

2019 Dry Bean Variety Trial Report



Trial Goal:

Evaluate heirloom and heirloom-type bean varieties as well as disease resistant modern breeding lines to assess performance and disease resistance under natural field pathogen pressure. Varieties were chosen based on communications with growers and seed companies based on the trial goal of evaluating commonly grown heirlooms such as Jacob's Cattle and Calypso as well as lesser known varieties that may perform well in specialty markets but are currently less widely grown. 10 varieties were selected, with one breeding line from Puerto Rico failing to mature before frost on October 5th. This entry was eliminated from trial analysis. USDK-CBB-15 and USC-CBB-20 are dark red kidney and cranberry (respectively) breeding lines developed by the USDA-ARS in Washington State to offer resistance to Common Bacterial Blight as well as Bean Common Mosaic Virus. They have also scored well in Anthracnose screenings, but we did not observe this pathogen in our trial. LFR101 is a pinto breeding line also developed by USDA-ARS in Puerto Rico for resistance to *Empoasca fabaceae* (Potato leafhopper).

Locations:

Homer C. Thompson Research Farm, Freeville NY
Hudson Valley Farm Hub, Hurley NY
Patchwork Farm, Aaronsburg PA

Trial Specifications:

Trial plots were seeded on June 16th at Homer C. Thompson Research Farm in Freeville, NY. Beans were seeded by hand into raised beds in two rows 30" apart. Plots were 8 ft long with 3 replicates using a Randomized Complete Block Design. On-farm trials were single replicates.

Leafhopper damage ratings were scored on July 12th, and Common Bacterial Blight and Halo blight ratings were scored on August 2nd. Plant height, growth habit and pod disease were rated at harvest. All pest and disease ratings were scored as a percentage of total plant area infected (AUDPC).

Entries categorized as 'Early' maturity based on pod dry down were harvested on September 17th (93 DAP) and entries categorized as 'Medium' maturity were harvested on September 30th (106 DAP).

Trial Results:

Yields varied widely, with 'Purple Stardust', 'Candy' and 'CBB-15' performing highest. 'LFR-101' was not included in yield analysis because due to limited seed, plot sizes were smaller. Anecdotally, 'LFR-101' was very high-yielding.

Severe natural disease pressure occurred in the trial, possibly caused by planting of some infected seed. 'Orca' seed was obtained from a culinary source and low germination as well as stunting in the seedling stage was observed. 'Orca' also tested positive for potyvirus, likely caused by BCMV, and trial performance was likely affected by seed quality and pathogen effects. Significant divergence in susceptibility was observed. Samples of infected tissue were collected for diagnosis and the presence of *Xanthomonas campestris* pv. *phaseoli* (Common Bacterial Blight) and *Pseudomonas syringae* pv. *phaseolicola* (Halo Blight) was confirmed. 'Jacob's Cattle' and 'Calypso' had highest severity of Common Bacterial Blight and Halo Blight, while 'CBB-15', 'CBB-20', 'LFR-101' and 'Stardust' showed the lowest severity (Table 3).

There was also moderate leafhopper pressure starting at approximately 14 days after planting. 'Stardust' and 'LFR101' showed superior leafhopper resistance at the seedling stage, though pest pressure was not severe enough to noticeably limit growth in any of the trial plots.

Very high lodging rates in all plots were observed (not reported), possibly due to high wind events and planting in two row plots on raised beds.

Table 1. Varieties Trialed in 2019.

Growth Habit: I=determinate bush, II=upright indeterminate bush, III=some vining, IV=pole

	EntryName	Plant.Height	Growth.Habit	Maturity
1	Calypso	38	I	Early
2	Candy	46	III	Med
3	CBB-15	40	I	Med
4	CBB-20	40	I	Early
5	Jacobs Cattle	40	I	Early
6	Jacobs Cattle Gold	38	I	Early
7	LFR101	50	III	Med
8	Orca	48	II	Med
10	Stardust	45	I	Med

Table 2. Table of Means and Groups. Note: Letters indicate entries which are not statistically different for that trait. For example, all entries with an 'a' are not statistically different for that trait.

Variety	Yield		Leafhopper.AUDPC		Leaf.CBB.AUDPC		Pod.CBB.AUDPC		Halo.Blight.ADUPC	
Calypso	652.4	b	33.3	a	70	a	70	a	90	a
Candy	1354.6	a	26.7	ab	43.3	b	43.3	b	20	bcd
CBB-15	1313	a	13.3	c	6.7	de	6.7	cd	10	cd
CBB-20	1019.6	ab	23.3	abc	10	de	10	cd	36.7	bc
Jacobs Cattle	892	ab	20	bc	73.3	a	70	a	83.3	a
Jacobs Cattle Gold	886.4	ab	33.3	a	36.7	bc	36.7	b	46.7	b
LFR101	852.8	ab	13.3	c	30	bcd	30	bc	6.7	d
Orca	773.5	b	26.7	ab	16.7	cde	10	cd	36.7	bc
Stardust	1384.2	a	13.3	c	36.7	bc	36.7	b	33.3	bcd

Table 2 cont.

