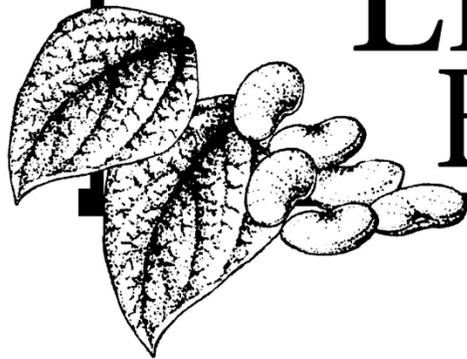


**UNIVERSITY OF
DELAWARE**



LIMA BEAN

VARIETY

TRIAL

RESULTS

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2013

**2013 UNIVERSITY OF DELAWARE GREEN BABY LIMA BEAN AND FORDHOOK
LIMA BEAN VARIETY TRIALS**

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2013 Baby Lima Bean Variety Trials

In 2013 two trials of baby lima varieties were planted at the University of Delaware Research Farm in Georgetown, Delaware. One trial was irrigated and the other was not.

Unirrigated Baby Lima Bean Variety Trial at Georgetown, DE- Planted May 31, 2013

The Unirrigated Baby Lima Bean Variety Trial included a total of 32 lines and was planted on May 31. The purpose of this trial was to evaluate advanced breeding material from the UD Lima Bean Breeding Program that had been selected under dryland conditions. This trial was not irrigated and was planted in late May expose the entries to heat stress during flowering. Trial entries were evaluated for yield and days to harvest.

Trial Location:

Field 6 D-2 at the University of Delaware Research and Education Center Farm, Georgetown, DE

Plot Setup and Cultural Practices:

The trial was planted on May 31, 2013 with a Jang TD1 Precision Seeder into rows marked with a Monosem planter. Some of the seed was treated, and some was not, as indicated in the results section. Varieties were planted in one-row plots with 30 inch between row spacing and 3 inch in-row spacing. Plots were 15 feet in length. The variety “Cypress” was planted in every other row as a border between experimental plots. Plots were arranged in a randomized complete block design with four replications. The field was fertilized with potassium (0-0-60) at a rate of 110 lbs/A before planting. A pre-emergence application of 1.3 pt/A Dual II Magnum for weed control as well as 40 lbs/A nitrogen in the form of 30% UAN was made after planting. Plots were cultivated three times. One sidedress application of 40 lbs/A nitrogen in the form of 30% UAN was made. Additional hand weeding was done as necessary. Weed control in the trial was satisfactory. Phostrol was applied preventatively for downy mildew at a rate of 4 pts/A. No disease was observed in the plot but weather conditions were favorable for disease development in early and mid August. No applications were made for insect control.

Harvest:

Harvest decisions were made based on visual evaluation of the individual plot. Plots were harvested to maximize the number of full (as opposed to dry or flat) pods. Not all replications for a variety were harvested on the same day. Harvest began on August 26 (87 DAP) and ended on September 18 (110 DAP).

A 10-foot section from each plot was harvested. The plants were cut off at soil level, counted and weighed. The plants were fed into a stationary FMC viner. Trash was removed from the

shelled beans with a fan and a screen, and the cleaned beans were weighed to determine yield. A random sample of 100 succulent beans was weighed to determine 100 bean weight as a means of bean size comparison.

Lines Evaluated in the Unirrigated Baby Lima Bean Trial Planted May 31, 2013

Line	Description
DE0900603A	UD dryland selection
DE0900604A	UD dryland selection
DE0900604B	UD dryland selection
DE0900701D	UD dryland selection
DE0900703A	UD dryland selection
DE0900802A	UD dryland selection
DE0901101C	UD dryland selection
DE0901201A	UD dryland selection
DE0901204A	UD dryland selection
DE0901204B	UD dryland selection
DE0901204C	UD irrigated selection
DE0901204D	UD dryland selection
DE0901502A	UD dryland selection
DE0901502B	UD dryland selection
DE0901601B	UD dryland selection
DE0900704A	UD dryland selection
DE0900705C	UD dryland selection
DE0900705E	UD dryland selection
DE0901206D	UD dryland selection
DE0901404B	UD dryland selection
DE0901805A	UD dryland selection
DE0901805B	UD dryland selection
DE0901805D	UD dryland selection
DE0901805E	UD dryland selection
DE0901902B	UD dryland selection
DE0802101A	UD dryland selection
DE0802702C	UD dryland selection
DE0505002A	UD irrigated selection
DE0407907	UD irrigated selection
DE0407905	UD irrigated selection
C-elite Select	Standard variety
Cypress	Standard variety

Irrigated Baby Lima Bean Variety Trial at Georgetown, DE – Planted June 13, 2013

The Irrigated Baby Lima Bean Variety Trial was planted on June 13 and included a total of 50 lines. Eight of the lines were entered by the two participating seed companies: ADM Seedwest and Ben Fish & Son. Thirty-eight lines were from the University of Delaware lima bean breeding program. The remaining four lines were standard varieties planted as checks. The purpose of this trial is to evaluate new processing green baby lima bean varieties for yield, maturity, and quality under Delaware growing conditions.

Entries in the Irrigated Baby Lima Bean Variety Trial Planted June 13, 2013

Variety Name	Source	Variety Name	Source
G200381	ADM	DE0901204C	University of Delaware
G200382	ADM	DE0901204D	University of Delaware
G9002033	ADM	DE0901502A	University of Delaware
G700801	ADM	DE0901502B	University of Delaware
Cypress	ADM (standard variety)	DE0901601B	University of Delaware
Meadow	ADM (standard variety)	DE0901601C	University of Delaware
GBL 21-04	Ben Fish	DE0900704A	University of Delaware
GBL 24-04	Ben Fish	DE0900705C	University of Delaware
GBL 26-04	Ben Fish	DE0901206D	University of Delaware
GBL-1000 GS	Ben Fish	DE0901805A	University of Delaware
GBL 184-85	Ben Fish (standard variety)	DE0901805B	University of Delaware
C-elite Select	Ben Fish (standard variety)	DE0901805D	University of Delaware
DE0900603A	University of Delaware	DE0901805E	University of Delaware
DE0900604A	University of Delaware	DE0802101A	University of Delaware
DE0900604B	University of Delaware	DE0802702C	University of Delaware
DE0900701C	University of Delaware	DE0802102B	University of Delaware
DE0900701D	University of Delaware	DE0802102A	University of Delaware
DE0900703A	University of Delaware	DE0802102C	University of Delaware
DE0900802A	University of Delaware	DE0802702A	University of Delaware
DE0901101C	University of Delaware	DE0801802B	University of Delaware
DE0901101D	University of Delaware	DE0802701B	University of Delaware
DE0901201A	University of Delaware	DE0505002A	University of Delaware
DE0901201B	University of Delaware	DE0407907	University of Delaware
DE0901204A	University of Delaware	DE0407905	University of Delaware
DE0901204B	University of Delaware	DE0501801A	University of Delaware

Location:

Field 13-A/11-A at the University of Delaware Research and Education Center Farm, Georgetown, DE

Cultural Practices:

The trial was planted on June 13, 2013 with a Monosem planter. Some of the seed was treated, and some was not, as indicated in the results section. Varieties were planted in one-row plots with 30 inch between row spacing and 3 inch in-row spacing. Plots were 25 feet in length. The variety “Cypress” was planted in every other row as a border between experimental plots. Plots were arranged in a randomized complete block design with four replications. The field was fertilized with potassium (0-0-60) at a rate of 110 lbs/A before planting. A pre-emergence application of 1.3 pt/A Dual II Magnum for weed control as well as 40 lbs/A nitrogen in the form

of 30% UAN was made after planting. Plots were cultivated three times. One sidedress application of 40 lbs/A nitrogen in the form of 30% UAN was made. Additional hand weeding was done as necessary. Weed control in the trial was good. Phostrol was applied preventatively for downy mildew at a rate of 4 pts/A. No disease was observed in the plot but weather conditions were favorable for disease development in early and mid August. No applications were made for insect control.

Harvest:

Harvest decisions were made based on visual evaluation of the individual plot. Plots were harvested to maximize the number of full (as opposed to dry or flat) pods. Not all replications for a variety were harvested on the same day. Harvest began on August 26 (74 DAP) and ended on September 16 (95 DAP).

A 15-foot section from each plot was harvested. The plants were cut off at soil level and weighed. To determine maturity at harvest, pods were stripped from five harvested plants from each plot and counted as full, flat or dry. The plants and pulled pods were fed into a stationary FMC viner. Trash was removed from the shelled beans with a fan and a screen, and the cleaned beans were weighed to determine yield. A random sample of 100 succulent beans was weighed to determine 100 bean weight as a means of bean size comparison.

Results and Discussion of the Baby Lima Trials at Georgetown

Weather, Pod Set and Maturity for the Irrigated Baby Lima Trial

Weather conditions in 2013 were wetter and cooler than they have been for the past three seasons (2010-2012 were the three warmest summers on record for Delaware). As a result, we did not see the same delay of maturity in the standard varieties that we have seen in the past three years in the irrigated baby lima trial. Maturity for Cypress was on par with the historical average. C-elite and 184-85 had slightly longer days to maturity than the historical average, but this may have been because the trial was plated approximately a week later than it was in 2006-2009, exposing the longer-season varieties to more cool temperature at the end of the season. A comparison of days to harvest for the standard varieties versus the historical average is as follows:

Variety	Days to Harvest in Irrigated Baby Lima Trials				
	Average 2006-2009	2010	2011	2012	2013
<i>Planting Date</i>		<i>June 6</i>	<i>June 6</i>	<i>June 14</i>	<i>June 13</i>
Cypress	77	91	97	82	77
C-elite Select	84	96	98	89	89
184-85	86	95	99	88	89

Split sets were not a problem in the irrigated trial baby lima trial this year.

Weather, Pod Set and Maturity for the Dryland Baby Lima Trial

The dryland baby lima trial was planted on May 31 and despite the higher than average rainfall this season, was exposed to more environmental stress than the irrigated trial. All of the varieties in the trial had split or delayed sets due to heat stress that occurred during flowering in July. (The irrigated trial, which was planted two weeks later, was not flowering during the hottest part of

July.) The field where this trial was planted is extremely sandy, and plants did experience some drought stress late in the season despite the high amounts of rainfall early in the season.

