



Head Lettuce Variety Performance, Matanuska Valley, Alaska 1996

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INTRODUCTION

Variety selection is an important management decision potentially impacting grower profitability. Sources providing information on variety performance include 1) literature and other information from private seed companies, 2) informal discussion among growers, and 3) University conducted variety trials. All of the above sources have unique strengths, and all should be considered when selecting varieties. University conducted variety trials, however, provide the only unbiased source of information on varietal performance.

Important traits determining suitability of lettuce varieties in the Matanuska Valley include general appearance, tip burn resistance, head size, maturity, and disease resistance. Tip burn results from a calcium deficiency in growing tissue, and is expressed as dead leaf tissue. Lesions may occur both internally or externally, and may predispose the plant to bacterial diseases. Head size is important because growers are required to pack a fixed number of heads per carton when harvesting, and also because head size influences consumer preference in the supermarket.

The ultimate goal of variety trials is not describing past performance, but rather predicting superior varieties for future years. This task is made more difficult by the fact that top performers in one environment (considered a year, site, management situation, etc.) may be outperformed in a different environment due to differences in temperature, rainfall, irrigation, etc. For this reason, variety trials are conducted over several years to determine average performance across a range of environmental conditions. The ranking of varieties, based on their average performance in head-to-head competition over time, provides powerful and objective information

that should be considered when selecting varieties.

In 1995, 27 head lettuce varieties were evaluated in a replicated study at the Palmer Research Center and two grower's fields in the Matanuska Valley. The 15 varieties that performed best in 1995 were selected for evaluation in 1996. The performance of those 15 varieties are summarized in this report.

MATERIALS AND METHODS

Fifteen head lettuce varieties were evaluated in this trial at the Palmer Research Center. Each variety was evaluated in an early-, mid-, and late-season planting. Seed was provided by five commercial seed companies: Asgrow (AS), Ferry-Morse (FM), Harris-Moran (HM), Petoseed Royal Sluis (PR), and Pybas Seeds (PY); and by Dr. Edward Ryder (RY), a USDA lettuce breeder.

Seed of each variety was planted in a commercial greenhouse into plug flats, and approximately 30 days later, the seedlings were transplanted to the field. Greenhouse planting dates were April 5, April 26, and May 23, and transplanting dates were May 1, May 23, and June 20.

Seedbed preparation consisted of moldboard plowing followed by rotary tilling and packing. Granular fertilizer (10-20-20) was broadcast at a rate of 120 lbs. N, 240 lbs P_2O_5 , and 240 lbs. K_2O/A with a drop spreader between plowing and rotary tilling operations. Plots were irrigated with overhead sprinklers immediately after transplanting and when soil moisture tension reached 30 centibars or more. Weeds were controlled by hoeing.

The experimental design was a randomized complete block with four replications. Each plot consisted of 20 plants in a 10 x 2 grid. The 10 plants in each row were spaced 12 inches

apart, and the two rows were 18 inches apart. Plots were harvested as they matured, with all plants in a plot harvested at the same time. For each plot, the number of days from transplanting to harvest was recorded. Tip burn was evaluated on all 20 heads of a plot using the following 0-4 scale: 0 = no tip burn, 1 = combined tip burn damage of less than one-half square inch, 2 = combined tip burn damage between one-half and 3 square inches, 3 = combined tip burn damage of more than 3 square inches or soft rot (slime) covering up to 10% of the head, and 4 = combined tip burn damage of more than 3 square inches or soft rot covering more than 10% of the head. Head diameter and head weight were measured on all 20 heads in each plot.

Each head was considered either marketable or unmarketable. An individual head was considered unmarketable if 1) its tip burn rating was greater than 2, 2) its head diameter was less than 5 inches or greater than 7 inches, 3) its head weight was less than 1.25 lb. or greater than 2.75 lb., or 4) it had other significant defects such as disease or deformities. Heads that were unmarketable for more than one reason were considered to be unmarketable for only that trait listed first in the above list.

Data were summarized by planting date, and were combined with data from the 1995 trial to summarize performance across years. Within each year, the performance of each variety was expressed as percentage of the overall mean for that year (mean of all planting dates), with percentages greater than 100 indicating above average performance, that is, a higher percent marketability and better tip burn resistance. For example, a marketability of 105% in 1995 would indicate that the marketability of that variety is 5% above the 1995 average, while a value of 95% in 1996 would indicate that the marketability of that variety is 5% below the 1996 average. Then, for each variety, these percent of mean values were averaged across 1995 and 1996 to obtain the two-year average performance. In the above example, the two-year average performance for this hypothetical variety would be

100%, the average of 105% and 95%.

