



## Spring High Tunnel Lettuce Production in Iowa

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High tunnels are tools in Iowa that allow growers to plant earlier in the spring. Planting earlier expands the growers' season and permits a competitive advantage in the market. Crops grown in high tunnels are protected from the adverse weather conditions, allowing for higher quality and yield. Specialty crop growers have expressed interest in better understanding the high tunnel cropping system with a broader array of crop options.

Lettuce is a high-value crop that has gained traction due to an increase in local market demand. Growers who would like to meet this demand have shared in needs assessments a desire to have more research-based information on types of high-quality and profitable lettuce cultivars in Iowa. This trial aimed to target the questions growers have about what types of lettuce to grow and how to manage them in a high tunnel system.

### Materials and Methods

Field research was conducted in the spring of 2021 at the Iowa State University Horticulture Research Station to evaluate several lettuce types and cultivars. Fifteen cultivars were chosen from five lettuce types. These types included Butterhead Bib, Butterhead Boston, Romaine, Salanova, and Summer Crisps. Lettuce was seeded at the ISU Department of Horticulture research greenhouses on March 1. Three cultivars for each five types of lettuce were planted. Three summer crisp cultivars included Muir (Johnny's Selected Seeds), Cherokee (Johnny's Selected Seeds), and Lovelock (High Mowing Organic Seeds). Romaine cultivars included Thurinus (Johnny's Selected Seeds), Coastal Star (Johnny's Selected Seeds), and Aerostar (High Mowing Organic Seeds). Salanovas evaluated were Green Batavia, Green Butter, and Red Oakleaf (Johnny's Selected Seeds). Two types of Butterheads, Bibs, and Boston were included in the trial. The Bib cultivars were Cegolaine, Buttercrunch, and Rosaine (Johnny's Selected Seeds). The Bostons were Adriana, Nancy, and Skyphos (Johnny's Selected Seeds).

Four-week lettuce seedlings were transplanted April 5 inside a 30 ft. by 96 ft. high tunnel at the Horticulture Research Station. The high tunnel had roll-up automated sides that were set to lift when temperatures reached 69°F.

The experimental design was a randomized complete block with five replications per treatment. Urea (0-0-46) was broadcasted and incorporated based on soil test results. Each treatment plot was a 6 ft. long raised bed, 24 in. wide, covered with white on black plastic mulch. Two rows of lettuce were planted in each plot with 9 in. between rows and 9 in. between plants. Hobo sensors were installed to measure air and soil temperatures and light intensity measurements. Plants were irrigated weekly, as needed, using drip irrigation.

At the end of April, plant samples were sent to the Plant and Insect Diagnostic Clinic to confirm presence of a disease which was confirmed to be *Botrytis* and *Pythium*. On May 11, a fungicide (a.i. Cyprodinil; Switch 62.5 WG) was sprayed to manage disease spread.

Lettuce was harvested May 17. Lettuce heads were graded into marketable and non-marketable categories. Data was collected on number and weight in each category. From the marketable heads, four were chosen to collect data on head diameter.

## Results and Discussion

Table 1 shows the average air, soil (4-in. depth) and light intensity data from the high tunnel. All lettuce cultivars evaluated performed well in this study and benefited from growing in a high tunnel, even with challenges. Due to cool weather conditions in the spring, lettuce is particularly susceptible to diseases in a high tunnel this time of year. Growers should monitor irrigation carefully as overwatering will encourage disease development.

The Butterheads in both the Bibs and Boston types were consistent across cultivars (Table 2). Of the Boston, Skyphos' marketable weight was significantly lower than Nancy. In the Romaines, Thurinus yielded the smallest by weight and size of head. Thurinus showed significantly lower marketable weight than the other two romaine cultivars, Aerostar and Coastal Star.

**Table 1. Field trial air and soil temperatures and light readings of lettuce plots grown in spring of 2021 at the Horticulture Research Station.**

	Air Temperature	Soil temperature	Light (lux)
	Mean	Mean	Mean
April	60.8 °F	58.5 °F	15,903
May	65.8 °F	64.3 °F	16,566

The Salanova cultivars showed differences among diameter comparisons. The marketable weight among the three was not significantly different. Salanova has been bred to grow as a head of lettuce to cut the core out and mix into a leaf lettuce mix. Leaves of this type are smaller and of larger quantity. Lovelock yielded the highest of the summer crisps, showing a significantly higher yield than cultivars Cherokee or Muir. Further data is being analyzed and collected in the lab for this study. This study will be replicated in the spring of 2022.

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**Table 2: Lettuce yield from the high tunnel at the ISU Horticulture Research Station, Ames, Iowa, in 2021. Yield data reported from 6-foot-long plots with two rows of lettuce. Each cultivar/treatment had five replications.**

Type	Cultivar	Marketable Heads	Marketable Weight kg	Average head Diameter cm
Butterhead Bib	Buttercrunch	9	3.34	57
	Cegolaine	10	4.04	59
	Rosaine	16	3.46	57
		NS	NS	NS
Butterhead Boston	Adriana	14	6.52 ab <sup>2</sup>	74
	Nancy	15	7.12 a	73
	Skyphos	14	5.26 b	72
		NS	0.0521	NS
Romaine	Aerostar	13	7.22 a	68 ab
	Costal Star	12	7.50 a	74 a
	Thurinus	12	3.45 b	59 b
		NS	0.0015	0.0594
Salanova	Green Batavia	13	4.20	80 a
	Green Butter	14	4.78	59 b
	Red Oakleaf	15	4.23	68 ab
		NS	NS	0.0170
Summer Crisp	Cherokee	15	4.98	64
	Lovelock	14	7.80	78
	Muir	12	6.50	73
		NS	NS	NS

<sup>2</sup>Means (within column and lettuce type) with the same letters are not statistically different (P<0.05)