Title Effect of continuous 0.3 μL/L gaseous ozone exposure on fungicide residues on table grape berries

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Abstract

The persistence of residues of some fungicides, commonly applied in table grape vineyards to reduce bunch rot, was investigated during the cold storage of 'Thompson Seedless' table grape stemmed berries in atmospheres of air or 0.3 μL/L ozone enriched air. Grape berries were sprayed with a mixture of boscalid, iprodione, fenhexamid, cyprodinil, and pyrimethanil solutions, dried in air for 24 h, and packed in plastic clamshell containers in expanded polystyrene boxes. The boxes were stored either in ozone or in ambient air atmosphere (2 °C, 95% RH) for 36 d. Residue analyses were done initially and at 12-d intervals using gas chromatography–mass spectrometry. Residues of boscalid, iprodione, fenhexamid, and pyrimethanil declined during storage in air, but cyprodinil residues did not change significantly during 36-d storage. Storage in the ozone atmosphere markedly accelerated the rates of decline of fenhexamid, cyprodinil, and pyrimethanil, but not those of boscalid or iprodione. At the end of storage, degradation of fenhexamid, cyprodinil, or pyrimethanil was 1.6-, 2.8-, or 3.6-fold higher, respectively, in the ozone atmosphere compared that in air. Despite their structural similarity, pyrimethanil declined more rapidly in an ozone atmosphere than cyprodinil. Fenhexamid declined in both air and ozone more rapidly than the other fungicides; at the end of storage period, only 59.2% or 35.5% of the initial residue remained after air or ozone storage, respectively. Our results have shown that gaseous ozone treatment during storage has a great potential for degrading contemporary fungicides related to table grape production.