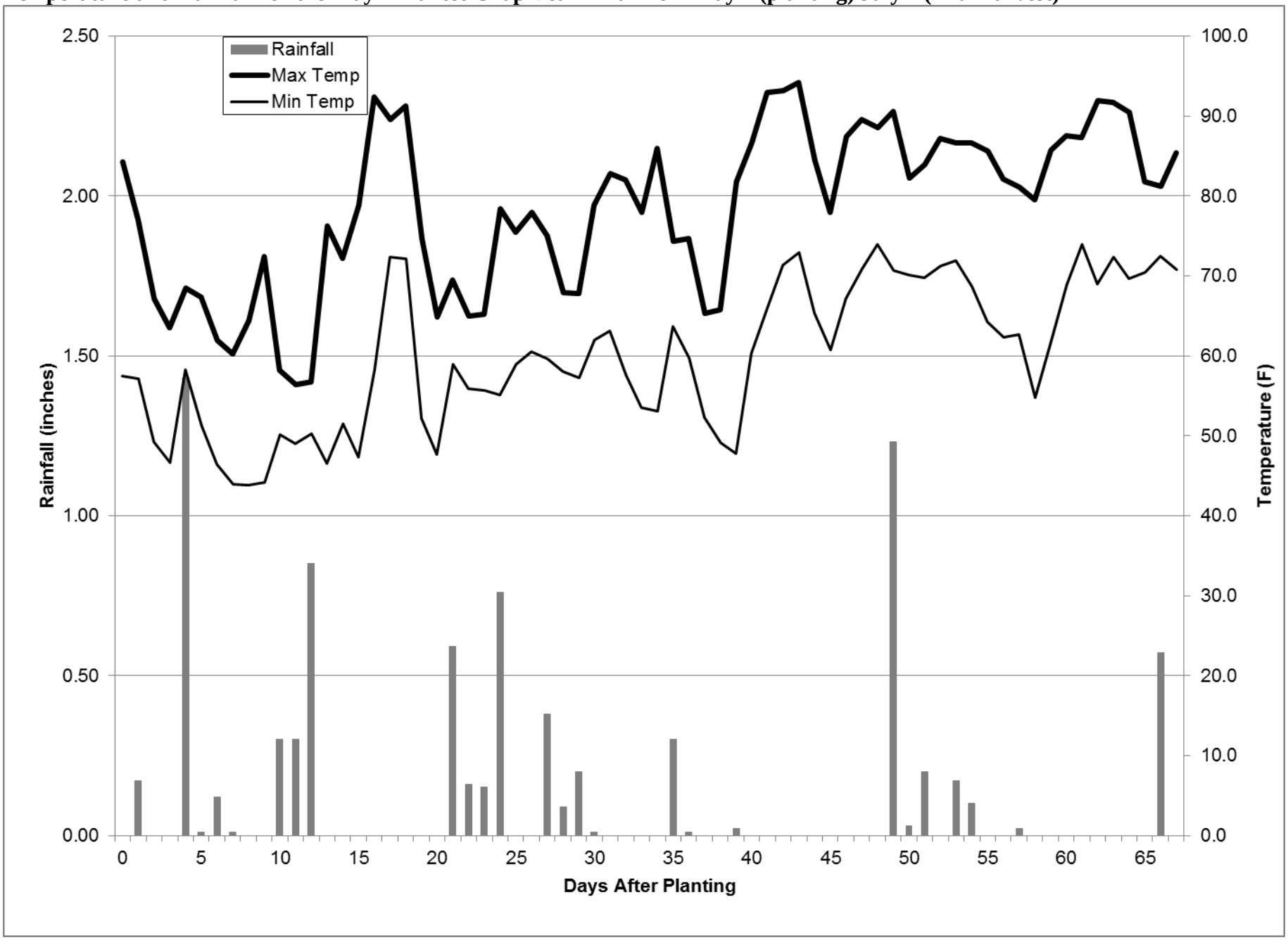
Figure 1. Pod samples from varieties in the 2017 snap bean trials.

Appendix A: Daily Maximum and Minimum Temperatures and Rainfall for Period of May 1, 2017 (first planting) to August 21, 2017 (final harvest) for Snap Bean Trials at Georgetown, Delaware

