



## One-Cut Lettuce Variety Trial

### In a Nutshell:

- Jordan Scheibel and Jon Yagla compared a selection of mini-head and one-cut lettuce varieties from two series: Eazyleaf and Salanova. Scheibel was particularly interested in red varieties.

### Key Findings:

- Varieties from both series (Eazyleaf and Salanova) performed similarly, overall. At Yagla's farm where there were statistical differences in yield, green varieties from both lettuce series out-performed red varieties.
- Stanford, a red Eazyleaf variety, had issues with bolting and flavor on both farms.

### BACKGROUND

Salad greens are prized crops for vegetable growers. During 2017 and 2018 farmers conducted variety trials on head lettuces to search for the most heat-tolerant varieties for their farm.<sup>[1,2]</sup> Jordan Scheibel and Jon Yagla were interested in a similar variety trial comparing production of Salanova varieties with Eazyleaf varieties for mini-heads and salad mix, particularly during the hot summer months. Scheibel said, "I have been using Salanova varieties on my farm since 2016 and have found them to be anecdotally superior to the other one cut lettuce varieties. However, I have yet to find a red leaf Salanova variety that I really like so I wanted to do a trial to see if one of the Eazyleaf varieties would fit into that slot for me."

### METHODS

Both farmers planted four replications of lettuce varieties in randomized, replicated trials. Scheibel trialed three Salanova: Red Sweet, Red Butter and Red Oakleaf; and three Eazyleaf: Brentwood, Buckley and Stanford. Yagla trialed four varieties over three successions. Salanova at Yagla's included Red Butter and Green Sweet; Eazyleaf included Ezrilla and Stanford. Information about varieties, including seed cost, can be found in **Table 1**. Varieties were selected based on farmer preference, similarity between Salanova and Eazyleaf varieties, and their production suitability for the summer. Seeds for the trials were provided by Johnny's Seeds (Winslow, ME) and High Mowing Seeds (Wolcott, VT).

Production practices including mulching, spacing, irrigation, planting dates and harvest dates were determined by farm and are detailed in **Table 2**. Farmers collected yield data by plot, including the number of heads harvested and harvest weight. During each harvest they also scored each plot for issues with quality, specifically: bolting, flavor, bottom rot and tip burn.

### Cooperators

Jordan Scheibel,  
Middle Way Farm, Grinnell  
Jon Yagla,  
Millet Seed Farm, Iowa City

### Funding

Ceres Trust; Seed provided  
by Johnny's Seeds and High  
Mowing Seeds



Newly transplanted variety trial at Jon Yagla's Millet Seed Farm in Iowa City.

**TABLE 1. Series and pricing of variety trial lettuces.**

VARIETY	SERIES	\$/100 SEEDS	\$/M	<i>About the series:</i>  “Regarded as the newest innovation in salad mix production and a superior hydroponic lettuce, Salanova offers versatility, efficiency, and high value. Harvested as fully mature heads, the flavor and texture have more time to develop than traditional baby-leaf lettuces. From the unique structure of the core a multitude of uniformly-sized leaves develops that is harvestable with one simple cut. Salanova is more than 40% higher yielding, has better flavor and texture, and double the shelf life of traditional baby-leaf lettuce, making it an excellent option for field or indoor production.” – Johnnyseeds.com  “Eazyleaf lettuces are one-cut ready types, so called because they can be cut once above the growth point and yield a ready-to-bag salad mix. Suitable for cut-and-come-again or single harvest. Can also be harvested as full heads.” – Highmowingseeds.com
Brentwood	Eazyleaf	3.95	10.25	
Buckley	Eazyleaf	3.95	10.25	
Ezrilla	Eazyleaf	3.95	10.25	
Green Sweet Crisp	Salanova	17.50	38.38	
Red Butter	Salanova	19.09	43.73	
Red Oakleaf	Salanova	19.09	43.73	
Red Sweet Crisp	Salanova	17.50	38.38	
Stanford	Eazyleaf	3.95	10.25	

Prices reflect Nov. 2019 web pricing for Johnny’s Selected Seeds and High Mowing Seeds

M = 1,000 seeds

Presence of these issues in each plot were scored as “Acceptable (A)”, or “Unacceptable (U)”. At times farmers marked A/U as a middle score. To create average scoring for quality, numerical values were substituted in the following manner: “U” = 0, “A/U” = 0.5, and “A” = 1.0. A score of 1.0 indicates that the farmer did not see any quality issues during harvest; scores closer to 1.0 indicate better quality. These scores were not statistically analyzed.

