



Research Report: Overwintering Onions in Low Tunnels, Univ. of New Hampshire 2012

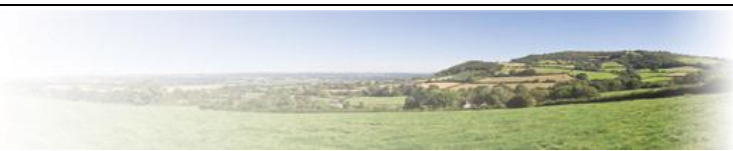
Background & Objectives: A handful of growers in the region have been experimenting with planting onion seedlings in the fall, covering them with low tunnels during the winter, and harvesting in the early spring. Some have reported good success, with an early harvest of beautiful bulbed onions, and others have reported challenges including poor survival and early bolting. At the NH Agricultural Experiment Station here in Durham NH (zone 5B), we planted seven varieties of onions in a replicated experiment to evaluate potential for overwintering and early spring harvest. This study was done in collaboration with University of Massachusetts researchers, as part of NESARE project LNE10-297.

Cultural Methods: Onions were grown in a randomized complete block design with 4 replicates, 24 plants per rep. Onions were seeded on Aug 18, 2011 and transplanted outdoors on Sept 20 (A) and Sept 30 (B), 2011. Seeds were provided by or purchased from Johnny's Selected Seeds (JSS), Seedway Seeds (SW) and Territorial Seeds (T). Plants were spaced 6" apart in three rows 6" apart on raised beds covered with embossed black plastic mulch. Low tunnels made of 10' PVC bows were installed over the onions in late fall. Plants were covered with heavy duty rowcover (1.25 oz/yd²) on Oct 18, and with an additional layer of greenhouse poly (6mil) added on Dec 16. The plastic was removed on March 14 and rowcover was removed on April 5.

Data: On Mar 13, 2012, plant vigor (number intact leaves) and overwinter survival were measured. On May 12, May 24, and Jun 6, subsamples of 6 plants were harvested from each plot. Bolting, bulb size, and weight of trimmed bulbs were measured.

Results:

- 1. Low Tunnel Environment.** The low tunnel covered with 1.25 oz/yd² rowcover and 6 mil plastic provided substantial temperature protection compared with outdoor temperatures. While outdoor air temperatures in Durham reached a low temperature of -9.6 °F, the low tunnel air temperature never fell below 13.8 °F, a difference of over 20 °F. Soil temperatures were also considerably warmer in the low tunnel than outdoors. While soil temperatures fluctuated widely inside the low tunnel, the soil temperature at 1.5" depth never fell below freezing, with a minimum temperature of 34.8 °F. In contrast, the soil temperature at 1.5" depth outdoors rarely went above freezing, and occasionally dipped much lower, with a minimum temperature of 20.7 °F. **The low tunnel is a protected environment, and any conclusions about our results should take this into account.**
- 2. Onion Survival.** In low tunnels, all varieties survived the winter equally well. The percentage of plants that died over the winter was less than 3% for all varieties.
- 3. Onion Plant Vigor.** On March 14, varieties different in terms of plant vigor. The varieties Keepsake, T-420 and TopKeeper were significantly taller and/or had more intact leaves than the two least vigorous varieties, Walla Walla and Winter White Scallion. Bridger and Hi-Keeper were intermediate.



