UNIVERSITY OF DELAWARE

LIMA BEAN

VARIETY TRIAL RESULTS

2016

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2016 UNIVERSITY OF DELAWARE GREEN BABY LIMA BEAN AND FORDHOOK LIMA BEAN VARIETY TRIALS

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2016 Baby Lima Bean Variety Trials

In 2016 three trials of baby lima varieties were planted at the University of Delaware Research Farm in Georgetown, Delaware: an irrigated trial of commercial varieties and advanced breeding lines, an irrigated trial of newly developed breeding lines and an unirrigated trial of advanced breeding lines.

Unirrigated Baby Lima Bean Variety Trial at Georgetown, DE- Planted June 10, 2016

The Unirrigated Baby Lima Bean Variety Trial included a total of 18 lines and was planted on June 10. The purpose of this trial was to evaluate advanced breeding material from the UD Lima Bean Breeding Program under dryland conditions. Trial entries were evaluated for yield and days to harvest.

Trial Location:

Field 31 at the University of Delaware Research and Education Center Farm, Georgetown, DE

Plot Setup and Cultural Practices:

The trial was planted by hand on June 10, 2016 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 three replications. Because of low quantities of seed of some lines, not all lines were replicated, as indicated in the results section. The field was fertilized with potassium (0-0-60) before planting according to soil test results. A pre-emergence application of 1.5 pt/A Dual II Magnum + 2 oz/A Pursuit for weed control as well as 33 lbs/A nitrogen in the form of 30% UAN was made on June 11. Plots were cultivated once. One sidedress application of 33 lbs/A nitrogen in the form of 30% UAN was made on June 21. Additional hand weeding was done as necessary. Weed control in the trial was good. Sniper at 4 oz/A was applied on September 1 for stinkbugs Kocide at 1 lb/A was applied on the same date. No disease was observed in the plot.

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 29 (80 DAP) and ended on September 21 (103 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.

Lines Evaluated in the Unirrigated Baby Lima Bean Trial Planted June 10, 2016

Line	Description
C-elite Select	standard variety
Cypress	standard variety
DE1200308B	UD breeding line
DE1200506B	UD breeding line
DE1200506D	UD breeding line
DE1200106A	UD breeding line
DE1200309A	UD breeding line
DE1200407C	UD breeding line
DE1200407E	UD breeding line
DE1200105A	UD breeding line
DE1200108A	UD breeding line
DE1200309C	UD breeding line
DE0505002A	UD breeding line
DE0901601B	UD breeding line
DE0802101A	UD breeding line
DE1000802B	UD breeding line
DE1000701B	UD breeding line
DE1105302A	UD breeding line

Irrigated Baby Lima Bean Variety Trial at Georgetown, DE – Planted June 9, 2016

The Irrigated Baby Lima Bean Variety Trial was planted on June 9 and included a total of 42 lines. Seven of the lines were entered by ADM Seedwest. Thirty-one 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 9, 2016

Variety Name	Source	Variety Name	Source
Cypress	ADM (standard variety)	DE1000701A	University of Delaware
Meadow	ADM (standard variety)	DE1000701B	University of Delaware
G200381	ADM	DE1000802B	University of Delaware
G200382	ADM	DE1001102B	University of Delaware
G0026023	ADM	DE1001102E	University of Delaware
G3041405	ADM	DE1001104B	University of Delaware
G3016323	ADM	DE1001201A	University of Delaware
G3015328	ADM	DE1001201C	University of Delaware
G3014319	ADM	DE1001202B	University of Delaware
184-85	Ben Fish (standard variety)	DE1001202C	University of Delaware
C-elite Select	Ben Fish (standard variety)	DE1001202E	University of Delaware
DE0407905	University of Delaware	DE1001802A	University of Delaware
DE0407907	University of Delaware	DE1100102B	University of Delaware
DE0505002A	University of Delaware	DE1100303A	University of Delaware
DE0802101A	University of Delaware	DE1100401A	University of Delaware
DE0802102A	University of Delaware	DE1100402B	University of Delaware
DE0802102B	University of Delaware	DE1100704A	University of Delaware
DE0900604B	University of Delaware	DE1100805B	University of Delaware
DE0900701D	University of Delaware	DE1101207A	University of Delaware
DE0900705C	University of Delaware	DE1101301B	University of Delaware
DE0901601B	University of Delaware	DE1105302A	University of Delaware

Location:

Field 31 at the University of Delaware Research and Education Center Farm, Georgetown, DE

Cultural Practices:

The trial was planted on June 9, 2016 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) before planting according to soil test results. A pre-emergence application of 1.5 pt/A Dual II Magnum + 2 oz/A Pursuit for weed control as well as 33 lbs/A nitrogen in the form of 30% UAN was made on June 11. Plots were cultivated once. One sidedress application of 33 lbs/A nitrogen in the form of 30% UAN was made on June 21. Additional hand weeding was done as necessary. Weed control in the trial was good. Sniper at 4

oz/A was applied on September 1 for stinkbugs. Kocide at 1 lb/A was applied on the same date. No disease was observed in the plot.

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 24 (76 DAP) and ended on September 21 (104 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.

Irrigated First Year Trial of Baby Lima Breeding Lines at Georgetown, DE – Planted June 10, 2016

The Irrigated First Year Trial of Baby Lima Bean Breeding Lines was planted on June 10 and included a total of 26 lines. Twenty-two of the entries were breeding lines were from the University of Delaware lima bean breeding program that were being evaluated for yield and days to harvest in a replicated trial for the first time. Two lines were standard commercial cultivars and two were high yielding advanced breeding lines from the UD breeding program. The purpose of this trial is to evaluate new UD breeding lines for yield, maturity, and quality under Delaware growing conditions.

Entries in the Irrigated First Year Trial of Baby Lima Breeding Lines, Planted June 10, 2016

Variety Name	Description
Cypress	commercial standard
C-elite Select	commercial standard
DE0505002A	UD advanced line
DE0407907	UD advanced line
DE1200103A	UD Breeding Line
DE1200203A	UD Breeding Line
DE1200307B	UD Breeding Line
DE1200403A	UD Breeding Line
DE1200404A	UD Breeding Line
DE1200505A	UD Breeding Line
DE1200802A	UD Breeding Line
DE1201101A	UD Breeding Line
DE1202203A	UD Breeding Line

Variety Name	Description
DE1202203B	UD Breeding Line
DE1202205A	UD Breeding Line
DE1202303C	UD Breeding Line
DE1202305B	UD Breeding Line
DE1202501A	UD Breeding Line
DE1202605D	UD Breeding Line
DE1202606A	UD Breeding Line
DE1202802A	UD Breeding Line
DE1202802B	UD Breeding Line
DE1202802C	UD Breeding Line
DE1202804A	UD Breeding Line
DE1202906B	UD Breeding Line
DE1203001B	UD Breeding Line

Location:
Field 31 at the University of Delaware Research and Education Center Farm, Georgetown, DE

Cultural Practices:
The trial was planted by hand on on June 10, 2016. 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 three replications. The field was fertilized with potassium (0-0-60) before planting according to soil test results. A pre-emergence application of 1.5 pt/A Dual II Magnum + 2 oz/A Pursuit for weed control as well as 33 lbs/A nitrogen in the form of 30% UAN was made on June 11. Plots were cultivated once. One sidedress application of 33 lbs/A nitrogen in the form of 30% UAN was made on June 21. Additional hand weeding was done as necessary. Weed control in the trial was good. Sniper at 4 oz/A was applied on September 1 for stinkbugs. Kocide at 1 lb/A was applied on the same date. No disease was observed in the plot.

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 September 1 (83 DAP) and ended on September 23 (105 DAP).

A 10-foot section from each plot was harvested. The plants were cut off at soil level 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.

Results and Discussion of the Baby Lima Trials at Georgetown

Weather, Pod Set and Maturity for the Irrigated Baby Lima Trials
Sustained high nighttime temperatures in July and August delayed pod set in the baby lima trials. Days to harvest for the three standard varieties, Cypress, C-elite Select and 184-85 were 10 to 14 days longer than the historical averages and similar to DTH for other years with high July temperatures. 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**	**2014**	**2015**	**2016**
Planting Date		***Jun 6***	***Jun 6***	***Jun 14***	***Jun 13***	***Jun 13***	***Jun 9***	***Jun 9***
Cypress	77	91	97	82	77	82	79	89
C-elite Select	84	96	98	89	89	91	86	98
184-85	86	95	99	88	89	86	87	96

Split sets were apparent in the irrigated trial baby lima trials this year. Moderate levels of stinkbug pressure in mid-August may also have reduced yield in some of the early and mid-season varieties.

Weather and Pod Set for the Dryland Baby Lima Trial

The dryland baby lima trial was planted on June 10 and received 17.67 inches of rain during the growing season and was not subjected to any periods of severe drought. Yield of Cypress in this plot was 57% of Cypress in the irrigated 1st year plot (which was planted on the same day) and yield of unirrigated C-elite Select was 62% of the yield in the 1st year plot.

Yield and Maturity in the June 10 Planted Dryland Baby Lima Trial

The purpose of the June 10-planted, dryland baby lima trial was to evaluate some of the advanced breeding material from the University of Delaware that has been selected in dryland conditions. There were statistically significant differences in yield between some of the varieties in this trial (Table 1) but no varieties had significantly higher yields than C-elite Select DE0505002A and DE1200309C had significantly higher yields than Cypress.

