

## Niche Market Dry Bean Variety Trial

Carol A. Miles and Madhu Sonde, Washington State University, Vancouver Research & Extension Unit, 1919 NE 78<sup>th</sup> Street, Vancouver, WA 98665

Phone: 360-576-6030 Fax: 360-576-6032 Email: [milesc@wsu.edu](mailto:milesc@wsu.edu)

---

Dry beans are generally considered a large-scale bulk commodity crop yet they are also well suited to small-scale production for niche markets. Dry beans are harvested in the fall, are easily stored over the winter, and can be a good addition for direct market farmers who need additional crops at the beginning and end of the growing season. A primary criterion for variety suitability in the maritime Pacific Northwest is early maturity. Cool summer temperatures in the region result in a low number of growing degree days (1900 GDD in Vancouver) and most varieties are harvested 15 or more days later than in the mid-west. A primary objective for evaluating dry beans in Vancouver was to determine which varieties are suitable for production in western Washington.

### Materials and Methods

The field was prepared in May and dry beans were planted on June 6 and May 23 in 2001 and 2002, respectively. The experiment had a randomized complete block design with four replications and included 53 varieties in 2001 and 64 varieties in 2002 (Table 1). In 2002 we also included 28 plant introductions (PI lines) in single row plots to study their performance and multiply seed for a replicated planting in 2003. A few runner varieties were included in these trials, however they were not staked or trellised. In 2001, 33 of the varieties were planted in 4 replications, while 20 varieties were planted in single plots due to limited seed. In 2002, 54 varieties were planted in 4 replications and the remaining 11 varieties were planted in 1-3 replications due to limited seed. Both years plots were 2 rows wide and 10 feet long, spacing between rows was 2 feet, and spacing in the row was 2 inches.

The field was certified organic and was maintained accordingly. Plots were mechanically cultivated once a week to control weeds between rows and hand weeded to control in-row weeds as needed from July through August. Feather meal fertilizer (12-0-0) was applied in a side-dress application on July 5 at a rate of 375 lb/A (45 lb N/A) in 2001. In 2002, an organic granular fertilizer 9-3-7 was applied at the rate of 200 lb/a (18 lb N/A) on June 12 in a side-dress application. In August, iron and manganese deficiency symptoms were observed in the field and an organic foliar spray was applied in the third week of August to supply iron and manganese each at the rate of 3 lbs per acre. Overhead irrigation was applied to the field on a weekly basis or as needed.

Days after planting (DAP) to emergence, first flower, 50% flower and harvest were measured. Plant stand was measured in 10 feet of row. Plant height (cm) was measured for 10 randomly selected plants in each plot, from the base of the plant (soil surface) to the top node. Plants were harvested from the center 5 feet of both rows in each plot for a total harvest area of 10 feet per plot. For varieties in single-row plots, plants were harvested from the center 5 feet of row. Whole plants were harvested, placed in burlap bags, and dried in field ovens for 16 hours at 68° C, until seed moisture was approximately 12%. 10 pods were selected at random from each plot, and pod length (cm) was measured. Beans were threshed and cleaned by hand and total marketable bean weight (g) was measured. 100 beans were randomly selected and weighed from each plot, and length and width (cm) of 25 beans were measured.

### Results and Discussion

Beans emerged from June 16-21, 10-15 days after planting (DAP) in 2001, and June 1-8, 9-17 DAP in 2002 (Table 2). Flowering began on July 15 (39 DAP) in 2001, and on June 21 (31 DAP) in 2002. All varieties had reached the 50% flowering stage by August 9 (64 DAP) and July 25 (64 DAP) in 2001

and 2002, respectively. Harvest began on September 24 (110 DAP), and continued until October 11 (127 DAP) in 2001. In 2002, harvest began on September 5 (105 DAP) and continued until October 9 (139 DAP). Rains prevented harvest from continuing beyond early October both years. Varieties that did not mature in 2001 were Candy, Celina's Romano and California Black Eye 46 (*Vigna unguiculata*). In 2002, Kentucky Wonder and Scarlet Emperor did not mature, and California Black Eye, PR95-055-2-1-16 and UI 228 had very poor plant stands and were not harvested.

