

Title The use of carbon dioxide at high pressure to control nine stored-product pests
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Abstract

The development of alternative treatments for pest control in food commodities is an increasing demand from the food industry, which should meet consumer demands for the reduced use or elimination of pesticides. The use of carbon dioxide (CO₂) at high pressure is one of the most rapid options for arthropod pest control among current commercial treatments, offering complete control within hours. The present study aimed to establish the efficacy of the technique against different stages of several insect and mite pests that affect stored-food products. Standard food diets containing eggs, larvae, pupae and adults of *Oryzaephilus surinamensis*, *Cryptolestes ferrugineus*, *Lasioderma serricorne*, *Sitophilus oryzae*, *Rhyzopertha dominica*, *Acanthoscelides obtectus*, *Ephestia kuehniella*, *Liposcelis bostrychophila* and *Tyrophagus putrescentiae* were treated with CO₂ for different times at two high pressures, 15 and 20 bar. A high level of control was achieved for most species and development stages when they were treated with CO₂ at 20 bar for 60 min. However, the efficacy at 15 bar was much lower. The eggs of *L. bostrychophila* and *L. serricorne* showed the highest tolerance of all species/stages and survived the most extreme conditions tested. The beetle *O. surinamensis*, the moth *E. kuehniella*, and the mite *T. putrescentiae* were easier to kill than the other species tested. Our results confirmed that the use of high-pressure CO₂ offers an effective and fast way to control most stored-product pests that affect food commodities.