Yield and Maturity in the Dryland Baby Lima Trial

The purpose of the May 31- planted, dryland baby lima trial was to evaluate some of the advanced breeding material from the University of Delaware that had been selected in dryland conditions. There were statistically significant differences in yield between some of the varieties in this trial (Table 1). Only one variety, DE0900603A, was significantly higher yielding than C-elite Select, but it was also one of the latest maturing varieties in the trial. Seven varieties (DE0900603A, DE0900604A, DE0901902B, DE0901201A, DE0901204A, DE0901204D and DE0407907) had significantly higher yields than Cypress, which was one of the lowest yielding varieties in the trial. However, all of these varieties were much later to mature than Cypress. DE0407905 was the highest yielding variety that matured early in the trial (Figure 1). DE0407905 has been tested in the irrigated variety trial for six years (since 2008) and is being considered for release.

Yield and Maturity in the June 13 Planted Baby Lima Trial

The purpose of the June 13 planted baby lima trial was to evaluate advanced breeding material from the University of Delaware, as well as new varieties available from the two companies supplying lima seed in Delaware under irrigated conditions. There were significant differences in yield between the varieties in this trial (Table 2). The two highest yielding varieties were DE0900604B and DE0900603A. The yield of DE0900604B was significantly higher than all of the other varieties in the trial except DE0900603A. In addition to the two previously mentioned varieties, DE0900604A had significantly higher yields than C-elite Select, the highest yielding standard variety in the trial. Many of the highest yielding breeding lines in the trial were not green seeded (Table 4 and Figure 2). The highest yielding green-seeded line was DE0901204B, but this variety was very late to mature at 95 days to harvest.

The performance of UD breeding lines with seed quality traits making them of particular interest for commercial release is as follows:

DE0407905 matured in 86 days and yielded 4700 lbs/A. Yield was numerically higher but not significantly higher than C-elite Select in this trial, but it was significantly higher than GBL 184-85, Cypress and Meadow. In this trial as in past trials, DE0407905 was a few days earlier to mature than C-elite Select.

DE0407907 matured in 86 days and yielded 4497 lbs/A. Yield was numerically lower but not significantly different than that of C-elite Select in this trial, but it was significantly higher than GBL 184-85, Cypress and Meadow. In this trial, DE0407907 was a few days earlier to mature than C-elite Select, but historically the maturities of these two varieties has been the same. DE0407907 is resistant to race F of downy mildew.

DE0802102B matured in 80 days and yielded 4914 lbs/A. Yield was numerically higher but not significantly higher than C-elite Select in this trial, but it was significantly higher than GBL 184-85, Cypress and Meadow. DE0802102B was evaluated for the first time in the 2012 trial, but was not replicated because of insufficient seed. Its unreplicated 2012 yield was 4999 lbs/A at 85 days to harvest. DE0802102B is of particular interest because it has had significantly higher yields than the other early maturing varieties.

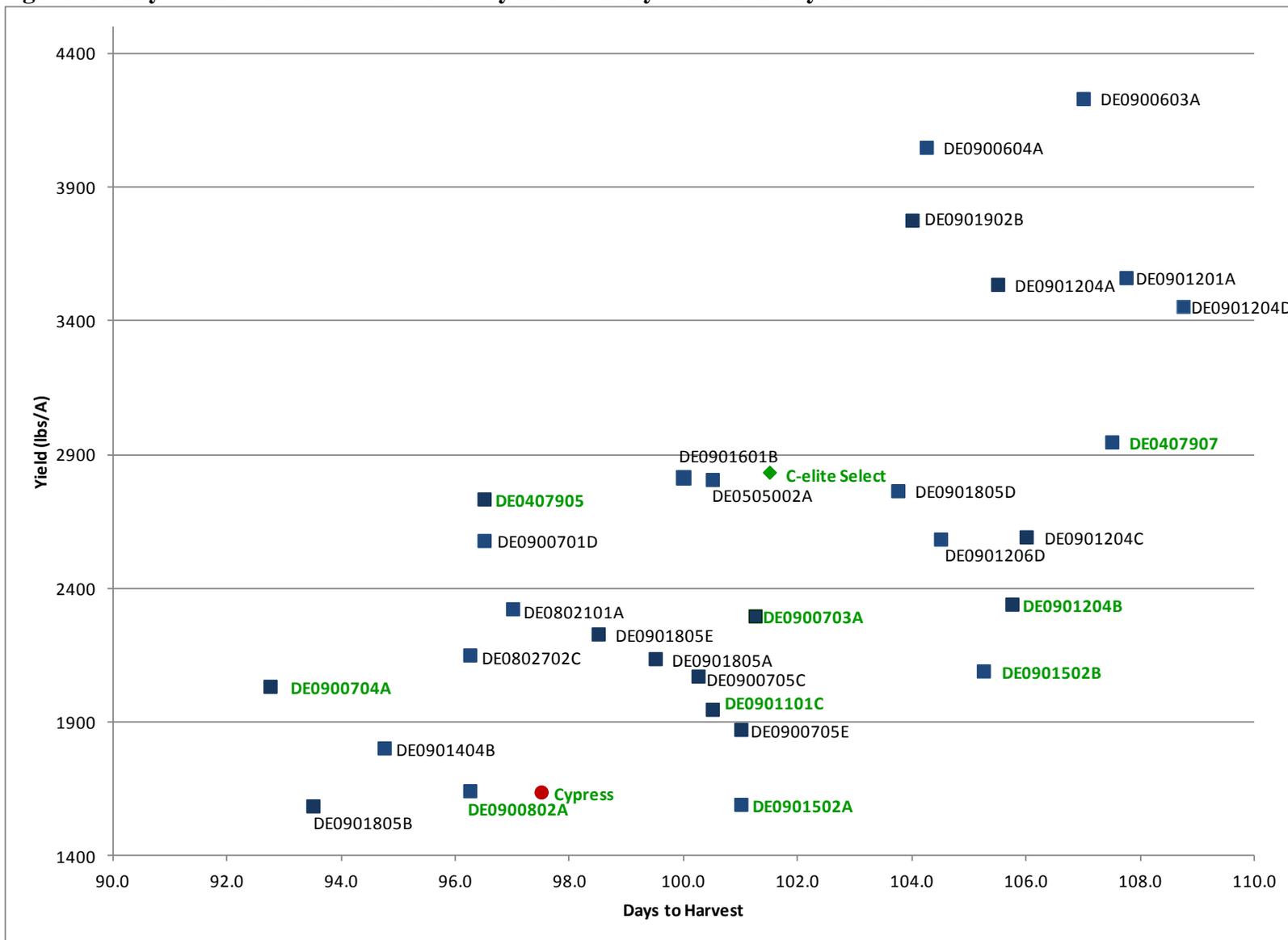
Among the varieties entered by ADM, G200381 and G200382 had significantly higher yields than Cypress. Both of these varieties performed well in the 2011 and 2012 trials. Maturity for these two varieties was nearly identical to Cypress in past trials but was slightly later than Cypress in the 2013 trial.

Experimental varieties entered by Ben Fish were similar in yield and maturity to C-elite Select, except for GBL-1000 GS, which matured in 82 days, about a week earlier than C-elite Select.

One characteristic desirable in a variety is uniform maturity across the field. The rate of maturity of some varieties is more affected by variations in field conditions (i.e. soil type, drainage, variable stand) than others. Standard deviation is a statistic used to describe the average difference between several individual observations and their mean (or average). The standard deviation of days to harvest for the replicated varieties in trial is given in Table 3. Varieties with the lowest standard deviation of days to harvest are those matured most uniformly across the field. The standard deviation of days to harvest was slightly more variable this year than it was in 2012, the first year for which this statistic is reported for the trial. For varieties with higher standard deviation of days to harvest it may be more difficult to determine when to harvest the field for maximum yield and quality.