Mean yield for 10-foot row was 446 g (0.98 lb) in 2001, and 498 g (1.1 lb) in 2002. Yield differed significantly among varieties in both years. In 2001, *Pinks* (588 g, 1.3 lb) and *Cranberry* (490 g, 1.1 lb) were the highest yielding types of beans whereas in 2002, *Dark Red Kidney* (786 g, 1.7 lb) and *White Kidney* (618 g, 1.4 lb) were the highest yielding types. Varieties that yielded greater than 600 g per 10-foot row in 2001 were G-18689 (681g, 1.5 lb), NW-63 (655 g, 1.4 g), and Etna (640 g, 1.4 lb). In 2002, varieties that yielded more than 700 g per 10-foot row were Montcalm (786 g, 1.7 lb), G-18689 (756 g 1.66 lb), and Magpie (746.4 g, 1.6 lb). The three climbing-types of beans, Scarlet Emperor (156 g, 0.34 lb), Painted Lady (167 g, 0.37 lb), and Kentucky Wonder (197 g, 0.43 lb) were very low yielding as can be expected as they were not trellised. In 2002, Painted Lady (187 g, 0.4 lb), was the second lowest yielding variety and was the only climbing variety that was harvested as the others did not reach maturity. Although it is possible to grow climbing type varieties in untrellised rows their yield is extremely low and their maturity appears to be delayed in this system.

Plant stand was measured mid-season and varied significantly among varieties (Table 3). Mean plant stand was 43 and 54 plants per 10-foot row in 2001 and 2002, respectively. Plant height was measured in August in 2001, in July 2002, and at harvest both years. Plant height varied significantly among varieties and between years. Mean mid-season plant height in 2001 was 27 cm (10.6 in), and in 2002 was 44.3 cm (17.4 in). Mean plant height at harvest in 2001 was 25 cm (9.8 in), and was 37 cm (14.6 in) in 2002. Plant height declined at harvest as compared to mid-season due to the weight of mature pods that cause plants to bend slightly.

Mean weight of 100 beans was 47.0 g (0.1 lb) and 47.5 g (0.1 lb) in 2001 and 2002, respectively, and differed significantly among varieties. Painted Lady (105 g, 0.2 lb) and Scarlet Emperor (89 g, 0.19 lb) were twice as large as most other varieties in 2001. Varieties with 100-bean weight greater than 60 g (0.13 lb) were Etna (69.7 g, 0.15 lb), Trout/Jacob's Cattle (66.5 g, 0.14 lb), Old Fashioned Soldier (66.2 g, 0.14 lb), Cardinal (63.8 g, 0.14 lb), and CELRK (63.0 g, 0.14 lb) in 2001. In 2002, Candy (139 g, 0.3 lb), Painted Lady (118 g, 0.26 lb) and Mansel Magic (100 g, 0.2 lb) had 100-bean weight more than 100 g (0.2 lb).

Length of 10 pods and length and width of 25 beans were measured in order to further characterize bean size. The overall mean pod length in 2001 was 12.0 cm (4.7 in) and in 2002 was 10.8 cm (4.3 in). Pod length of Cardinal, Etna and Trout/Jacob's Cattle varied by 2 cm (0.8 in) between the two years. The overall mean length of 25 beans was 32 (12.6 in) and 31 cm (12.2 in) in 2001 and 2002, respectively. The overall mean width of 25 beans was 20 (7.9 in) and 18.8 cm (7.4 in) in 2001 and 2002, respectively. CELRK and Andrew Kent varied significantly in bean length between the two years. Andrew Kent also varied significantly in bean width between the two years.

In 2002, virus and Halo Blight (*Pseudomonas syringae*) symptoms were first observed on plant leaves in the field on July 1. Symptoms increased in severity and spread through the field as the season progressed. Leaf samples from all varieties were collected and sent to the WSU disease diagnostic laboratory for pathogen identification. Cannellini, Celina's Romano, Dwayne Baptiste's, Maine Yellow Eye, Nugget, Serene, Speckled Bays and Tongue of Fire were found to be affected by Halo Blight. Orca, Hutterite, Maefax, Beka, Zert, Cannellini, Andrew Kent, Trout/Jacob's Cattle and Speckled Bays were affected by a poty virus.

