

NEW YORK STATE 2021 DRY BEAN CULTIVAR TRIAL REPORT (Dark Red Kidney, Light Red Kidney, Black Turtle, Cranberry & Others)

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Trial Objectives:

Pulses, such as Dry Beans, are demanding global attention as the search for sustainable and high nutritional value crops intensifies. Globally, we face growing populations and limited farmland. Dry beans are high in macro-nutrients, such as proteins and carbs, as well as micro-nutrients, such as minerals, vitamins and healthy lipids (Iriti & Varoni 2017). New York State has a long history of growing dry beans, but the past few decades acreage has dwindled. In 1996-97, NYS growers planted about 35,000 acres (96-97 nass/usda.gov). In 2017, NYS growers planted about 12,619 acres (17-18 nass/usda.gov). Although acreage has shrunk, past and present growers have shown dry beans are a viable crop in NYS. Growing global interest in dry bean production means potential markets for NYS growers and processors.

The objective of this trial was to compare the performance of new dry bean varieties with industry standards. Metrics of interest include yield, maturity, height & width of plants, disease resistance, adaptation to NYS growing conditions and processing quality. This was accomplished in cooperation with the NYS Dry Bean Industry in an attempt to find new, higher quality, and disease resistant varieties that are adapted to our climate and soil conditions.

For both replicated and observation entries, yield of ten feet per replication was obtained by pulling the plants and hand picking the pods. An Almeco thresher was used to shell the pods. Seeds were hand graded to remove the splits and blemished seeds prior to processing. Seed count is a true sample of what was harvested.

Procedures and Materials:

Location: Research North Farm, 1097 County Road 4, Geneva, NY 14456

Soil Type: Honeoye Silt Loam

Planting Dates: 6/25/2021

Row Width: 30 inches, Row length: 30 ft.

In-row Spacing: (kidneys/cranberries, 5-6 seeds/ft., blacks/navies/small reds - 6-8 seeds/ft.)

Tillage: Conventional

Fertilizer: 300#/A of 8-14-21

Herbicide: Dual

Planter - Two Row Monosem Vacuum Planter

Plot Size: 1 row 35 ft long - 4 replications (3 replications harvested, 1 for observation)

Season Summary:

The 2021 Dry Bean field had not been planted with a legume for three years as part of our purposeful rotation. Soil moisture was adequate at the time of planting. July was an excessively wet month and recorded several intense rain events. August was similarly wet with intense rain events. September was dry enough for most of the beans to dry down in the field. Although it was an overall wet year, no white mold was observed. See the weather insert at the end of the summary for a breakdown of temperatures and precipitation over the growing season. We are optimistically planning for a late March 2022 cutting event where 2021 samples will be put on display. As Spring approaches, we will evaluate and plan accordingly. Once visual evaluations are completed at the cutting, ratings will be added to the report and redistributed.

Table 1: Cultivar List and Seed Source

Dark Red Kidney:	Seed Source:
Chaparral	ProVita
Epic	ProVita
Rampart	ProVita
Spire	ProVita
161164	ProVita
161156	ProVita
181017	ProVita
181021	ProVita
Red Hawk	Standard

Cranberry:	Seed Source:
Jester	ProVita
16756	ProVita
16758	ProVita
16775	ProVita
16816	ProVita

Light Red Kidney:	Seed Source:
Red Dawn	ProVita
Big Red	ProVita
15923	ProVita
161014	ProVita
161041	ProVita
161082	ProVita
Cal Early	Standard

Other Types:	Type:	Source:
Alpena	Navy	MSU
BK33	Black Kidney	Cornell
Merlot	Small Red	MSU
Powderhorn	Northern	MSU
Rojo Chiquito	Small Red	WSU
Rosetta	Pink	MSU
UPRK45	Purple Kidney	Cornell

Black Turtle:	Seed Source:
Black Tails	ProVita
Spectre	ProVita
Black Beard	ProVita
Eclipse	ProVita
Nimbus	ProVita
13496	ProVita
Ace	ADM
B3036381	ADM
Zenith	Standard

