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## Lettuce Cultivar Observation Trial – 2013

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# Lettuce Cultivar Observation Trial — 2013

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Lettuce is one of several cool-season crops that Indiana growers produce to meet market demands for local produce early and late in the season. It is grown in the field as well as in unheated and heated structures. Growers who responded to a survey in 2013 indicated that important characteristics for lettuce varieties include slow bolting, good eating quality, and disease resistance. Numerous varieties are available and it is important to identify which perform well in Indiana. We report here characteristics of 38 lettuce cultivars grown in an unreplicated field trial at the Pinney-Purdue Agricultural Center in Wanatah, Indiana.

## Materials and Methods

The purpose of this trial was to screen a large number of cultivars to identify those with desirable characteristics that would be worth including in a future replicated trial. To narrow the number of varieties in the trial we focused on green lettuce, including leaf, romaine, butterhead, bibb, and summer crisp types. We did not include crisphead lettuce types because they are not widely grown in Indiana. In order to limit the number of varieties we did not emphasize red lettuce, expecting that in a future year red varieties could be emphasized. Some varieties with red leaves were included, however. Several of the red-leaf varieties were marketed as part of the Salanova<sup>®</sup> brand. This brand is selected so that an entire head can be harvested, and the core easily removed to produce a marketable product of individual leaves suitable for a “spring mix” product. The seeds are marketed as sets of four varieties to provide a mix of color and texture. This brand is indicated by SP or SF at the start of the variety name. All varieties included in the trial are listed in Table 1, and include three bibb, seven butterhead, fourteen leaf, twelve romaine, and two summer crisp types.

The trial was conducted on a Tracy sandy loam in a block that has been managed using organic practices for approximately 20 years. The spring 2013 soil test showed 2.4% organic matter, pH 6.5, 90 ppm phosphorus (P), 172 ppm potassium (K), 205 ppm magnesium (Mg), and 800 ppm calcium (Ca). On May 14, 2013 NatureSafe 13-0-0 OMRI-certified fertilizer (Griffin Industries, Cold Spring, KY) was spread by hand at 1,884 lb./A to supply an estimated 132 lb./A N, assuming that 1% of the N is immediately available, and half of the remaining N would become available over the growing season. Fertilizer was incorporated.

On May 16, furrows were made by hand 2 feet apart and each variety was hand-seeded in one 14-foot row. No data were collected from the 2 feet of each row at the outside edge of the trial. One (if pelleted seed in short supply), two (pelleted), or three (unpelleted) seeds were placed every 6 inches. On June 6, plants were thinned to approximately one every 6 inches, or 43,560 plants per acre. A single line of drip tape (Toro Aquatraxx 12-inch emitter spacing, 40 GPH/100 ft.) was placed next to each row and supplied water as needed. Heavy weed pressure was managed by hand weeding and one cultivation.

Lettuce was harvested and weighed on July 1 and July 9-10 and stored at 40°F for further data collection on July 2 and 11. On July 1, approximately half the heads in each plot were harvested, leaving remaining heads at a spacing of 12 inches. All harvested heads were weighed as a group and counted. Leaves were trimmed off of heads so they met USDA Fancy standards for leaf lettuce, and weight of trimmed heads determined. In cases where inadequate thinning meant that

two plants very close to one another were harvested together; they were counted as two heads, and if too small, were not counted as marketable. Length and width of three heads were determined by placing each head on a ruler and measuring from the base of the cut stem to tip of the tallest leaf, then rotating the head 90° and recording the maximum width.

On July 9 and 10 all remaining heads except two were harvested from each plot. Total head number and weight, number and weight of marketable heads after trimming, length and width of three single marketable heads, and number and weight of cull heads were determined. A unit was defined as either a single head, or two or three heads growing very close together and harvested as one. For this harvest heads were trimmed the minimum amount necessary to make them marketable: only seriously damaged, discolored, or diseased leaves were removed. Two heads of each variety were selected for evaluation of eating quality, sliced in half lengthwise, and leaves taken from the middle of the plant were rated on a scale of 1 to 9 for bitterness (1=not at all bitter, 5=somewhat bitter, 9=inedibly bitter) and flavor (1=no flavor, like water; 5=some flavor; 9=intense flavor). Three individuals rated leaves from one head and one individual rated leaves from the second head. Lettuce type, color, appearance, and diseases and disorders were noted at each harvest.