RESULTS AND DISCUSSION

A large percentage of heads in the first planting were considered unmarketable due to their small size (Table 1). This may have been due in part to stress from low temperatures immediately after transplanting. The early-season planting was transplanted on May 1, and low temperatures of 30, 25, and 27 °F were recorded on May 1, May 2, and May 3, respectively. Plants exhibited symptoms of frost damage, including withered leaves and slow early growth. Coolgreen had the highest percentage of marketable heads, due mainly to its lower percentage of heads too small to market. Tiber had the best tip burn ratings, which contributed to its high percentage of marketable heads. Tip burn injury was relatively high in this planting, which allowed for good separation of varieties for this trait. It should be remembered that only varieties found to have high levels of tip burn resistance were included in this trial.

The mid-season planting also had a high percentage of undersized heads (Table 2). Exceptions were Coolgreen, having only 2.5%, and Salinas, having only 8.8%, unmarketable due to undersized heads. Both, however, had poor tip burn ratings. Patriot and Alpha had the best tip burn ratings in this planting. Coolgreen had a relatively large percentage of heads classified as unmarketable due to reasons other than tip burn, size, or weight. Most of these heads were classified as unmarketable because of deformities.

Tiber had the highest percentage of marketable heads in the late-season planting, followed by Coolgreen (Table 3), and both had the smallest percentages of heads rejected due to small size. The late-season planting had an overall higher percentage of undersized heads than the mid-season planting, despite the fact that more days were required to reach harvest maturity. There was less tip burn injury in this planting than the first two and, subsequently, differences among varieties were

small. Pybas 142 showed an exceptionally high level of tip burn resistance in this planting, with no heads considered unmarketable due to tip burn.

Results using information from both 1995 and 1996 (Table 4) provides a more useful assessment of varietal performance, because two-year averages are more reliable indicators of future performance than are results from a single year. Averaged across these two years, Tiber had both the highest percentage marketable heads and best tip burn resistance. 87-716-1 and Salinas were the next best for percent marketability, although their tip burn resistance was below average. Coolgreen had a fairly high percentage of marketable heads, but its tip burn resistance was the poorest of any variety.

Results from this trial should not be considered definitive, but rather should be interpreted in the context of expected on-farm performance. That is, known differences between conditions at this experimental site and a specific farm situation should be considered. The ranges in head diameter and weight we used to determine marketability are somewhat subjective. Differences in visual appearance that might influence buyer acceptance was not quantitatively evaluated in this trial. These subjective considerations, in conjunction with objective results from this variety trial, provide valuable information to assist growers in identifying superior varieties.

Table 1. Performance of 15 head lettuce varieties in the early-season planting at the Palmer Research Center in 1996.

Variety	Source	Marketable		Unmarketable due to:				Days transplanting to harvest
		heads %	Tip burn (1-5)	Tip burn %	Undersized %	Oversized %	Other %	
Coolgreen	FM	31.3	1.5	21.3	45.0	0.0	2.5	79
Tiber	RY	29.4	0.8	5.4	61.0	0.0	4.2	78
Patriot	AS	25.2	1.1	14.2	59.4	0.0	1.3	77
Salinas	HM	23.8	1.6	28.0	45.8	0.0	2.5	78
87-714-5	RY	22.6	1.0	11.4	64.7	0.0	1.3	78
Alpha	HM	22.0	1.5	20.5	56.2	0.0	1.3	79
Top Gun	AS	21.3	1.3	18.8	57.5	0.0	2.5	79
Target	PR	16.3	1.9	36.3	46.3	0.0	1.3	77
Premier	HM	14.2	1.3	18.2	67.6	0.0	0.0	78
87-716-1	RY	14.1	2.0	40.3	44.3	0.0	1.3	78
Pybas 142E	PY	13.9	1.0	14.0	70.9	0.0	1.3	77
Stinger	AS	10.7	1.5	22.0	67.4	0.0	0.0	80
Pybas 142	PY	10.1	1.0	8.8	81.1	0.0	0.0	79
Montemar	FM	10.0	1.7	30.0	58.8	0.0	1.3	80
Bullseye	PR	9.1	1.4	29.6	58.7	0.0	2.6	78
LSD 0.05*		15.2	0.6	16.9	19.8	—	5.0	3

* Least Significant Difference. Values in each column differing by less than the LSD are not significantly different.