To determine the effect of variety on lettuce yield, we calculated Tukey’s least significant difference (LSD). If the difference in yield measurements for any two varieties was greater than or equal to the LSD, we confirm that variety had a statistically significant effect on yield. On the other hand, if the difference in any yield measurements was less than the LSD, we consider the varieties to be statistically similar. We used a 90% confidence level to calculate the LSDs, which means that we would expect our rankings to occur 90 times out of 100. We could make these statistical calculations because the farmers’ experimental designs involved replication and randomization of the three treatments (**Figure A1**).

**TABLE 2. Planting and trial design at each farm.**

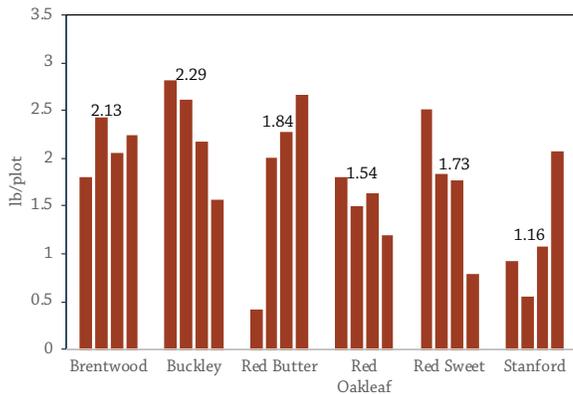
	SCHEIBEL	YAGLA
Seeding Date(s)	July 30	May 18; June 12; July 10
Transplant Date(s)	Aug. 23	June 14; July 9; Aug. 7
Varieties Used	Red Sweet, Red Butter, Red Oakleaf, Brentwood, Buckley, Stanford	Red Butter, Green Sweet, Ezrilla, Stanford
In-row Spacing	6 in.	8 in.
Between-row Spacing	9 in.	10 in.
Planting Notes	Paper pot transplanter; 4 rows in a 36-in. bed.	Hand-transplanted; four rows per bed.
Irrigation	drip	drip and hand-water
Mulch	none	light layer of leaf mulch
Plot Area	4.5 ft <sup>2</sup>	4.44 ft <sup>2</sup>
Plants per Plot	12	8

## RESULTS AND DISCUSSION

*Scheibel, Grinnell*

At Scheibel's, no variety managed a statistically significant difference in yield measurements, including plot weight, harvestable heads, head weight and Brix, as shown in **Table 3** and **Figure 1**. Scheibel noted that his weed management was poor in this trial, and that it may have caused some head loss and smaller heads.

Scheibel observed the most bolting in Stanford and Red Butter; those two varieties also scored the lowest on flavor. Buckley, an Eazyleaf variety, was the only variety to have no issues with bolting during the trial. None of the varieties showed incidence of bottom rot or tip burn (**Table 4**).



**FIGURE 1.** Lettuce Yield at Scheibel's. Bars are individual plot values, with varietal mean reported above each cluster of bars. Because no varieties differed by more than the least significant difference (LSD = 1.38), we consider the varieties statistically similar with 90% certainty.