The unharvested heads were observed every two or three days until July 31 and rated for bolting: 0=not bolted, 1=lengthening of head visible, beginning to bolt; and B or 2: stem has pushed out of rosette, fully bolted.

The weight of marketable or fancy heads as a percentage of the untrimmed head weight was calculated as an indicator of head quality: a higher percentage means less trimming was required to make a fancy or marketable head. The percent of harvested heads that were marketable was also calculated for each harvest date (data not shown). Flavor and bitterness ratings were analyzed using ANOVA followed by mean separation using Fisher's protected LSD. Dates of 50% and 100% bolting were defined as when the average bolt rating reached 1 and 2, respectively.

## Results and Discussion

The growing season for this trial was cool and wet, with an average temperature of 65.5°F, and 13.7 inches of rain from May 13 through July 7, 7 inches above normal (USDA NASS Indiana Crop and Weather Reports). Of that total, 10.4 inches fell after June 10. The temperature was fine for lettuce growth, but the excess rain probably increased the amount of rot observed at base of lettuce heads and facilitated weed growth. The bottom rot was most likely caused by *Rhizoctonia solani*, although the pathogen was not definitively identified in the lab.

Lettuce emerged unevenly, and even after thinning the plant stand was not uniform, ranging from 6 to 23 plants per plot (data not shown). With such variation in plant population, comparing yield per acre among varieties is not useful.

Individual head characteristics can be compared, however. While plant spacing can affect head size, at the spacing and harvest dates in this trial, it is unlikely that the effect was large enough to mask differences between varieties. Table 1 shows head weight (trimmed and untrimmed), length, and width for the July 1 harvest. Untrimmed heads ranged from 0.35 to 10.19 oz., and averaged 3.74 oz. Heads trimmed to meet USDA Fancy standards ranged from 0.21 oz. to 6.70 oz. and averaged 1.85 oz. Head length ranged from 3.8 to 11.6 inches and width ranged from 4.0 to 13.4 inches. Green Forest (romaine) untrimmed heads were almost 30% heavier than the next heaviest variety Tango (leaf). Other varieties with untrimmed heads weighing more than 6 oz.

included leaf types Tropicana, SF Green Sweet Crisp, and Waldmann's; Salvius, a romaine; and Buttercrunch, a bibb type. If trimmed head weight is considered, Lettony (leaf), and the romaines Fenberg, and Green Towers move into the top seven, and Waldmann's, Buttercrunch, and Salvius drop lower in rank.

Heavier heads also tended to be longer and wider. Varieties with heads weighing less than 1.5 oz. untrimmed or 0.75 oz. trimmed were the leaf types Bergam's Green, Two Star, and SP Red Oakleaf; butterheads SP Red Butter and Mirlo, and the small romaine Freckles. Most heads required extensive trimming to remove leaves that had even slight defects, and so the percent of weight retained after trimming is an indication of head quality. Six varieties retained at least 60% of the weight: leaf types SP Red Oakleaf, Tango, Tropicana, and Bergam's Green; butterhead Nancy; and Fenberg, a romaine. Jericho required such extensive trimming that only 6.6% of the untrimmed head remained. Other varieties that lost 60% or more of their weight due to trimming were Concept (summer crisp), Parris Island, Salvius, and Coastal Star (romaines), Waldmann's (leaf), Buttercrunch (bibb), and Pirat (butterhead). It is unlikely that growers would trim as heavily as we did at this July 1 harvest.

Results from the July 9-10 harvest are shown in Table 2. Average weight of an untrimmed head ranged from 2.32 to 30.1 oz. and averaged 11.4 oz. Trimmed heads weighed from 1.41 to 26.1 oz. and averaged 8.26 oz. Head length ranged from 5.1 to 15.8 inches with an average of 9.5, and width ranged from 6.6 to 16.8 inches and averaged 11.6 inches. As on July 1, Green Forest (30.1 oz.) was much heavier than the next heaviest varieties: it weighed 50% more than Salvius, Coastal Star, Tropicana, and Lettony, which were all within 1 oz. of each other. Varieties with heads weighing less than 5 oz. before trimming included Two Star, SP Red Butter, SP Red Oakleaf, and Bergam's Green. Varieties that required trimming away 50% or more of the head to make it marketable included SP Red Oakleaf, Pirat, SF Red Incised, SP Green Butter, Buttercrunch, Sylvesta, SF Green Incised, and SF Red Sweet Crisp. Another indication of quality is the percentage of harvested units that are marketable. Most varieties produced a high percentage of marketable units: 21 had 90%, and another 8 had between 75% and 90%. Varieties for which 50% or fewer of the units were marketable included SF Green Incised, Lettony, Panisse, and Tango. Tango heads were unmarketable because they had bolted by the time of this harvest.