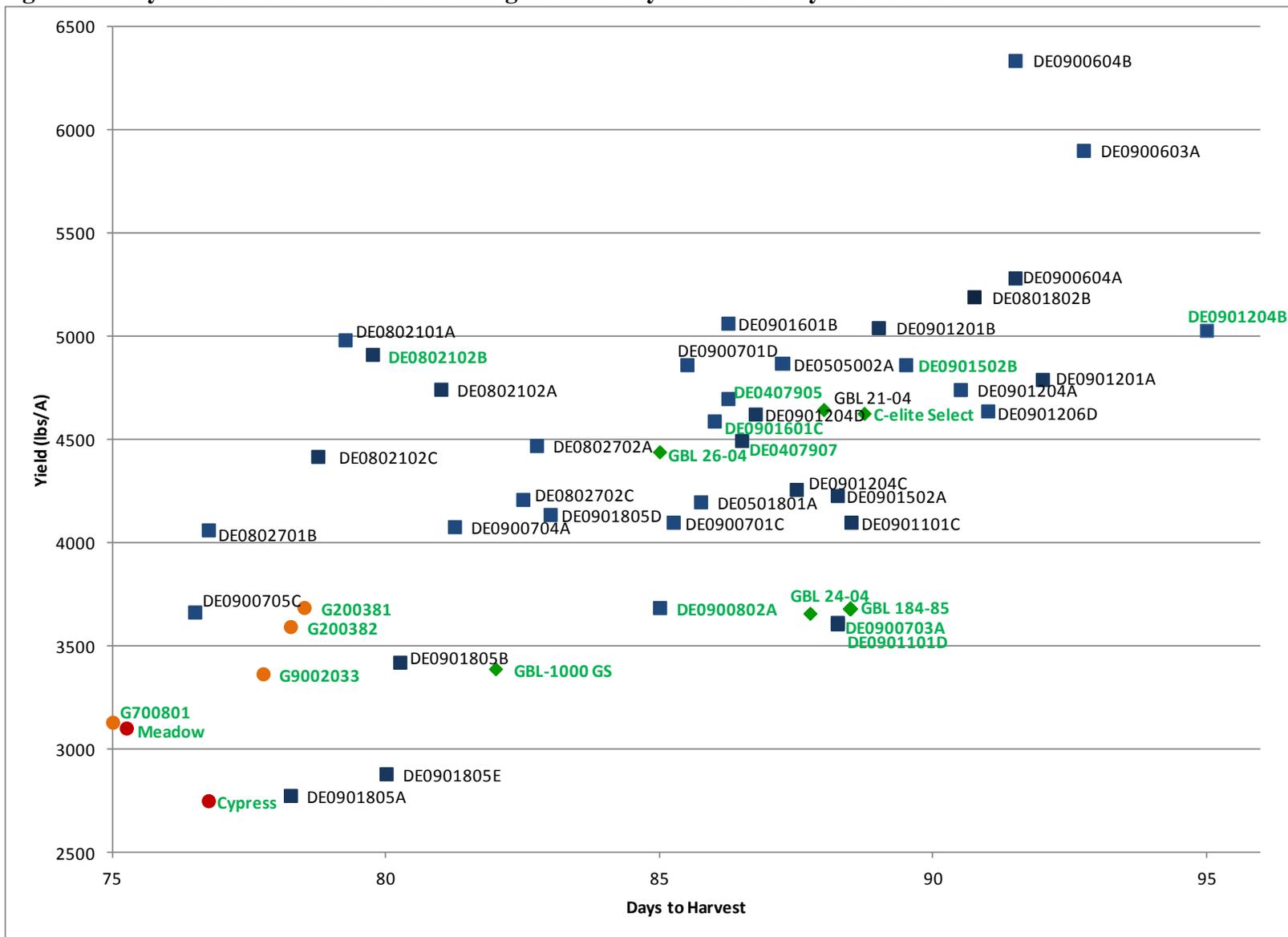
The breeding lines from the University of Delaware program that were evaluated in the trial are not all green seeded and exhibit a range of seed sizes. At harvest 100 succulent seeds from each plot were weighed as an indicator of seed size. The 100 seed weights, seedcoat color, cotyledon color, and yield for each variety in the trial are given in Table 4. Most of the lines in the trial did not have seed weights that were significantly different than one of the commercial standards, Cypress or C-elite Select (Figure 3), although a few of the UD breeding lines were significantly larger than both of the standards. With the exception of DE0900704A, these lines all also have seedcoat and cotyledon color characteristics that make them commercially unacceptable and therefore useful only as parents in the breeding program.

Figure 1. Baby Lima Bean Varieties in the Dryland Trial by Yield and Days to Harvest*



* Green-seeded varieties are indicated by green data point labels.

Figure 2. Baby Lima Bean Varieties in the Irrigated Trial by Yield and Days to Harvest*



* Green-seeded varieties are indicated by green data point labels.

Figure 3. Baby Lima Bean Varieties in the Irrigated Trial by Weight of 100 Succulent Seeds

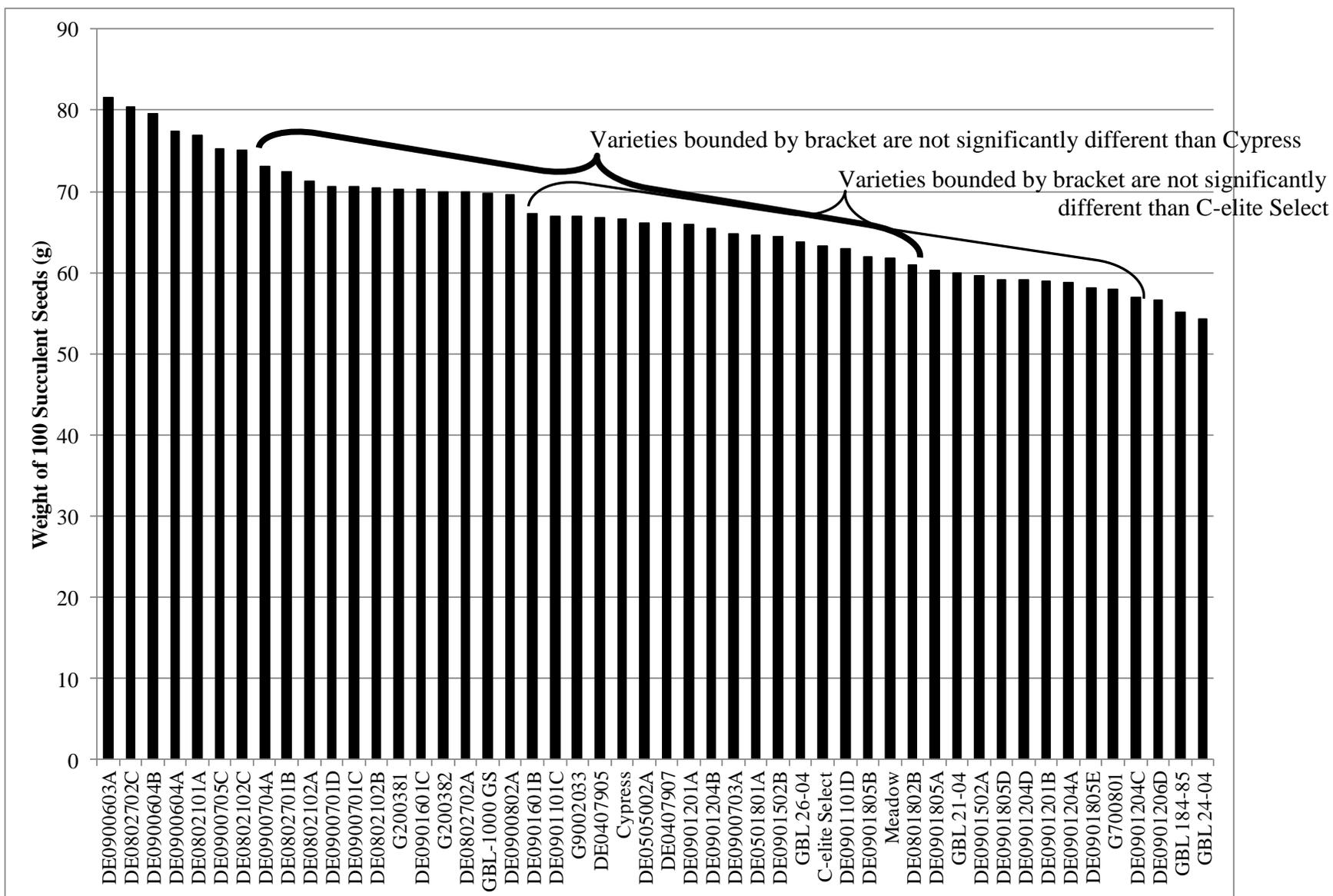


Table 1. Days to Harvest, Yield, Plant Weight, and Percent Stand at Harvest for the Unirrigated Baby Lima Bean Variety Trial Planted May 31, 2013

Variety	Days to Harvest	Yield (Lbs/A)	Plant Weight (Lbs/10 ft)	% Stand ¹
DE0900603A	107.0 ab	4233 a	12.6 a-c	77 a
DE0900604A	104.3 a-e	4051 ab	13.7 a	90 a
DE0901902B	104.0 a-f	3778 a-c	12.1 a-d	87 a
DE0900604B	101.8 a-g	3665 a-d	11.9 a-d	91 a
DE0901201A	107.8 ab	3563 a-e	13.1 ab	76 a
DE0901204A	105.5 a-e	3544 a-f	13.8 a	93 a
DE0901204D	108.8 a	3455 a-g	12.0 a-d	91 a
DE0407907	107.5 ab	2948 a-h	10.3 a-g	75 a
C-elite Select	101.5 a-g	2835 b-i	11.3 a-e	80 a
DE0901601B	100.0 a-g	2814 b-i	8.9 c-i	88 a
DE0505002A	100.5 a-g	2808 b-i	9.0 c-i	82 a
DE0901805D	103.8 a-f	2766 b-i	10.8 a-f	94 a
DE0407905	96.5 d-g	2735 b-i	10.4 a-f	77 a
DE0901204C	106.0 a-c	2593 c-i	8.8 c-i	72 a
DE0901206D	104.5 a-e	2585 c-i	9.1 c-i	73 a
DE0900701D	96.5 d-g	2580 c-i	9.6 b-h	88 a
DE0901204B	105.8 a-d	2341 d-i	9.3 b-h	63 a
DE0802101A	97.0 c-g	2324 e-i	7.6 e-i	73 a
DE0900703A	101.3 a-g	2297 e-i	9.4 b-h	75 a
DE0901805E	98.5 b-g	2230 f-i	9.6 b-h	83 a
DE0802702C	96.3 e-g	2151 g-i	6.4 g-i	72 a
DE0901805A	99.5 a-g	2138 g-i	8.8 c-i	94 a
DE0901502B	105.3 a-e	2092 h-i	6.4 g-i	71 a
DE0900705C	100.3 a-g	2072 h-i	8.6 d-i	84 a
DE0900704A	92.8 g	2034 h-i	7.7 e-i	79 a
DE0901502A	101.0 a-g	2008 h-i	7.0 f-i	86 a
DE0901101C	100.5 a-g	1948 h-i	8.2 d-i	73 a
DE0900705E	101.0 a-g	1873 h-i	8.7 c-i	67 a
DE0901404B	94.8 fg	1803 h-i	7.4 f-i	71 a
DE0900802A	96.3 e-g	1652 h-i	7.1 f-i	65 a
Cypress	97.5 c-g	1639 h-i	5.3 i	64 a
DE0901805B	93.5 g	1587 i	6.3 hi	70 a
<i>p-value</i>	0.0212	0.0007	0.0002	0.3599
Fisher's LSD²	9.31	1324	3.9155	NA
Tukey's HSD³	*18.32	2604	7.6971	NA

¹Percent stand is highlighted for varieties for which treated seed was planted.

²Means followed by the same letter are not significantly different according to Fisher's LSD.

³Minimum significant difference according to Tukey's HSD. For starred HSD values there are no significant differences according to the Tukey test.