**TABLE 3.** Yield and yield characteristics at Scheibel's.

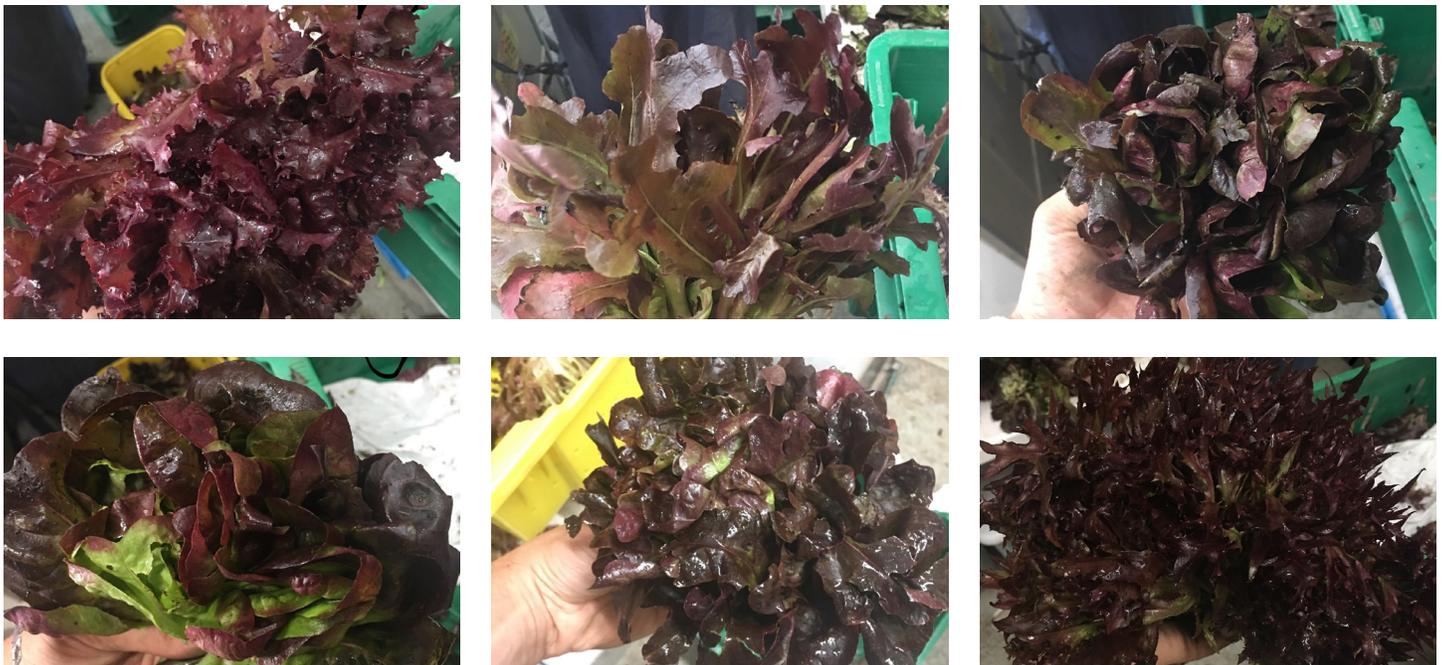
VARIETY	HEADS HARVESTED (%)	HEAD WEIGHT (LB/HEAD)	BRIX
Brentwood (E)	96%	0.21	1.17
Buckley (E)	100%	0.13	1.38
Red Butter (S)	83%	0.13	1.38
Red Oakleaf (S)	75%	0.19	2.00
Red Sweet (S)	88%	0.17	1.88
Stanford (E)	75%	0.18	1.25
LSD	28%	0.09	1.13

By columns, because values do not differ by more than the least significant difference (LSD) the varieties are considered statistically similar with 90% certainty.  
(E) indicates an Eazyleaf variety; (S) indicates a Salanova variety.

**TABLE 4.** Lettuce quality scores at Scheibel's.

VARIETY	BOLTING	FLAVOR	BOTTOM ROT	TIP BURN
Brentwood (E)	0.88	1.00	1.00	1.00
Buckley (E)	1.00	1.00	1.00	1.00
Red Butter (S)	0.50	0.88	1.00	1.00
Red Oakleaf (S)	0.75	1.00	1.00	1.00
Red Sweet (S)	0.75	1.00	1.00	1.00
Stanford (E)	0.63	0.75	1.00	1.00