Yield and Maturity in the June 9 Planted Baby Lima Trial

The purpose of the June 9-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). Yields were low to average in this trial, due to unfavorable temperatures for pod set, maturity was delayed and some lines produced split sets. The highest yielding entries in the 2016 trial were DE1001802A, DE1100402B, DE1001202E, DE0900701D, C-elite Select, DE0900604B, and DE1001201A. None of the entries had a significantly higher yield than C-elite Select, which produced 3684 lbs/A in this trial. Of the top yielding varieties, only C-elite Select is green-seeded (Table 4 and Figure 1). DE0802101A matured in 86 days (3 days earlier than Cypress) and was the highest yielding of the early maturing varieties (Table 4 and Figure 1).

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

DE0407905 matured in 92 days and yielded 2238 lbs/A. *Plant Variety Protection has been obtained for DE0407905 and it has been released as a cultivar named* ***'Brooke'.***

DE0407907 matured in 99 days and yielded 2884 lbs/A. In some field evaluations DE0407907 has been resistant to race F of downy mildew, but this year it developed disease. We are testing it in the greenhouse to further characterize its reaction to downy midlew. *Plant Variety Protection has been obtained for DE0407907 and it has been released as a cultivar named* ***'Bert'.***

DE1001104B matured in 91 days and yielded 2827 lbs/A. Yield was not significantly different than any of the check varieties. This is the third year that DE1001104B has been evaluated in the trial. It was also among the top yielding varieties in 2014 and 2015.

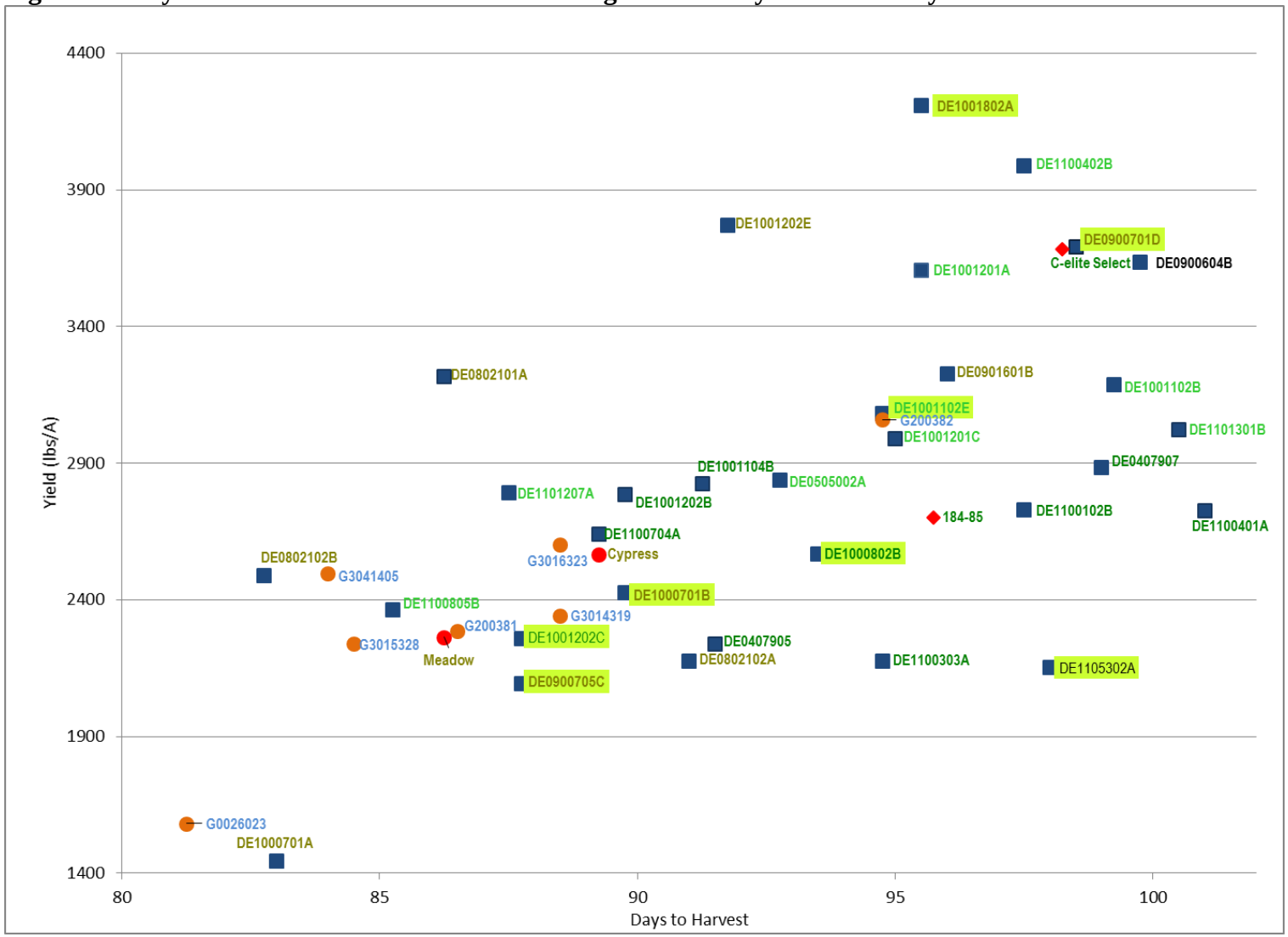
DE1001202B matured in 90 days and yielded 2787 lbs/A. Yield was not significantly different than any of the standard varieties in this trial. DE1001202B was very similar in yield and maturity to DE0505002A, which is one of its parents and has been consistently high yielding in past trials. DE0505002A has green cotyledons but a light colored seed coat. DE1001202C has better seed quality characteristics than DE0505002. Additional testing will be needed to confirm DE10001202B's yield stability and maturity characteristics.

Among the varieties entered by ADM, G200382 was the highest yielding entry and G0026023 was the earliest maturing. None of the ADM entries had yields that were significantly higher than that of Cypress. G200382 also performed well in the 2011, 2012, 2013, 2014 and 2015 trials. Maturity for G200382 was six days later than Cypress in this trial. In most past years its maturity was nearly identical to Cypress.

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 extremely high this year, probably as a result of split sets caused by heat stress. 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.

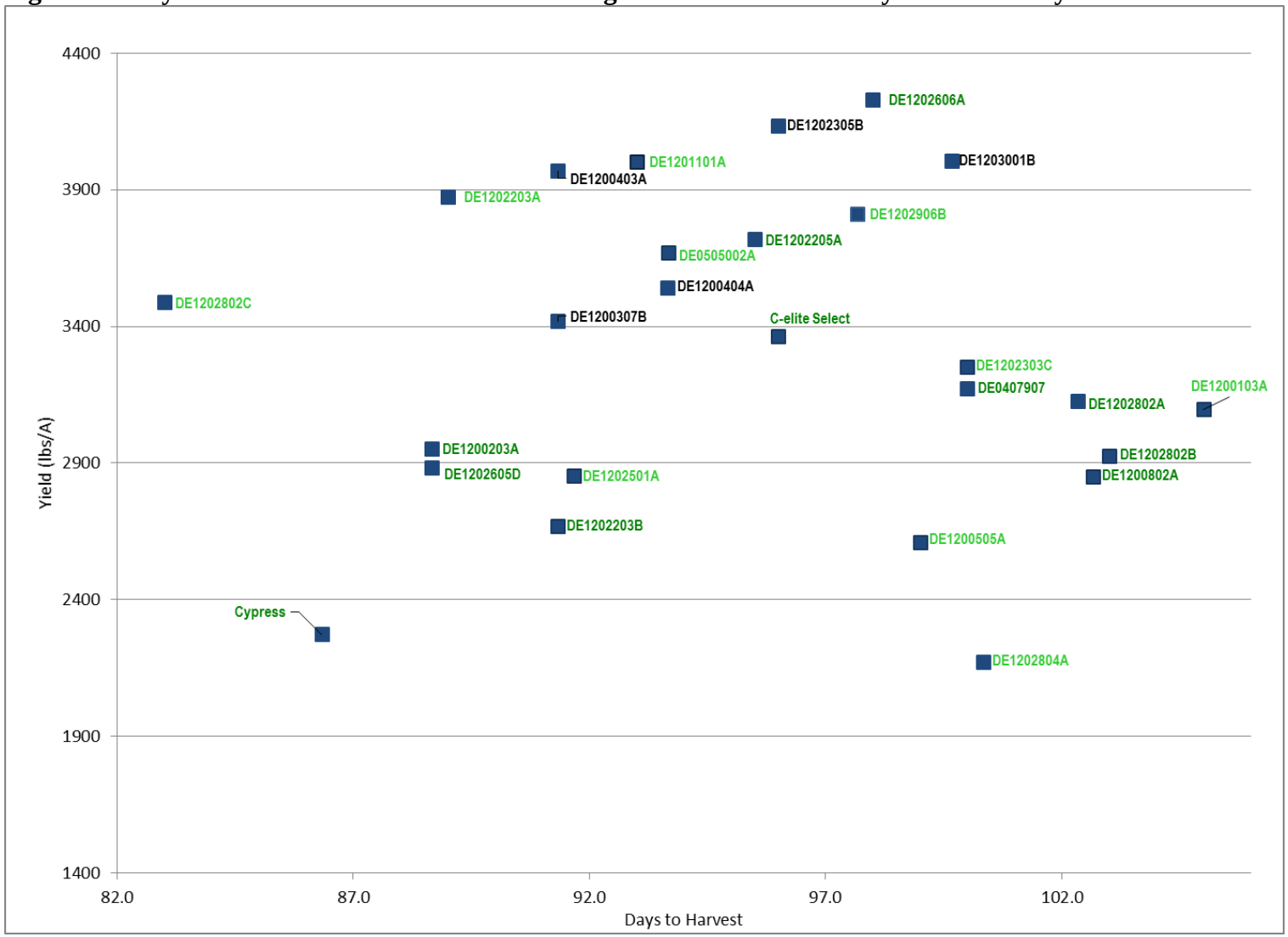
As in 2015, breeding lines that were being evaluated for the first time were tested in a separate trial, which was not evaluated for maturity by categorizing and counting pods at harvest. The Irrigated First Year Trial was planted on day after the irrigated advanced trial. Yields of standard varieties in this trial were comparable to those in the Irrigated Advanced Trial. The results from this trial are in Table 5 and Figure 2. Eleven of the lines from this trial will be advanced to evaluation in the main irrigated trial in 2017: DE1200307B, DE1200403A, DE1200404A, DE1201101A, DE1202203A, DE1202205A, DE1202305B, DE1202606A, DE1202802C, DE1202906B and DE1203001B.

