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Leek Variety Trial 2014

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URI Leek Variety Trial Report

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Leeks have been a popular fall and winter vegetable in Europe for centuries, but have only recently gained a place in the produce sections of American markets. Leeks store very well under refrigeration, and can also be harvested throughout the winter if the ground is not frozen. This has made them popular for direct retail, particularly at late fall and winter markets. The increased demand for leeks in the United States has led to many new varieties. Most of the newer varieties are F1 hybrids, which offer improved uniformity of size, improved seedling vigor, and shorter plants that require less hilling. In 2012 and 2013 leek variety trials were conducted at the University of Rhode Island's Greene H. Gardiner Crops Research Farm to identify varieties particularly well-suited to southern New England. The trials were funded by a Specialty Crops Farm Viability block grant from the Rhode Island Department of Environmental Management's Division of Agriculture.

Trial Conditions

Seed of all varieties was started in the greenhouse in March of each year. In 2012 the transplants were grown in plug trays, but in 2013 we switched to open flats. Leek seedlings are very tolerant of root disturbance, but do not form good root balls, making them difficult to remove from the plug trays. In 2012 the leeks were transplanted into the field on April 17. Seedlings were planted approximately 2 inches deep with 5 inches between plants in the row and 15 inches between rows. In 2013 the leeks were transplanted on May 13 with 4 inches between plants in the row and 30 inches between rows. Weeds were controlled by hoeing and by repeated hilling. Granular organic fertilizer was incorporated at

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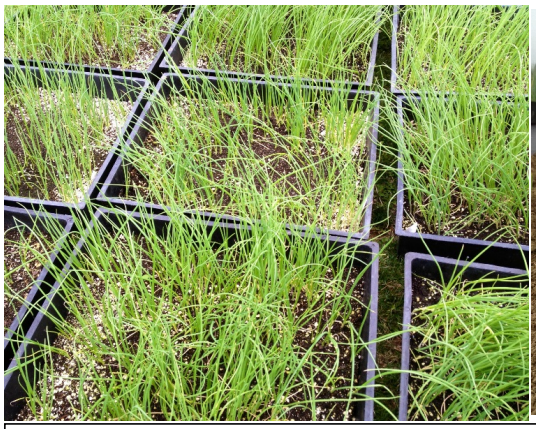

Leek transplants in the greenhouse and in the field in Spring 2013. Open flats proved more efficient than plug trays for growing leek transplants, and did not negatively affect transplant survival.

Noah using a wheel hoe to cultivate and hill the leek variety trial.

recommended rates during bed construction. Rainfall was supplemented as needed with overhead irrigation. Thrips were controlled with a tank mix of spinosad and azidirachtin. Chlorothalonil (Bravo Weatherstik) was used to control fungal diseases, particularly purple blotch (*Alternaria poori*). The trial was a randomized complete block with three replications. Two replications were harvested in the fall and the third was allowed to overwinter in the field. In 2012 fall harvest began September 20; in 2013 harvest took place on October 15. Overwintering was evaluated on the 2012 trial in January 2013. The winter of 2013-14 was colder than usual, with temperatures below 0°F and no January thaw, so overwintering was measured as spring regrowth in April.

2012 Trial

The 2012 trial included 28 varieties. The top-performing varieties in the trial were DP-12-02, Megaton, and Tadorna. DP-12-02 was an outstanding leek for fall harvest, but did not overwinter. Megaton and Tadorna were similar, except that Megaton was larger and more uniform, while Tadorna had better overwintering quality. Belton also did well, except for poor establishment.

Average size varied widely, from 5.6 oz. for Belton down to 0.7 oz. for Matisse. Data were not available for Matejko, as the harvested leeks were misplaced prior to trimming and weighing. Belton produced very large leeks, but it had poor seed germination and poor transplant survival, so the actual yield was low. Megaton and DP-12-02 had the highest yields due to the combination of large leeks and good establishment. DP-12-02 and Striker had the most uniformity among the leeks, but any variety with a score above 3.0 was statistically similar.