Table 2: Yield Characteristics

Cultivar	Count per pound	Plants per foot	Moisture %	Pounds per acre	Bushels per acre	Days to harvest
Dark Red Kidney Types:						
Chaparral	1258	6.4	10.2	1670	27.8	97
Epic	1046	6.6	14.9	1774	29.5	97
Rampart	1266	6.7	13.9	1734	28.9	97
Spire	1492	6.8	11.5	1824	30.4	99
161164	1214	6.1	12.2	1786	29.8	99
161156	1282	6.1	13.9	2012	33.5	99
181017	1075	6.4	13.1	1606	26.8	99
181021	1064	6.7	12.8	1876	31.3	97
Red Hawk (std)	1087	5.2	11.1	1780	29.7	99
Light Red Kidney Types:						
Red Dawn	971	6.1	12.5	1835	30.6	99
Big Red	1099	6.1	12.5	1986	33.1	99
15923	1000	6.2	11.1	1638	27.3	99
161014	1036	5.9	10.7	1623	27.0	99
161041	1112	6.3	10.9	1603	26.7	99
161082	1063	6.7	12.6	1510	25.2	99
Cal Early (std)	1124	5.0	12.1	1710	28.5	99
Black Turtle Types:						
Black Tails	2564	6.2	9.2	2285	38.1	99
Spectre	2364	7.2	8.4	1934	32.2	99
Black Beard	2404	7.2	8.8	2094	34.9	99
Eclipse	2611	6.4	10.6	1957	32.6	99
Nimbus	2388	7.1	8.2	1835	30.6	99
13496	2457	7.2	9.1	2012	33.5	99
Ace	2625	6.7	10.3	2187	36.5	97
B3036381	2653	6.6	9.1	1995	33.3	99
Zenith (std)	2439	6.3	7.8	1655	27.6	97

Table 2: Yield Characteristics Cont.

Cultivar	Count per pound	Plants per foot	Moisture %	Pounds per acre	Bushels per acre	Days to harvest	
Cranberry Types:							
Jester	1075	6.6	13.7	1713	28.5	99	
16756	1316	6.5	13.2	1281	21.3	99	
16758	1351	6.6	11.1	1260	21.0	99	
16775	1282	5.9	14.4	1266	21.1	99	
16816	1203	6.3	12.5	1574	26.2	99	
Other Types:							Type:
Alpena	2786	6.8	7.7	1777	29.6	99	Navy
BK33*	1289	8.3	12.2	1072	17.9	97	Black Kidney
Merlot	1445	6.3	13.4	1615	26.9	99	Small Red
Powderhorn	1570	5.4	10.5	1943	32.4	99	Northern
R. Chiquito	2224	7.8	10.1	1725	28.8	99	Small Red
Rosetta	1565	6.7	14.2	2012	33.5	97	Pink
UPRK45*	1235	6.6	12.1	1045	17.4	97	Purple Kidney

*Experimental bean varieties that only had enough seed for 2 replications. They were planted in REP1 & REP2, which started on the east side of the field. Intense rains resulted in standing water at times on the east side of field. Therefore, all other varieties were harvested from REPS 2,3&4. Whereas BK33 and UPRK45 were harvested from REPS 1&2, which likely faced the most stress out of all reps and likely impacted yield.

Table 3: Plant and Pod Characteristics

Cultivar	Plant habit rating	Plant height (in)	Plant width (in)	Avg. pod Length (in)	Avg. seeds per pod
Dark Red Kidney Types:					
Chaparral	3-3.5	12-15	14-17	5.2	4.2
Epic	2.5-3	10-16	10-13	4.6	3.7
Rampart	2.5-3	10-15	10-14	4.5	4.4
Spire	2.5-3	9-16	10-15	5.6	4.7
161164	3-3.5	12-19	10-14	4.4	4.4
161156	3-3.5	12-19	10-12	4.6	5.1
181017	3-3.5	12-20	10-14	4.7	4.2
181021	3-3.5	10-15	9-15	4.4	4.2
Red Hawk (std)	2.5-3	9-15	8-12	4.5	4.3
Light Red Kidney Types:					
Red Dawn	3-3.5	14-21	10-12	4.7	4.7
Big Red	2-2.5	10-17	9-11	4.8	4.6
15923	4-4.5	15-20	8-10	4.5	4.5
161014	2.5-3	10-19	9-15	4.9	4.7
161041	3.5-4	12-20	8-10	5.4	5.1
161082	3.5-4	11-18	8-11	4.2	4.2
Cal Early (std)	2.5-3	11-15	8-11	4.5	4.7
Black Turtle Types:					
Black Tails	4-4.5	17-25	9-12	3.6	6.3
Spectre	4-4.5	19-24	9-14	3.0	4.3
Black Beard	4-4.5	19-27	7-10	3.7	5.7
Eclipse	4.5	18-26	8-12	3.6	5.4
Nimbus	4-4.5	18-25	x	3.3	5.1
13496	4-4.5	16-25	8-10	3.6	6.5
Ace	4.5	17-24	7-10	3.7	6.0
B3036381	3.5-4	17-25	7-11	3.6	5.6
Zenith (std)	4-4.5	14-24	7-10	3.6	5.6