Figure 1. Baby Lima Bean Varieties in the 2016 Irrigated Trial by Yield and Days to Harvest*



* color of data label indicates seed color: **Green, rated acceptable by all evaluators**, **Green, rated acceptable by most evaluators**, **Green, but color not rated acceptable by most evaluators or not evaluated**, **Not Evaluated**, **Not Green**.
Green highlight=resistant to race F of downy mildew.

Figure 2. Baby Lima Bean Varieties in the 2016 Irrigated First Year Trial by Yield and Days to Harvest*



* color of data label indicates seed color: **Green, by visual rating of succulent seed**, **Light Green, by visual rating of succulent seed**, **Not Green**.

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Table 1. Days to Harvest, Yield, Plant Weight, and Percent Stand at Harvest for the Unirrigated Baby Lima Bean Variety Trial Planted June 10, 2016

Variety	Days to Harvest[1]	Yield (Lbs/A)[1]	Plant Weight (Lbs/10 ft)[1]	% Stand[2]
DE0505002A	90.3 abc	2522 a	13.9 ab	84 bc
DE1200309A	90.0 *	2316 *	11.7 *	91 *
DE1200309C	85.7 de	2287 ab	13.8 ab	93 ab
DE1200308B	103.0 **	2259 **	16.0 **	95 **
DE1200506D	94.0 **	2228 **	12.6 **	95 **
DE0901601B	88.0 cd	2141 abc	12.5 abc	99 a
C-elite Select	92.7 ab	2100 abc	14.3 a	99 a
DE1200407E	92.0 *	2005 *	12.9 *	78 *
DE1000802B	87.0 cd	1951 abc	10.4 cd	80 c
DE1200106A	96.5 *	1913 *	14.4 *	98 *
DE1200506B	90.0 **	1828 **	12.1 **	100 **
DE0802101A	88.0 cd	1810 abcd	11.0 cd	83 bc
DE1200407C	90.5 *	1644 *	11.6 *	79 *
DE1200105A	94.0 a	1485 bcde	9.6 d	87 abc
DE1105302A	92.7 ab	1383 cde	11.5 bcd	92 abc
Cypress	82.3 ef	1303 cde	11.6 bcd	87 abc
DE1200108A	89.0 bcd	1060 de	9.9 d	62 d
DE1000701B	81.0 f	783 e	10.0 d	86 bc
p-value	***0.0001***	***0.0071***	***0.0018***	***0.0006***
Fisher's LSD[3]	**4.636**	**851.71**	**2.3818**	**12.936**

[1]* indicates average of two reps, ** indicates data from a single plot

[2]Percent stand is highlighted for varieties for which treated seed was planted.

[3]Means followed by the same letter are not significantly different according to Fisher's LSD. * indicates averages of less than four replications not included in the statistical analysis.

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 9, 2016

Variety[1]	Days to Harvest	Yield (Lbs/A)	% Full Pods	% Flat Pods	% Dry Pods	# Pods/Plant	Plant Weight (Lbs/15 ft)	% Stand[2]
DE1001802A	95.5 a-g	4208 a	78.7 abc	0.8 i	20.5 a	24.8 abc	20.4 f-n	72.5 g-j
DE1100402B	97.5 a-e	3990 ab	66.9 a-g	2.5 hi	30.7 a	20.6 b-i	21.3 d-l	81.3 c-g
DE1001202E	91.8 d-k	3772 a-c	74.1 a-f	4.3 f-i	21.6 a	27.8 a	18.7 i-n	69.6 ijk
DE0900701D	98.5 abc	3692 a-d	65.8 a-g	12.4 a-h	21.8 a	20.0 b-i	29.3 a	77.5 e-i
C-elite Select	98.3 abc	3684 a-e	63.4 c-g	4.2 f-i	32.4 a	20.7 a-i	24.7 bcd	89.6 abc
DE0900604B	99.8 ab	3635 a-e	59.1 e-h	17.4 abc	23.5 a	15.1 hij	24.5 cde	95.0 a
DE1001201A	95.5 a-g	3608 a-e	75.1 a-e	3.9 f-i	21.0 a	22.9 a-f	22.4 d-j	68.8 ijk
DE0901601B	96.0 a-f	3229 b-f	73.6 a-f	7.0 c-i	19.3 a	23.5 a-e	21.8 d-k	85.0 b-e
DE0802101A	86.3 k-p	3218 b-f	80.8 a	2.3 hi	17.0 a	21.4 a-h	20.5 f-m	92.1 ab
DE1001102B	99.3 ab	3187 b-g	58.1 fgh	10.3 b-i	31.6 a	16.3 f-j	23.6 c-f	84.2 b-e
DE1001102E	94.8 a-h	3085 b-h	79.8 ab	6.2 d-i	13.9 a	21.2 a-i	23.1 d-g	84.6 b-e
G200382	94.8 a-h	3060 b-i	73.6 a-f	8.2 c-i	18.2 a	21.6 a-h	19.2 h-n	92.5 ab
DE1101301B	100.5 a	3024 b-i	38.9 i	20.8 ab	40.3 a	11.2 j	22.4 d-i	60.8 kl
DE1001201C	95.0 a-g	2991 b-i	78.9 abc	5.6 d-i	15.5 a	25.4 ab	19.6 g-n	57.5 l
DE0407907	99.0 abc	2884 c-i	63.8 b-g	11.8 a-h	24.4 a	22.9 a-f	27.3 abc	70.4 hij
DE0505002A	92.8 c-j	2840 d-i	74.7 a-e	2.7 ghi	22.6 a	17.3 e-j	21.6 d-k	82.9 c-f
DE1001104B	91.3 e-l	2827 d-i	80.4 a	9.7 c-i	9.9 a	20.2 b-i	21.1 d-l	81.7 c-f
DE1101207A	87.5 i-p	2793 d-i	79.8 ab	8.6 c-i	11.7 a	23.4 a-f	20.2 f-n	87.5 a-d
DE1001202B	89.8 f-m	2787 d-i	76.4 a-d	5.1 e-i	18.5 a	23.4 a-f	19.8 g-n	77.5 e-i
DE1100102B	97.5 a-e	2730 e-i	63.3 c-g	13.4 a-f	23.3 a	17.4 d-j	23.3 d-g	74.6 f-j
DE1100401A	101.0 a	2727 e-i	52.4 ghi	14.9 a-e	32.7 a	17.7 c-j	28.5 ab	61.3 kl
184-85	95.8 a-f	2700 e-i	60.4 d-h	8.9 c-i	30.7 a	17.4 d-j	22.9 d-h	82.9 c-f
DE1100704A	89.3 g-m	2642 f-i	68.2 a-g	10.2 b-i	21.7 a	21.5 a-h	17.8 lmn	78.8 d-h
G3016323	88.5 h-o	2601 f-i	73.4 a-f	8.1 c-i	18.4 a	24.5 a-d	18.5 k-n	85.0 b-e
DE1000802B	93.5 b-i	2570 f-i	63.7 b-g	6.6 d-i	29.6 a	21.0 a-i	17.6 lmn	67.5 jk
Cypress	89.3 g-n	2565 f-i	68.8 a-f	6.0 d-i	25.2 a	21.8 a-h	20.4 f-n	81.3 c-g
G3041405	84.0 n-p	2496 f-j	79.1 abc	8.8 c-i	12.1 a	23.0 a-f	20.5 f-n	79.6 d-g
DE0802102B	82.8 op	2490 f-j	67.4 a-g	5.4 d-i	27.2 a	19.1 b-i	19.2 h-n	81.7 c-f
DE1000701B	89.8 f-m	2427 f-j	77.6 abc	9.3 c-i	13.2 a	27.8 a	19.9 f-n	80.8 c-g
DE1100805B	85.3 l-p	2364 f-k	78.0 abc	10.6 b-i	11.4 a	25.8 ab	22.5 d-i	85.0 b-e
G3014319	88.5 h-o	2342 f-k	63.9 b-g	11.4 b-h	24.6 a	22.6 a-g	18.6 j-n	83.7 b-e
G200381	86.5 j-p	2286 g-k	75.5 a-d	10.2 b-i	14.3 a	23.2 a-f	19.1 h-n	80.8 c-g
Meadow	86.3 k-p	2264 g-k	77.9 abc	9.8 c-i	12.3 a	22.4 a-g	20.0 f-n	84.6 b-e
DE1001202C	87.8 i-o	2259 g-k	75.7 a-d	16.0 a-d	8.4 a	21.6 a-h	19.7 g-n	76.3 e-j
G3015328	84.5 m-p	2239 h-k	63.3 c-g	13.2 a-g	23.6 a	20.3 b-i	16.7 mn	77.5 e-i
DE0407905	91.5 e-l	2238 h-k	67.5 a-g	13.7 a-f	18.9 a	15.7 g-j	21.1 d-l	68.8 ijk
DE0802102A	91.0 f-l	2178 h-k	74.6 a-e	5.2 e-i	20.2 a	18.7 b-i	18.5 k-n	85.0 b-e
DE1100303A	94.8 a-h	2176 h-k	65.2 a-g	12.0 a-h	22.8 a	15.0 hij	20.7 e-l	87.1 a-d
DE1105302A	98.0 a-d	2153 h-k	46.5 hi	22.3 a	31.3 a	14.2 ij	23.7 c-f	84.6 b-e
DE0900705C	87.8 i-o	2095 ijk	76.9 abc	9.2 c-i	13.9 a	23.4 a-f	18.5 k-n	70.4 hij
G0026023	81.3 p	1581 jk	63.2 c-g	15.2 a-e	21.6 a	15.1 hij	18.0 k-n	87.5 a-d
DE1000701A	83.0 nop	1446 k	73.9 a-f	9.3 c-i	16.8 a	22.5 a-g	16.7 n	80.4 d-g
p-value	***<0.0001***	***<0.0001***	***<0.0001***	***0.0240***	***0.1131***	***0.0008***	***<0.0001***	***<0.0001***
Fisher's LSD[3]	**6.317**		**16.195**	**10.618**	**NA**	**7.134**	**3.824**	**8.808**
Tukey's HSD[4]	**12.805**		**32.831**	**21.525**	**NA**	**14.463**	**7.752**	**17.857**

