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Onion variety trials conducted at Kingston, RI, in the summer of 2012.

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Onion Variety Trials, 2012

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The 2012 onion trial included 23 varieties, with an emphasis on yellow long-day storage onions. Entries were seeded in the greenhouse during the second half of March, and transplanted to the field on April 13. Onions were grown on raised beds with black plastic mulch for weed control. There were three rows per 30" bed, with 4" between plants in the row. The soil was a silt loam with good water holding capacity but low organic matter. Fertilizer was incorporated into the beds at planting; water was provided by overhead irrigation and rainfall. The significant pest problems in the field were an outbreak of thrips, followed by an outbreak of Purple Blotch, caused by *Alternaria porri*. Onions were harvested approximately one week after 50% of the tops went down; the harvest period was August 2-27. Onions that appeared to be marketable at harvest were cured in a warm greenhouse until September 6. Following curing the onions were topped, bagged, and stored in a walk-in cooler at 42-45°F until January 7. In addition to yield data, the varieties were evaluated for foliage color, leaf angle, thrips infestation and damage, purple blotch susceptibility, and overall suitability to plasticulture production. Yield data is presented as percentages because of wide variability in establishment of seedlings and transplants. Prince, Highlander, and Copra had the best performance overall, primarily due to excellent establishment, high marketable yield, and low storage losses.

Most varieties had good to excellent seed germination and establishment of transplants (Table 1). The exceptions were BGS 270, Patterson, and Brandt. Brandt suffered from poor germination, such that there were only sufficient transplants to plant one row per bed, but the transplants themselves established well. Redwing and Red Bull also had problems with germination, such that they had to be reseeded and did not go to the field until May 30. BGS 270 and Patterson suffered from poor transplant establishment. The variety Highlander was the first to mature; Red Defender and Redwing were the last. 'Prince' had the highest marketable yield, at 91%, followed by Cortland at 89%. Yankee and Dakota Tears had the lowest marketable yields, at 44% and 47% respectively. Copra held up best in storage, with only 16% loss after 5 months. Other varieties that stored well included Calibra, Gunnison, Highlander, Prince, Red Defender, and Sedona. The varieties with the highest storage losses also had large numbers of culls at harvest, suggesting that poor storage was due to field infection with a bulb-rotting pathogen. Average bulb size ranged from a low of 4.3 ounces for the pink torpedo onion BGS 270 to a high of 9.8 ounces for the yellow Spanish onion Sedona.

Because onions have shallow roots and upright leaves which do not form a closed canopy, weed control can be challenging. Plastic mulch offers an effective alternative to the use of herbicides, with the added advantage that it increases moisture levels in the shallow root zone. However, the plastic also increases humidity levels around the base of the bulb, which can lead to rot. Onion varieties appear to differ in how well suited they are to plasticulture production. In our trial Madras, Sedona, Safrane, and Red Defender were best suited to plasticulture, while Brandt, Yankee, Redwing, and Braddock were poorly suited (Table 2). Onions that were not suited to plasticulture exhibited restrictive girdling around the bulb region as well as secondary mold and fungal decay. The high humidity combined with heat under the plastic seemed to have accelerated the rot, when rot was present. In addition, onions that failed to "push" through the plastic had large thrip colonies attacking the

neck regions. Onion thrip populations thrive in hot environments, and the space below the plastic provided both refuge and optimal conditions for population growth.

Onion thrips (*Thrips tabaci*) are the primary insect pest of onion. The thrips feed on the leaves, particularly in the neck of the onion. Feeding damage reduces photosynthetic capability and facilitates infection by fungal and bacterial diseases; thrips can also vector diseases. Thrips damage is worst in hot, dry weather, and much of the research on thrips in onion comes from the onion-growing regions of the western US. Researchers have found that onion thrips prefer to feed on leaves with a heavy wax bloom and a bluish color, and that thrips also prefer onions with tight necks, as the tighter spaces protect the thrips from rain, pesticides, and predators. However, glossy-leaved onions have also been reported to have increased damage from powdery mildew, and large necks are associated with poor bulb curing and increased neck rot.

We evaluated the varieties in the 2012 trial for foliage color, leaf angle at the neck, thrips population density, thrips feeding damage, and purple blotch infection (Table 2). The varieties Calibra, Sarape Café, and Red Defender had the glossiest foliage, while Madras, Patterson, and Yankee had the bluest foliage. All varieties with color ratings above 3.0 are similar to Madras, Patterson, and Yankee. BGS 270, Candy, and Yankee had the most open necks, while Safrane had very tight leaf angles at the neck. Varieties with axil scores above 2.7 were similar to Safrane. This would lead us to predict that varieties such as Safrane and Patterson that have both blue foliage and tight necks would have the most thrips damage, while varieties such as Red Defender, Calibra, and Candy that have open necks and glossy leaves would have very little thrips damage. However, that is not what we saw in the field. BGS 270 had the highest thrips populations, despite its open leaf axils, and Patterson was in the lowest group for thrips population density. Only Pontiac and BGS 270 had significantly higher thrips populations than the varieties with the lowest population levels. Candy was most severely damaged by thrips, despite having glossy foliage and an open neck, while Safrane suffered little damage. These results suggest that other factors may be more important than either foliage color or neck tightness in determining the susceptibility of varieties to thrips damage under our conditions. Varieties with good tolerance of thrips were Red Bull, Sedona, Safrane, and Gunnison. There were no significant differences among the varieties in our trial for susceptibility to purple blotch.