Based on our study results, we have developed a web page <http://SustainableSeedSystems.wsu.edu/nicheMarket/beanVarieties.pdf>, that describes dry bean varieties with an emphasis on varieties that are suitable for niche markets. This web page is designed to facilitate variety selection by farmers by including a brief description of each variety based on our data and observations, and a color photograph. The color, pattern and size of dry beans play a large role in variety selection for niche markets.

**Table 1.** Bean varieties, and their sources, planted at WSU Vancouver REU in 2001 and 2002.

<b>No</b>	<b>Variety</b>	<b>Seed Company</b>	<b>No</b>	<b>Variety</b>	<b>Seed Company</b>
1	5-593 Wild type	Jim Myers, OSU	33	Major	Territorial
2	5-593Cu	Jim Myers, OSU	34	Mansel Magic	Salt Spring Island
3	5-593p gri	Jim Myers, OSU	35	Midnight Black Turtle	Johnny's
4	Andrew Kent	Johnny's	36	Molasses Face	Salt Spring Island
5	Arthur	USDA-ARS Prosser	37	Montcalm	Territorial
6	Beka	Salt Spring Island	38	Montezuma Red	Nichols
7	Beni Dainagon <i>adzuki</i>	WSU Prosser	39	Mrocumiere	Salt Spring Island
8	Black Coco	Johnny's & Territorial	40	Norstar	USDA-ARS Prosser
9	California Black Eye	Territorial	41	Norwegian	Salt Spring Island
10	Candy	Salt Spring Island	42	Nugget	Territorial
11	Cannellini	Territorial	43	NW-63	USDA-ARS Prosser
12	Cardinal	USDA-ARS Prosser	44	Old Fashioned Soldier	Johnny's
13	Celina' Romano	Salt Spring Island	45	Painted Lady	Territorial
14	CELRK	USDA-ARS Prosser	46	Pinks	Salt Spring Island
15	Childer's Golden	Salt Spring Island	47	PR95-055-2-1-16	USDA-ARS Prosser
16	Dwane Baptiste's	Salt Spring Island	48	Red Soldier	WSU Prosser
17	Erimo <i>adzuki</i>	WSU Prosser	49	Royal Burgundy	Territorial
18	Etna	Territorial	50	Scarlet Emperor	Territorial
19	French Flageolet	Nichols	51	Serene	Salt Spring Island
20	French Shell Flambeau	Johnny's	52	Speckled Bays	Territorial
21	G18689	USDA-ARS Prosser	53	Stevenson Blue Eve	Salt Spring Island
22	Hutterite	Salt Spring Island	54	Takara <i>adzuki</i>	WSU Prosser
23	ICB-10-5-14	USDA-ARS Prosser	55	Thort	USDA-ARS
24	Ireland Creek	Salt Spring Island	56	Tongue of Fire	Salt Spring Island
25	Kardinal	USDA-ARS Prosser	57	Trout/Jacob's Cattle	Johnny's
26	Kentucky Wonder	Territorial	58	UI-228	Univ. of Idaho
27	Kintoki	Salt Spring Island	59	UI-537	USDA-ARS Prosser
28	Lake Kivu	Salt Spring Island	60	UI-911	USDA-ARS Prosser
29	Le Baron	USDA-ARS Prosser	61	Orca (USWA-27)	USDA-ARS Prosser
30	Maefax	Salt Spring Island	62	Vermont Cranberry	Johnny's
31	Magpie	Salt Spring Island	63	WAA 2201/Crimson <i>adz.</i>	WSU Prosser
32	Maine Yellow Eye	Johnny's	64	ZERT	Salt Spring Island

**Table 2.** Days after planting (DAP) to emergence, 1<sup>st</sup> flower, 50% flower, and harvest of dry bean varieties at WSU Vancouver REU in 2001 and 2002.