[1]Varieties highlighted and in bold are resistant to race F of downy mildew.
[2]Percent stand is highlighted for varieties for which treated seed was planted.
[3]Means followed by the same letter are not significantly different according to Fisher's LSD.
[4]Minimum significant difference according to Tukey's HSD.

Table 3. Average Days to Harvest and Standard Deviation of Days to Harvest for the Irrigated Baby Lima Bean Variety Trial Planted June 9, 2016

Variety	Average Days to Harvest	Standard Deviation of Days to Harvest*
184-85	95.8	0.50
DE0505002A	92.8	1.50
DE0900604B	99.8	1.50
DE1001104B	91.3	1.50
C-elite Select	98.3	1.50
DE1100402B	97.5	1.73
DE1100303A	94.8	1.89
G200382	94.8	1.89
DE1100401A	101.0	2.31
G3014319	88.5	2.38
DE1001102B	99.3	2.87
DE1001202E	91.8	2.87
DE1100704A	89.3	2.99
DE1001202C	87.8	3.20
DE0900701D	98.5	3.32
DE1001102E	94.8	3.40
G3015328	84.5	3.42
DE1101301B	100.5	3.70
Meadow	86.3	3.77
G3041405	84.0	3.83
DE1001201A	95.5	4.04
DE0901601B	96.0	4.24
DE0802102A	91.0	4.24
DE1001201C	95.0	4.24
DE1101207A	87.5	4.36
DE1100805B	85.3	4.50
DE1100102B	97.5	4.65
DE1105302A	98.0	5.03
DE1001202B	89.8	5.12
DE1000701B	89.8	5.12
G200381	86.5	5.32
DE0407907	99.0	5.66
G3016323	88.5	5.80
DE0407905	91.5	5.92
DE1000701A	83.0	5.94
Cypress	89.3	6.02
G0026023	81.3	6.18
DE0900705C	87.8	6.80
DE1001802A	95.5	7.00
DE1000802B	93.5	7.14
DE0802101A	86.3	10.72
DE0802102B	82.8	12.71

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 Overall Quality Varieties in the 2016 Irrigated Baby Lima Trial

Variety	Yield (lbs/A)	Weight of 100 Succulent Seeds (g)	Seedcoat Color	% of Evaluators Rating Overall Acceptable
DE1101301B	3024 b-i	89.79 a	light green	not evaluated
DE1100401A	2727 e-i	84.27 ab	green	not evaluated
DE0900701D	3692 a-d	84.02 abc	light green	50
DE1001201A	3608 a-e	83.46 abc	light green	67
DE1000802B	2570 f-i	83.02 abc	lt green	100
DE1100102B	2730 e-i	81.70 a-d	green	not evaluated
DE0802102A	2178 h-k	80.38 a-e	light green	33
DE1001102E	3085 b-h	79.46 a-f	light green	83
184-85	2700 e-i	78.89 a-g	green	100
DE1100402B	3990 ab	78.70 a-g	light green	not evaluated
DE0407907	2884 c-i	78.29 b-h	green	100
DE1001102B	3187 b-g	77.87 b-i	light green	83
DE0407905	2238 h-k	76.62 b-j	green	100
DE1001201C	2991 b-i	76.43 b-j	light green	67
DE0505002A	2840 d-i	76.01 b-j	light green	100
DE1001802A	4208 a	75.45 b-k	light green	50
DE1105302A	2153 h-k	74.36 b-k	light green	not evaluated
DE0900604B	3635 a-e	74.11 b-k	buff/black speckle	not evaluated
DE1100303A	2176 h-k	74.09 b-k	green	not evaluated
DE1001202E	3772 a-c	72.65 c-l	light green	50
DE0802101A	3218 b-f	70.84 d-l	buff/magenta speckle	17
DE0900705C	2095 ijk	70.80 d-l	light green	33
G200382	3060 b-i	70.22 e-l	green	not evaluated
DE0802102B	2490 f-j	69.83 e-l	light green	33
DE1101207A	2793 d-i	69.80 e-l	light green	not evaluated
DE1001202B	2787 d-i	68.87 f-m	green	100
G200381	2286 g-k	68.37 f-m	green	not evaluated
DE1100704A	2642 f-i	68.17 f-m	green	not evaluated
Cypress	2565 f-i	68.08 g-m	green	33
G3041405	2496 f-j	67.16 h-n	green	not evaluated
C-elite Select	3684 a-e	66.73 i-n	green	100
G3015328	2239 h-k	66.55 i-n	green	not evaluated
DE1000701B	2427 f-j	66.39 j-n	light green	not evaluated
DE1001202C	2259 g-k	66.37 j-n	green	100
DE1001104B	2827 d-i	66.02 j-n	green	100
DE0901601B	3229 b-f	65.98 j-n	light green	not evaluated
Meadow	2264 g-k	64.38 k-n	green	50
G3014319	2342 f-k	64.31 k-n	green	not evaluated
G3016323	2601 f-i	64.16 k-n	green	not evaluated
DE1100805B	2364 f-k	62.51 lmn	light green	not evaluated
G0026023	1581 jk	58.11 mn	green	not evaluated
DE1000701A	1446 k	56.59 n	light green	33
p-value	***<0.0001***	***<0.0001***		
Fishers' LSD[1]		**11.373**		
Tukey's HSD[2]		**23.055**		

[1]Means followed by the same letter are not significantly different according to Fisher's LSD.
[2]Minimum significant difference according to Tukey's HSD.

Table 5. Days to Harvest, Yield, Plant Weight, Percent Stand, Seed Weight and Seed Color for the Irrigated First Year Trial of Baby Lima Bean Breeding Lines Planted June 10, 2016

Variety	Days to Harvest[1]	Yield (Lbs/A)[1]	Plant Weight (Lbs/15 ft)[1]	% Stand[1,2]	Weight of 100 Succulent Seeds (g)[1]	Seed Color
DE1202606A	98.0 abc	4231 a	20.6 ab	75.0 de	86.6 ab	green
DE1202305B	96.0 *	4133 *	15.7 *	80.0 *	81.6 *	white
DE1203001B	99.7 abc	4005 ab	21.6 a	87.5 bcd	84.1 abc	white
DE1201101A	93.0 *	4003 *	16.0 *	98.8 *	80.2 *	green
DE1200403A	91.3 efg	3969 ab	16.8 cde	98.3 ab	65.8 fg	buff, magenta
DE1202203A	89.0 *	3876 *	16.8 *	93.8 *	77.1 *	light green
DE1202906B	97.7 abcd	3813 abc	17.0 cde	85.0 bcd	88.2 a	green
DE1202205A	95.5 *	3718 *	15.5 *	96.3 *	80.1 *	green
DE0505002A	93.7 cdef	3670 abcd	15.6 cdefg	83.3 bcd	72.7 def	light green
DE1200404A	93.7 cdef	3542 abcde	15.9 cdefg	91.7 abcd	77.3 bcde	buff, red and tan
DE1202802C	83.0 *	3488 *	15.7 *	110.0 *	59.5 *	white
DE1200307B	91.3 efg	3419 abcde	12.9 fgh	94.2 abc	62.3 g	buff, red and tan
C-elite Select	96.0 bcde	3363 abcde	17.0 cde	97.5 abc	76.2 cde	green
DE1202303C	100.0 ab	3252 bcde	18.0 bcd	82.5 bcd	86.2 ab	light green
DE0407907	100.0 ab	3173 bcdef	16.3 cdef	77.5 cde	80.5 abcd	green
DE1202802A	102.3 a	3127 bcdef	15.3 cdefg	92.5 abcd	84.6 abc	green
DE1200103A	105.0 **	3096 **	20.3 **	100.0 **	81.1 **	green
DE1200203A	88.7 fg	2953 cdefg	15.9 cdefg	110.0 a	63.5 fg	green
DE1202802B	103.0 *	2927 *	13.6 *	98.8 *	74.1 *	green
DE1202605D	88.7 fg	2884 cdefg	14.6 defgh	93.3 abcd	69.1 efg	green
DE1202501A	91.7 defg	2855 defg	12.5 gh	100.0 ab	70.9 defg	green
DE1200802A	102.7 a	2850 defg	18.1 bc	90.0 abcd	77.5 bcde	green
DE1202203B	91.3 efg	2668 efg	13.9 efgh	90.0 abcd	75.8 cde	green
DE1200505A	99.0 abc	2610 efg	17.4 bcde	90.0 abcd	82.0 abcd	green
Cypress	86.3 g	2274 fg	15.2 cdefg	80.8 bcd	62.1 g	green
DE1202804A	100.3 ab	2174 g	11.6 h	57.5 e	84.8 abc	green
p-value	<.0001	0.0018	0.0001	0.0089	<.0001	
Fisher's LSD[3]	6.0838	940.38	3.5021	20.225	9.5166	

[1]* indicates average of two reps, ** indicates data from a single plot

[2]Percent stand is highlighted for varieties for which treated seed was planted.