Table 1. Onion varieties and yield data

Variety	Source	Type	Establish.	First Hvst	% Mkt ^c	storage loss ^d	bulb size (oz.)
Madras	Bejo	yellow	98%	15-Aug	58%	70%	6.7
Sedona	High Mowing	yellow Spanish	95%	20-Aug	72%	24%	9.8
Safrane	Bejo	yellow	98%	15-Aug	87%	35%	7.6
Red Defender	Harris	red	98%	27-Aug	78%	22%	8.2
Gunnison	JSS ^b	yellow	100%	13-Aug	85%	23%	7.9
Sarape Café	dp seeds	yellow	100%	13-Aug	76%	58%	8.2
Verrazano	Siegers	yellow	81%	15-Aug	62%	46%	7.3
Pontiac	Siegers, JSS	yellow	91%	20-Aug	58%	nd ^c	7.2
Hendrix	Siegers	yellow	88%	15-Aug	70%	38%	7.1
Calibra	High Mowing	red	87%	20-Aug	88%	22%	8.6
BGS 270 ^a	Bejo	pink torpedo	55%	20-Aug	50%	94%	4.3
Copra	JSS	yellow	100%	13-Aug	84%	16%	5.5
Prince	Siegers	yellow	100%	15-Aug	91%	20%	7.6
Patterson	JSS	yellow	79%	20-Aug	56%	62%	4.6
Dakota Tears	High Mowing	yellow	91%	13-Aug	47%	50%	6.0
Candy	Harris	intermediate day	82%	13-Aug	70%	57%	8.7
Red Bull	JSS	red	100%	20-Aug ^f	67%	41%	5.8
Cortland	JSS	yellow	88%	20-Aug	89%	30%	6.4
Highlander	Siegers	yellow	92%	2-Aug	81%	20%	5.8
Brandt	Siegers	yellow	32%	13-Aug	49%	50%	5.7
Yankee	Bejo	yellow	88%	20-Aug	44%	62%	5.2
Redwing	JSS	red	93%	27-Aug ^f	72%	30%	5.0
Braddock	Bejo, Siegers	yellow	82%	20-Aug	77%	42%	5.4

^a BGS 270 is a torpedo-shaped onion with a mild, shallot-like flavor. It has shown excellent storage qualities in other trials, but did not do well under our conditions in 2012.

^b JSS is Johnny's Selected Seeds.

^c % marketable was based on marketability at harvest. Onions were culled for size, disease, and damage.

^d storage loss was determined after 5 months. Only marketable onions were put into storage.

^e Pontiac was misplaced as onions were moved into storage; no storage data was collected.

^f Redwing and Red Bull were transplanted to the field May 30.

Table 2. Onion varieties evaluated for traits related to thrips, disease, and suitability to plasticulture

Variety	Color ^a	Neck Tightness ^b	Thrips ^c	Damage ^d	Purple Blotch ^e	Suitability ^f
Madras	4.0	2.7	3.0	2.3	2.0	1.3
Sedona	2.7	3.3	2.3	1.7	1.7	1.7
Safrane	3.3	4.0	2.7	1.7	3.0	1.7
Red Defender	1.3	2.7	2.7	2.0	1.3	1.7
Gunnison	3.0	3.3	2.7	1.7	1.7	2.0
Sarape Café	1.0	3.7	2.7	2.7	2.7	2.0
Verrazano	3.0	3.0	3.3	2.7	2.0	2.0
Pontiac	2.7	2.3	3.7	2.7	1.7	2.0
Hendrix	3.7	2.3	3.0	2.3	2.0	2.3
Calibra	1.0	2.3	3.3	2.7	1.7	2.3
BGS 270	3.3	1.0	4.0	3.0	2.0	2.3
Copra	3.3	2.7	2.3	2.3	2.0	2.7
Prince	3.0	3.3	2.7	2.3	1.3	2.7
Patterson	4.0	3.7	2.3	2.0	2.7	3.0
Dakota Tears	3.7	2.3	3.3	3.0	1.3	3.0
Candy	2.0	1.7	3.3	3.7	1.3	3.0
Red Bull	2.7	2.3	2.7	1.3	1.3	3.3
Cortland	3.3	2.7	3.0	2.0	2.0	3.3
Highlander	3.0	3.0	3.3	2.7	1.7	3.3
Brandt	3.7	3.3	2.7	2.3	1.3	3.7
Yankee	4.0	2.0	2.3	2.0	1.0	4.0
Redwing	2.7	2.3	2.7	2.0	1.7	4.0
Braddock	3.3	3.0	3.3	2.7	1.7	4.0