Type Variety	Emergence DAP		1st Flower		50% Flower		Harvest	
	2001	2002	2001	2002	2001	2002	2001	2002
<b>Dark Red Kidney</b>								
Montcalm	11	12	43.7	34.8	46.5	36.3	112.2	115
<b>Light Red Kidney</b>								
CELRK	13	13	40.7	31.3	42.5	33.5	110.0	115
Kardinal	11	13	45.7	35.3	47.0	37.3	116.5	116
Kintoki		12		31.3		33.7		108
<b>White Kidney</b>								
Cannellini	13	14	40.3	32.5	42.5	34.9	115.0	118
Dwane Baptiste		12		32.8		34.8		118
<b>Small White/Navy</b>								
Arthur	11	13	46.3	37.3	50.7	43.3	112.2	118
Norstar	12	14	49.3	40.3	52.7	43.3	111.7	115
<b>Small Red/ Red Mexican</b>								
LeBaron	11	13	42.7	34.8	48.5	38.5	110.0	108
Montezuma Red	15	14	45.0	32.8	47.0	34.8	111.0	110
NW-63	13	14	40.7	33.8	45.0	35.8	116.2	113
<b>Pink</b>								
PR95-055-2-1-16	13	15	49.3		52.5		112.0	
UI-537	13	12	47.7	36.3	49.7	39.0	115.2	110
Pinks		13		35.0		37.3		115
<b>Black</b>								
UI-911	12	12	43.7	33.8	45.5	36.0	118.0	119
5-593 Wild Type		12		33.0		35.0		105
Black Coco	11	13	42.5	32.2	44.1	33.7	118.1	118
ICB-10-5-14	11	16	52.0	38.8	55.0	41.5	118.0	122
Major		10		29.0		33.0		105
Midnight Black Turtle	11	12	54.0	43.0	56.7	45.8	118.2	117
<b>Cranberry</b>								
Andrew Kent		14	43.0	33.7	45.5	36.3	119.7	123
Candy		12		39.0		43.0		119
Cardinal	11	11	43.0	31.5	45.5	33.5	118.7	117
Etna	10	12	42.0	31.9	44.7	33.9	113.5	112
Speckled Bays	12	13	45.0	34.9	46.7	36.6	116.2	114
Thort	11	14	43.3	32.0	46.7	35.0	114.0	113
Tongue of Fire	10	12	42.3	32.3	43.5	34.0	116.3	113
Vermont Cranberry	11	14	42.3	34.0	48.0	36.0	111.7	116

**Table 2 (Continued)**

<i>Type</i> Variety	<u>Emergence DAP</u>		<u>1st Flower</u>		<u>50% Flower</u>		<u>Harvest</u>	
	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>
<b><i>Yellow Eye/ Partially Colored</i></b>								
Celina's Romano		11		37.0		39.0		114
Magpie		12		35.0		37.0		119
Maine Yellow Eye	11	13	42.3	33.0	44.0	35.0	113.5	114
Molasses Face		12		38.0		39.8		108
Old Fashioned Soldier	11	12	42.7	32.0	46.0	34.0	113.5	113
Orca (USWA-27)	12	11	51.0	45.0	56.7	47.9	117.0	116
Red Soldier		9		43.3		45.5		113
Trout/Jacobs Cattle	10	15	40.7	31.8	43.2	34.0	113.7	112
<b><i>Brown or Yellow Beans</i></b>								
Beka		12		31.8		33.8		112
Childer's Golden		16		33.3		35.3		114
Hutterite		15		32.8		34.8		117
Ireland Creek		12		32.0		34.0		112
Lake Kivu		11		31.0		34.3		111
Maefax		11		31.5		33.5		109
Norwegian		11		31.5		33.5		108
Zert		12		31.3		34.0		112
<b><i>Flageolet</i></b>								
French Flageolet		12	50.5	34.5	54.0	36.5	114.5	122
French Shell Flambeau		13		35.0		37.0		131
Nugget		14		35.0		36.0		113
<b><i>Other</i></b>								
G18689	12	12	55.0	44.0	58.0	47.0	115.2	119
5-593Cu		12		64.0		72.0		112
5-593p gri		10		32.0		34.0		105
California blackeye 46	13	14	67.0					
Mansel Magic		11		31.0		33.3		113
Mrocumiere		10		32.5		34.5		121
Royal Burgundy		12		34.0		36.0		139
Serene		15		33.3		35.3		112
Stevenson Blue Eye		14		38.5		41.0		119
<b><i>Pole</i></b>								
Kentucky Wonder	12	16	61.0	50.3	64.0	53.0	127.0	127
Painted Lady	11	15	39.0	31.0	42.7	33.0	127.0	133
Scarlet Emperor	12	16	40.0		44.5		127.0	127
<b><i>Adzuki</i></b>								
Beni Dainagon		17		54.5		56.8		134
Erimo		16		51.0		58.3		132
Takara		17		59.3		63.8		133
WAA 2201(Crimson)		16		32.0		34.0		135
Mean	12	13	46.0	36.2	48.0	46.0	116	117
P Value	0.0008	0.0000	0.0260	0.0000	0.0000	0.0000	0.0000	0.0001