Flavor and bitterness ratings differed among varieties as shown in Table 3. Bitterness ratings ranged from 1.0 for SP Green Butter to 7.5 for Tango, and averaged 2.8. Tango had fully bolted by the time the rating was taken. Because bolting increases bitter compounds in lettuce, the rating for Tango doesn't reflect what a marketable head would taste like. Fenberg received the next highest rating for bitterness, 5.5, and didn't differ significantly from Tango. Many varieties received low ratings for bitterness: Nancy, Nevada, Spretnak, Buttercrunch, SP Green Oakleaf, Deer Tongue, and Mirlo were all rated below 1.5, and those as well as 23 others with ratings less than 3.5 and did not differ significantly from SP Green Butter. Ratings of flavor intensity ranged from 1.8 to 5.5 and averaged 3.7. Varieties with moderately intense flavor included Lettony, Panisse, Adriana, Aerostar, Salvius, and Pirat, which received ratings of 5 to 5.5. These were significantly different from varieties with little flavor: SP Green Butter, SF Red Sweet Crisp, SP Red Oakleaf, SP Green Oakleaf, and Green Star, which were rated 2.4 or below.

Some varieties had started to bolt by the time of the final harvest, and others did not bolt until after July 31 when we stopped observing them (Table 3). Varieties that had reached 50% bolting by 60 days after seeding included the leaf types Tango, Waldmann's, Green Star, and Tropicana,

the summer crisp Concept, and the bibb Deer Tongue. Varieties that reached 50% bolting more than 70 days after seeding included the romaine Green Towers and Aerostar, and SP Red Oakleaf and SP Green Butter. Varieties that did not reach 100% bolting until 76 or more days after seeding included the butterhead Sylvesta, romaines Aerostar, Fenberg, and Tin Tin, the summer crisp Nevada, and the leaf Panisse, as well as the Salanova<sup>®</sup> brands SF Green Incised, SF Red Incised, SF Red Sweet Crisp, SP Green Oakleaf, SP Red Oakleaf, and SP Green Butter.

Notes on color and other head characteristics are provided in Table 4.

Some differences between types of lettuce were apparent in this trial. Romaines tended to have less bottom rot. Butterheads and the Salanova<sup>®</sup> leaf types with flattened heads tended to have heavy bottom rot. Leaf lettuces other than the Salanova<sup>®</sup> brand tended to bolt earlier. The Salanova<sup>®</sup> brand tended to have small heads.

In a future replicated trial it would be necessary to reduce the number of trial entries. Based on these results, varieties of each type that look most promising are listed below. Several are included for interest as a specialty lettuce, and that is noted. Early bolters are generally not listed unless desirable for another reason. The Salanova<sup>®</sup> brand (varieties beginning with SP or SF) includes both leaf and butterhead types; all of those would potentially be of interest. In this trial that brand was harvested and evaluated as a head lettuce, but to take full advantage of their characteristics they should be evaluated for salad mix production.

Bibb: Bambi, Deer Tongue (specialty)

Butterhead: Adriana, Nancy, Pirat, maybe Sylvesta.

Leaf: Tropicana, Panisse (specialty), Green Star.

Romaine: Aerostar, Coastal Star, Freckles (specialty), Green Forest, Green Towers, Salvius. Summer Crisp: Nevada.

## Acknowledgments

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**Table 1.** Weight and dimensions of heads for 38 varieties of lettuce harvested 46 days after field seeding on May 16, Wanatah, Indiana, 2013.