Table 3: Plant and Pod Characteristics Cont.

Cultivar	Plant habit rating	Plant height (in)	Plant width (in)	Avg. pod Length (in)	Avg. seeds per pod	
Cranberry Types:						
Jester	3-3.5	11-20	8-10	4.0	4.1	
16756	3-3.5	10-18	8-11	3.5	3.5	
16758	3-3.5	10-17	10-14	3.9	5.3	
16775	4-4.5	14-19	8-11	3.6	4.3	
16816	3.25-3.5	12-19	8-11	3.9	5.0	
Other Types:						Type:
Alpena	4-4.5	14-23	7-10	3.4	5.1	Navy
BK33*	3-3.5	11-17	8-10	4.3	4.3	Black Kidney
Merlot	3-3.5	12-23	9-11	4.0	4.4	Small Red
Powderhorn	3-3.5	9-18	10-15	4.0	4.8	Northern
R. Chiquito	4-4.5	15-24	7-10	3.8	5.9	Small Red
Rosetta	3-3.5	13-22	8-12	4.4	6.0	Pink
UPRK45*	3-3.5	12-17	8-10	3.9	3.8	Purple Kidney

Table 4: Weather Summary for Geneva NY

Day	Avg. Temp. (F)	Min. Temp. (F)	Max. Temp. (F)	Precip. (in)	Monthly Acc. Precip.	Degree days base 50	Acc. dd units base 50
6/25/21	72.2	61.9	82.9	0.00	0.00	22	22
6/26/21	77.3	68.2	88.9	0.00	0.00	29	51
6/27/21	81.9	71.6	92.3	0.00	0.00	32	83
6/28/21	83.8	75.7	93.0	0.00	0.00	34	117
6/29/21	79.8	70.5	95.4	0.24	0.24	33	150
6/30/21	76.3	70.7	83.5	0.12	0.36	27	177

Table 4: Weather Summary for Geneva NY Cont.

Day	Avg. Temp. (F)	Min. Temp. (F)	Max. Temp. (F)	Precip. (in)	Monthly Acc. Precip.	Degree days base 50	Acc. dd units base 50
7/1/21	70.5	64.8	75.0	0.00	0.00	19	196
7/2/21	63.5	58.8	70.3	0.80	0.80	15	211
7/3/21	65.1	60.3	72.5	0.07	0.87	16	227
7/4/21	67.0	59.2	74.3	0.00	0.87	16	243
7/5/21	72.2	55.0	89.1	0.00	0.87	22	265
7/6/21	79.8	73.6	85.6	0.00	0.87	30	295
7/7/21	70.3	61.0	76.6	0.84	1.71	19	314
7/8/21	68.5	61.2	77.5	0.38	2.09	20	334
7/9/21	69.0	63.9	77.9	0.40	2.49	21	355
7/10/21	67.2	61.5	74.1	0.01	2.50	17	372
7/11/21	64.5	59.4	70.9	0.28	2.78	15	387
7/12/21	67.0	61.7	74.5	0.39	3.17	18	405
7/13/21	75.5	68.0	85.3	0.13	3.30	27	432
7/14/21	73.4	68.5	82.8	0.19	3.49	26	458
7/15/21	76.3	64.2	87.1	0.00	3.49	26	484
7/16/21	72.0	66.0	76.5	0.00	3.49	21	505
7/17/21	64.0	61.7	67.3	1.62	5.11	15	520
7/18/21	67.5	61.3	75.9	0.08	5.19	19	539
7/19/21	73.0	61.5	83.1	0.00	5.19	22	561
7/20/21	74.5	64.6	85.8	0.05	5.24	25	586
7/21/21	65.7	61.7	72.9	0.00	5.24	17	603
7/22/21	66.5	58.6	74.0	0.00	5.24	16	619
7/23/21	68.5	59.9	77.5	0.00	5.24	18	637
7/24/21	68.7	54.7	78.8	0.00	5.24	17	654
7/25/21	75.9	67.5	83.8	0.26	5.50	26	680
7/26/21	75.4	64.0	85.3	0.00	5.50	25	705
7/27/21	71.6	65.1	85.3	0.05	5.55	25	730
7/28/21	66.3	58.3	75.2	0.00	5.55	16	746
7/29/21	65.3	56.3	77.0	0.04	5.59	17	763
7/30/21	65.0	57.2	68.4	0.00	5.59	13	776
7/31/21	63.3	51.8	73.4	0.00	5.59	13	789

