CHEMICAL ALTERNATIVES FOR METHYL BROMIDE TREATMENTS OF DRIED FRUITS AND NUTS

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Carbonyl sulfide, methyl iodide and sulfuryl fluoride were tested for their effectiveness as fumigants to replace methyl bromide and phosphine for quarantine and insect disinfestation treatments of dried fruits and nuts. Efficacy tests were conducted against navel orangeworm, *Amyelois transitella* (Walker), codling moth, *Cydia pomonella* (L.), sawtooth grain beetle, *Oryzaephilus surinamensis* (L.), driedfruit beetle, *Carpophilus hemipterus* (L.), cigarette beetle, *Lasioderma serricorne* (F.), and confused flour beetle, *Tribolium confusum* Jacquelin duVal. Carbonyl sulfide was toxic to five species of stored product pests in 24 hour fumigations at 25°C. LC_{50}s ranged from 1.74 mg/L for navel orangeworm larvae to 29.96 mg/L for eggs of the confused flour beetle , the most tolerant life stage of the most tolerant species tested.

Methyl iodide was toxic to all life stages of confused flour beetle and to diapausing codling moth larvae when fumigated for 3 hours at 25°C. LC_{50}s ranged from 0.27 mg/L for confused flour beetle eggs, the most susceptible life stage, to 11.49 mg/L for diapausing codling moth larvae, the most tolerant life stage tested. Carbonyl sulfide and methyl iodide also controlled diapausing codling moth larvae inside walnuts at dosages comparable to those of methyl bromide. During these 24 hour disinfestation fumigations, walnuts absorbed about 50% of the applied COS dose and about 90% of the MeI dose.

Sulfuryl fluoride was more toxic to diapausing larvae than eggs of the codling moth in 4 hour fumigations at 25°C. Vacuum fumigation with sulfuryl fluoride at 100 mm Hg effectively reduced LC values for diapausing larvae of codling moth but had little or no effect on toxicity to codling moth eggs. These tests showed that the 3 fumigants are toxic at relatively short exposure times. Their potential as viable pest management tools is discussed.