2012 Leek variety performance data

Variety	Transplant Establishment	Size (oz.)[a]	Yield (lbs)[b]	Uniformity[c]	Leaf Angle[d]	Color[e]	Over-wintering[f]
0050 TZ	88%	2.4	3.1	3.0	2.3	4.0	3
98118 TZ	83%	1.9	4.4	3.0	3.0	3.3	2
Autumn Giant	94%	2.1	5.4	2.0	2.3	3.7	4
Bandit	65%	2.3	5.2	2.0	2.7	3.3	4
Belton	42%	5.6	5.7	2.5	3.0	3.5	
Bleu de Solaize	52%	1.1	1.9	1.7	2.0	3.3	2
Bulgarian Giant	63%	2.0	4.0	1.7	1.7	2.0	1
Carentan	100%	1.1	3.1	2.7	2.7	2.7	1
Conway	83%	2.5	5.9	3.3	3.0	3.0	2
DP-12-02	97%	4.0	10.2	3.7	2.3	1.7	1
Electra	81%	2.9	6.8	3.0	2.0	4.0	2

Gevaria	37%	2.9	2.5	1.7	2.0	3.0	2
Giant Musselburgh	92%	2.0	5.3	2.3	2.3	2.3	1
King Richard	73%	1.2	2.4	2.0	2.7	3.0	3
King Sieg	66%	3.7	7.6	2.7	2.0	2.3	1
Lancelot	82%	2.7	6.3	2.3	2.7	3.7	2
Lexton	42%	2.3	3.1	2.3	2.3	4.0	3
Lincoln	53%	3.7	3.9	3.0	2.7	2.0	2
Matejko	64%			2.0	3.0	3.7	2
Matisse	49%	0.7	1.4	1.7	2.3	3.3	3
Megaton	97%	4.7	12.4	3.0	3.3	3.3	3
Oarsman	61%	2.9	4.8	1.7	2.7	3.0	2
Pandora	40%	2.9	4.3	2.7	3.0	3.0	1
Runner	75%	1.3	2.2	2.7	4.0	2.3	2
Striker	92%	2.9	7.7	3.7	3.0	3.3	2
Surfer	58%	1.5	2.6	2.7	3.7	3.7	2
Tadorna	97%	3.3	8.7	3.3	2.7	4.0	5
Tornado	44%	3.9	2.2	1.3	2.0	3.0	2
LSD				*1.7*	*0.9*	*1.0*	

[a] Size is the average weight after trimming and cleaning.
[b] Yield is the total yield from two plots, originally planted with 45 seedlings per plot.
[c] Uniformity was rated on a scale of 1-4 with 4 indicating that the plants were highly uniform for size and color.
[d] Leaf angle was rated on a scale of 1-4 where 1 indicates a leaf angle close to horizontal at the stem, and 4 indicates vertical leaves.
[e] Foliage color ranged from glossy green (1) to blue (4).
[f] Overwintering was evaluated in January 2013 after exposure to temperatures below 10°F. A score of 1 indicates that plants were completely dead, while a score of 5 indicates minimal damage. There is no LSD as data was not replicated.

Vertical leaves are desirable in leeks as they decrease the amount of soil that accumulates in the leaf axils and thus give cleaner leeks. However, tight leaf axils can also provide a haven for thrips, and exacerbate damage. Runner, Surfer, and Megaton had the most upright leaves. Leaf color can also be important, as waxy, blue leaves are more attractive to thrips, but may be less susceptible to fungal diseases and more tolerant of freezing. Tadorna, 0050 TZ, Electra, and Lexton had very blue leaves, while DP-12-02 had glossy green leaves similar to many of the heirloom varieties. Tadorna had the best quality after overwintering in the field – the healthy blue plants were visible from a significant distance. Autumn Giant and Bandit also held well in the field. In general the varieties that survived overwintering had blue foliage, while those that were killed by hard freeze had glossy green foliage. Overwintering data was not available for Belton, as the plot in the row that was left unharvested failed to establish. There were no differences among the varieties in the amount of damage from purple blotch.

