

Report to the Pennsylvania Vegetable Research and Marketing Board

Evaluation of Lettuce Cultivars for both a Spring and Fall Crop in High Tunnels

Elsa Sánchez, Associate Professor of Horticultural Systems Management and

Bill Lamont, Professor of Vegetable Crops

Jon Dillner and Travis Berner, Undergraduate Students

Department of Plant Science, The Pennsylvania State University

University Park, Pa 16802

High tunnels have been proven to extend the growing season, which can allow growers to have the ability to generate more profits, but only when growing high value crops. Lettuce is a high value crop and is the second most important vegetable crop (after tomatoes) for high tunnel growers. Growers need cultivars that perform well in the high tunnel environment and also have excellent quality for the marketplace.

In 2013 we evaluated in both the spring and fall, sixteen cultivars of lettuce grown in a 17 ft by 36 ft high tunnel at the Penn State High Tunnel Research and Education Facility located at the Horticulture Research Farm in Rock Springs, Pennsylvania to determine which are best suited for a spring and fall crop in high tunnels. We evaluated yield, crop uniformity, maturity, color, habit, and susceptibility to insect/disease/stress.

The high tunnel had three raised wooden beds. The outer two beds being 3 foot wide and the center bed being 4 foot wide. The length of the beds was 30 feet. The two outer beds were planted with 3 rows of 3 transplants across for a total of 9 plants of lettuce per cultivar while the center bed was planted with 3 rows of 4 transplants across for a total of 12 plants per cultivar. The spacing between the rows was 7.5 inches and 12 inches between plants in the row. Drip irrigation system was used to maintain adequate soil moisture in the beds. Weeds were managed by hand hoeing. The only pest experienced was some aphids and white fly late in the fall crop.

For each cultivar the entire 9 heads from the outer beds were harvested while 9 heads from the center bed were harvested leaving three plants to observe for bolting, etc. Harvesting date for the cultivars was determined by referring to the days to maturity listed for the cultivar and by the appearance of the cultivar. The individual heads were then weighed and the diameter of the heads recorded.

The spring crop of lettuce was seeded on March 15, 2013 in 1.25-inch diameter cells in a 98-count cell tray with two cultivars per tray or 49 plants per cultivar in the tray. The spring crop was transplanted on May 3, 2013. Fertilizer (.6 lbs. of 10-10-10) was applied and lightly incorporated into the beds prior to transplanting. Harvest for the spring crop commenced May 24, 2013. The lettuce was seeded on August 6, 2013 for fall trial as before. Fertilizer was applied at the rate of (.6 lbs. of 10-10-10-10) and lightly incorporated into the beds prior to transplanting the lettuce. Drip irrigation was used to maintain adequate soil moisture. The lettuce was transplanted on September 13, 2013. The first harvest of lettuce commenced on October 21, 2013.

The data was analyzed using analysis of variance (PROC MIXED) and means will be separated using Tukey's Least Significance Difference test ($P > 0.05$).

Table 1. Lettuce cultivar, type, seed source, days to maturity and organic or non-treated seed for high tunnel spring and fall cultivar trial.

Cultivar	Type	Seed Source	Maturity	Organic Seed
True Heart	Romaine (narrow pointed, dense head)	Syngenta		NT
Rio Bravo	Romaine (large, v-shaped head)	Syngenta		NT
Red Zin	Romaine (triple red, medium thick, waxy leaf)	Syngenta		NT
Camino Verde	Romaine (open head)	Syngenta		NT
Skyphos MTO	Red Butterhead	Johnny's	47	NT
Two Star MTO	Green Leaf	Johnny's	51	Yes
Red Cross MTO	Red Butterhead	Johnny's	48	NT
Concept MTO	Green Summer Crisp	Johnny's	51	Yes
Mottistone MTO	Red Summer Crisp	Johnny's	55	NT
New Red Fire MTO	Red Leaf	Johnny's	55	Yes
Panisse MTO	Green Oakleaf	Johnny's	48	NT
Cherokee MTO	Red Summer Crisp	Johnny's	48	NT
Adriana MTO	Green Butterhead	Johnny's	48	NT
Rouxai MTO	Red Oakleaf	Johnny's	47	NT
Nevada MTO	Green Summer Crisp	Johnny's	48	NT
Nancy MTO	Green Butterhead	Johnny's	52	Yes

Table 2. Head weight (lb) and diameter (in) of 16 lettuce cultivars grown for a spring and fall crop in a 17 foot by 36 foot high tunnel located at the Penn State High Tunnel Research and Education Facility, Rock Springs, Pa.; in 2013

Cultivar	Spring Crop		Fall Crop	
	Head Weight (lb)	Head Diameter (in)	Head Weight (lb)	Head Diameter (in)
Rio Bravo	1.574a ^z	14.69a	0.550b	12.24b
True Heart	1.499a	14.27a	0.676a	12.49b
Camino Verde	1.308b	13.91abc	0.668a	12.47b
Adriana	0.649c	13.77abc	0.377de	11.16c
Nancy	0.624c	14.04ab	0.387d	12.92b
Skyphos	0.619c	14.15ab	0.366def	12.28b
Concept	0.463d	13.25bcd	0.479b	12.94b
Nevada	0.412de	11.51e	0.468c	10.56cde
Red Cross	0.349def	11.59e	0.300fgh	12.64b
New Red Fire	0.329ef	12.71d	0.369def	14.19a
Panisse	0.259fg	9.92fg	0.406cd	12.30b
Two Star	0.258fg	13.01cd	0.369def	12.40b
Mottistone	0.243fg	8.37h	0.265ghi	10.12de
Rouxai	0.202g	9.35g	0.220i	10.83c
Red Zin	0.194g	10.01fg	0.226hi	10.04e
Cherokee	0.180g	10.48f	0.305efg	10.77cd

^zValues are the mean of 3 replications; values followed by different letters within a column are significantly different using Tukey's multiple comparison test at the 5% level

Table 3. Harvest dates and cultivars harvested.

Cultivar	Spring Crop Harvest Date	Cultivar	Fall Crop Harvest Date
Two Star	May 24	Two Star	October 21
Cherokee		Panisse	October 24
Panisse		Red Cross	
Red Cross	Mottistone		
Mottistone	May 29	New Red Fire	
New Red Fire		Nancy	
Rouxai		Red Zin	
Nevada		Rouxai	
Concept	Cherokee		
Red Zin	Adriana		
Nancy	June 4	Skyphos	November 7
Adriana		Rio Bravo	
Skyphos		Camino Verde	
Rio Bravo	June 22	True Heart	
Camino Verde		Nevada	
True Heart		Concept	

Overall all lettuces that were trialed proved acceptable and were of excellent quality. The various color of the lettuces were extremely attractive and would be good for the local roadside stands or farmers markets. The eating quality of the varieties was excellent. I believe that the selection would dependent of one's market and how responsive the consumer would be to some of the varieties such as Mottistone, which has a unique speckling on the leaves, which we found to be very acceptable but others may find not as attractive. We have photos of all the varieties, which we will present at the Mid-Atlantic Fruit and Vegetable Conference in the High Tunnel Session when discussing the results of the lettuce trial.