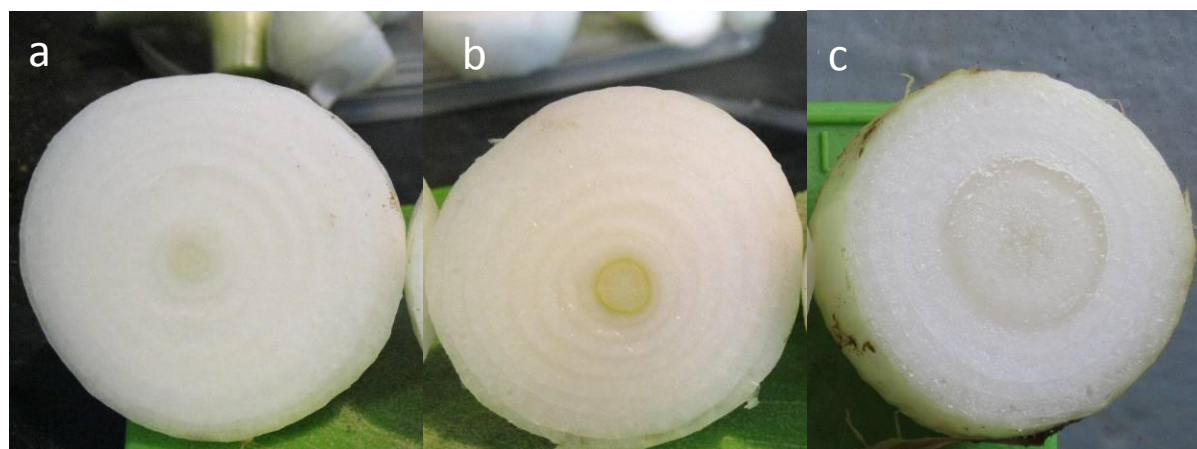
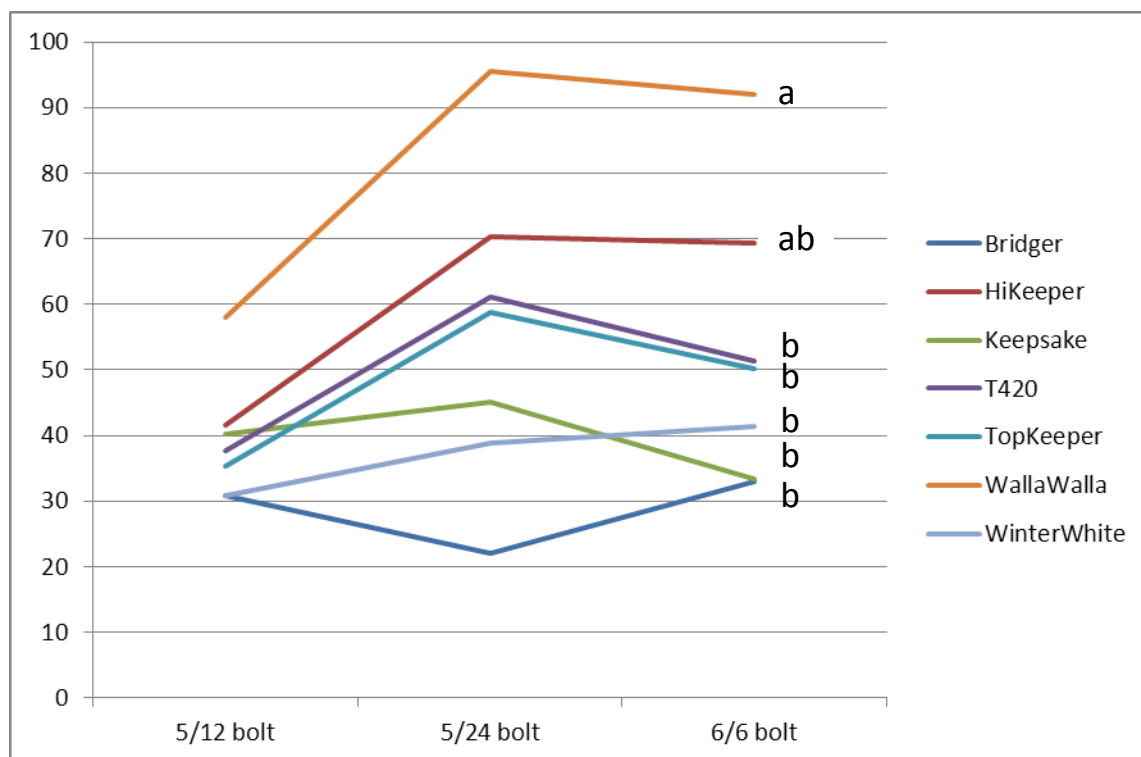
4. **Varieties.** *Winter White Scallion* (T) is a hardy non-bulbing scallion, which was grown because of its hardiness, but was not expected to bulb. It did not produce bulbs, but instead produced long white leek-like shanks that had a slight enlargement on the bottom. It could be creatively marketed as an oversized scallion in the spring, but not as a typical bulbing onion. *Walla Walla* (SW) is a long-day sweet onion commonly fall-planted in the Pacific Northwest as an overwintering onion. In our trial, it bolted quickly and did not produce large bulbs, perhaps because it bolted before our days reached the 14-16 hour daylength required to initiate bulbing. *Top-Keeper* (T), *Hi-Keeper* (T), *T-420* (JSS), *Keepsake* (T) and *Bridger* (JSS) are yellow storage varieties that produced high quality bulbs in our production system. These varieties varied somewhat in their tendency to bolt and bulb size, but all were marketable as spring onions.