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

Appendix A: Weather Data for 2016 Baby Lima Variety Trials at Georgetown
June 9th (first planting) to September 23rd (final harvest)

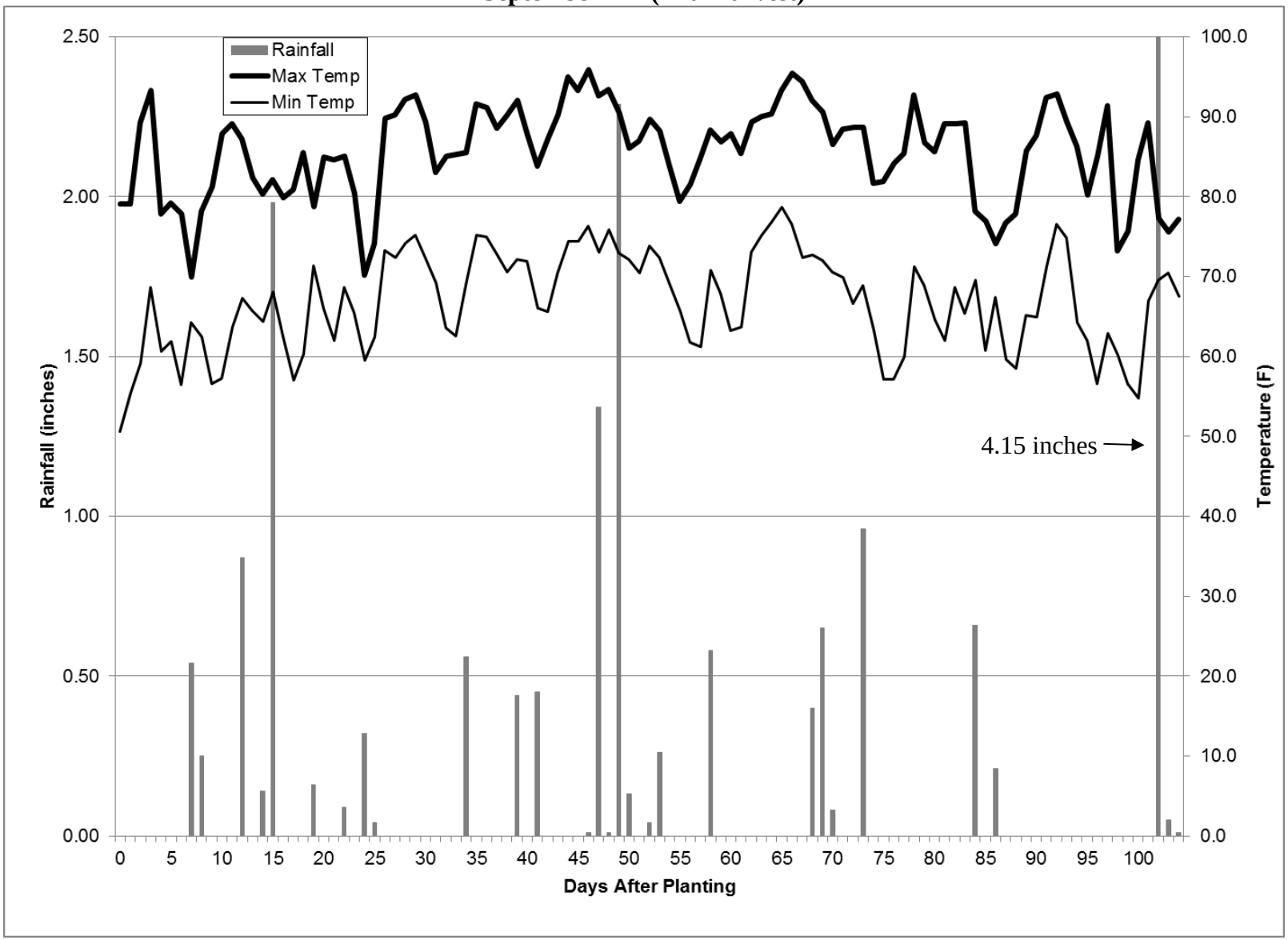
Data from DEOS weather station @ Georgetown, DE-REC: www.deos.udel.edu

Days After Planting		Date	Max Temp °F	Min Temp °F	Rainfall (in.)
June 9 Trial	June 10 Trials				
0		9-Jun	79.1	50.6	0
1	0	10-Jun	79.1	55.4	0
2	1	11-Jun	89.2	59.2	0
3	2	12-Jun	93.3	68.6	0
4	3	13-Jun	77.8	60.6	0
5	4	14-Jun	79.2	61.9	0
6	5	15-Jun	77.8	56.5	0
7	6	16-Jun	69.9	64.2	0.54
8	7	17-Jun	78.2	62.4	0.25
9	8	18-Jun	81.2	56.6	0
10	9	19-Jun	87.9	57.2	0
11	10	20-Jun	89.1	63.7	0
12	11	21-Jun	87.2	67.3	0.87
13	12	22-Jun	82.4	65.7	0
14	13	23-Jun	80.3	64.4	0.14
15	14	24-Jun	82.1	68.1	1.98
16	15	25-Jun	79.9	62.6	0
17	16	26-Jun	80.9	57.0	0
18	17	27-Jun	85.5	60.3	0
19	18	28-Jun	78.7	71.4	0.16
20	19	29-Jun	85.0	66.1	0
21	20	30-Jun	84.6	62.0	0
22	21	1-Jul	85.1	68.6	0.09
23	22	2-Jul	80.4	65.5	0
24	23	3-Jul	70.2	59.5	0.32
25	24	4-Jul	74.1	62.4	0.04
26	25	5-Jul	89.8	73.3	0
27	26	6-Jul	90.3	72.4	0
28	27	7-Jul	92.2	74.2	0
29	28	8-Jul	92.7	75.2	0
30	29	9-Jul	89.3	72.4	0
31	30	10-Jul	83.0	69.2	0
32	31	11-Jul	85.1	63.6	0
33	32	12-Jul	85.3	62.6	0
34	33	13-Jul	85.5	69.4	0.56
35	34	14-Jul	91.6	75.2	0
36	35	15-Jul	91.1	75.0	0
37	36	16-Jul	88.6	72.7	0
38	37	17-Jul	90.1	70.6	0
39	38	18-Jul	92.1	72.2	0.44
40	39	19-Jul	87.8	71.9	0
41	40	20-Jul	83.8	66.1	0.45
42	41	21-Jul	87.3	65.6	0
43	42	22-Jul	90.2	70.4	0
44	43	23-Jul	95.0	74.4	0
45	44	24-Jul	93.3	74.4	0
46	45	25-Jul	95.9	76.3	0.01
47	46	26-Jul	92.6	73.0	1.34
48	47	27-Jul	93.4	75.9	0.01
49	48	28-Jul	90.5	72.9	2.29
50	49	29-Jul	86.1	72.2	0.13