Table 4: Weather Summary for Geneva NY Cont.

Day	Avg. Temp. (F)	Min. Temp. (F)	Max. Temp. (F)	Precip. (in)	Monthly Acc. Precip.	Degree days base 50	Acc. dd units base 50
8/1/21	62.9	58.1	67.8	0.37	0.37	13	802
8/2/21	64.5	55.2	72.9	0.03	0.40	14	816
8/3/21	65.5	50.9	79.2	0.00	0.40	15	831
8/4/21	68.1	53.6	80.2	0.00	0.40	17	848
8/5/21	70.0	55.8	83.7	0.00	0.40	20	868
8/6/21	73.4	57.9	87.1	0.00	0.40	23	891
8/7/21	74.9	64.8	85.5	0.21	0.61	25	916
8/8/21	73.4	64.2	85.8	0.01	0.62	25	941
8/9/21	77.9	70.3	87.8	0.00	0.62	29	970
8/10/21	78.6	71.8	85.5	0.00	0.62	29	999
8/11/21	81.1	72.7	91.6	0.00	0.62	32	1031
8/12/21	79.2	71.8	88.2	0.00	0.62	30	1061
8/13/21	78.2	69.3	87.4	0.00	0.62	28	1089
8/14/21	69.0	58.1	76.5	0.13	0.75	17	1106
8/15/21	65.3	57.0	76.5	0.00	0.75	16	1122
8/16/21	66.4	53.4	79.5	0.00	0.75	16	1138
8/17/21	72.5	67.6	81.5	0.88	1.63	25	1163
8/18/21	71.9	70.5	73.9	1.52	3.15	22	1185
8/19/21	72.6	69.8	79.5	1.36	4.51	25	1210
8/20/21	75.1	68.2	82.6	0.00	4.51	25	1235
8/21/21	73.6	69.6	81.9	0.31	4.82	26	1261
8/22/21	74.7	66.4	83.7	0.01	4.83	25	1286
8/23/21	76.2	71.6	82.4	0.00	4.83	27	1313
8/24/21	76.2	68.9	85.5	0.00	4.83	27	1340
8/25/21	78.6	66.6	89.6	0.00	4.83	28	1368
8/26/21	78.2	71.2	86.0	0.00	4.83	29	1397
8/27/21	73.2	67.1	77.2	0.00	4.83	22	1419
8/28/21	73.3	62.2	84.2	0.00	4.83	23	1442
8/29/21	74.8	70.0	82.4	0.15	4.98	26	1468
8/30/21	74.6	68.9	81.5	0.00	4.98	25	1493
8/31/21	70.6	64.0	79.5	0.00	4.98	22	1515

Table 4: Weather Summary for Geneva NY Cont.