**Table 3.** Plant height (cm) in mid season and at harvest, plant stand at harvest, and pod length (cm) of dry bean varieties at WSU Vancouver REU in 2001 and 2002.

Type Variety	Mid-Season Ht (cm)		Final Ht (cm)		Plant Stand (No)		Podlength (cm)	
	2001	2002	2001	2002	2001	2002	2001	2002
<b>Dark Red Kidney</b>								
Montcalm	27.9	45.4	25.1	40.0	64	75	11.6	11.8
<b>Light Red Kidney</b>								
CELRK	26.4	47.3	23.4	39.2	36	38	12.8	12.0
Kardinal	34.3	56.0	29.0	39.1	45	61	13.5	12.2
Kintoki		49.9		24.5		68		9.5
<b>White Kidney</b>								
Cannellini	26.8	42.7	23.4	35.9	36	33	13.4	12.5
Dwane Baptiste		49.1		41.7		60		12.3
<b>Small White/Navy</b>								
Arthur	36.1	45.4	42.7	60.0	44	41	9.2	8.0
Norstar	24.5	48.9	22.2	38.5	19	25	8.4	8.6
<b>Small Red/ Red Mexican</b>								
LeBaron	22.8	40.4	18.8	29.9	56	40	9.5	10.0
Montezuma Red	25.8	41.9	21.3	34.1	44	69	9.5	9.8
NW-63	23.6	47.8	21.5	27.6	50	39	9.9	9.1
<b>Pink</b>								
PR95-055-2-1-16	24.4	32.6	17.3		54		9.9	
UI-537	21.5	49.6	23.1	25.1	41	66	9.3	9.9
Pinks		45.8		21.4		47		9.1
<b>Black</b>								
UI-911	31.1	52.8	24.4	40.3	67	56	9.9	9.0
5-593 Wild Type		37.4		29.6		106		10.7
Black Coco	26.9	46.6	22.8	35.5	47	65	11.2	10.8
ICB-10-5-14	25.2	31.2	25.7	39.7		14	8.9	9.3
Major		37.5		32.6		97		12.7
Midnight Black Turtle	36.7	52.8	30.8	47.8	46	56	10.1.	9.5
<b>Cranberry</b>								
Andrew Kent	30.7	43.4	26.3	37.9	54	30	13.0	12.3
Candy		52.2		31.7		47		14.0
Cardinal	26.1	47.5	22.9	33.3	48	65	12.9	10.7
Etna	27.5	47.4	24.6	30.6	63	90	14.1	12.0
Speckled Bays		40.3		35.4	35	68	10.4	10.2
Thort	28.5	48.9	24.4	43.9	50	47	13.4	11.7
Tongue of Fire	24.9	45.4	22.1	38.8	44	57	11.1	11.3
Vermont Cranberry	21.5	41.4	19.5	23.4	41	44	13.3	12.5