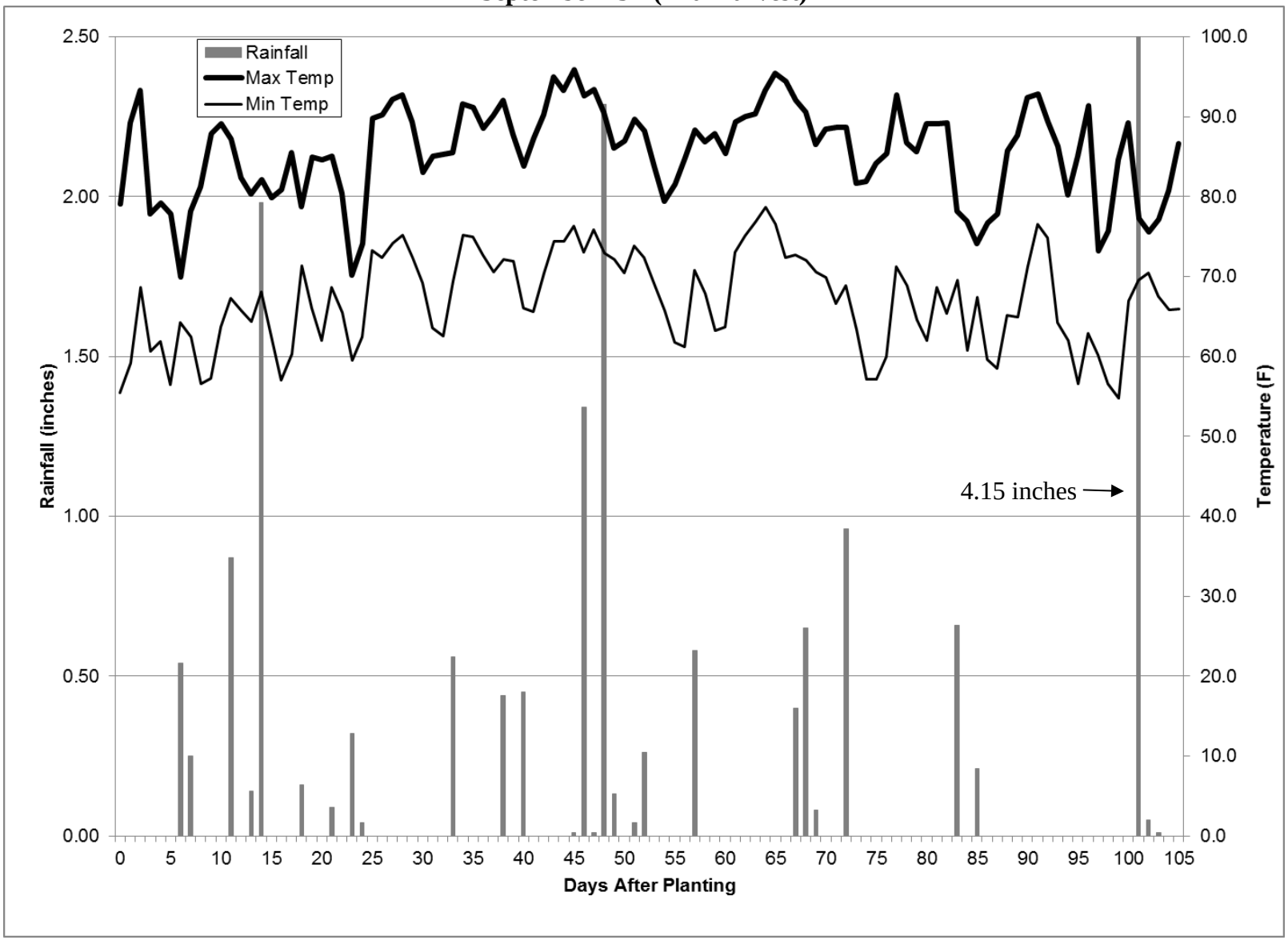
Days After Planting		Date	Max Temp °F	Min Temp °F	Rainfall (in.)
June 9 Trial	June 10 Trials				
52	51	31-Jul	89.7	73.8	0.04
53	52	1-Aug	88.2	72.4	0.26
54	53	2-Aug	83.7	68.9	0
55	54	3-Aug	79.4	65.7	0
56	55	4-Aug	81.6	61.8	0
57	56	5-Aug	84.8	61.2	0
58	57	6-Aug	88.3	70.8	0.58
59	58	7-Aug	86.9	67.9	0
60	59	8-Aug	87.9	63.2	0
61	60	9-Aug	85.4	63.7	0
62	61	10-Aug	89.4	73.0	0
63	62	11-Aug	90.0	75.1	0
64	63	12-Aug	90.4	76.9	0
65	64	13-Aug	93.3	78.7	0
66	65	14-Aug	95.4	76.5	0
67	66	15-Aug	94.4	72.4	0
68	67	16-Aug	92.0	72.7	0.4
69	68	17-Aug	90.6	72.0	0.65
70	69	18-Aug	86.5	70.6	0.08
71	70	19-Aug	88.4	69.9	0
72	71	20-Aug	88.7	66.6	0
73	72	21-Aug	88.7	68.9	0.96
74	73	22-Aug	81.7	63.3	0
75	74	23-Aug	81.9	57.1	0
76	75	24-Aug	84.2	57.1	0
77	76	25-Aug	85.4	60.0	0
78	77	26-Aug	92.7	71.2	0
79	78	27-Aug	86.8	68.9	0
80	79	28-Aug	85.6	64.6	0
81	80	29-Aug	89.1	62.0	0
82	81	30-Aug	89.1	68.6	0
83	82	31-Aug	89.2	65.4	0
84	83	1-Sep	78.2	69.6	0.66
85	84	2-Sep	76.9	60.8	0
86	85	3-Sep	74.1	67.4	0.21
87	86	4-Sep	76.7	59.6	0
88	87	5-Sep	77.8	58.5	0
89	88	6-Sep	85.7	65.1	0
90	89	7-Sep	87.6	64.9	0
91	90	8-Sep	92.4	71.2	0
92	91	9-Sep	92.8	76.5	0
93	92	10-Sep	89.3	74.8	0
94	93	11-Sep	86.3	64.2	0
95	94	12-Sep	80.2	62.0	0
96	95	13-Sep	85.1	56.6	0
97	96	14-Sep	91.4	62.9	0
98	97	15-Sep	73.2	60.2	0
99	98	16-Sep	75.7	56.6	0
100	99	17-Sep	84.6	54.8	0
101	100	18-Sep	89.2	66.9	0
102	101	19-Sep	77.3	69.5	4.15

Days After Planting		Date	Max Temp °F	Min Temp °F	Rainfall (in.)
June 9 Trial	June 10 Trials				
103	102	**20-Sep**	75.6	70.5	0.05
104	103	**21-Sep**	77.2	67.5	0.01
	104	**22-Sep**	80.8	65.8	0
	105	**23-Sep**	86.6	65.9	0

Appendix B: Weather Conditions During the 2016 Irrigated Advanced Baby Lima Variety Trial June 9th (planting) to September 21st (final harvest)



Appendix C: Weather Conditions During the 2016 Irrigated 1st Year Trial and Dryland Trial from June 10th (planting) to September 23rd (final harvest)



2016 Fordhook Lima Bean Variety Trial

The 2016 Fordhook Lima Bean Variety Trial included a total of 33 lines. Thirty-two of the lines were from the University of Delaware lima bean breeding program. Fordhook 242 was included in the trial as a check variety. 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.

Variety Name	Description
FH 242	commercial standard
DE0600602B	UD Breeding Line
DE0600605C	UD Breeding Line
DE0700904	UD Breeding Line
DE0701101	UD Breeding Line
DE0701301A	UD Breeding Line
DE0803801A	UD Breeding Line
DE0804401C	UD Breeding Line
DE0804404A	UD Breeding Line
DE0804404C	UD Breeding Line
DE0900302A	UD Breeding Line
DE1002701A	UD Breeding Line
DE1002703A	UD Breeding Line
DE1002703B	UD Breeding Line
DE1101902B	UD Breeding Line
DE1102002A	UD Breeding Line
DE1102103C	UD Breeding Line
DE1102104B	UD Breeding Line
DE1102104C	UD Breeding Line
DE1102201A	UD Breeding Line
DE1102202A	UD Breeding Line
DE1102206A	UD Breeding Line
DE1102209B	UD Breeding Line
DE1202301B	UD Breeding Line
DE1202301D	UD Breeding Line
DE1203202A	UD Breeding Line
DE1203401A	UD Breeding Line
DE1203402B	UD Breeding Line
DE1203403A	UD Breeding Line
DE1203502A	UD Breeding Line
DE1203502B I	UD Breeding Line
DE1203502B II	UD Breeding Line
DE1204101A	UD Breeding Line

Location:

Field 31 at the University of Delaware Research and Education Center Farm, Georgetown, DE

Cultural Practices:

The trial was hand planted on June 28, 2016 into rows marked with a Monosem planter. Only the 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. Some lines were not replicated due to low seed stock.

The field was fertilized with potassium according to soil test recommendations before planting. A pre-emergence application of 1.5 pt/A Dual II Magnum + 2 oz/A Pursuit for weed control as well as 33 lbs/A nitrogen in the form of 30% UAN was made on June 30. Plots were cultivated once. One sidedress application of 33 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. Sniper at 4 oz/A was applied on September 1 for stinkbugs and again on September 23 at 6.4 oz/A. Kocide at 1 lb/A was applied on the same dates. Bacterial brown spot was observed in the plot and caused yield loss.

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 3 (97 DAP) and ended on October 20 (114 DAP).

All plants from each plot were 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.

Results and Discussion
This trial was planted in late June but still experienced significant heat stress during flowering which delayed maturity and reduced yields. Plants were also affected by bacterial brown spot after periods of wet and windy weather late in the season. Overall, yields in this trial were very low but there were statistically significant differences between varieties in terms of yield. Three lines had significantly higher yields than FH 242: DE1102103C, DE1002703B and DE1203402B (Table 6). The standard variety, Fordhook 242, yielded 540 lbs/A.

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

DE1002703A has been tested for three years and has an average yield of 2642 lbs/A or 94% of the yield of Fordhook 242 for the same years. DE1002703A has green seed and was rated acceptable by all of the evaluators in 2014. This line is also resistant to race F of downy mildew.

DE1002703B has been tested for three years and has an average yield of 2057 lbs/A or 73% of the yield of FH 242 for the same years. DE1002703B has green seed and was rated acceptable by 80% of the evaluators in 2014. This line is also resistant to race F of downy mildew.

Table 6. Days to Harvest, Yield, Maturity at Harvest, Number of Pods per Plant, Plant Weight, and Percent Stand at Harvest, for Entries in the 2016 Fordhook Lima Bean Variety Trial

