

EFFECTIVENESS OF ETHYL FORMATE AS A FUMIGANT OF SULTANAS AND RAISINS

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Ethyl formate is used in the Australian dried fruit industry as a fumigant against insect infestation. The rate of sorption of ethyl formate on sultanas was found to be independent of concentration but greatly increased with filling ratio and moisture content. There was a slight temperature effect. Sorption was initially rapid, with 13 % of gas remaining in the headspace at 12 h in containers 95% full, followed by a more gradual reaction phase. Rate constants per full container for the reaction ranged from 0.077 h^{-1} to 0.038 h^{-1} . At typical commercial dosage rates, concentration x time (CT) products. of 1493 g h m^{-3} at 8 h and 3876 g h m^{-3} at 24 h were obtained in sealed containers at 25°C and 60% r.h.. These were shown to be greater than that required to control dried fruit pests.

Fumigations at 25°C of mixed aged cultures of six pests showed that 8 h exposures were more effective than 24 hour exposures with the same CT product. In 24 hour exposures, there was 100 % mortality of *Oryzaephilus surinamensis*, *O. mercator*, *Plodia interpunctella* and *Carpophilus hemipterus* at 765 g h m^{-3} , *Tribolium confusum* at 1158 g h m^{-3} and 94 % mortality of *T. castaneum* at 1158 g h m^{-3} . All pests were controlled at 541 g h m^{-3} , but not at 496 g h m^{-3} in 8 hour fumigations. Ethyl formate appears to have excellent potential as a replacement to methyl bromide in the treatment of durable commodities where not limited by sorption behaviour.