

Title Combined effect of carbon monoxide mixed with carbon dioxide in air on the mortality of stored-grain insects

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Abstract

A study to determine the effect of carbon monoxide (CO) mixed with carbon dioxide (CO₂) in air on controlling stored-grain insects was conducted in the laboratory. Within modified airtight gas exposure units containing wheat at 15% moisture content wet basis (w.b.), mixed-age adults of rusty grain beetle, *Cryptolestes ferrugineus* (Stephens), red flour beetle, *Tribolium castaneum* (Herbst), and granary weevil, *Sitophilus granarius* (L.) were exposed for 48, 96, 144 or 192 h to three types of gas mixtures in air, 5% CO, or 30% CO₂, or 5% CO + 30% CO₂ at 20 °C and 30 °C, the balance of the gas being air in each case.

Carbon monoxide alone had no effect on the mortality of adults of the three insect species. For *C. ferrugineus*, there was no difference in mortality between by CO₂ alone and the CO₂ + CO mixture at either temperature for all exposures. However, both *T. castaneum* and *S. granarius* had higher mortality in the CO₂ + CO mixture than the CO₂ alone at both temperatures. Moreover, *S. granarius* was more susceptible to CO₂ + CO mixture than *T. castaneum*. These results suggest that for certain species, CO could be used to increase the efficiency of CO₂, especially at high temperatures.