Variety[1]	Days to Harvest		Yield (Lbs/A)		% Full Pods		% Flat Pods		% Dry Pods		# Pods/Plant		Plant Weight (lbs/8 ft)		% Stand[2]	
DE1102103C	110.0	abc	1137	a	78.8	abc	8.4	a	12.8	bcdef	5.5	abcde	12.2	bcde	80.0	abc
DE1002703B	110.0	abc	1055	ab	71.1	bc	11.7	a	17.1	abcd	6.3	abc	8.2	hi	58.3	defg
DE1203402B	97.0	d	1037	ab	75.8	abc	22.7	a	1.5	g	6.9	ab	13.1	abcd	86.7	ab
DE1203502A	105.0	**	987	**	77.8	**	12.9	**	9.2	**	5.9	**	9.4	**	75.0	**
DE1203502B I	108.5	**	956	**	80.8	**	4.5	**	14.7	**	4.5	**	9.6	**	85.0	**
DE0803801A	107.7	bc	940	abc	86.2	ab	8.2	a	5.6	efg	4.9	abcdef	11.6	defg	83.3	abc
DE1102201A	113.5	**	926	**	88.9	**	3.9	**	7.2	**	5.3	**	15.4	**	72.5	**
DE0804404A	97.0	*	899	*	72.7	*	27.3	*	0.0	*	5.5	*	11.8	*	85.0	*
DE1102104B	110.0	abc	868	abcd	75.5	abc	10.8	a	13.7	bcdef	4.7	abcdef	11.6	defg	81.7	abc
DE1002703A	113.5	**	780	**	65.3	**	7.2	**	27.6	**	3.3	**	9.1	**	80.0	**
DE1202301B	113.3	ab	768	abcde	80.2	abc	14.3	a	5.5	efg	3.5	cdefg	11.9	cdef	91.7	a
DE1203502B II	110.3	abc	679	bcdef	62.7	c	11.8	a	25.5	a	2.8	defg	8.9	fghi	86.7	ab
DE0701301A	113.5	**	657	**	89.5	**	0.7	**	9.8	**	3.7	**	10.4	**	60.0	**
DE1102202A	113.7	a	622	bcdef	84.3	ab	5.5	a	10.2	defg	4.0	bcdefg	11.0	defgh	61.7	def
DE1002701A	113.5	**	618	**	75.3	**	13.4	**	11.3	**	4.8	**	8.3	**	55.0	**
DE1102209B	104.7	bc	617	bcdef	77.8	abc	16.5	a	5.7	efg	5.9	abcd	11.9	bcdef	53.3	fgh
DE0700904	113.3	ab	614	bcdef	86.2	ab	8.1	a	5.7	efg	4.6	abcdef	8.6	ghi	70.0	cde
DE0600605C	113.3	ab	589	cdef	84.0	ab	4.1	a	11.9	bcdefg	3.4	cdefg	8.8	fghi	56.7	efgh
DE1101902B	110.0	abc	589	cdef	82.2	abc	13.1	a	4.6	efg	3.7	cdefg	14.8	abc	80.0	abc
DE1204101A	113.7	a	579	cdef	75.9	abc	10.2	a	13.9	bcde	3.0	defg	8.5	hi	78.3	abc
DE0600602B	114.0	*	569	*	82.7	*	7.7	*	9.6	*	2.9	*	8.8	*	75.0	*
FH 242	113.3	ab	540	cdefg	79.3	abc	9.6	a	11.1	cdefg	2.1	fg	15.7	a	91.7	a
p-value		***0.0003***		***0.0017***		***0.0202***		***0.3004***		***0.0017***		***0.0093***	***<.0001***		***<.0001***	
Fisher's LSD[3]		**5.9948**		**447.24**		**19.611**		**NA**		**11.036**		**3.1635**		**3.1219**		**15.494**
Tukey's HSD[4]		**11.325**		**844.86**		**37.047**		**NA**		**20.847**		**5.9762**		**5.8975**		**29.269**

[1]Varieties highlighted and in bold are resistant to race F of downy mildew

[2]Percent stand is highlighted for varieties for which treated seed was planted.

[3]Means followed by the same letter are not significantly different according to Fisher's LSD. ** indicates average of 2 reps, * indicates single plot data.

[4]Minimum significant difference according to Tukey's HSD. ***Table 6 continues on the next page.***

Table 6. Days to Harvest, Yield, Maturity at Harvest, Number of Pods per Plant, Plant Weight, and Percent Stand at Harvest, for Entries in the 2016 Fordhook Lima Bean Variety Trial *continued*

Variety[1]	Days to Harvest	Yield (Lbs/A)	% Full Pods	% Flat Pods	% Dry Pods	# Pods/Plant	Plant Weight (lbs/8 ft)	% Stand[2]
DE1203401A	113.3 ab	525 cdefg	76.8 abc	10.7 a	12.5 bcdefg	3.4 cdefg	9.1 efghi	70.0 cde
DE1203202A	114.0 *	499 *	51.9 *	11.5 *	36.5 *	1.6 *	7.1 *	85.0 *
DE1202301D	113.3 ab	451 defg	90.9 a	4.2 a	4.9 efg	2.6 efg	10.2 defgh	85.0 abc
DE1102002A	110.0 abc	425 defg	78.4 abc	18.8 a	2.8 fg	3.6 cdefg	12.7 abcd	45.0 gh
DE0701101	113.5 **	350 **	82.3 **	12.2 **	5.5 **	1.5 **	9.7 **	80.0 **
DE0804404C	105.0 **	350 **	54.0 **	11.3 **	34.7 **	10.3 **	3.0 **	10.0 **
DE1102104C	113.7 a	348 efg	76.7 abc	10.2 a	13.1 bcdef	2.1 fg	15.0 ab	73.3 bcd
DE1102206A	110.0 abc	343 efg	78.9 abc	12.2 a	8.9 defg	7.4 a	8.3 hi	28.3 i
DE1203403A	108.5 **	342 **	77.8 **	11.1 **	11.1 **	2.0 **	9.7 **	77.5 **
DE0804401C	113.3 ab	259 fg	73.1 abc	4.2 a	22.7 ab	2.1 fg	6.9 i	46.7 fgh
DE0900302A	113.3 ab	107 g	41.9 d	36.3 a	21.8 abc	1.0 g	8.8 fghi	41.7 hi
p-value	***0.0003***	***0.0017***	***0.0202***	***0.3004***	***0.0017***	***0.0093***	***<.0001***	***<.0001***
Fisher's LSD[3]	**5.9948**	**447.24**	**19.611**	**NA**	**11.036**	**3.1635**	**3.1219**	**15.494**
Tukey's HSD[4]	**11.325**	**844.86**	**37.047**	**NA**	**20.847**	**5.9762**	**5.8975**	**29.269**

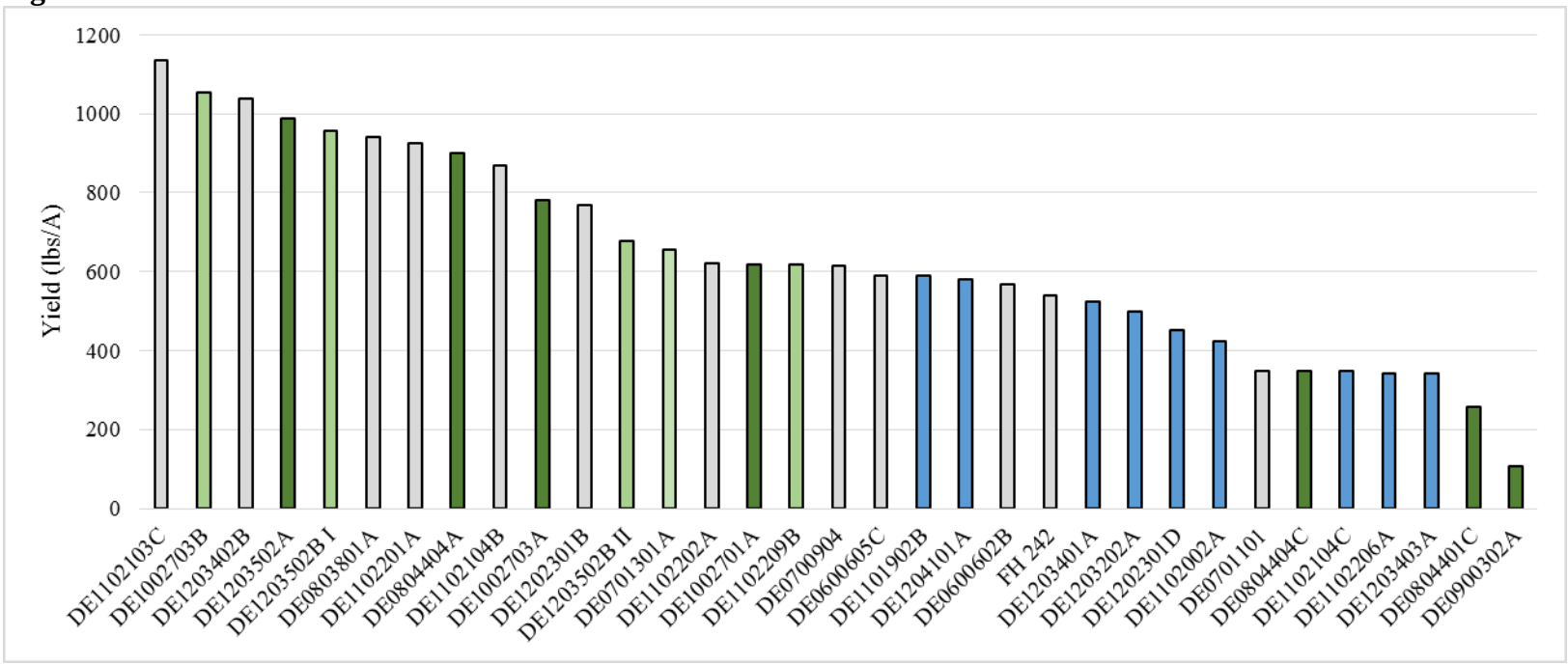
[1]Varieties highlighted and in bold are resistant to race F of downy mildew

[2]Percent stand is highlighted for varieties for which treated seed was planted.

[3]Means followed by the same letter are not significantly different according to Fisher's LSD. ** indicates average of 2 reps, * indicates single plot data.