2013 Leek Variety Yield Data

Variety	Establishment	% Marketable[a]	Yield (lbs)	Size (oz.)	%<1/2" dia.[b]
0050TZ	93%	78%	14.1	3.5	7%
98118TZ	86%	71%	16.6	4.7	8%

Autumn Giant	84%	63%	10.1	3.2	15%
Bandit	84%	49%	6.3	2.8	23%
Bulgarian Giant	96%	81%	19.1	4.4	8%
Catcher	87%	50%	7.2	2.8	28%
Conway	70%	85%	20.9	4.8	15%
DP-12-02	90%	55%	16.3	5.7	14%
Electra	96%	78%	12.2	2.8	11%
Giant Musselburgh	93%	71%	15.8	4.1	7%
Jumper	97%	67%	13.2	3.7	11%
King Richard	83%	68%	13.1	4.0	19%
Lancelot	89%	58%	10.8	3.7	21%
Matejko	100%	81%	17.5	3.8	6%
Matisse	96%	78%	19.6	4.8	7%
Megaton	98%	75%	23.3	5.7	4%
Oarsman	98%	69%	21.5	5.7	3%
Pandora	90%	51%	9.4	3.5	23%
Rally	87%	80%	26.1	6.0	7%
Runner	93%	72%	12.0	2.9	23%
Striker	93%	83%	18.0	3.9	15%
Surfer	99%	79%	14.4	3.2	7%
Tadorna	99%	70%	13.8	3.6	19%
Tornado	73%	63%	11.4	4.1	10%
LSD	*16%*	*26%*		*1.2*	*2.0*

[a] Indicates the percentage of the established plants that produced marketable leeks
[b] Leeks less than ½" in diameter were culled. Small size was the primary source of culls.

2013 Trial

The 2013 trial contained only 24 varieties. Establishment was generally better than in 2012; Conway had the worst establishment at 70% and 15 varieties averaged better than 90% establishment over the three replications. Yields were higher in 2013; this was a result of better establishment combined with slightly larger leeks. Rally yielded the most at 26.1 lbs, followed by Megaton at 23.3 lbs and Oarsman at 21.5 lbs. DP-20-12 yielded near the middle of the list at 16.3 lbs. All four varieties had excellent establishment. Conway had the greatest percentage of marketable leeks, which put it into 4th place for yield despite poor establishment. Percent marketable ranged from 49% to 85% with 5 varieties having significantly less marketable yield than Conway. Most culls were because the leeks were less than ½ inch in diameter. Average size for marketable leeks ranged from 6 ounces for Rally down to 2.8 ounces for Bandit, Electra, and Catcher.

In addition to yield traits the leeks were evaluated for color, leaf axil tightness, damage from purple blotch, thrips damage, late-season yellowing, height, and thickness. Color ranged from yellow-green to blue. Bulgarian Giant, DP-12-02, and King Richard were the greenest leeks, while Bandit and Surfer were completely blue. Some varieties became chlorotic as the season progressed, with yellowing affecting. individual plants. There were significant differences between varieties, with some varieties having most plants affected and others not being affected at all. We did not determine the cause of the yellowing but it may have been related to genetic color as the varieties in the greenest color group had a yellowing score of 3.1, while the varieties in the bluest group had a score of only 0.7. DP-12-02 and Bulgarian Giant

The leek variety trial in the field in October 2013. The empty beds were for the onion trial, which had already been harvested.

had very loose leaf axils that easily collected soil. In contrast, 0050TZ, Jumper, and Bandit had tight axils.

