

Title Ozone gas penetration and control of the sporulation of *Penicillium digitatum* and *Penicillium italicum* within commercial packages of oranges during cold storage.

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Abstract

Ozone gas penetration through packaging materials and its effectiveness in controlling sporulation of *Penicillium digitatum* and *P. italicum* were evaluated on artificially inoculated and commercially packed 'Lanelate' oranges stored at 12.8°C and exposed to an average ozone concentration of 0.72 ppm (v/v) for 14 days. Inoculated control fruit were stored in a non-ozonated room with the same environmental conditions. Oranges were packed naked in California standard citrus cartons, naked or bagged (in polyethylene bags) in vented RPCs (returnable plastic containers), or bagged in fiberboard Master cartons. Ozone penetration was strongly dependent on the vented area of each type of package, and while it was very low through fiberboard cartons or polyethylene bags (9-17%), it was acceptable through RPCs (82%). Sporulation inhibition of both *P. digitatum* and *P. italicum* was clearly related to ozone penetration and it was satisfactory only on oranges packed naked in RPCs. Since the gas was not able to penetrate through fiberboard cartons or plastic bags, which are commonly used in California and worldwide for commercial packaging of not only citrus but a large variety of fruits and vegetables, the practical use of ozone gas exposure during storage for the treatment of fresh produce is limited to highly vented packages or open-top containers.