Variety	Seed Source	Type	Ave. Head Wt.		Fancy Percent	Head Dimensions	
			Untrimmed	Trimmed to 'Fancy'		Length	Width
			oz.			in.	
Adriana	JS	Butterhead	2.38	1.28	54	7.8	9.6
Aerostar	HMS	Romaine	3.74	2.16	58	9.7	8.3
Bambi	JS	Bibb	1.97	0.81	41	6.2	6.6
Bergam's Green	HMS	Leaf	0.35	0.23	65	4.6	4.0
Buttercrunch	JS	Bibb	6.25	2.39	38	7.2	8.9
Coastal Star	HMS	Romaine	5.82	2.14	37	10.2	10.8
Concept	JS	Summer Crisp	5.51	1.39	25	9.0	11.3
Deer Tongue	JS	Bibb	2.65	1.09	41	7.4	8.1
Fenberg	JS	Romaine	5.06	3.23	64	6.5	8.8
Freckles	HMS	Romaine	1.50	0.75	50	8.4	6.9
Green Forest	JS	Romaine	10.19	6.03	59	11.4	13.4
Green Star	HMS	Leaf	3.26	2.02	49	9.4	11.1
Green Towers	HMS	Romaine	4.51	2.93	50	10.6	12.0
Jericho	HMS	Romaine	5.61	0.41	7	10.7	12.7
Lettony	HMS	Leaf	4.51	3.28	59	9.4	11.6
Mirlo	HMS	Butterhead	1.33	0.73	47	6.3	8.6
Nancy	JS	Butterhead	1.85	1.23	67	5.9	6.4
Nevada	HMS	Summer Crisp	3.10	1.44	46	6.6	7.0
Panisse	JS	Leaf	2.56	1.15	45	5.6	8.3
Parris Island	HMS	Romaine	2.78	0.95	31	9.9	10.1
Pirat	HMS	Butterhead	3.75	1.46	39	6.6	9.7
Salvius	JS	Romaine	6.55	2.12	32	10.8	10.7
SF Green Incised	JS	Leaf	2.12	1.12	53	4.7	7.0
SF Green Sweet Crisp	JS	Leaf	7.32	3.26	45	7.3	10.7
SF Red Incised	JS	Leaf	1.57	0.77	49	5.3	6.7
SF Red Sweet Crisp	JS	Leaf	1.94	1.23	64	5.5	7.2
SP Green Butter	JS	Butterhead	3.17	1.29	41	4.4	6.5
SP Green Oakleaf	JS	Leaf	3.00	1.34	45	4.7	7.1
SP Red Butter	JS	Butterhead	1.15	0.62	54	4.4	5.1
SP Red Oakleaf	JS	Leaf	0.71	0.71	100	3.8	5.3
Spretnak	HMS	Romaine	4.14	1.83	45	6.9	6.4
Sylvesta	HMS	Butterhead	2.16	0.99	46	6.8	8.4
Tango	JS	Leaf	7.94	6.70	84	11.6	11.7
Tin Tin	HMS	Romaine	3.48	1.63	47	6.7	7.3
Tropicana	JS	Leaf	7.76	5.38	69	10.3	11.9
Two Star	HMS	Leaf	0.40	0.21	52	4.5	4.6
Waldmann's	HMS	Leaf	6.88	2.47	36	10.2	12.4
Winter Density	HMS	Romaine	3.13	1.50	48	6.9	7.2
<i>Average</i>			<i>3.74</i>	<i>1.85</i>	<i>50</i>	<i>7.5</i>	<i>8.7</i>

**Table 2.** Number, weight, and dimensions of heads for 38 varieties of lettuce harvested 54-55 days after field seeding on May 16, Wanatah, Indiana, 2013.