2013 Leek Variety Quality Data

Variety	Axil[a]	Mean Color[b]	Yellowing[c]	Over-wintering[d]	Height	Thickness
0050TZ	3.00	3.33	1.3	2	medium-tall	variable
98118TZ	2.67	3.83	0.0	1	medium	stocky
Autumn Giant	2.67	3.17	2.7	3	short	stocky
Bandit	3.00	4.00	1.0	2	short	variable
Bulgarian Giant	1.67	1.50	3.3	0	very tall	variable
Catcher	2.67	3.50	0.3	1	medium-short	thin
Conway	2.33	3.17	0.0	0	medium-tall	medium
DP-12-02	1.00	1.17	3.3	0	very tall	medium
Electra	2.00	3.00	3.0	2	short	stocky
Giant Musselburgh	2.33	2.50	3.3	2	short	stocky
Jumper	3.00	3.33	0.0	0	tall	large
King Richard	2.33	1.33	2.7	0	tall	variable
Lancelot	2.17	2.83	0.5	0	medium	thin
Matejko	2.33	3.17	0.0	0	tall	stocky
Matisse	2.67	3.83	0.0	0	tall	stocky
Megaton	2.67	3.17	1.0	0	tall	stocky
Oarsman	2.33	3.50	2.3	0	medium	stocky
Pandora	2.33	3.83	0.7	0	medium	variable
Rally	2.67	3.17	0.0	0	tall	stocky
Runner	2.50	3.50	1.7	1	medium-tall	thin
Striker	2.33	3.00	0.0	0	tall	variable
Surfer	2.67	4.00	0.3	1	medium-tall	large
Tadorna	2.33	3.83	0.0	3	medium-tall	variable
Tornado	2.50	2.33	2.7	0	medium	medium
LSD	*1.0*	*0.70*	*2*			

[a] Axil tightness was rated on a scale of 1-4 where 4 indicates tight axils that do not collect dirt. Tight axils are associated with vertical leaf angle

[b] Foliage color ranged from glossy green (1) to blue (4).

[c] Some varieties became chlorotic late in the season. Yellowing was rated on a scale of 0 to 5 in October. A score of 0 indicates that no chlorotic leeks were present; a score of 5 indicates lots of yellowing. Data shown is the average of 3 replications.

[d] Overwintering was evaluated on April 10, 2014. A score of 0 indicates that all plants died. Only one replication remained in the field over winter.

Once again there were no statistical differences in purple blotch damage between varieties, and the July and October ratings were not well correlated. There were also no significant differences in thrips damage.

The winter of 2013-14 was unusually severe, with a low of -10°F on January 4 and average temperatures below normal from December through March. The ground remained frozen and mostly snow-covered

well into March, with spring green-up occurring in April. Winter survival ratings were taken on April 10, 2014. Plots were rated on a scale of 0-3 where 0 indicated that all plants were dead. The best plots had a few inches of green growth on the majority of the plants. Autumn Giant and Tadorna had the most green growth, followed by Electra, Giant Musselburgh, Bandit, and 0050TZ. None of the other varieties had any useable leeks.

Plant height and stem thickness were recorded as narrative descriptions just prior to harvest in October. Varieties with variable thickness had a full range of sizes from under ½" to over 2" in the same plot. Stocky leeks were the largest in diameter, around 2". Of the six varieties in the top group for size, Rally, Matisse, and Megaton were both tall and stocky. Oarsman was somewhat shorter, making it easier to pack into boxes. DP-12-02 was excessively tall, while Conway was medium. Autumn Giant and Giant Musselburgh also had good proportions for packing.

Conclusions

Megaton was an excellent performer for yield both years, with strong establishment and uniformly large leeks. DP-12-02 and Tadorna also did well both years; moderate yields are due to the smaller size of these leeks relative to Megaton. DP-12-02 is a very tall, thin, green leek that is well suited to bunching sales in late summer and early fall, but loses quality when harvested late. Tadorna and Autumn Giant were the most winter hardy, and were generally good performers except for a tendency to variable size and a high percentage of unmarketably small leeks. Rally was only tested in 2013 but shows real promise as a leek for fall harvest.

Seed Sources for Leek Varieties

Seed Company	Varieties			
Baker Creek	Autumn Giant[h]	Carentan[h]	Giant Musselburgh[h]	
	Bulgarian Giant[h]			
Bejo	Striker	Surfer	Runner	Jumper
	Rally	Lancelot	Catcher	
DP Seeds	DP-12-02			
Fedco	Lincoln[h]	King Sieg*	King Richard[h]*	
	Bleu de Solaize[h]			
Harris	Electra			
High Mowing	Bandit*	Runner*		
Johnny's	Pandora*	Lancelot	Lexton	King Richard[h]*
Selected Seeds	Megaton	Tadorna*	Bandit*	
Siegers	Belton	Conway	0050 TZ	Megaton
	98118 TZ	Tornado	Oarsman	Tadorna
	Gevaria	Matejko	Matisse	

[h] Heirloom variety
* Organic seed