Day	Avg. Temp. (F)	Min. Temp. (F)	Max. Temp. (F)	Precip. (in)	Monthly Acc. Precip.	Degree days base 50	Acc. dd units base 50
9/1/21	63.7	58.5	66.9	0.00	0.00	13	1528
9/2/21	61.7	55.8	68.5	0.00	0.00	12	1540
9/3/21	61.2	54.3	68.4	0.00	0.00	11	1551
9/4/21	65.5	54.7	76.1	0.00	0.00	16	1567
9/5/21	67.9	62.8	76.5	0.02	0.02	20	1587
9/6/21	64.9	60.1	72.5	0.07	0.09	16	1603
9/7/21	66.8	54.5	76.5	0.00	0.09	16	1619
9/8/21	67.5	62.2	72.1	0.07	0.16	17	1636
9/9/21	64.2	57.7	73.9	0.01	0.17	16	1652
9/10/21	62.1	55.4	71.2	0.00	0.17	13	1665
9/11/21	66.7	57.2	78.8	0.00	0.17	18	1683
9/12/21	70.8	64.0	76.1	0.00	0.17	20	1703
9/13/21	65.6	59.5	74.3	0.26	0.43	17	1720
9/14/21	70.9	58.8	84.9	0.00	0.43	22	1742
9/15/21	67.2	60.1	74.3	0.54	0.97	17	1759
9/16/21	63.8	53.8	73.9	0.00	0.97	14	1773
9/17/21	70.0	59.7	78.8	0.00	0.97	19	1792
9/18/21	68.1	58.5	73.6	0.00	0.97	16	1808
9/19/21	61.2	51.1	71.6	0.00	0.97	11	1819
9/20/21	63.5	49.6	77.7	0.00	0.97	14	1833
9/21/21	67.2	61.3	74.1	0.00	0.97	18	1851
9/22/21	68.8	65.8	72.1	0.22	1.19	19	1870
9/23/21	66.2	55.6	72.3	0.89	2.08	13	1883
9/24/21	57.5	50.5	67.1	0.00	2.08	9	1892
9/25/21	60.7	50.2	72.9	0.00	2.08	12	1904
9/26/21	59.2	49.1	69.8	0.01	2.09	9	1913
9/27/21	65.2	53.8	76.1	0.05	2.14	16	1929
9/28/21	59.2	50.0	66.6	0.00	2.14	8	1937
9/29/21	56.3	49.6	64.9	0.00	2.14	7	1944
9/30/21	53.2	47.5	59.0	0.00	2.14	3	1947

Seed Company Description

Dark Red Kidney

Chaparral – Provita, matures 97-101 days or about the same as Montcalm, about 939 seeds per pound, good seed appearance and shape, preliminary data shows yield advantage over Montcalm, Red Hawk and Red Rover; preliminary testing has shown resistance to BCMV, average canning characteristics similar to Montcalm.

Epic (DRK09430) – Provita, matures 97-101 days or about the same maturity as Montcalm but preliminary data shows a yield advantage over Montcalm, Red Hawk and Red Rover, approximate seed count is 811 seeds per pound, good seed appearance and seed shape, average canning characteristics compared to Montcalm, preliminary testing has shown resistance to bean common mosaic virus and early data from CSU rust screening nursery has shown it may tolerate Rust a little better than Montcalm.

Rampart – Provita, 99-103 days or 3 days earlier than Montcalm, approximate seed count is 1008 per pound or slightly smaller than Montcalm, preliminary testing has shown resistance to BCMV, some tolerance to Common Bacterial Blight, yield advantage over Red Hawk and Red Rover, average canning characteristics.

Spire (09431) – Provita, 102-106 days or about the same maturity as Montcalm but preliminary data shows a yield advantage over Montcalm, Red Hawk and Red Rover, broadly adapted, approximate seed count of 988 seeds per pound, good seed appearance and shape, average canning characteristics, preliminary testing has shown resistance to bean common mosaic virus and some tolerance to Common Bacterial Blight.

161164 – Provita.

161156 – Provita.

181017 – Provita.

181021 – Provita.

Red Hawk (std) – MSU/TV, mid to main season maturity (5 days earlier than Montcalm), more erect plant and better dry down than Montcalm, resistant to mosaic virus, rust and races 7 and 73 of anthracnose, equivalent to Isles in resistance to halo blight, excellent canning quality similar to Montcalm.