Table 2. Days to Harvest, Yield, Maturity at Harvest, Pods per Plant, Plant Weight, and Percent Stand for the Irrigated Baby Lima Bean Variety Trial Planted June 13, 2013

Variety	Days to Harvest	Yield (Lbs/A)	% Full Pods	% Flat Pods	% Dry Pods	# Pods/Plant	Plant Weight (Lbs/15 ft)	% Stand ¹
DE0900604B	91.5 b-d	6338 a	84.0 a-e	1.8 o	14.3 a-k	27 a-g	25.0 a-f	91 a-d
DE0900603A	92.8 ab	5903 ab	79.3 b-j	4.3 j-o	16.8 a-g	24 c-i	26.2 a-d	91 a-d
DE0900604A	91.5 b-d	5285 bc	87.0 a-c	5.0 i-o	8.0 e-m	21 f-i	24.9 a-g	93 ab
DE0801802B	90.8 b-f	5194 b-d	91.8 a	3.5 l-o	5.0 j-m	31 a-c	25.2 a-e	90 a-e
DE0901601B	86.3 i-n	5066 cd	73.3 e-k	14.3 a-j	12.3 a-m	25 c-i	25.7 a-e	91 a-d
DE0901201B	89.0 d-i	5044 cd	76.8 c-k	4.0 l-o	19.3 a-c	27 b-i	22.9 a-m	92 a-d
DE0901204B	95.0 a	5031 c-e	84.8 a-d	2.3 no	13.5 a-k	29 a-e	26.3 a-c	90 a-e
DE0802101A	79.3 u-y	4985 d-f	85.3 a-d	5.5 h-o	9.3 d-m	24 c-i	18.3 n-r	91 a-e
DE0802102B	79.8 t-x	4914 d-g	85.5 a-d	3.5 l-o	11.0 b-m	28 a-f	19.5 i-r	93 ab
DE0505002A	87.3 h-n	4867 d-h	85.0 a-d	3.3 m-o	11.5 b-m	24 c-i	22.9 a-m	90 a-e
DE0900701D	85.5 l-p	4864 d-h	80.3 b-j	17.5 a-f	2.5 m	28 a-f	26.7 ab	89 a-f
DE0901502B	89.5 c-h	4864 d-h	76.3 c-k	2.3 no	22.0 a	24 d-i	22.6 b-n	93 a-c
DE0901201A	92.0 bc	4793 d-i	77.8 b-j	5.0 i-o	17.3 a-e	29 a-e	23.8 a-i	91 a-e
DE0802102A	81.0 r-w	4745 d-i	83.0 a-f	1.5 o	15.5 a-i	24 d-i	19.8 i-r	90 a-e
DE0901204A	90.5 b-g	4744 d-i	72.0 f-k	9.0 d-o	19.3 a-c	23 d-i	27.1 a	92 a-d
DE0407905	86.3 i-n	4700 d-i	79.0 b-j	5.5 h-o	15.3 a-i	24 d-i	24.4 a-h	95 a
GBL 21-04	88.0 f-m	4647 d-i	81.3 a-i	2.8 no	16.3 a-h	32 ab	22.2 c-o	68 h
DE0901206D	91.0 b-e	4640 d-i	82.8 a-g	5.0 i-o	12.0 b-m	27 a-h	23.0 a-l	92 a-d
C-elite Select	88.8 d-j	4628 d-i	70.3 i-k	9.3 c-o	20.5 ab	28 a-f	22.4 b-n	86 b-f
DE0901204D	86.8 h-n	4625 d-i	79.3 b-j	11.3 b-o	9.5 c-m	28 a-e	25.7 a-e	91 a-d
DE0901601C	86.0 j-n	4592 d-i	79.8 b-j	8.5 e-o	11.8 b-m	24 c-i	23.4 a-j	84 d-f
DE0407907	86.5 i-n	4497 d-i	82.5 a-h	2.8 no	14.8 a-j	26 c-i	22.4 b-n	92 a-d
DE0802702A	82.8 p-s	4473 d-i	71.8 g-k	8.5 e-o	20.5 ab	21 g-i	23.1 a-k	89 a-f
GBL 26-04	85.0 n-q	4442 d-j	85.5 a-d	7.5 f-o	7.0 g-m	33 a	19.6 i-r	81 fg
DE0802102C	78.8 v-y	4420 d-k	83.0 a-f	10.3 c-o	7.0 g-m	26 c-i	22.0 c-p	93 ab
DE0901204C	87.5 h-n	4260 e-l	74.8 d-k	9.5 c-o	15.8 a-i	27 a-f	21.8 d-q	89 a-f
DE0901502A	88.3 e-l	4231 f-l	79.0 b-j	2.5 no	18.3 a-d	23 d-i	20.4 g-q	91 a-d
DE0802702C	82.5 q-t	4212 f-l	88.0 ab	5.0 i-o	7.3 f-m	25 c-i	20.2 h-q	91 a-d
DE0501801A	85.8 k-o	4200 g-m	71.5 h-k	18.3 a-e	9.8 c-m	21 g-i	25.1 a-e	95 a
DE0901805D	83.0 o-r	4139 g-n	70.0 jk	17.0 a-g	13.3 a-k	23 d-i	21.4 e-q	92 a-d
DE0900701C	85.3 m-	4101 h-n	79.8 b-j	13.0 a-m	7.3 f-m	24 d-i	21.6 e-q	90 a-e
DE0901101C	88.5 e-k	4101 h-n	79.0 b-j	4.0 d-o	17.0 a-f	24 c-i	23.0 a-l	90 a-e
DE0900704A	81.3 r-v	4080 i-n	75.0 d-k	13.5 a-l	11.8 b-m	24 d-i	18.3 n-r	95 a
DE0802701B	76.8 yz	4064 i-n	82.5 a-h	8.3 e-o	9.0 d-m	26 b-i	17.4 q-s	93 a-c
G200381	78.5 v-y	3688 j-o	77.5 b-k	14.0 a-k	8.0 e-m	24 d-i	20.1 h-q	91 a-e
DE0900802A	85.0 o-q	3688 j-o	76.5 c-k	7.3 g-o	16.0 a-h	21 f-i	17.9 o-r	87 a-f
GBL 184-85	88.5 e-k	3677 j-o	77.8 b-j	7.8 f-o	14.8 a-j	24 d-i	19.8 i-r	83 ef
<i>p-value</i>	<0.0001	<0.0001	0.0013	<0.0001	0.0018	0.0185	<0.0001	<0.0001
Fisher's LSD²	2.88	780.70	11.02	10.03	9.80	6.74	4.47	8.17
Tukey's HSD³	5.95	1612.80	22.77	*20.72	*20.24	*13.92	9.24	16.88

¹Percent stand is highlighted for varieties for which treated seed was planted.

²Means followed by the same letter are not significantly different according to Fisher's LSD.

³Minimum significant difference according to Tukey's HSD. For starred HSD values there are no significant differences according to the Tukey test.

Table 2 continues on the next page.

Table 2 (Continued). Days to Harvest, Yield, Maturity at Harvest, Pods per Plant, Plant Weight, and Percent Stand for the Irrigated Baby Lima Bean Variety Trial Planted June 13, 2013

Variety	Days to Harvest	Yield (Lbs/A)	% Full Pods	% Flat Pods	% Dry Pods	# Pods/Plant	Plant Weight (Lbs/15 ft)	% Stand ¹
DE0900705C	76.5 yz	3666 j-o	85.0 a-d	12.0 a-n	3.3 lm	29 a-d	25.6 a-e	93 a-c
GBL 24-04	87.8 g-n	3660 k-p	75.3 d-k	15.5 a-h	9.0 d-m	24 c-i	19.1 j-r	71 h
DE0900703A	88.3 e-l	3616 l-p	79.0 b-j	8.5 e-o	12.5 a-l	22 e-i	20.5 f-q	94 ab
DE0901101D	88.3 e-l	3609 l-p	79.8 b-j	4.0 d-o	16.8 a-g	22 f-i	18.6 l-r	90 a-e
G200382	78.3 w-	3596 l-p	72.3 f-k	16.3 a-g	11.8 b-m	25 c-i	18.5 m-r	88 a-f
DE0901805B	80.3 r-x	3423 m-q	73.0 e-k	19.3 a-c	8.0 e-m	24 d-i	19.7 i-r	87 a-f
GBL-1000 GS	82.0 r-u	3391 n-q	82.5 a-h	9.3 c-o	7.8 e-m	27 a-h	17.7 o-r	74 gh
G9002033	77.8 x-z	3367 n-q	84.0 a-e	10.3 c-o	6.0 i-m	20 hi	12.9 s	90 a-e
G700801	75.0 z	3132 o-q	85.5 a-d	7.8 f-o	6.8 h-m	28 a-f	17.7 p-r	91 a-e
Meadow	75.3 z	3104 o-q	78.0 b-j	14.5 a-i	7.8 e-m	21 f-i	15.5 rs	85 c-f
DE0901805E	80.0 s-x	2882 pq	66.5 k	21.0 ab	12.5 a-l	20 i	18.6 l-r	91 a-d
DE0901805A	78.3 w-	2777 q	69.5 jk	21.5 a	8.8 d-m	21 f-i	17.3 q-s	93 ab
Cypress	76.8 yz	2752 q	76.3 c-k	19.0 a-d	4.8 k-m	27 a-h	18.8 k-r	72 h
<i>p-value</i>	<0.0001	<0.0001	0.0013	<0.0001	0.0018	0.0185	<0.0001	<0.0001
Fisher's LSD²	2.88	780.70	11.02	10.03	9.80	6.74	4.47	8.17
Tukey's HSD³	5.95	1612.80	22.77	*20.72	*20.24	*13.92	9.24	16.88

¹Percent stand is highlighted for varieties for which treated seed was planted.

²Means followed by the same letter are not significantly different according to Fisher's LSD.

³Minimum significant difference according to Tukey's HSD. For starred HSD values there are no significant differences according to the Tukey test.