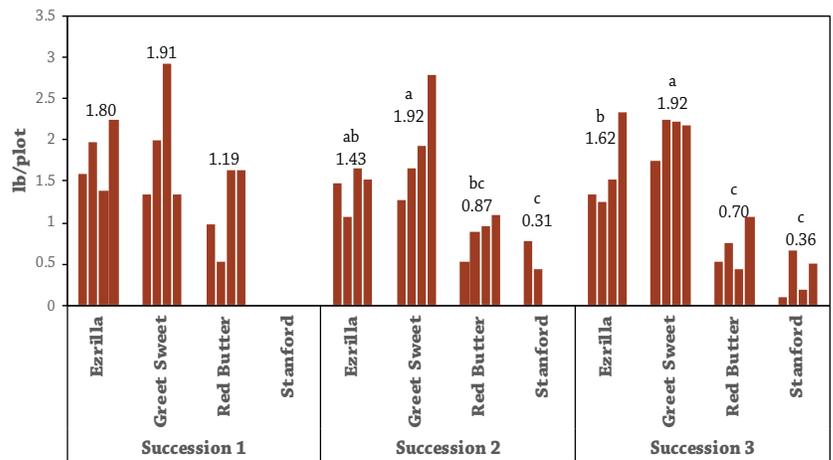
Quality scores for each variety were recorded during each harvest.  
1.00 = Acceptable  
0.50 = Acceptable/Unacceptable  
0.00 = Unacceptable  
We did not conduct statistical analysis of quality scores.  
(E) indicates an Eazyleaf variety; (S) indicates a Salanova variety.



Harvested lettuces of each variety at Scheibel's. Top row, from left to right: Brentwood, Buckley, Stanford. Bottom row, from left: Red Butter, Red Oakleaf, Red Sweet

At Yagla's, there were no differences among varieties in Succession 1 but he did observe differences in plot weight in Succession 2 and 3 (Figure 2) and head weight in Succession 3 (Table 5). Green Sweet Crisp was the top performer for plot weight and percent heads harvested in both Succession 2 and 3 and for head weight in Succession 3. Larger heads and typically high rates of head harvest led to overall higher plot yields for Green Sweet Crisp, and Ezrilla, compared to Red Butter and Stanford. Ezrilla and Green Sweet Crisp are both green-leafed lettuces; Red Butter and Stanford are red-leafed varieties.

Yagla noted that Green Sweet Crisp, a Salanova variety, was the least susceptible to bolting, followed by Ezrilla, an Eazyleaf variety. Red Butter and Stanford both had issues with bolting, and Stanford had additional quality issues with bottom rot and flavor (Table 6).



**FIGURE 2.** Lettuce Yield at Yagla's by Succession. Bars are individual plot values, with varietal mean reported above each cluster of bars. Different letters above the mean indicate that yields differed more than the least significant difference with 90% certainty during that Succession (LSD = 1.09 for Succession 1; 0.82 for Succession 2; 0.48 for Succession 3). Where letters are the same or no letters are reported, yields were statistically similar. Varieties were not compared across successions.

**TABLE 5.** Yield and yield characteristics at Yagla's.

SUCCESION	VARIETY	HEADS HARVESTED (%)	HEAD WEIGHT (LB)
S1	Ezrilla (E)	97%	0.23
	Green Sweet Crisp (S)	100%	0.24
	Red Butter (S)	100%	0.15
	LSD	6%	0.14
S2	Ezrilla (E)	59% ab	0.32
	Green Sweet Crisp (S)	88% a	0.27
	Red Butter (S)	78% a	0.15
	Stanford (E)	34% b	0.11
LSD	40%	0.25	
S3	Ezrilla (E)	91% a	0.23 a
	Green Sweet Crisp (S)	97% a	0.27 a
	Red Butter (S)	72% a	0.12 b
	Stanford (E)	44% b	0.10 b
LSD	25%	0.08	

By succession within columns, values followed by different letters indicate that yields differed by more than the least significant difference (LSD) and were statistically different with 90% certainty. Where letters are the same or no letters are reported, yields were statistically similar.

(E) indicates an Eazyleaf variety; (S) indicates a Salanova variety.