[4]Minimum significant difference according to Tukey's HSD. ***Table 6 continues on the next page.***

Figure 3. Yield of Fordhook Lines Trialed in 2016



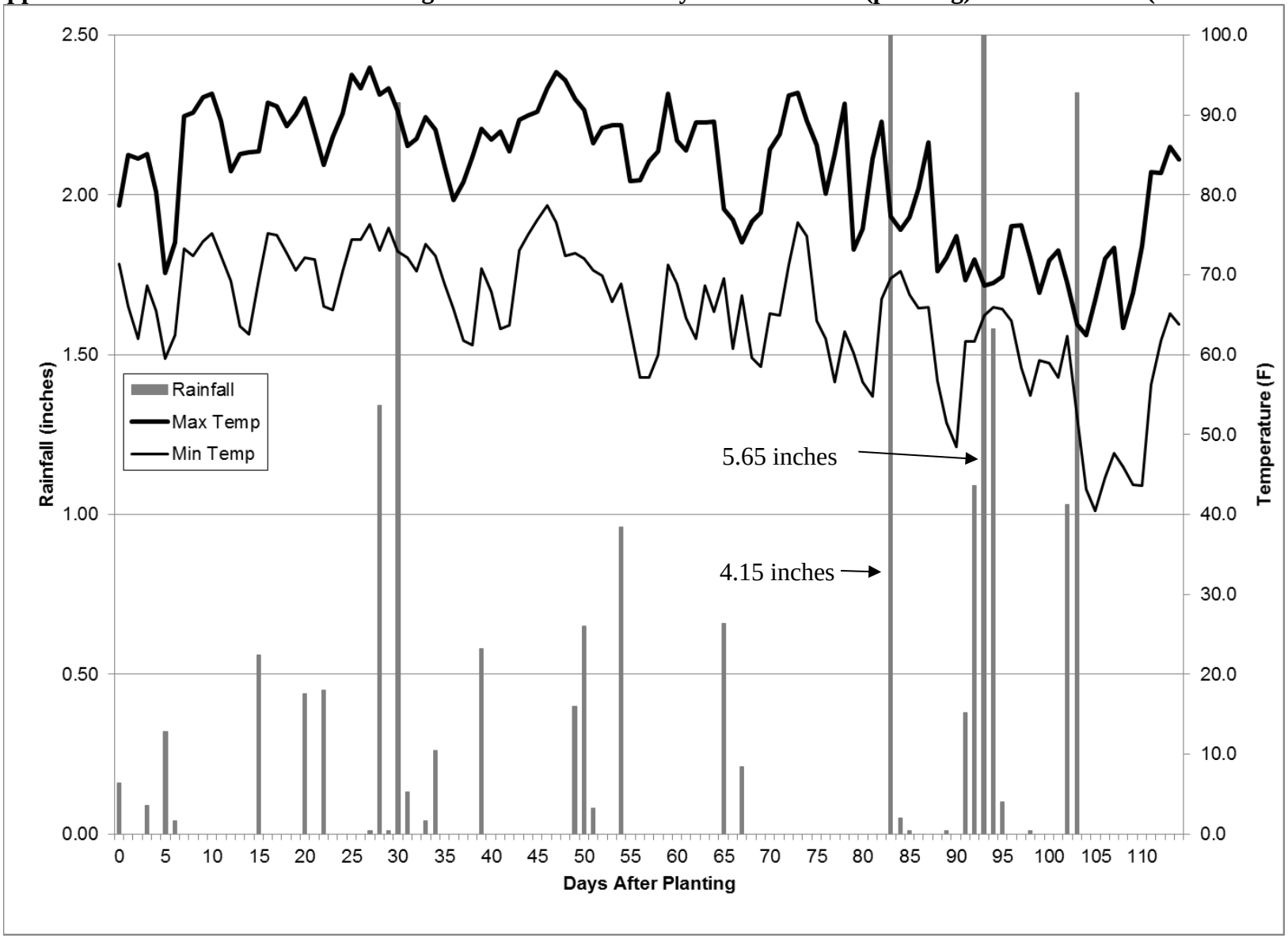
Appendix E: Weather Data for 2016 Fordhook Lima Variety Trial
June 28th (planting) to October 20th (final harvest)

DAP	Date	Max Temp °F	Min Temp °F	Rainfall (in.)
0	**28-Jun**	78.7	71.4	0.16
1	**29-Jun**	85.0	66.1	0
2	**30-Jun**	84.6	62.0	0
3	**1-Jul**	85.1	68.6	0.09
4	**2-Jul**	80.4	65.5	0
5	**3-Jul**	70.2	59.5	0.32
6	**4-Jul**	74.1	62.4	0.04
7	**5-Jul**	89.8	73.3	0
8	**6-Jul**	90.3	72.4	0
9	**7-Jul**	92.2	74.2	0
10	**8-Jul**	92.7	75.2	0
11	**9-Jul**	89.3	72.4	0
12	**10-Jul**	83.0	69.2	0
13	**11-Jul**	85.1	63.6	0
14	**12-Jul**	85.3	62.6	0
15	**13-Jul**	85.5	69.4	0.56
16	**14-Jul**	91.6	75.2	0
17	**15-Jul**	91.1	75.0	0
18	**16-Jul**	88.6	72.7	0
19	**17-Jul**	90.1	70.6	0
20	**18-Jul**	92.1	72.2	0.44
21	**19-Jul**	87.8	71.9	0
22	**20-Jul**	83.8	66.1	0.45
23	**21-Jul**	87.3	65.6	0
24	**22-Jul**	90.2	70.4	0
25	**23-Jul**	95.0	74.4	0
26	**24-Jul**	93.3	74.4	0
27	**25-Jul**	95.9	76.3	0.01
28	**26-Jul**	92.6	73.0	1.34
29	**27-Jul**	93.4	75.9	0.01
30	**28-Jul**	90.5	72.9	2.29
31	**29-Jul**	86.1	72.2	0.13
32	**30-Jul**	87.0	70.5	0
33	**31-Jul**	89.7	73.8	0.04
34	**1-Aug**	88.2	72.4	0.26
35	**2-Aug**	83.7	68.9	0
36	**3-Aug**	79.4	65.7	0
37	**4-Aug**	81.6	61.8	0
38	**5-Aug**	84.8	61.2	0
39	**6-Aug**	88.3	70.8	0.58
40	**7-Aug**	86.9	67.9	0
41	**8-Aug**	87.9	63.2	0
42	**9-Aug**	85.4	63.7	0
43	**10-Aug**	89.4	73.0	0
44	**11-Aug**	90.0	75.1	0
45	**12-Aug**	90.4	76.9	0
46	**13-Aug**	93.3	78.7	0
47	**14-Aug**	95.4	76.5	0
48	**15-Aug**	94.4	72.4	0
49	**16-Aug**	92.0	72.7	0.4
50	**17-Aug**	90.6	72.0	0.65
51	**18-Aug**	86.5	70.6	0.08
52	**19-Aug**	88.4	69.9	0
53	**20-Aug**	88.7	66.6	0

DAP	Date	Max Temp °F	Min Temp °F	Rainfall (in.)
54	**21-Aug**	88.7	68.9	0.96
55	**22-Aug**	81.7	63.3	0
56	**23-Aug**	81.9	57.1	0
57	**24-Aug**	84.2	57.1	0
58	**25-Aug**	85.4	60.0	0
59	**26-Aug**	92.7	71.2	0
60	**27-Aug**	86.8	68.9	0
61	**28-Aug**	85.6	64.6	0
62	**29-Aug**	89.1	62.0	0
63	**30-Aug**	89.1	68.6	0
64	**31-Aug**	89.2	65.4	0
65	**1-Sep**	78.2	69.6	0.66
66	**2-Sep**	76.9	60.8	0
67	**3-Sep**	74.1	67.4	0.21
68	**4-Sep**	76.7	59.6	0
69	**5-Sep**	77.8	58.5	0
70	**6-Sep**	85.7	65.1	0
71	**7-Sep**	87.6	64.9	0
72	**8-Sep**	92.4	71.2	0
73	**9-Sep**	92.8	76.5	0
74	**10-Sep**	89.3	74.8	0
75	**11-Sep**	86.3	64.2	0
76	**12-Sep**	80.2	62.0	0
77	**13-Sep**	85.1	56.6	0
78	**14-Sep**	91.4	62.9	0
79	**15-Sep**	73.2	60.2	0
80	**16-Sep**	75.7	56.6	0
81	**17-Sep**	84.6	54.8	0
82	**18-Sep**	89.2	66.9	0
83	**19-Sep**	77.3	69.5	4.15
84	**20-Sep**	75.6	70.5	0.05
85	**21-Sep**	77.2	67.5	0.01
86	**22-Sep**	80.8	65.8	0
87	**23-Sep**	86.6	65.9	0
88	**24-Sep**	70.4	56.7	0
89	**25-Sep**	72.2	51.5	0.01
90	**26-Sep**	74.8	48.5	0
91	**27-Sep**	69.3	61.6	0.38
92	**28-Sep**	71.9	61.6	1.09
93	**29-Sep**	68.6	64.9	5.65
94	**30-Sep**	69.0	65.9	1.58
95	**1-Oct**	69.8	65.7	0.1
96	**2-Oct**	76.1	64.3	0
97	**3-Oct**	76.2	58.4	0
98	**4-Oct**	72.2	54.9	0.01
99	**5-Oct**	67.7	59.3	0
100	**6-Oct**	71.8	58.9	0
101	**7-Oct**	73.1	57.1	0
102	**8-Oct**	69.0	62.3	1.03
103	**9-Oct**	63.8	52.2	2.32
104	**10-Oct**	62.5	43.1	0
105	**11-Oct**	66.8	40.5	0
106	**12-Oct**	72.0	44.6	0
107	**13-Oct**	73.4	47.7	0
108	**14-Oct**	63.4	46.0	0
109	**15-Oct**	67.8	43.7	0

DAP	Date	Max Temp °F	Min Temp °F	Rainfall (in.)
110	**16-Oct**	73.6	43.6	0
111	**17-Oct**	82.9	56.2	0
112	**18-Oct**	82.7	61.8	0
113	**19-Oct**	86.0	65.1	0
114	**20-Oct**	84.4	63.8	0

Appendix F: Weather Conditions During 2016 Fordhook Variety Trial June 28th (planting) to October 20th (final harvest)



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