Date	Days After Planting		Max Temp	Min Temp	Rainfall
	May 1	June 12	(F)	(F)	(in)
1-May	0		84.3	57.5	0
2-May	1		77.1	57.1	0.17
3-May	2		67.1	49.2	0
4-May	3		63.5	46.7	0
5-May	4		68.5	58.3	1.43
6-May	5		67.4	51.3	0.01
7-May	6		61.9	46.4	0.12
8-May	7		60.3	44.0	0.01
9-May	8		64.4	43.8	0
10-May	9		72.4	44.2	0
11-May	10		58.2	50.2	0.3
12-May	11		56.4	49.0	0.3
13-May	12		56.7	50.3	0.85
14-May	13		76.3	46.5	0
15-May	14		72.2	51.5	0
16-May	15		78.9	47.3	0
17-May	16		92.4	58.3	0
18-May	17		89.6	72.4	0
19-May	18		91.3	72.1	0
20-May	19		74.7	52.2	0
21-May	20		64.9	47.7	0
22-May	21		69.5	58.9	0.59
23-May	22		65.0	55.9	0.16
24-May	23		65.2	55.7	0.15
25-May	24		78.4	55.1	0.76
26-May	25		75.5	58.9	0
27-May	26		77.9	60.5	0
28-May	27		75.0	59.6	0.38
29-May	28		67.9	58.1	0.09
30-May	29		67.8	57.2	0.2
31-May	30		78.9	62.0	0.01
1-Jun	31		82.8	63.1	0
2-Jun	32		82.0	57.6	0
3-Jun	33		77.9	53.5	0
4-Jun	34		86.0	53.1	0
5-Jun	35		74.4	63.7	0.3
6-Jun	36		74.7	59.7	0.01
7-Jun	37		65.3	52.3	0
8-Jun	38		65.8	49.1	0
9-Jun	39		81.8	47.8	0.02
10-Jun	40		86.6	60.3	0
11-Jun	41		92.9	66.0	0
12-Jun	42	0	93.2	71.3	0
13-Jun	43	1	94.2	72.9	0
14-Jun	44	2	84.5	65.4	0
15-Jun	45	3	77.9	60.8	0
16-Jun	46	4	87.4	67.2	0
17-Jun	47	5	89.6	70.9	0
18-Jun	48	6	88.6	73.9	0
19-Jun	49	7	90.6	70.7	1.23
20-Jun	50	8	82.2	70.1	0.03
21-Jun	51	9	83.9	69.8	0.2
22-Jun	52	10	87.2	71.2	0
23-Jun	53	11	86.6	71.9	0.17
24-Jun	54	12	86.6	68.7	0.1
25-Jun	55	13	85.6	64.3	0
26-Jun	56	14	82.1	62.3	0
27-Jun	57	15	81.1	62.7	0.02
28-Jun	58	16	79.5	54.8	0
29-Jun	59	17	85.7	61.5	0
30-Jun	60	18	87.5	68.9	0

Date	Days After Planting		Max Temp (F)	Min Temp (F)	Rainfall (in)
	May 1	June 12			
1-Jul	**61**	**19**	87.3	74.0	0
2-Jul	**62**	**20**	91.9	69.0	0
3-Jul	**63**	**21**	91.7	72.4	0
4-Jul	**64**	**22**	90.5	69.7	0
5-Jul	**65**	**23**	81.8	70.4	0
6-Jul	**66**	**24**	81.2	72.5	0.57
7-Jul	**67**	**25**	85.4	70.8	0
8-Jul		**26**	88.4	68.4	0
9-Jul		**27**	85.2	66.0	0
10-Jul		**28**	88.6	63.4	0
11-Jul		**29**	91.2	74.2	0
12-Jul		**30**	94.4	75.8	0
13-Jul		**31**	95.0	78.6	0
14-Jul		**32**	94.0	71.9	1.29
15-Jul		**33**	86.4	71.9	0.04
16-Jul		**34**	85.6	66.4	0
17-Jul		**35**	84.4	68.6	0
18-Jul		**36**	89.1	68.9	0
19-Jul		**37**	91.5	72.5	0.01
20-Jul		**38**	94.4	72.8	0.01
21-Jul		**39**	92.8	77.5	0
22-Jul		**40**	90.8	74.1	0.28
23-Jul		**41**	87.9	72.8	0.51
24-Jul		**42**	86.0	74.7	0
25-Jul		**43**	79.6	67.8	0.66
26-Jul		**44**	78.1	65.7	0
27-Jul		**45**	82.8	65.8	0
28-Jul		**46**	86.4	69.8	1.11
29-Jul		**47**	73.4	67.7	2.4
30-Jul		**48**	78.7	59.1	0
31-Jul		**49**	85.0	55.8	0
1-Aug		**50**	89.7	64.6	0
2-Aug		**51**	86.8	69.1	0
3-Aug		**52**	86.8	66.8	0.2
4-Aug		**53**	86.7	68.3	0
5-Aug		**54**	78.6	62.7	0
6-Aug		**55**	82.5	59.1	0
7-Aug		**56**	76.7	66.5	1.5
8-Aug		**57**	77.3	63.1	0.1
9-Aug		**58**	83.3	58.6	0
10-Aug		**59**	81.2	58.4	0
11-Aug		**60**	82.5	62.7	0
12-Aug		**61**	80.4	70.4	1.19
13-Aug		**62**	84.3	67.9	0.19
14-Aug		**63**	81.3	64.5	0
15-Aug		**64**	80.9	71.5	0.69
16-Aug		**65**	88.2	72.3	0
17-Aug		**66**	85.7	70.1	0
18-Aug		**67**	90.6	72.5	1.41
19-Aug		**68**	87.0	72.6	0
20-Aug		**69**	84.2	65.9	0
21-Aug		**70**	86.2	63.5	0

Temperature and Rainfall for the May 1 Planted Snap Bean Trial from May 1 (planting) July 7 (final harvest)



Temperature and Rainfall for the June 12 Planted Snap Bean Trial from June 12 (planting) August 21 (final harvest)