Variety	Plant.Height	Pod.Distance	Pod.Disease	Lodging
Calypso	38.3	de	4	a
Candy	46.7	abc	0	a
CBB-15	39.3	cde	2.7	a
CBB-20	40	bcde	2.7	a
Jacobs Cattle	37.7	de	0.7	a
Jacobs Cattle Gold	36.3	e	3.7	a
LFR101	53.3	a	2	a
Orca	45.3	abcd	0.7	a
Stardust	47.7	ab	1.3	a

Table 4. Flavor Evaluations

Variety	Aesthetics (1-10), Cooking Quality	Eating Quality (1-10)
Calypso	8 - held shape, pattern/color faded but retained	9
LFR-101	4 - fast cooking, prone to splitting/falling apart	4 very mild/flavorless, thin skin
Jacob's Cattle	7 - mostly intact, though lost most color/pattern, fast cooking	8, good flavor and texture
Orca	10 – held shape, holds color and pattern very well, dark broth	9 Rich bean and broth flavor
Candy	8 Large size is pleasing, didn't hold color	5 Skin was somewhat tough
Jacob's Cattle Gold	8 Held color/pattern better than Jacob's Cattle, mostly intact	8 good flavor and smooth texture
Stardust	8, mostly intact but lost most color/pattern	9 mild but pleasing flavor, texture
CBB-15	8 held color and shape well	4 tough skin, somewhat grainy texture
CBB-20	6 fast cooking, prone to splitting/disintegrating	5 mild flavor and thin skin, somewhat watery

On-Farm Trial Results

Hudson Valley Farm Hub/Seedshed

Highest yielding entries were CBB-20, CBB-15, Stardust and Black Coco. Lowest yielding entries were Jacob's Cattle and Tiger's Eye. Standout varieties at this site for overall performance were CBB-20 (high yielding, upright, minimal pest/disease damage and delicious), Calypso (unique, beautiful bean, upright, tasty) and Jacob's Cattle Gold (upright, moderate yield, less damage, beautiful and delicious).

There was extreme leafhopper pressure at this site, and growers reported that ‘Tiger’s Eye’, ‘Jacob’s Cattle’, ‘Calypso’ and ‘Black Coco’ had the most severe damage. Maturation and yields appeared to have been affected by leafhopper damage. ‘Orca’ was removed due to presence of seedborne pathogens, and Candy did not mature before to frost due to fairly late planting date (July 24).

Flavor Evaluations

Variety	Aesthetics (1-10), Cooking Quality	Eating Quality (1-10)
Calypso	10, Skin fell off and beans became soupy/lost integrity	7
Tiger’s Eye	10, beans split & lost skins	3.2
Jacob’s Cattle	10, skins fell off, beans remained semi-integral	7
Black Coco	5, mostly integral, some skins fell off	3.8
Orca	N/A	N/A
Candy	Didn’t mature before frost	N/A
Jacob’s Cattle Gold	10, Split when soaked, became soupy/lost integrity	7
Stardust	10, held skins, good integrity	4.4
CBB-15	5, ½ skins fell off, stayed semi-integral	7.2
CBB-20	5, stayed semi-integral	2.2

Patchwork Farm

Highest yielding entries were CBB-15, Jacob’s Cattle Gold, CBB-20, and Calypso. Lowest yielding entries were Jacob’s Cattle, Black Coco and Stardust. Orca yields were likely affected by low germination. They found Stardust, Orca and Tiger’s Eye to be less preferable due to vining habit.

Patchwork Farm grows roughly 1 acre of certified organic dry beans. They harvest whole plants onto pallets, dry them down in greenhouse and shell using a Rotofingers. They apply *Pediobius foveolatus*, a beneficial nematode, for Mexican Bean Beetle control.

Bean Seed Photos



'Candy'



'Purple Stardust'



'CBB-15'



'LFR-101'



'Calypso'



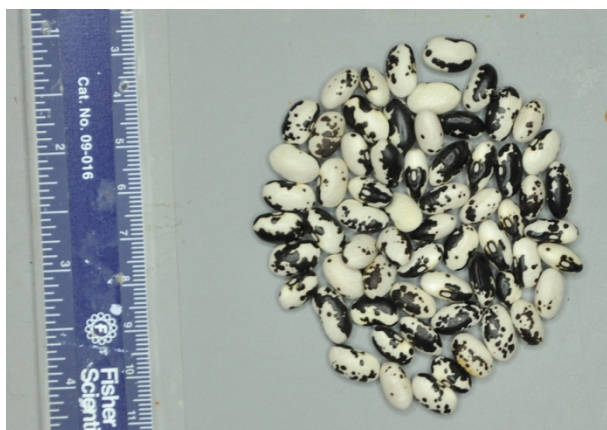
'Jacob's Cattle'



'Jacob's Cattle Gold'



'CBB-20'



'Orca'

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