Table 2. Performance of 15 head lettuce varieties in the mid-season planting at the Palmer Research Center in 1996.

Variety	Source	Marketable		Unmarketable due to:				Days transplanting to harvest
		heads %	Tip burn (1-5)	Tip burn %	Undersized %	Oversized %	Other %	
Top Gun	AS	61.8	0.7	10.0	19.1	0.0	9.2	69
Salinas	HM	61.3	1.0	20.0	8.8	0.0	10.0	67
Tiber	RY	60.8	0.6	7.6	20.3	0.0	11.3	67
87-714-5	RY	58.5	0.5	10.0	25.3	0.0	6.3	66
Pybas 142	PY	56.3	0.9	17.5	18.8	0.0	7.5	70
Patriot	AS	55.8	0.3	2.6	29.7	0.0	11.9	67
Target	PR	53.2	0.9	16.5	22.6	0.0	7.6	63
Bullseye	PR	51.3	0.6	7.5	33.8	0.0	7.5	67
Stinger	AS	50.0	0.6	7.7	38.6	0.0	3.8	69
Alpha	HM	45.7	0.4	5.0	45.5	0.0	3.8	67
Premier	HM	45.0	1.0	18.8	26.3	1.3	8.8	71
Pybas 142E	PY	42.5	0.6	8.8	47.5	0.0	1.3	66
87-716-1	RY	40.3	1.2	22.8	29.1	0.0	7.8	67
Montemar	FM	34.0	0.6	6.3	43.4	0.0	16.4	71
Coolgreen	FM	30.0	1.4	23.8	2.5	2.5	41.3	70
LSD 0.05		21.4	0.6	14.9	22.0	1.5	13.1	4

* Least Significant Difference. Values in each column differing by less than the LSD are not significantly different.

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Table 3. Performance of 15 head lettuce varieties in the late-season planting at the Palmer Research Center in 1996.

Variety	Source	Marketable		Unmarketable due to:				Days transplanting to harvest
		heads	Tip burn	Tip burn	Undersized	Oversized	Other	
		%	(1-5)	%	%	%	%	
Tiber	RY	58.4	0.2	1.3	32.6	0.0	7.8	91
Coolgreen	FM	54.4	0.4	3.8	33.1	0.0	8.8	94
87-716-1	RY	52.1	0.4	6.3	40.4	0.0	1.3	86
Pybas 142	PY	49.1	0.2	0.0	44.6	0.0	6.3	94
Target	PR	48.3	0.4	6.4	41.5	0.0	3.9	88
87-714-5	RY	47.1	0.4	5.1	47.8	0.0	0.0	89
Salinas	HM	42.5	0.5	9.2	41.8	0.0	6.5	91
Bullseye	PR	38.8	0.3	5.0	53.8	0.0	2.5	93
Pybas 142E	PY	30.1	0.3	3.8	64.9	0.0	1.3	88
Stinger	AS	29.5	0.5	9.1	58.9	0.0	2.5	92
Patriot	AS	29.1	0.4	5.3	60.4	0.0	5.3	89
Montemar	FM	27.5	0.4	8.8	58.7	0.0	5.0	92
Top Gun	AS	26.6	0.1	1.3	69.6	0.0	2.6	90
Alpha	HM	21.4	0.4	5.0	69.7	0.0	3.9	91
Premier	HM	21.1	0.1	1.3	73.7	0.0	4.0	76
LSD 0.05		21.4	0.4	8.9	23.5	—	8.5	10

* Least Significant Difference. Values in each column differing by less than the LSD are not significantly different.

Table 4. Performance of 15 head lettuce varieties grown at the Palmer Research Center in both 1995 and 1996 averaged across three planting dates and two years, expressed as percent of trial mean. *

Variety	Source	Marketability	Tip Burn
Tiber	RY	129.6	120.3
87-716-1	RY	117.9	83.6
Salinas	HM	117.0	79.9
87-714-5	RY	116.9	111.4
Patriot	AS	113.8	107.7
Coolgreen	FM	112.1	76.9
Target	PR	109.9	80.0
Premier	HM	106.8	108.6
Top Gun	AS	104.6	114.6
Alpha	HM	103.8	101.5
Bullseye	PR	101.6	101.7
Pybas 142	PY	99.2	108.2
Pybas 142E	PY	97.9	108.5
Stinger	AS	95.8	91.5
Montemar	FM	66.8	98.7

* Values greater than 100 indicated higher marketability and higher tip burn resistance. See text for how values were calculated.