^a Color was rated on a 1-4 scale with 1 indicating glossy green foliage and 4 indicating blue foliage. LSD = 0.9

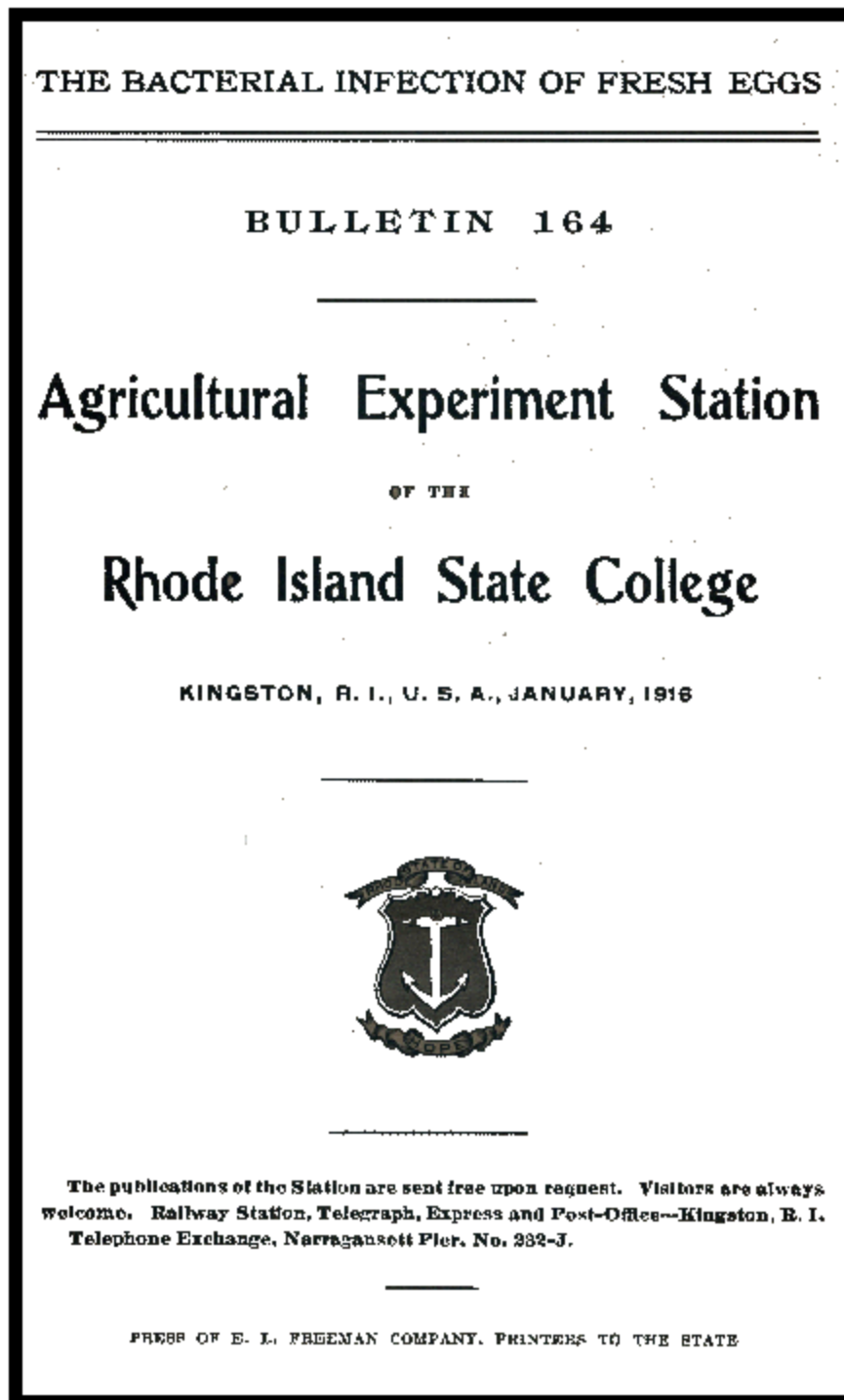
^b Neck tightness was evaluated on a 1-4 scale where 1 indicates an open neck and 4 indicates tightly closed leaf axils. LSD = 1.2

^c Thrips population levels were rated on a scale of 1-4 where 4 indicates high levels. LSD = 1.1

^d Thrips damage was evaluated on a scale of 1-4 where 4 indicates severe damage. LSD = 0.5

^e Damage from purple blotch was rated on a 1-4 scale where 4 indicates severe damage. There were no significant differences among varieties.

^f Suitability to plasticulture was rated on a 1-4 scale with 1 indicating that a variety was well-suited. LSD = 0.5.



Scan of an original frontispiece from 1916. Courtesy of Special Collections, Robert L. Carothers Library, University of Rhode Island, Kingston, RI