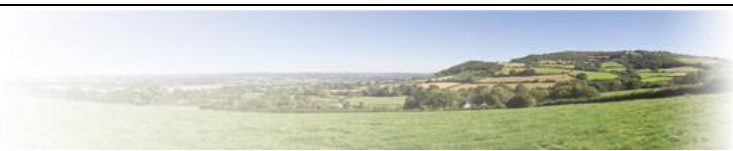


5. **Bolting.** By late April, flower stalks (scapes) were evident on some plants of several varieties. By May 24, varieties showed significant differences in percentage of bolting. In particular, Walla Walla had nearly 100% bolted plants, significantly more than all other varieties except Hi Keeper, which averaged approximately 70% bolting. Interestingly, bolting did not necessarily reduce marketability of onions that were harvested early, while the scape was still small. On bolted plants, scapes were evident in the center of the bulb as a small pithy core, but the presence of a scape did not reduce bulbing. At the last harvest date (Jun 6), scapes were large and readily apparent even when trimmed, which would likely not be acceptable for some markets.

Percent Bolted Plants (Over Time) of Overwintered Onion Cultivars

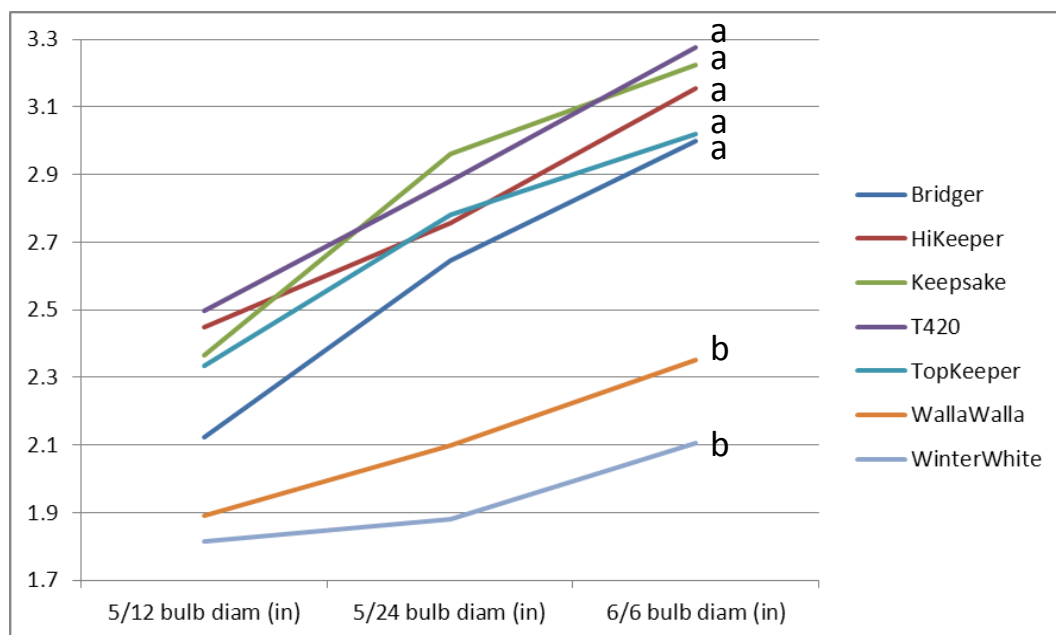


Onion cross-sections at various stages of bolting: a) non-bolted - no scape visible, b) early bolting – small scape visible, and c) late bolting – enlarged scape in center of bulb.



6. **Bulb Size.** As described above, two varieties did not form large bulbs: Walla Walla and Winter White Scallion. For the other five varieties, bulbs began to form in April and continued to enlarge until our final harvest on Jun 6. Average bulb diameters ranged from 2-2.5” on May 12, from 2.6-3” on May 24, and from 3-3.25” on Jun 6. Weight of trimmed bulbs for these five varieties ranged from 4-5.5 oz on May 12, and from 5.5-7.5 oz on May 24.

Bulb Diameter (inches) Over Time of Overwintered Onion Cultivars



Onions drying down after mid-June harvest. Only non-bolting onions of bulbing types are shown here: a) T420, b) Keepsake, c) Bridger, d) Hi- Keeper, e) Top Keeper.





Conclusions: We experienced good success in the first year of our overwintering onion trial. Low tunnels provided a protected environment that allowed onions to grow well over winter in Durham, NH (USDA hardiness zone 5B). With mid-August seeding and late September transplanting dates, survival was nearly 100% and bulbs were ready for harvest in early May. Bulbs continued to increase in size until early June. The varieties TopKeeper, Hi-Keeper, Keepsake, Bridger and T420 produced nice bulbs. Nearly half of each of these varieties bolted; but bolted plants were still marketable if harvested early. 2011-12 presented a relatively long, warm fall and a mild winter. We will repeat this experiment in 2012-13 and hope for more “typical” conditions. With any questions, please contact Becky Sideman at becky.sideman@unh.edu or call 603-862-3203.

Onions in low tunnels throughout the seasons.