Table 3. Average Days to Harvest and Standard Deviation of Days to Harvest for the Irrigated Baby Lima Bean Variety Trial Planted June 13, 2013

Variety	Average Days to Harvest	Standard Deviation of Days to Harvest*
GBL-1000 GS	82.0	0.00
DE0901201A	92.0	0.00
DE0901204B	95.0	0.00
DE0901101D	88.3	0.50
DE0901502A	88.3	0.50
DE0901101C	88.5	0.58
GBL 184-85	88.5	1.00
DE0900604A	91.5	1.00
DE0900604B	91.5	1.00
DE0802702C	82.5	1.00
DE0901805D	83.0	1.15
Meadow	75.3	1.26
DE0802701B	76.8	1.26
G700801	75.0	1.41
DE0900603A	92.8	1.50
DE0802702A	82.8	1.50
DE0900705C	76.5	1.73
GBL 24-04	87.8	1.89
Cypress	76.8	1.89
DE0901502B	89.5	1.91
DE0901201B	89.0	2.00
DE0802102A	81.0	2.00
DE0802102C	78.8	2.22
DE0505002A	87.3	2.22
G200381	78.5	2.38
DE0901204C	87.5	2.38
G200382	78.3	2.50
DE0900701C	85.3	2.50
DE0901204D	86.8	2.63
DE0901601B	86.3	2.63
DE0802102B	79.8	2.63
DE0407905	86.3	2.63
GBL 26-04	85.0	2.71
DE0501801A	85.8	2.87
DE0901601C	86.0	2.94
DE0901204A	90.5	3.11
DE0901206D	91.0	3.16
GBL 21-04	88.0	3.27
DE0900703A	88.3	3.30
DE0901805B	80.3	3.30
DE0802101A	79.3	3.40
DE0801802B	90.8	3.40
DE0900802A	85.0	3.46
DE0407907	86.5	3.51
DE0901805E	80.0	3.56
DE0901805A	78.3	3.95
DE0900701D	85.5	4.12
G9002033	77.8	4.27
DE0900704A	81.3	4.27
C-elite Select	88.8	4.57

Standard Deviation of Days to Harvest
Standard deviation of days to harvest describes the average number of days between harvest of an individual plot of a variety and the overall average days to harvest for all of the plots of that variety. Varieties with low standard deviation of days to harvest, reached maturity at the same time. Varieties with high standard deviation of days to harvest did not mature uniformly.

Table 4. Yield, 100 Seed Weight, Seedcoat Color and Cotyledon Color from the Irrigated Baby Lima Trial

Variety	Yield (Lbs/A)	Weight of 100 Succulent Seeds (g)	Seedcoat Color	Cotyledon Color
DE0900603A	5903 ab	81.51 a	S	G
DE0802702C	4212 f-l	80.38 ab	M	W
DE0900604B	6338 a	79.58 ab	S	G
DE0900604A	5285 bc	77.50 a-c	S	G
DE0802101A	4985 d-f	76.91 a-d	S	W
DE0900705C	3666 j-o	75.34 a-e	YW	W
DE0802102C	4420 d-k	75.04 b-e	YG	W
DE0900704A	4080 i-n	73.07 c-f	G	G
DE0802701B	4064 i-n	72.43 c-g	YW	W
DE0802102A	4745 d-i	71.29 d-h	WG	G
DE0900701D	4864 d-h	70.59 e-i	YW	W
DE0900701C	4101 h-n	70.53 e-i	LG	G
DE0802102B	4914 d-g	70.36 e-i	G	G
G200381	3688 j-o	70.28 e-i	G	G
DE0901601C	4592 d-i	70.20 e-i	G	G
G200382	3596 l-p	69.91 e-j	G	G
DE0802702A	4473 d-i	69.86 e-j	M	W
GBL-1000	3391 n-q	69.80 e-j	G	G
DE0900802A	3688 j-o	69.53 e-j	G	G
DE0901601B	5066 cd	67.36 f-k	WG	W
DE0901101C	4101 h-n	66.99 f-l	G	G
G9002033	3367 n-q	66.91 f-l	G	G
DE0407905	4700 d-i	66.70 g-l	G	G
Cypress	2752 q	66.58 g-l	G	G
DE0505002A	4867 d-h	66.12 h-m	WG	LG
DE0407907	4497 d-i	66.11 h-m	G	G
DE0901201A	4793 d-i	65.94 h-m	WG	W
DE0901204B	5031 c-e	65.39 h-n	G	G
DE0900703A	3616 l-p	64.71 i-o	G	G

(Table 4 continued)

Variety	Yield (Lbs/A)	Weight of 100 Succulent Seeds (g)	Seedcoat Color	Cotyledon Color
DE0501801A	4200 g-m	64.69 i-o	G	G
DE0901502B	4864 d-h	64.47 i-o	G	G
GBL 26-04	4442 d-j	63.79 j-p	G	G
C-elite Select	4628 d-i	63.26 k-p	G	G
DE0901101D	3609 l-p	62.98 k-q	G	G
DE0901805B	3423 m-q	61.98 k-r	WG	W
Meadow	3104 o-q	61.86 k-r	G	G
DE0801802B	5194 b-d	60.88 l-s	YW	W
DE0901805A	2777 q	60.36 m-t	YW	W
GBL 21-04	4647 d-i	59.95 m-t	G	G
DE0901502A	4231 f-l	59.59 n-t	G	G
DE0901805D	4139 g-n	59.11 o-t	YW	W
DE0901204D	4625 d-i	59.06 o-t	WG	W
DE0901201B	5044 cd	59.01 o-t	WG	W
DE0901204A	4744 d-i	58.87 o-t	WG	W
DE0901805E	2882 pq	58.10 p-t	YW	W
G700801	3132 o-q	58.00 p-t	G	G
DE0901204C	4260 e-l	56.98 q-t	YW	W
DE0901206D	4640 d-i	56.62 r-t	WG	W
GBL 184-85	3677 j-o	55.06 st	G	G
GBL 24-04	3660 k-p	54.31 t	G	G
<i>p-value</i>	<0.0001	<0.0001		
Fisher's LSD²	780.70	6.109		
Tukey's HSD³	1612.80	12.788		

¹S=speckled; M=magenta; YW=yellow-white; YG=yellow-green; G=green; WG=white-green; LG=light green; W= white

²Means followed by the same letter are not significantly different according to Fisher's LSD.

³Minimum significant difference according to Tukey's HSD.

Appendix A: Weather Data for 2012 Baby Lima Variety Trials at Georgetown

May 31st (first planting) to September 18th (final harvest)

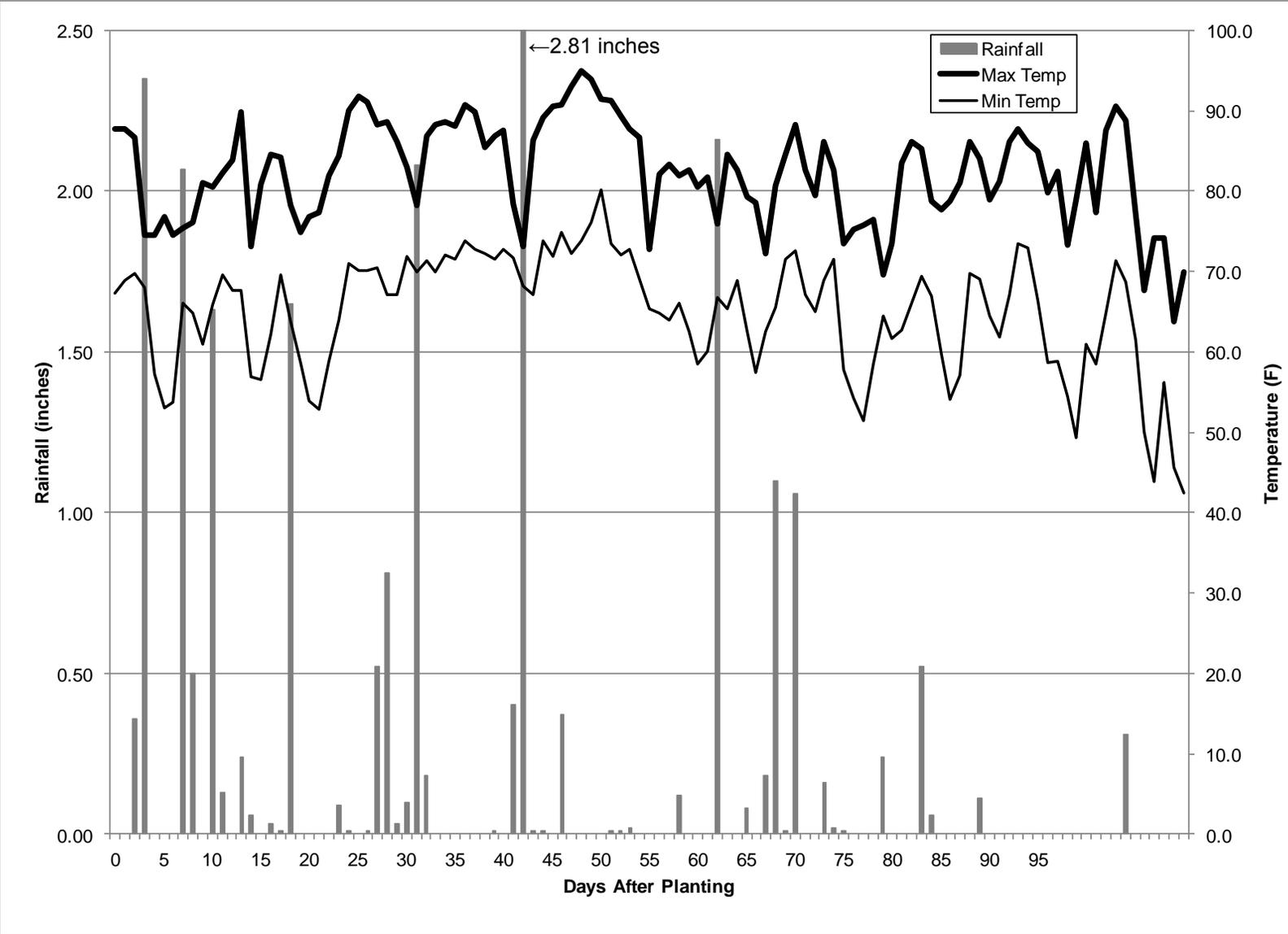
Data from DEOS weather station @ Georgetown, DE-REC: www.deos.udel.edu

