

Title Fumigation of empty fruit bins with carbon dioxide to control diapausing codling moth larvae and *Penicillium expansum* Link. ex Thom spores.

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Abstract

Wooden apple fruit bins are a source of diapausing codling moth and postharvest pathogenic fungi. The redistribution of codling moths within bins is a problem where codling moth populations are being controlled by areawide codling moth sterile release programmes, mating disruption programmes, or both. Laboratory and fumigation chamber trials were carried out to determine the impact of relatively low levels of carbon dioxide on late-instar codling moth (*Cydia pomonella*) and two postharvest fruit pathogens, *Penicillium expansum* and *Botrytis cinerea*. Fumigation of diapausing codling moth with 40% CO₂ in laboratory trials resulted in over 60% mortality after only 6 days of exposure and mortality increased with time of exposure. Significant mortality (68%) of diapausing codling moth larvae occurred after 14 days of exposure in the laboratory to 13% CO₂ and a mean of 88% mortality was recorded after fumigation for 20 days. A significant number of *P. expansum* (46%) spores failed to germinate after laboratory exposure to 13% CO₂ for 12 and 18 days respectively. Close to 100% of the *P. expansum* spores failed to germinate by day 20. When diapausing codling moth larvae and spores from both plant pathogens were placed in wooden fruit bins and fumigated for 21 days at 13% CO₂, 75% of the diapausing codling moths died and 80% of the *P. expansum* spores failed to germinate. No effect on *B. cinerea* was observed.