Variety	Marketable Units <sup>z</sup>		Ave. Head Wt. <sup>y</sup>		Mkt. Percent	Head Dimensions		Cull Units	
	No.	Wt. lb.	Untrim.	Trim.		Length	Width	No.	Wt. lb
Adriana	5	2.03	10.76	6.49	60	7.9	12.4	3.0	0.76
Aerostar	8	5.20	11.11	9.64	87	12.0	11.1	0.5	0.03
Bambi	7	1.87	5.91	4.28	72	7.7	8.7	2.0	0.61
Bergam's Green	7	0.83	2.32	1.89	82	6.0	9.1	0.0	0.00
Buttercrunch	7	1.52	9.13	3.48	38	7.9	9.4	3.5	0.93
Coastal Star	9	10.33	20.46	18.38	90	14.1	15.6	0.0	0.00
Concept	9	6.17†	16.76	10.97	65	11.5	13.5	1.0	0.36
Deer Tongue	5	2.24	11.82	9.44	80	10.6	10.8	0.5	0.06
Fenberg	4	2.51	11.29	10.05	89	8.0	9.3	0.0	0.00
Freckles	2	1.30	12.88	10.41	81	12.1	10.5	0.0	0.00
Green Forest	7	11.39	30.08	26.05	87	15.8	14.7	0.0	0.00
Green Star	8	4.87	11.78	9.98	85	11.0	16.8	1.5	0.43
Green Towers	8	7.16	17.37	15.34	88	13.5	13.6	1.0	0.07
Jericho	5	4.82	12.56	15.45	123	14.2	16.2	0.0	0.00
Lettony	2	0.59	19.81	–	–	12.6	14.7	6.0	6.83
Mirlo	9	3.11	9.41	5.53	59	7.7	12.7	0.0	0.00
Nancy	6	2.51	11.64	6.70	58	8.0	12.6	0.0	0.00
Nevada	8	4.06	10.74	8.62	80	9.7	10.0	2.5	0.33
Panisse	1	0.54	7.76	8.64	111	7.5	11.9	6.0	2.42
Parris Island	7	5.46	14.97	12.50	84	14.1	13.9	0.0	0.00
Pirat	4	1.43	11.55	5.73	50	8.9	13.1	0.0	0.00
Salvius	8	7.89	20.81	15.79	76	13.2	12.6	0.0	0.00
SF Green Incised	2	0.25	6.26	2.03	32	6.3	9.0	2.0	0.54
SF Green Sweet Crisp	4	2.42	18.08	9.70	54	8.9	13.0	0.0	0.00
SF Red Incised	5	0.90	5.95	2.89	49	6.8	9.9	1.0	0.19
SF Red Sweet Crisp	5	0.57	5.74	1.83	32	6.5	9.7	2.0	0.24
SP Green Butter	2	0.37	6.35	3.00	47	5.3	8.3	1.0	0.23
SP Green Oakleaf	6	1.19	6.08	3.17	52	5.1	8.7	2.0	0.37
SP Red Butter	5	0.73	3.39	2.33	69	5.9	6.6	0.0	0.00
SP Red Oakleaf	4	0.35	2.82	1.41	50	5.1	7.1	0.0	0.00
Spretnak	7	2.40	9.70	5.70	59	7.5	7.7	3.5	1.15
Sylvesta	6	1.17	8.70	3.12	36	8.6	12.9	0.0	0.00
Tango	0	0.00	11.88	–	–	–	–	3.0	2.22
Tin Tin	6	2.67	7.85	7.11	91	8.7	9.6	2.0	0.35
Tropicana	6	6.30	19.82	17.00	86	12.2	16.4	0.0	0.00
Two star	6	1.41	3.70	3.41	92	8.0	11.7	1.0	0.13
Waldmann's	7	3.96	11.64	9.07	78	11.6	16.5	0.0	0.00
Winder Density	9	6.41	14.82	11.41	77	11.4	10.5	0.0	0.00
<i>Average</i>	<i>5.6</i>	<i>3.13</i>	<i>11.41</i>	<i>8.29</i>	<i>71</i>	<i>9.5</i>	<i>11.6</i>	<i>1.2</i>	<i>0.48</i>

<sup>z</sup>Unit=a single head, or multiple heads growing very close together and harvested as one.<sup>y</sup>Untrim.=heads as cut from field, with all leaves. Trim.=marketable heads, trimmed to remove seriously diseased and damaged leaves.

**Table 3.** Flavor intensity, bitterness, and bolting date for 38 varieties of lettuce seeded in the field on May 16, Wanatah, Indiana, 2013.

