Title Enhanced fumigant toxicity of allyl acetate to stored-product beetles in the presence of carbon dioxide

Author B.C. Leelaja, Y. Rajashekar, P. Vanitha Reddy, Khamrunissa Begum and S. Rajendran

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Abstract

Toxicity of allyl acetate (5–25 mg/l doses) to mixed-age cultures of stored-product beetles including *Cryptolestes ferrugineus*, *Lasioderma serricorne*, *Oryzaephilus surinamensis*, *Rhyzopertha dominica*, *Sitophilus oryzae* and *Tribolium castaneum* in the presence of carbon dioxide (CO_2) (10% and 20%) with a 48-h exposure period was studied in the laboratory at 27±2 °C. Depending on dosage and the insect species, the fumigant toxicity of allyl acetate was enhanced by CO_2. At most of the allyl acetate+CO_2 combinations, increased mortality was observed in *C. ferrugineus*, *O. surinamensis* and *S. oryzae*. In *L. serricorne* and *T. castaneum*, which are tolerant to allyl acetate, higher mortality due to CO_2 was achieved at selected dose combinations only (e.g. 15 mg/l allyl acetate+20% CO_2). Significant increase in mortality of *R. dominica* (the most susceptible species to allyl acetate) exposed to allyl acetate in the presence of CO_2 was not evident except at the lower dose of 5 mg/l allyl acetate+CO_2 that caused 31.7% mortality. The mortality data show that CO_2 could be used as an adjuvant for allyl acetate.