

Title Some properties of sulphuryl fluoride in relation to its use as a fumigant in the cereals industry.
Authors Bell, C. H., Wontner-Smith, T. J. and Savvidou, N.
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Abstract

The toxicity of sulfur dioxide (SF) to various pest species, the penetration of SF into flour, and the potential for any problems to arise because of fumigant cross resistance or malfunction of electronic equipment exposed to SF were studied in the UK. The pest species included *Tribolium castaneum* (rust-red flour beetle), *T. confusum* (confused flour beetle) *Cryptolestes turcicus* (Turkish grain beetle), *Ephesia kuehniella* (Mediterranean flour moth), *Ptinus tectus* (Australian spider beetle), *Sitophilus granarius* (granary weevil), *Gnathocerus cornutus* (broad-horned flour beetle), *Tenebrio molitor* (meal worm), *Liposcelis bostrychophila* (book louse) and *Acarus siro* (flour mite). For most of the pests, the egg stage was the most tolerant of fumigation, but the postembryonic stages of mites were as tolerant as the eggs. Most of the species were completely controlled by a concentration x product of 500 g h-1 m-3 at 30 deg C, or 1000 g h-1 m-3 at 25 deg C. Penetration studies into flour of 30 cm depth revealed that SF required 30 to 40 minutes to break through to this level whether or not there was forced air movement over the flour surface, and that only 2.5-3 h were required, irrespective of temperature over the range 18-28 deg C, for concentrations to reach 50-60% of those at the surface. At venting, 90% of the gas present in flour at 30-cm depth had dissipated after 4.5 h. Studies on phosphine-resistant and susceptible strains of *T. castaneum* revealed no cross resistance to SF, and repeated exposure of computer equipment to the gas revealed no malfunction. SF is a promising replacement for methyl bromide in the flour milling industry.