Days After Planting		Date	Max Temp °F	Min Temp °F	Rainfall (in.)
May 31 Dryland Trial	June 13 Irrigated Trial				
0		31-May	87.8	67.3	0
1		1-Jun	87.7	68.8	0
2		2-Jun	86.6	69.7	0.36
3		3-Jun	74.5	68.0	2.35
4		4-Jun	74.6	57.3	0
5		5-Jun	76.8	53.0	0
6		6-Jun	74.6	53.7	0
7		7-Jun	75.4	66.1	2.07
8		8-Jun	76.1	64.8	0.5
9		9-Jun	81.1	60.9	0
10		10-Jun	80.6	65.9	1.63
11		11-Jun	82.2	69.6	0.13
12		12-Jun	83.9	67.7	0
13	0	13-Jun	89.9	67.7	0.24
14	1	14-Jun	73.2	56.9	0.06
15	2	15-Jun	80.8	56.6	0
16	3	16-Jun	84.6	62.2	0.03
17	4	17-Jun	84.2	69.6	0.01
18	5	18-Jun	78.3	63.7	1.65
19	6	19-Jun	74.9	58.6	0
20	7	20-Jun	76.8	53.9	0
21	8	21-Jun	77.4	52.9	0
22	9	22-Jun	81.9	58.9	0
23	10	23-Jun	84.4	63.9	0.09
24	11	24-Jun	90.1	71.0	0.01
25	12	25-Jun	91.8	70.1	0
26	13	26-Jun	91.1	70.1	0.01
27	14	27-Jun	88.3	70.5	0.52
28	15	28-Jun	88.6	67.2	0.81
29	16	29-Jun	86.2	67.2	0.03
30	17	30-Jun	82.9	71.9	0.1
31	18	1-Jul	78.2	69.9	2.08
32	19	2-Jul	86.8	71.3	0.18
33	20	3-Jul	88.2	70.0	0
34	21	4-Jul	88.6	72.1	0
35	22	5-Jul	88.1	71.6	0
36	23	6-Jul	90.7	73.9	0
37	24	7-Jul	89.8	72.8	0
38	25	8-Jul	85.4	72.3	0
39	26	9-Jul	86.8	71.6	0.01
40	27	10-Jul	87.6	72.8	0
41	28	11-Jul	78.4	71.7	0.4
42	29	12-Jul	73.1	68.1	2.81
43	30	13-Jul	86.4	67.2	0.01
44	31	14-Jul	89.2	73.9	0.01
45	32	15-Jul	90.5	71.9	0
46	33	16-Jul	90.8	74.9	0.37
47	34	17-Jul	93.0	72.2	0
48	35	18-Jul	94.9	73.9	0
49	36	19-Jul	94.0	76.1	0

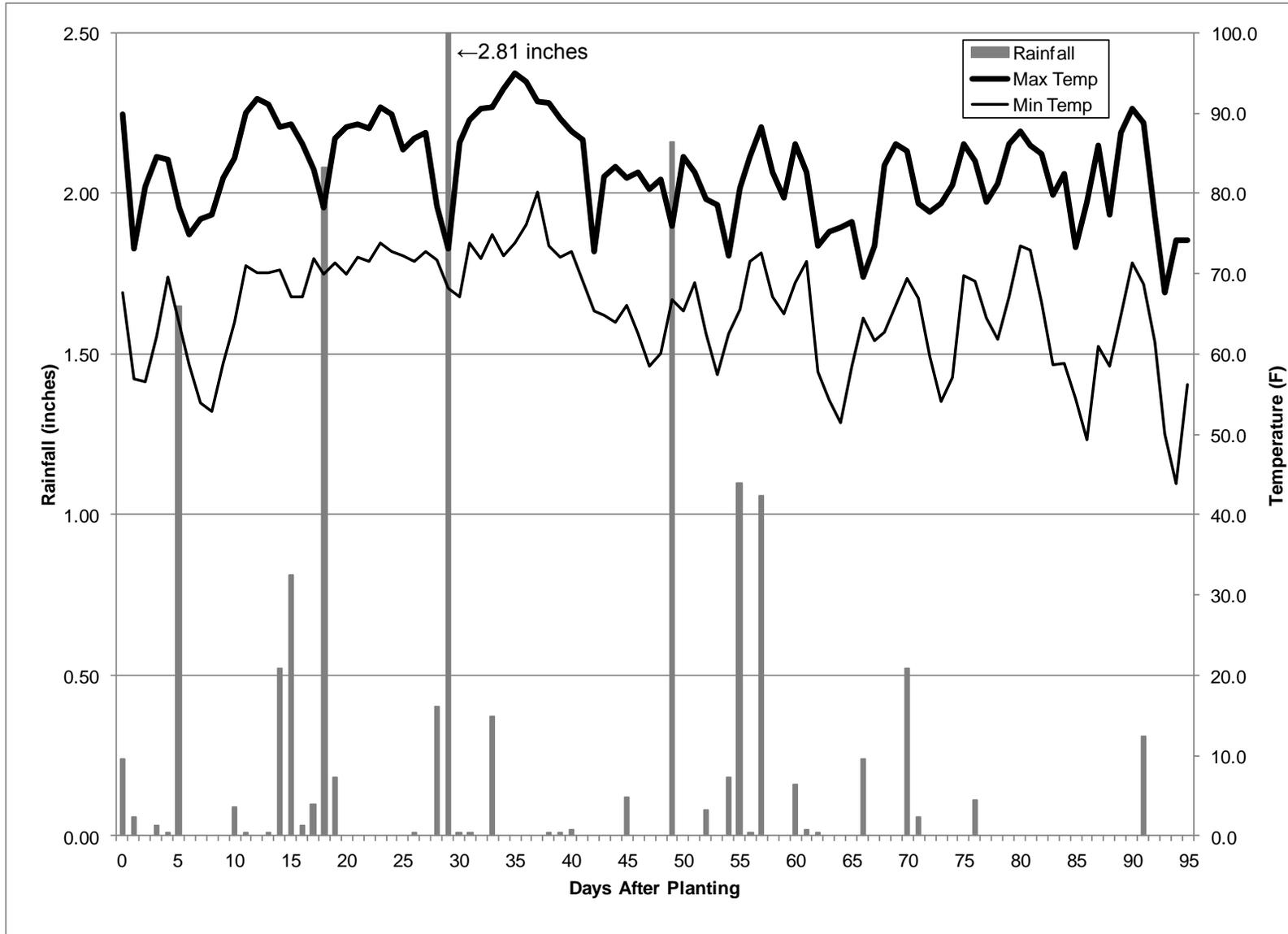
Days After Planting		Date	Max Temp °F	Min Temp °F	Rainfall (in.)
May 31 Dryland Trial	June 13 Irrigated Trial				
50	37	20-Jul	91.5	80.1	0
51	38	21-Jul	91.2	73.4	0.01
52	39	22-Jul	89.3	72.1	0.01
53	40	23-Jul	87.8	72.8	0.02
54	41	24-Jul	86.6	69.0	0
55	42	25-Jul	72.8	65.3	0
56	43	26-Jul	82.1	64.8	0
57	44	27-Jul	83.4	64.0	0
58	45	28-Jul	81.9	66.1	0.12
59	46	29-Jul	82.6	62.6	0
60	47	30-Jul	80.6	58.4	0
61	48	31-Jul	81.7	60.0	0
62	49	1-Aug	76.0	66.8	2.16
63	50	2-Aug	84.6	65.4	0
64	51	3-Aug	82.7	68.9	0
65	52	4-Aug	79.2	62.5	0.08
66	53	5-Aug	78.6	57.5	0
67	54	6-Aug	72.3	62.6	0.18
68	55	7-Aug	80.7	65.6	1.1
69	56	8-Aug	84.5	71.5	0.01
70	57	9-Aug	88.3	72.5	1.06
71	58	10-Aug	82.7	67.2	0
72	59	11-Aug	79.4	65.0	0
73	60	12-Aug	86.2	68.8	0.16
74	61	13-Aug	82.6	71.6	0.02
75	62	14-Aug	73.5	57.8	0.01
76	63	15-Aug	75.3	54.3	0
77	64	16-Aug	75.7	51.5	0
78	65	17-Aug	76.5	58.5	0
79	66	18-Aug	69.6	64.4	0.24
80	67	19-Aug	73.4	61.7	0
81	68	20-Aug	83.6	62.7	0
82	69	21-Aug	86.2	66.1	0
83	70	22-Aug	85.3	69.4	0.52
84	71	23-Aug	78.8	66.9	0.06
85	72	24-Aug	77.7	59.8	0
86	73	25-Aug	78.7	54.1	0
87	74	26-Aug	81.1	57.0	0
88	75	27-Aug	86.2	69.8	0
89	76	28-Aug	84.1	69.0	0.11
90	77	29-Aug	79.0	64.5	0
91	78	30-Aug	81.3	61.8	0
92	79	31-Aug	86.2	67.1	0
93	80	1-Sep	87.8	73.5	0
94	81	2-Sep	86.0	72.9	0
95	82	3-Sep	85.0	66.4	0
96	83	4-Sep	79.8	58.6	0
97	84	5-Sep	82.5	58.8	0
98	85	6-Sep	73.3	54.5	0
99	86	7-Sep	78.9	49.4	0
100	87	8-Sep	85.9	61.0	0
101	88	9-Sep	77.4	58.5	0

Days After Planting		Date	Max Temp °F	Min Temp °F	Rainfall (in.)
May 31 Dryland Trial	June 13 Irrigated Trial				
102	89	10-Sep	87.5	64.9	0
103	90	11-Sep	90.6	71.3	0
104	91	12-Sep	88.8	68.7	0.31
105	92	13-Sep	77.1	61.4	0
106	93	14-Sep	67.7	50.1	0
107	94	15-Sep	74.2	43.9	0
108	95	16-Sep	74.2	56.2	0
109		17-Sep	63.8	45.7	0
110		18-Sep	69.9	42.5	0

Appendix B: Weather Conditions During the 2013 Dryland Baby Lima Variety Trial May 31st (planting) to September 18th (final harvest)



Appendix C: Weather Conditions During the 2013 Irrigated Baby Lima Variety Trial June 13th (planting) to September 16th (final harvest)



2013 Fordhook Lima Bean Variety Trial

The 2013 Fordhook Lima Bean Variety Trial included a total of 17 lines. Fourteen of the lines were from the University of Delaware lima bean breeding program. Concentrated Fordhook and Fordhook 242 were included in the trial as check varieties. Sussex is a green-seeded ADM variety trialed in Delaware in the past. The purpose of this trial is to evaluate advanced Fordhook breeding lines and other available varieties for yield, maturity, and quality under Delaware growing conditions.