**TABLE 6.** Lettuce quality rankings at Yagla's.

SUCCESION	VARIETY	BOLTING	FLAVOR	BOTTOM ROT	TIP BURN
S1	Ezrilla (E)	0	1.0	1.0	1.0
	Green Sweet Crisp (S)	0	1.0	1.0	1.0
	Red Butter (S)	0	1.0	1.0	1.0
S2	Ezrilla (E)	0.75	1.0	0.5	1.0
	Green Sweet Crisp (S)	1.0	1.0	1.0	1.0
	Red Butter (S)	0.5	1.0	0.75	1.0
	Stanford (E)	0	0	0.25	1.0
S3	Ezrilla (E)	0.5	1.0	1.0	1.0
	Green Sweet Crisp (S)	1.0	1.0	1.0	1.0
	Red Butter (S)	1.0	1.0	1.0	1.0
	Stanford (E)	0	0.5	0.5	1.0

Quality scores for each variety were recorded during each harvest.

1.00 = Acceptable; 0.50 = Acceptable/Unacceptable; 0.00 = Unacceptable

We did not conduct statistical analysis of quality scores. (E) indicates an Eazyleaf variety; (S) indicates a Salanova variety.

## CONCLUSIONS AND NEXT STEPS

Both farmers were impressed with how well the Eazyleaf lettuces compared to the Salanova lettuces, considering the difference in seed cost. Looking ahead at future production, Yagla decided not to continue with one-cut lettuces at all, instead saving the space for full-sized head lettuce which do well for him. Though Scheibel was impressed with some Eazyleaf varieties, he decided to only reorder Salanovas for 2020 production. “I liked the Salanovas better; I think they work better as a series. I did order more green varieties than red varieties, and particularly ordered more Green Sweet.”



Above: Differences in resistance to bolting between red and green varieties were clear in the field. Red Butter performed better than Stanford, for the red varieties at Yagla's

## APPENDIX – TRIAL DESIGN AND WEATHER CONDITIONS

REP1	REP2	REP3	REP4
Ezrilla	Stanford	Red Butter	Green Sweet
Green Sweet	Ezrilla	Stanford	Red Butter
Red Butter	Green Sweet	Ezrilla	Stanford
Stanford	Red Butter	Green Sweet	Ezrilla

**FIGURE A1.** Example of experimental design used by farmers in the trial, which included randomized, replicated plots of the varieties. This design allowed for statistical analysis of the results.

<b>TABLE A1. Climate data for 2019 and historical averages.</b>								
Month	Scheibel: Grinnell				Yagla: Iowa City			
	Growing Degree Days (base 50 °F)		Rainfall (in.)		Growing Degree Days (base 50 °F)		Rainfall (in.)	
	2019	Avg.	2019	Avg.	2019	Avg.	2019	Avg.
May	281	359	9.6	4.7	344	430	9.6	4.4
June	572	560	4.0	5.1	621	646	3.4	5.1
July	763	677	2.0	4.2	843	753	1.0	4.0
August	601	617	5.0	4.6	711	699	4.7	4.3

Monthly growing degree days and monthly rainfall for the current year and historical averages are reported from the nearest weather station. Climate data were accessed from the Grinnell and Iowa City weather stations.<sup>[3]</sup> Historical data include years 1985-2018.) Where rainfall in 2019 was more than two inches different than the average, values are italicized.

## REFERENCES

1. Kolbe, L., C. Black, R. Faux, A. McGary, J. Scheibel and K. Edwards. 2017. Summer Lettuce Variety Trial. Practical Farmers of Iowa Cooperators' Program. <https://practicalfarmers.org/research/summer-lettuce-variety-trial/> (accessed Sept. 2020).
2. Kolbe, L., J. Beebout, C. Black, K. Edwards, R. Faux, J. Scheibel and J. Yagla. 2018. Summer Lettuce Variety Trial. <https://practicalfarmers.org/research/summer-lettuce-variety-trial-2/> (accessed Sept. 2020).
3. Iowa Environmental Mesonet. 2019. Iowa Environmental Mesonet. Iowa State University Department of Agronomy. <http://mesonet.agron.iastate.edu/> (accessed Sept. 2020).



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