Ultra-low oxygen treatment for postharvest insect control on lettuce and broccoli

Yong-Biao Liu
USDA-ARS, Salinas, CA

U.S. lettuce and broccoli face phytosanitary barriers on overseas markets because of interceptions of live insects that are either quarantined or regulated. Controlled atmosphere treatment with ultra-low oxygen (ultra-low oxygen treatment or ULO treatment) was studied to develop an alternative treatment to the current practice of chemical fumigation mostly with methyl bromide. Lettuce aphid, *Nasonovia ribisnigri*, western flower thrips, *Frankliniella occidentalis*, and leafminer, *Liriomyza langei*, were tested under different oxygen levels and temperatures for various durations to determine effective ultra-low oxygen treatments. Selected ULO treatments were further tested with commercial lettuce and broccoli to determine their impact on postharvest quality of lettuce and broccoli. Lettuce aphid was most susceptible among the three insects to ULO treatment. Leafminer flies were more tolerant to ULO treatment than lettuce aphid or thrips. Lettuce aphid can be controlled successfully without negative impact on lettuce quality. Thrips can also be controlled on broccoli without any negative effects on broccoli quality. Ultra-low oxygen treatment for control of thrips had minor effects on lettuce quality in the form of low oxygen injury or carbon dioxide injury to heart leaves and research is continuing to determine safe ultra-low oxygen treatment for thrips control on lettuce. Maturity of lettuce and cultivar difference also affected impact of ultra-low oxygen treatment on lettuce quality.