Varieties Entered in the 2013 Delaware Fordhook Lima Bean Variety Trial

Variety Name	Description
DE0803801A	UD Breeding Line
DE0600605C	UD Breeding Line
DE0803801B	UD Breeding Line
DE0700904	UD Breeding Line
DE0804404C	UD Breeding Line
DE0804404A	UD Breeding Line
DE0701101	UD Breeding Line
DE0803801C	UD Breeding Line
DE0600602B	UD Breeding Line
DE0804401C	UD Breeding Line
DE0701301A	UD Breeding Line
DE0701303B	UD Breeding Line
DE0804101A	UD Breeding Line
DE0900302A	UD Breeding Line
Sussex	ADM Variety
Concentrated FH	Standard Variety
FH 242	Standard Variety

Location:

Field 11-B at the University of Delaware Research and Education Center Farm, Georgetown, DE

Cultural Practices:

The trial was hand planted on June 26, 2013 into rows marked with a Monosem planter. Only the Concentrated Fordhook and Fordhook 242 seed was treated. Varieties were planted in one-row plots with 30 inch between row spacing and 6 inch in-row spacing. Plots were 10 feet in length and arranged in a randomized complete block design with three replications. The field was fertilized with potassium (0-0-60) at a rate of 110 lbs/A before planting. A pre-emergence application of 1.3 pt/A Dual II Magnum for weed control as well as 40 lbs/A nitrogen in the form of 30% UAN was made after planting. Plots were cultivated three times. One sidedress application of 40 lbs/A nitrogen in the form of 30% UAN was made. Additional hand weeding was done as necessary. Weed control in the trial was good. Phostrol was applied preventatively for downy mildew at a rate of 4 pts/A. No disease was observed in the plot but weather conditions were favorable for disease development in early and mid August. No applications were made for insect control.

Harvest:

As harvest approached, plants were visually evaluated for maturity and plots were harvested when the majority of the pods were filled. Not all replications for a variety were harvested on the same day. Harvest began on October 1 (97 DAP) and ended on October 8 (104 DAP).

An 8 foot section from each plot was harvested. The plants were cut off at soil level and weighed. Pods were stripped from the harvested plants from each plot and counted as full, flat or dry. The pulled pods were shelled in a Model 520 “TaMaCo” huller from Taylor Manufacturing Co., Inc., Moultrie, GA. Any remaining trash was removed from the shelled beans by hand and the cleaned beans were weighed to determine yield. A random sample of 100 succulent beans from each plot was weighed to determine seed size.

Results and Discussion

Seedling emergence in this trial was variable. Varieties with poor stands tended to have lower yields in the trial (Table 5). While some of the variability in final stand may have resulted from differences in seed age and quality, there could also be genetic factors inherent to the variety at play. DE0701301A, DE0803801A and DE0700904 had at least 90% stands at harvest in both 2012 and 2013.

This trial was planted in late June and experienced excellent conditions for growth and pod set with the cooler and wetter conditions this year. Overall, yields in this trial were very high. The highest yielding variety in the trial, DE0701101 produced a yield of 6950 lbs/A. Fordhook 242 was the second highest yielding variety in the trial at 6526 lbs/A. None of the varieties produced a significantly higher yield than FH 242, but five UD lines produced a significantly higher yield than Concentrated FH: DE0701101, DE0600602B, DE0701301A, DE0804404C, and DE0600605C. Of these lines DE0701301A and DE0804404C had acceptable seed quality ratings for color, shape and size by 100% of quality evaluators in 2012 (Table 6).

UD lines of particular interest because of yield and quality characteristics are as follows:

DE0600605C has had consistently high yields in the four years it has been trialed. The four year average yield for this line is 4854 lbs/A, or 172% of the yield of Concentrated Fordhook for those same years. DE0600605C was rated unacceptable for commercial production because of its light colored seed by the majority of evaluators in 2012. It has been used as a parent for numerous Fordhook breeding lines that are still in development in the program.

DE0600602B has had consistently high yields in the four years it has been trialed. The four year average yield for this line is 4273 lbs/A, or 151% of the yield of Concentrated Fordhook for those same years. DE0600602B was rated unacceptable for commercial production because of its light colored seed by the majority of evaluators in 2012, but had slightly better acceptability than DE0600605C. It has been used as a parent for numerous Fordhook breeding lines that are still in development in the program.

DE0701301A has been tested for three years and has performed well. The three year average yield for this line is 3907 lbs/A, or 152% of the yield of Concentrated Fordhook for those same years. Yield is not as high or as stable as the DE0600605C, but DE0701301A has commercial quality green seed and was rated acceptable by all of the 2012 evaluators. It also had excellent emergence and final stand in the 2012 and 2013 trials.

DE0804404C has been tested for two years and has performed well in both years. The two year average yield for this line is 4811 lbs/A, or 140% of the yield of Concentrated Fordhook for those same years. Yield is not as high or as stable as the DE0600605C, but DE0804404C has commercial quality green seed and was rated acceptable by all of the 2012 evaluators. It had poor stand and emergence in the two years it has been trialed, which may be a problem for this line.

Table 5. Days to Harvest, Yield, Maturity at Harvest, Number of Pods per Plant, Plant Weight, and Percent Stand at Harvest, for Entries in the 2013 Fordhook Lima Bean Variety Trial

Variety	Days to Harvest	Yield (Lbs/A)	% Full Pods	% Flat Pods	% Dry Pods	# Pods/Plant	Plant Weight (lbs/8 ft)	% Stand ¹
DE0701101	101.0 a	6950 a	91.8 a	4.3 c	4.0 a	19.3 a	12.1 b	81.7 abc
FH 242	99.0 a	6526 ab	84.5 abc	12.9 bc	2.6 a	18.6 a	15.5 a	95.0 a
DE0600602B	99.0 a	6395 ab	78.9 bcdef	11.0 bc	10.1 a	16.0 a	10.7 bc	81.7 abc
DE0701301A	101.0 a	6387 ab	77.9 bcdef	10.2 bc	11.9 a	17.6 a	11.9 bc	90.0 ab
DE0804404C	102.0 a	5937 abc	82.8 abcd	3.7 c	13.4 a	23.7 a	3.6 e	30.0 e
DE0600605C	99.0 a	5874 abcd	81.8 abcde	12.5 bc	5.7 a	17.2 a	10.7 bc	65.0 d
Sussex	101.0 a	5824 abcde	77.5 bcdef	8.8 bc	13.7 a	13.8 a	9.9 bc	83.3 abc
DE0803801A	98.0 a	5793 abcde	80.9 abcdef	12.2 bc	6.9 a	16.4 a	10.2 bc	90.0 ab
DE0803801B	98.0 a	5721 abcdef	69.0 ef	13.3 bc	17.7 a	20.5 a	10.5 bc	85.0 ab
DE0700904	101.0 a	5088 bcdef	79.9 abcdef	9.6 bc	10.5 a	15.9 a	11.2 bc	91.7 a
DE0900302A	100.3 a	5035 bcdef	72.5 cdef	19.3 ab	8.2 a	18.2 a	10.4 bc	65.0 d
DE0803801C	100.0 a	4777 cdef	87.5 ab	4.1 c	8.4 a	18.7 a	6.7 d	61.7 d
DE0804404A	101.3 a	4744 cdef	80.2 abcdef	17.4 ab	2.4 a	20.8 a	4.1 e	28.3 e
DE0701303B	103.3 a	4571 cdef	68.2 f	18.6 ab	13.2 a	12.9 a	10.3 bc	81.7 abc
DE0804101A	98.0 a	4434 def	78.6 bcdef	11.2 bc	10.2 a	15.4 a	9.4 c	83.3 abc
Concentrated FH	101.0 a	4336 ef	77.1 bcdef	12.2 bc	10.7 a	15.0 a	10.0 bc	68.3 cd
DE0804401C	98.7 a	4300 f	70.0 def	25.2 a	4.7 a	14.9 a	10.7 bc	75.0 bcd
<i>p-value</i>	0.4876	0.0084	0.0457	0.0215	0.0691	0.0726	<0.0001	<0.0001
Fisher's LSD²	NS	1492.3	12.851	10.746	NS	NS	2.5554	15.725
Tukey's HSD³	NS	*2745.2	*23.641	19.767	NS	NS	4.701	28.928

¹Percent stand is highlighted for varieties for which treated seed was planted.

²Means followed by the same letter are not significantly different according to Fisher's LSD.

³Minimum significant difference according to Tukey's HSD. For starred HSD values there are no significant differences according to the Tukey test.

Table 6. Days to Harvest, Yield, 100 Seed Weight, % Acceptability from 2012 Evaluation and Quality Defects from 2012 Evaluation for Entries in the 2013 Fordhook Lima Bean Variety Trial

Variety	Days to Harvest	Yield (lbs/A)	100 Seed Wt (g)	% of Evaluators Rating as Acceptable ¹	Quality Defects ¹
DE0701101	101.0 a	6950 a	200.5 cdef	0	shape, color
FH 242	99.0 a	6526 ab	220.7 abc	12.5	color
DE0600602B	99.0 a	6395 ab	207.3 cde	25	color
DE0701301A	101.0 a	6387 ab	233.2 ab	100	
DE0804404C	102.0 a	5937 abc	175.3 fghi	100	
DE0600605C	99.0 a	5874 abcd	242.6 a	12.5	color
Sussex	101.0 a	5824 abcde	220.6 abc	100	
DE0803801A	98.0 a	5793 abcde	194.8 cdefgh	0	size, color
DE0803801B	98.0 a	5721 abcdef	163.3 i	0	color
DE0700904	101.0 a	5088 bcdef	194.0 defgh	12.5	color
DE0900302A	100.3 a	5035 bcdef	206.5 cde		
DE0803801C	100.0 a	4777 cdef	172.2 ghi	0	size, shape, color
DE0804404A	101.3 a	4744 cdef	188.4 efghi	100	
DE0701303B	103.3 a	4571 cdef	197.7 cdefg	87.5	size, shape
DE0804101A	98.0 a	4434 def	169.9 hi	100	
Concentrated FH	101.0 a	4336 ef	215.6 bcd	37.5	color
DE0804401C	98.7 a	4300 f	191.9 defgh	37.5	color
<i>p-value</i>	0.4876	0.0084	<0.0001		
Fisher's LSD²	NS	1492.3	25.887		
Tukey's HSD³	NS	*2745.2	47.622		

¹Based on a 2012 evaluation of blanched and frozen samples. For details see the 2012 Lima Bean Variety Trial Results.