**Table 3 (Continued)**

<i>Type</i> Variety	<u>Mid-Season Ht (cm)</u>		<u>Final Ht (cm)</u>		<u>Plant Stand (No)</u>		<u>Podlength (cm)</u>	
	<u>01-Aug</u>	<u>02-Jul</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>
<b><i>Yellow Eye/ Partially Colored</i></b>								
Celina's Romano		55.1		35.2		30		10.7
Magpie		54.1		39.1		44		11.6
Maine Yellow Eye	26.2	46.8	24.2	39.2	46	34	10.2	8.8
Molasses Face		61.0		29.4		82		8.7
Old Fashioned Soldier	28.9	46.3	24.4	43.3	56	62	13.9	13.0
Orca (USWA-27)	26.6	33.5	29.4	35.5	41	64	9.4	9.6
Red Soldier		40.1		30.5		29		12.9
Trout/Jacobs Cattle	28.5	39.5	22.3	31.8	43	25	15.4	13.4
<b><i>Brown or Yellow Beans</i></b>								
Beka		43.4		30.4		59		9.0
Childer's Golden		28.8		29.2		13		8.9
Hutterite		43.0		33.3		30		10.1
Ireland Creek		37.7		39.3		35		10.8
Lake Kivu		51.8		39.7		61		8.7
Maefax		45.9		31.5		62		9.3
Norwegian		38.5		32.0		64		12.5
Zert		37.4		24.8		53		10.5
<b><i>Flageolet</i></b>								
French Flageolet	25.4	46.6	24.5	31.4	40	23	12.7	10.8
French Shell Flambeau		46.6		30.8		35		12.0
Nugget		42.9		38.9				10.8
<b><i>Other</i></b>								
G18689	26.7	44.1	19.6	36.8	33	38	10.5	10.2
5-593Cu		45.3				104		7.7
5-593p gri		48.4		41.5		128		8.4
California blackeye 46	17.9	24.0	35.6		23			
Mansel Magic		53.2		39.8		66		11.0
Mrocumiere		51.1		35.4		68		13.3
Royal Burgundy		44.0		37.0		74		12.9
Serene		43.3		39.8		33		11.6
Stevenson Blue Eye		55.6		42.8		51		10.6
<b><i>Pole</i></b>								
Kentucky Wonder	30.8	45.6	22.7		43		15.0	
Painted Lady	32.8	55.8	26.5	90.7	48	20	15.3	16.6
Scarlet Emperor	25.9	45.0	28.4		32		16.4	
<b><i>Adzuki</i></b>								
Beni Dainagon		35.6		60.7		47		9.8
Erimo		39.5		43.2		44		9.3
Takara		32.3		49.2		62		9.9
WAA 2201(Crimson)		32.2		50.1		38		9.8
Mean	27.0	44.3	25.0	37.1	43	54	12.0	10.8
P Value	0.0260	0.0000	0.0001	0.0000	0.0001	0.0000	N/A	N/A

**Table 4.** Total bean weight (g) from 10 feet row, weight of 100 beans (g), length (Lth) and width (Wth) of 25 beans (cm) and at WSU Vancouver REU in 2001 and 2002.

Type Variety	T Bean Wt (g)		Wt 100 beans (g)		Lth 25 beans (cm)		Wth 25 beans (cm)	
	2001	2002	2001	2002	2001	2002	2001	2002
<b>Dark Red Kidney</b>								
Montcalm	431.2	786.1	51.9	84.9	39.3	39.9	19.2	22.0
<b>Light Red Kidney</b>								
CELRK	437.9	499.4	63.0	59.5	42.3	37.0	20.8	21.1
Kardinal	479.9	586.0	57.0	63.2	42.2	38.5	21.8	20.3
Kintoki		672.6		67.5		34.7		21.7
<b>White Kidney</b>								
Cannellini	320.4	528.0	59.3	52.2	38.5	37.4	20.1	20.7
Dwane Baptiste		708.1		57.0		34.9		18.1
<b>Small White/Navy</b>								
Arthur	481.5	496.0	14.7	16.8	20.9	20.9	14.0	14.0
Norstar	465.6	364.0	17.8	17.7	21.1	22.1	14.4	14.6
<b>Small Red/ Red Mexican</b>								
LeBaron	344.4	401.5	34.7	61.3	28.2	28.1	18.7	19.0
Montezuma Red	401.0	606.2	36.3	35.0	26.5	26.0	16.7	20.8
NW-63	655.0	513.2	34.6	33.6	28.4	28.8	19.2	19.4
<b>Pink</b>								
PR95-055-2-1-16	581.9		36.8		31.3		19.2	
UI-537	592.9	369.7	36.4	33.3	28.1	28.6	18.3	18.4
Pinks		459.2		33.3		25.9		17.2
<b>Black</b>								
UI-911	487.1	605.8	20.1	20.4	22.0	24.2	14.9	14.3
5-593 Wild Type		642.0		21.3		22.0		14.5
Black Coco	416.7	584.5	54.3	56.1	30.6	29.9	21.8	22.9
ICB-10-5-14	406.7	364.1	21.5	21.8	23.7	24.8	16.1	16.3
Major		649.1		36.0		35.0		14.5
Midnight Black Turtle	517.4	633.8	17.9	18.8	22.3	19.9	14.7	16.0
<b>Cranberry</b>								
Andrew Kent	572.6	685.3	58.3	74.4	31.3	43.0	27.4	20.7
Candy		436.1		139.0		46.0		22.5
Cardinal	452.8	506.6	63.8	62.0	34.0	35.5	22.7	21.6
Etna	639.5	608.0	69.7	62.5	35.0	35.6	22.3	21.7
Speckled Bays	357.1	400.5	49.5	49.4	28.3	31.2	20.1	22.7
Thort	452.2	532.0	55.3	53.7	33.0	32.8	22.6	21.2
Tongue of Fire	502.9	294.9	58.8	52.0	32.6	32.4	22.9	22.6
Vermont Cranberry	457.1	530.5	48.8	48.5	30.6	30.6	19.0	19.1