Variety	Flavor Rating <sup>z</sup>	Bitterness Rating	Days from Seeding to Bolting	
			50% Bolt	100% Bolt
Adriana	5.2 AB	3.3 BCDE	64	67
Aerostar	5.2 AB	3.3 BCDE	71	76
Bambi	3.0 CDEFGH	3.8 BCD	67	69
Bergam's Green	3.1 BCDEFGH	3.0 CDE	64	74
Buttercrunch	2.7 DEFGH	1.5 DE	64	69
Coastal Star	3.5 ABCDEFGH	3.3 BCDE	62	67
Concept	4.0 ABCDEFG	2.7 CDE	60	69
Deer Tongue	4.7 ABCD	1.2 E	60	67
Fenberg	4.2 ABCDEFG	5.5 AB	69	76
Freckles	4.0 ABCDEFG	2.2 DE	63	64
Green Forest	4.5 ABCDE	2.5 DE	65	67
Green Star	2.4 EFGH	3.8 BCD	60	67
Green Towers	3.9 ABCDEFGH	3.8 BCD	70	74
Jericho	4.5 ABCDE	3.8 BCD	64	67
Lettony	5.5 A	3.0 CDE	62	74
Mirlo	3.7 ABCDEFGH	1.2 E	66	69
Nancy	2.7 DEFGH	1.5 DE	63	67
Nevada	4.0 ABCDEFG	1.5 DE	69	>76
Panisse	5.2 AB	3.0 CDE	64	76
Parris Island	4.8 ABCD	5.0 BC	64	74
Pirat	5.0 ABC	2.2 DE	62	69
Salvius	5.0 ABC	3.0 CDE	66	74
SF Green Incised	3.5 ABCDEFGH	2.5 DE	62	76
SF Green Sweet Crisp	3.3 BCDEFGH	2.0 DE	62	74
SF Red Incised	3.3 BCDEFGH	2.0 DE	62	76
SF Red Sweet Crisp	1.8 H	2.0 DE	62	76
SP Green Butter	1.8 H	1.0 E	>76	>76
SP Green Oakleaf	2.2 FGH	1.5 DE	69	76
SP Red Butter	2.7 DEFGH	2.7 CDE	62	67
SP Red Oakleaf	1.9 GH	2.5 DE	71	76
Spretnak	3.5 ABCDEFGH	1.5 DE	62	67
Sylvesta	4.3 ABCDEF	3.0 CDE	67	76
Tango	3.5 ABCDEFGH	7.5 A	46	54
Tin Tin	3.0 CDEFGH	2.0 DE	67	>76
Tropicana	3.0 CDEFGH	1.8 DE	60	64
Two Star	3.7 ABCDEFGH	3.3 BCDE	62	71
Waldmann's	4.5 ABCDE	2.7 CDE	55	60
Winter Density	4.3 ABCDEF	3.0 CDE	64	69
<i>Average</i>	3.7	2.7		

<sup>z</sup>Flavor intensity: 1=bland, no flavor, like water; 5=moderate flavor; 9=intense flavor. Bitterness: 1=not at all bitter; 5=somewhat bitter; 9=inedibly bitter. Values are least squares means of ratings by 4 evaluators per variety. Means within a column followed by the same letter do not differ significantly based on Fisher's protected LSD at  $P<.05$ .



**Table 4.** Notes on color, quality, core length at 54-55 days after seeding, and other characteristics for 38 varieties of lettuce grown in the field in Wanatah, Indiana, 2013.

Variety	Color	Comments at Harvest
Adriana	light green	Butterhead. Very attractive. Very tender leaves. Heavy bottom rot means much trimming. Heads trimmed too small became culls. Core to 2 in. long. One bolting. Bottom rot very heavy.
Aerostar	green	Smaller romaine. Core 4 in. Little bottom rot.
Bambi	green	Mini-romaine. Small, dense. Core 1.5 in. Issues: tears, some bottom rot, some leaf spot. Light bottom rot.
Bergam's Green	green	Small heads.
Buttercrunch	green	Small, heavily trimmed. Bibb? Core 1 to 1.5 in. Very tender. Many leaves removed. Slimy. Some marginal scorch and chlorosis. Broken leaves. Bottom rot very heavy.
Coastal Star	green	Big green romaine, little trimming needed. Core 4 to 5 in. Starting to bolt. Some sweet aftertaste. Little bottom rot.
Concept	green	Big romaine. Vase-shaped. Wavy leaf margin. 4 in. core. Leaves removed due to patches of bottom rot on lower rib. Some feeding on midrib not removed. Medium bottom rot.
Deer Tongue	green	Bibb. Pointy deep bright green leaves. Dense. Broad core, about 3 to 4 in. long. Some leaf tear and leaf split -- may be due to drooping at base. Very mild, tender in mouth. Light bottom rot.
Fenberg	green	Small, heavy heads. Very thick leaves, toothed margins. Vase-shaped. Midribs arch out. Core 2 in. Very little bottom rot.
Freckles	green w/ red freckles	Nice romaine. Attractive coloring. Delicate leaves. Core 2 to 3 in. Not too much trimming needed. Light bottom rot.
Green Forest	green	Big romaine. Nice. Heavy. Brittle leaves. Thick leaves. Midribs arch outwards. Core 4 to 5 in. Occasional round spots (lesions) on lower leaves. Light bottom rot.
Green Star	green	Frilly leaves. Bottom rot. Starting to bolt. Stem about 4 in. long. Feeding on midribs. Possible aster yellows.
Green Towers	green	A big romaine. Some yellowing lowest leaves. Core 4 in. long. Light, dry bottom rot.