²Means followed by the same letter are not significantly different according to Fisher's LSD.

³Minimum significant difference according to Tukey's HSD. For starred HSD values there are no significant differences according to the Tukey test.

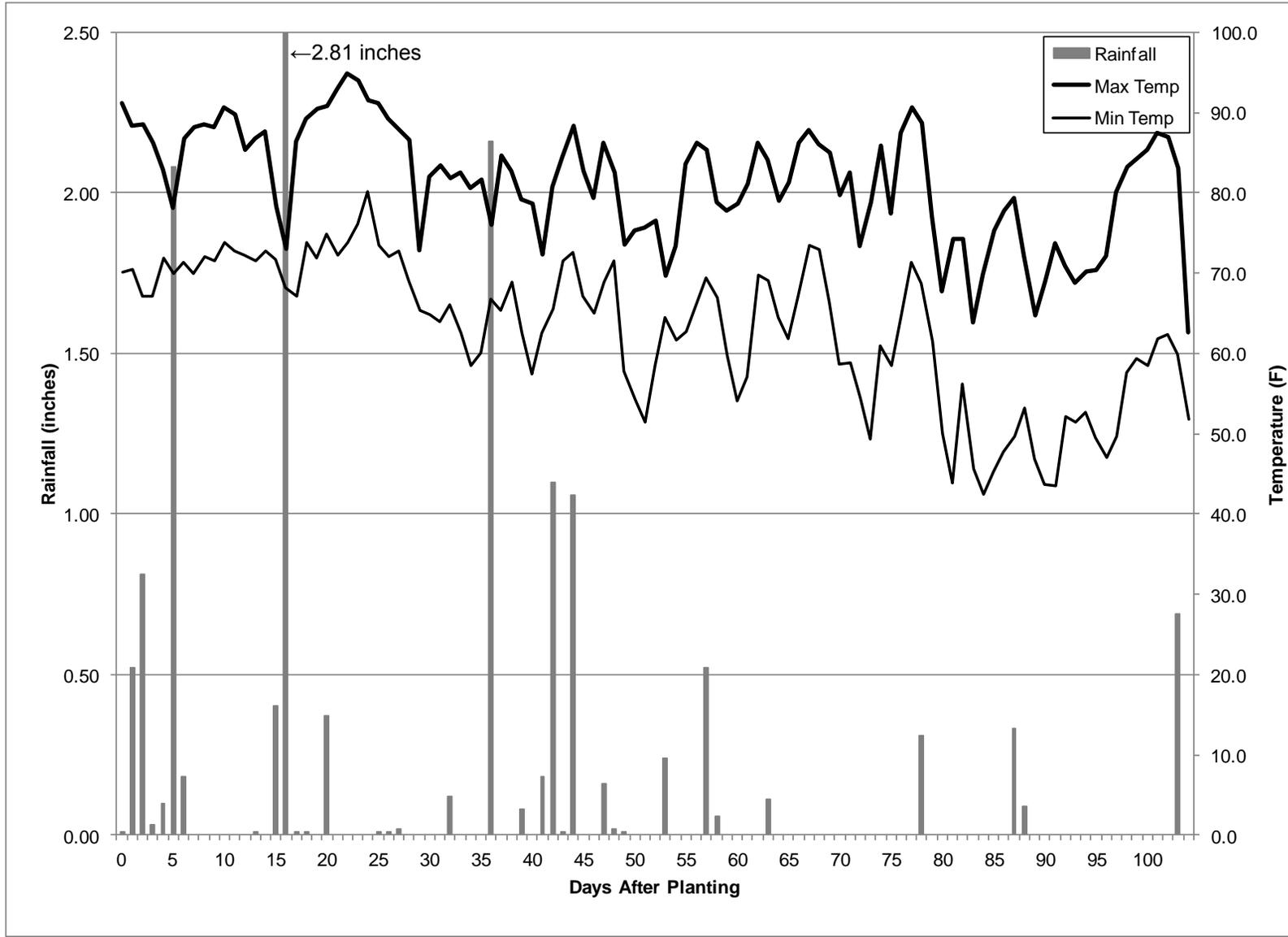
**Appendix E: Weather Data for 2013 Fordhook Lima Variety Trial
June 26th (planting) to October 8th (final harvest)**

DAP	Date	Max Temp °F	Min Temp °F	Rainfall (in.)
0	26-Jun	91.1	70.1	0.01
1	27-Jun	88.3	70.5	0.52
2	28-Jun	88.6	67.2	0.81
3	29-Jun	86.2	67.2	0.03
4	30-Jun	82.9	71.9	0.1
5	1-Jul	78.2	69.9	2.08
6	2-Jul	86.8	71.3	0.18
7	3-Jul	88.2	70.0	0
8	4-Jul	88.6	72.1	0
9	5-Jul	88.1	71.6	0
10	6-Jul	90.7	73.9	0
11	7-Jul	89.8	72.8	0
12	8-Jul	85.4	72.3	0
13	9-Jul	86.8	71.6	0.01
14	10-Jul	87.6	72.8	0
15	11-Jul	78.4	71.7	0.4
16	12-Jul	73.1	68.1	2.81
17	13-Jul	86.4	67.2	0.01
18	14-Jul	89.2	73.9	0.01
19	15-Jul	90.5	71.9	0
20	16-Jul	90.8	74.9	0.37
21	17-Jul	93.0	72.2	0
22	18-Jul	94.9	73.9	0
23	19-Jul	94.0	76.1	0
24	20-Jul	91.5	80.1	0
25	21-Jul	91.2	73.4	0.01
26	22-Jul	89.3	72.1	0.01
27	23-Jul	87.8	72.8	0.02
28	24-Jul	86.6	69.0	0
29	25-Jul	72.8	65.3	0
30	26-Jul	82.1	64.8	0
31	27-Jul	83.4	64.0	0
32	28-Jul	81.9	66.1	0.12
33	29-Jul	82.6	62.6	0
34	30-Jul	80.6	58.4	0
35	31-Jul	81.7	60.0	0
36	1-Aug	76.0	66.8	2.16
37	2-Aug	84.6	65.4	0
38	3-Aug	82.7	68.9	0
39	4-Aug	79.2	62.5	0.08
40	5-Aug	78.6	57.5	0
41	6-Aug	72.3	62.6	0.18
42	7-Aug	80.7	65.6	1.1
43	8-Aug	84.5	71.5	0.01
44	9-Aug	88.3	72.5	1.06
45	10-Aug	82.7	67.2	0
46	11-Aug	79.4	65.0	0
47	12-Aug	86.2	68.8	0.16

DAP	Date	Max Temp °F	Min Temp °F	Rainfall (in.)
48	13-Aug	82.6	71.6	0.02
49	14-Aug	73.5	57.8	0.01
50	15-Aug	75.3	54.3	0
51	16-Aug	75.7	51.5	0
52	17-Aug	76.5	58.5	0
53	18-Aug	69.6	64.4	0.24
54	19-Aug	73.4	61.7	0
55	20-Aug	83.6	62.7	0
56	21-Aug	86.2	66.1	0
57	22-Aug	85.3	69.4	0.52
58	23-Aug	78.8	66.9	0.06
59	24-Aug	77.7	59.8	0
60	25-Aug	78.7	54.1	0
61	26-Aug	81.1	57.0	0
62	27-Aug	86.2	69.8	0
63	28-Aug	84.1	69.0	0.11
64	29-Aug	79.0	64.5	0
65	30-Aug	81.3	61.8	0
66	31-Aug	86.2	67.1	0
67	1-Sep	87.8	73.5	0
68	2-Sep	86.0	72.9	0
69	3-Sep	85.0	66.4	0
70	4-Sep	79.8	58.6	0
71	5-Sep	82.5	58.8	0
72	6-Sep	73.3	54.5	0
73	7-Sep	78.9	49.4	0
74	8-Sep	85.9	61.0	0
75	9-Sep	77.4	58.5	0
76	10-Sep	87.5	64.9	0
77	11-Sep	90.6	71.3	0
78	12-Sep	88.8	68.7	0.31
79	13-Sep	77.1	61.4	0
80	14-Sep	67.7	50.1	0
81	15-Sep	74.2	43.9	0
82	16-Sep	74.2	56.2	0
83	17-Sep	63.8	45.7	0
84	18-Sep	69.9	42.5	0
85	19-Sep	75.4	45.3	0
86	20-Sep	77.8	47.7	0
87	21-Sep	79.3	49.6	0.33
88	22-Sep	72.1	53.2	0.09
89	23-Sep	64.8	46.9	0
90	24-Sep	68.9	43.6	0
91	25-Sep	73.8	43.5	0
92	26-Sep	70.9	52.1	0
93	27-Sep	68.8	51.4	0
94	28-Sep	70.2	52.7	0
95	29-Sep	70.3	49.5	0
96	30-Sep	72.2	47.1	0
97	1-Oct	80.1	49.6	0
98	2-Oct	83.3	57.6	0
99	3-Oct	84.3	59.4	0

DAP	Date	Max Temp °F	Min Temp °F	Rainfall (in.)
100	4-Oct	85.3	58.4	0
101	5-Oct	87.4	61.8	0
102	6-Oct	86.9	62.3	0
103	7-Oct	83.0	59.9	0.69
104	8-Oct	62.6	51.7	0

Appendix F: Weather Conditions During 2013 Fordhook Variety Trial June 26th (planting) to October 8th (final harvest)



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