**Table 4** (Continued).

<i>Type</i> Variety	<u>T Bean Wt (g)</u>		<u>Wt 100 beans (g)</u>		<u>Lth 25 beans (cm)</u>		<u>Wth 25 beans (cm)</u>	
	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>	<u>2001</u>	<u>2002</u>
<b><i>Yellow Eye/ Partially Colored</i></b>								
Celina's Romano		161.3		54.3		37.0		23.0
Magpie		746.4		35.2		36.4		16.5
Maine Yellow Eye	285.5	401.5	43.5	46.9	28.0	29.6	19.6	19.8
Molasses Face		562.8		45.7		29.4		19.8
Old Fashioned Soldier	575.9	634.6	66.2	55.0	40.2	41.5	20.0	20.3
Orca (USWA-27)	435.2	563.1	32.5	35.4	28.2	28.3	18.1	17.8
Red Soldier		510.1		59.5		37.5		18.8
Trout/Jacobs Cattle	394.3	357.7	66.5	66.7	40.1	39.8	19.9	20.2
<b><i>Brown or Yellow Beans</i></b>								
Beka		617.6		42.4		26.4		18.3
Childer's Golden		224.8		21.6		21.6		16.0
Hutterite		308.5		47.2		31.0		19.8
Ireland Creek		554.1		54.5		36.5		19.3
Lake Kivu		541.7		52.1		26.4		19.3
Maefax		550.9		41.8		26.0		18.4
Norwegian		664.2		37.8		33.4		17.8
Zert		549.6		44.8		25.8		20.5
<b><i>Flageolet</i></b>								
French Flageolet	518.1	417.1	25.4	31.5	31.0	34.4	15.0	16.4
French Shell Flambeau		575.6		27.6		30.1		15.3
Nugget		256.2		32.0		34.0		17.5
<b><i>Other</i></b>								
G18689	681.3	756.2	23.6	40.9	24.6	25.1	15.8	16.7
5-593Cu		558.0		22.0		21.5		14.0
5-593p gri		447.2		24.6		24.5		16.5
California blackeye 46								
Mansel Magic		627.7		100.2		30.0		22.3
Mrocumiere		628.9		54.7		39.1		19.0
Royal Burgundy		374.0		49.3		34.3		24.1
Serene		327.4		66.2		34.6		22.8
Stevenson Blue Eye		487.4		50.3		28.9		19.5
<b><i>Pole</i></b>								
Kentucky Wonder	197.0		38.8		34.9		18.0	
Painted Lady	167.4	186.6	104.5	117.9	49.5	54.0	29.3	30.0
Scarlet Emperor	155.9		88.5		47.4		26.4	
<b><i>Adzuki</i></b>								
Beni Dainagon		536.3		68.2		28.3		17.4
Erimo		227.4		8.4		17.3		11.8
Takara		247.9		13.5		18.0		12.0
WAA 2201(Crimson)		299.5		23.5		20.5		13.1
Mean	446.0	497.7	47.0	47.5	32.0	31.0	20.0	18.8
P Value	0.0001	0.0000	0.0001	0.0000	0.0001	0.0000	0.0091	0.0000