

The purpose of the trial was to determine if: Windham Packaging bags with lower O₂ flux rates would extend asparagus shelf life after being stored in room temperature for 3 days; and if spraying the asparagus with water would keep the tips from drying out. Asparagus were either sprayed with H₂O or not sprayed and stored in 38°F until pack-out. 12 and 16oz samples of asparagus were packaged in test bags or control bags from the previous trial at Miami Agro and then overnight shipped to Windham Packaging, Windham, NH. Asparagus was stored in 38-40°F for 4 days + 50°F for 2 days + 68-70°F for 2 days + 38-40°F for the remainder of the study. We felt that storing the asparagus in room temperature for any longer than 2 days would have resulted in severe decay. Weight loss, headspace analyses, and visual observations were noted on days 4, 8, 11, 13, 15, and 18. Weight loss remained under 1% in all samples throughout the study.

Control samples:

- Both the 12- and 16-oz control samples maintained close to ambient atmosphere (21% O₂, 0.3% CO₂) on day 4. On day 8, O₂ decreased to ~17% and then went back to 20% on day 11. This occurred in both H₂O-sprayed and non-sprayed samples. Atmosphere changes on day 8 are likely due to the asparagus being stored in room temperature. As storage temperature increases, respiration increases. After day 8 the asparagus was placed back in cold storage, resulting in decreased respiration rates and higher O₂ levels.
- Shelf life was significantly shorter in asparagus packages in control bags vs. asparagus packaged in test bags. This is because there was little to no atmosphere control, which caused increased respiration rates and faster deterioration.
- Spraying the asparagus with water caused the asparagus in control bags to decay more quickly. Samples in control bags sprayed with water had a shelf life of 7 days and non-sprayed samples lasted 8-9 days. Asparagus sprayed with H₂O had more instances of mushy tips and wet, brown ends compared to non-sprayed asparagus. There was no tip dryness observed in the non-sprayed samples.

12-oz Samples

- Non-sprayed samples had slightly higher O₂ levels than H₂O-sprayed samples. It's likely that the added moisture caused microbial growth, which increased respiration in H₂O-treated asparagus. In both treatments, O₂ levels started high on day 4 - 10.4% O₂ in H₂O-sprayed and 16.5% O₂ in non-sprayed treatments. The O₂ levels dropped on day 8 after 2 days of storage in room temperature (3.9% and 7.2% O₂ in H₂O-sprayed and non-sprayed treatments, respectively). Once the asparagus was moved back to cold storage, %O₂ increased to ~15% in H₂O-sprayed and ~16% in non-sprayed asparagus.
- 12-oz non-sprayed asparagus had early signs of browning on the ends on day 11, but the browning was controlled by reduced O₂ and increased CO₂ headspace levels. The ends remained acceptable until day 18. There was some wetness in the tips noticed on day 11. Average shelf life of 12-oz non-sprayed asparagus was about 16-17 days.
- 12-oz asparagus sprayed with water had good visual appearance until day 8, and then on day 11, the tips began to get mushy. On day 15, the ends began to brown due to oxidation reactions that occur during storage. Shelf life of 12-oz asparagus sprayed with water was about 16 days.

16oz Samples

- Unlike the rest of the treatments, 16oz samples in test bags had higher O₂ levels when sprayed with H₂O compared to the non-sprayed samples. This may be due to the bags being too small and leaks in the seals.
 - On day 4, The average headspace O₂ was 13.95% in H₂O-sprayed asparagus and 13.2% in non-sprayed asparagus.
 - On day 6 (4 days in 38-40°F + 2 days in 50°F), headspace O₂ slightly decreased to 13.4% (H₂O-sprayed) and 12.2% (non-sprayed) asparagus. Therefore, asparagus processed in 50°F will have a slightly higher respiration rate than asparagus processed in 40°F. The difference is not drastic, but if possible, it is better to pack the asparagus in 38-40°F.
 - Day 8 (4 days in 38-40°F + 2 days in 50°F + 2 days in 68-70°F): Headspace O₂ decreased to ~2% in both sprayed and non-sprayed asparagus after 2 days in room temperature.
 - Days 11-18 (4 days in 38-40°F + 2 days in 50°F + 2 days in 68-70°F + 10 days in 38-40°F): Headspace O₂ increased to 15% (H₂O-sprayed) and 13% (non-sprayed) after being placed back in cold storage.
- Non-sprayed asparagus had no visual defects until day 13. On day 13, the tips looked wet (but not mushy), and the ends looked OK. The asparagus remained acceptable until day 18. Shelf life of non-sprayed 16-oz asparagus was about 17 days.
- H₂O-sprayed asparagus began to show mushy tips on day 7. On day 11, the ends started to become wet and brown, with white liquid forming in the bags. Shelf life of 16-oz asparagus sprayed with H₂O was 12 days.

Conclusions:

- Spraying the asparagus with water was detrimental to asparagus shelf life in all bags. Too much moisture promotes microbial growth, causing decay. In fact, there was no dryness in asparagus tips that were not sprayed with H₂O. We recommend not spraying the asparagus with H₂O.
- We believe the bags were cut too short for these trials. In many samples, the tips were position against the top of the bag, coming into contact with condensation and resulting in wet, mushy tips. Asparagus continues to grow after harvest, so we need to account for that and increase the length of the bags.
- Storing asparagus in room temperature causes the respiration rate to increase significantly, resulting in decreased shelf life. However, “room temperature” in the grocery store is likely to be colder than 68-70°F. We recommend not keeping the asparagus in room temperature for longer than 2 days to avoid premature off-odors and soft rot.