Seed Company Descriptions continued:

Light Red Kidney:

Red Dawn – Provita, 88-92 days to maturity.

Big Red – Provita, earlier maturity of 90-94 days or about 4 days earlier than Pink Panther, excellent upright architecture, about 919 seeds per pound, preliminary testing has shown resistance to BCMV, average canning characteristics similar to Pink Panther.

15923 - Provita.

161014 - Provita.

161041 - Provita.

161082 – Provita.

Cal Early – Treasure Valley, 85-90 days maturity, large, determinate, upright habit, resistant to BCMV race 1 and 15, acceptable yield, good color and canning qualities.

Black Turtle:

Black Tails (13489)- Provita, new black bean variety with excellent upright architecture suitable for direct harvest, 99-103 days or about 1-2 days later than Eclipse, about 2405 seeds per pound or slightly larger than Eclipse, preliminary testing shows that it has the “I” gene for bean common mosaic virus and has shown rust resistance in the CSU rust screening trial.

Spectre (14497) – Provita, Full season maturity black maturing in about 102 days in Michigan or about 1 day later than Zorro. 14497 was the top yielding black variety at 2,720 lbs./AC for 2016-2017 data from Bay, Huron, Sanilac and Tuscola counties. Received the best white mold rating for 2017 with a rating of 2.0. 14497 also has the best lodge rating for 2016-2017 with a rating of 2.0. 14497 had an average canning rating of 2.9 for 2016-2017 PRAB canning trial. This variety has also been the top yielding variety in the NDSU black bean trials in 2016-2017 at 3,153 lbs/AC. Has shown broad adaptability where full season varieties are grown in North Dakota, Michigan, Nebraska, and Idaho.

BlackBeard (14506) – Provita, Full season maturity black maturing in about 101 days in Michigan or about the same maturity as Zorro. 14506 yielded 4th overall at 2,490 lbs./AC for 2016-2017 data from Bay, Huron, Sanilac, and Tuscola. This black bean variety had the best canning score for the average of the 2016-2017 Michigan PRAB canning trials; with a score of 4.0. Nice strong tall upright architecture suitable for direct harvest. 14506 received the best lodge rating given of 2.0 for 2016-2017 and a 2017 white mold rating of 2.5. Long well filled pods many times with 8 beans per pod. Has shown broad adaptability where full season varieties are grown in North Dakota, Michigan, Nebraska, and Idaho. Received the best canning score of 4.0 for the ferrous and non ferrous canning trial by Cornell in 2016 & 2018.

Seed Company Descriptions continued:

Eclipse – ProVita. 99 days maturity (three days earlier than T-39), some resistance to white mold, potential yield advantage over T-39, upright plant growth, excellent lodging resistance, early maturity and uniform dry down of plant and pods helps harvest efficiency, purple flowers, dull black seed coat, resistant to rust, BCMV and anthracnose race 7, canned product scores similar to T-39.

Nimbus – Provita.

13496 – Provita.

Ace – ADM. Ace is an ADM variety distributed by Seedwest. It is an upright and indeterminate variety that is broadly adapted to black bean growing regions. Ace is an early maturing variety (equal to Eclipse) with excellent yield potential. Since 2011, Ace has been tested in many environments and has an average yield of 27 cwt/ac (31 year/location environments) – which is a 1 cwt/ac improvement over the variety Eclipse.

B3036381 – ADM.

Zenith (std) –Michigan State University, 100 day maturity, new upright full season variety for direct harvest (upright, short vine growth habit), narrow plant profile combined with resistance to lodging makes it suitable for narrow production, exhibits uniform maturity coupled with good dry down similar to Zorro, white mold avoidance due to its erect plant habit, resistant to race 73 anthracnose, unique canning quality.

Cranberry:

Jester – Provita, 90-94 days to maturity.

16756 – Provita.

16758 – Provita.

16775 – Provita.

16816 – Provita.

Other Types:

Alpena – MSU, navy type.

BK33 – Cornell, black kidney type.

Merlot – MSU, small red type.

Powderhorn – MSU, great northern type.

Rojo Chiquito – WSU, small red type.

Rosetta – MSU, pink type.

UPRK45 – Cornell, purple kidney type.