*Continued on next page*

Table 4 (continued)

Variety	Color	Comments at Harvest
Jericho	green	Big romaine. Few torn leaves. Good quality. Core 4 in. long. A little possible aster yellows on midrib. Little bottom rot.
Lettony	green	Frippy leaf margins. Tipburn. Core about 3 in. long. A little 'tough' or chewy.
Mirlo	green	Butterhead. Very tender leaves. Many leaves left in field because they were slimy and stuck to the ground. Core 1 to 1.5 in. Bottom rot very heavy.
Nancy	green	Floppy-leaved, light green butterhead. Wavy margin. Tender. Core 2 in. long. Bottom rot leaves removed; still decent heads left. Heavy bottom rot.
Nevada	green	Wavy leaves. Dense leaf. Core 1-1.5 in. Tearing on lower leaves. Many leaves removed due to bottom rot. Heavy bottom rot, but not obvious.
Panisse	green	Pale green, frilly—large rounded lobes. Somewhat flattened. Tender. One head very pale. Heavy bottom rot.
Parris Island	green	Big romaine. Core 4 in. long. Some leaves removed due to small patches of bottom rot. Light bottom rot.
Pirat	light green and red	Butterhead. Very attractive. Very tender leaves. Not too many torn. Core 1.5 in. long. Very heavy and slimy bottom rot.
Salvius	green	Big romaine. Nice heads even after trimming. Core 4 in. long. Some round 1/4 inch spots on occasional lower leaf. Bottom rot not slimy. Possible aster yellows. Light to medium bottom rot.
SF Green Incised	green frilly	Fine cut leaves. Frilly. Core 1.5 in. on small head. A little possible aster yellows. Culls have bottom rot. Fairly heavy bottom rot.
SF Green Sweet Crisp	green frilly	Fine cut leaves. Core 3 to 4 in. Possible aster yellows. Fairly heavy bottom rot.
SF Red Incised	red/green frilly leaves	Fine cut leaves. Frilly. Core 1.5 - 2 in. long. Quite a bit of bottom rot.
SF Red Sweet Crisp	red/green	Leaves have pointy lobes. Core 1.5-2 in. long on small head. Many leaves lost in trimming due to bottom rot. Fairly heavy bottom rot.
SP Green Butter	light green	Flattened head. Tender, light-green leaves. Entire rounded leaves, not lobed. Many leaves removed due to bottom rot. Heavy bottom rot.

Continued on next page

Table 4 (continued)

Variety	Color	Comments at Harvest
SP Green Oakleaf	green	Flattened rosette. Deeply lobed oak leaf with rounded-lobes. Quite tender. Core 1 in. long. Heavy bottom rot.
SP Red Butter	Dark maroon lt. green base	Entire, unlobed leaves. Vertical habit, like small romaine. Core 1-2 in. long. Light bottom rot.
SP Red Oakleaf	maroon green interior	Rounded-lobed leaves. Fairly flattened head. Core 1-1.5 in. long. Some leaves removed due to bottom rot. Medium bottom rot.
Spretnak	green	Dense small bibb. Core 4 in. long. Tender in mouth, fine to eat. Required heavy trimming of bottom rot. Very heavy bottom rot.
Sylvesta	green	Light green butterhead; tender delicate leaves. Core 1-1.5 in. long. Lots of slimy bottom rot removed. Not many torn leaves. Some decent heads. Very heavy bottom rot.
Tango	green	Bolted. Fine cut leaves. Tipburn.
Tin Tin	green	Small romaine. Thick, brittle leaves. Torn lower leaves. Core about 2 in. long. Bottom rot leaves removed and heads still decent. Some possible aster yellows. Light to medium bottom rot.
Tropicana	green	Very large heads. Frilly leaf margins.
Two Star	green	Variable size, some small heads. Frilly leaf margins.
Waldmann's	green	Core 4 in. long. Tipburn.
Winter Density	green	Small dense romaine. Core to 3-4 in. long. Yellowing/necrotic spots at leaf margins. Spots on lower leaves. Some interveinal chlorosis. Brittle leaves break easily. Branches at base; possible aster yellows on branches. Little bottom rot.