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THE RAPID DISINFESTATION OF GRAIN WITH VAPORMATE™, A FORMULATION OF ETHYL FORMATE WITH CO_2.

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ABSTRACT

VAPORMATE™, a cylinderised mixture of ethyl formate (EF) in carbon dioxide (16.7% by weight), has been evaluated as an alternative to phosphine or dichlorvos for the rapid disinfestation of stored grain. We propose to apply VAPORMATE™ using a forced flow technique to ensure uniform delivery in grain storages. The rate of EF penetration into grain and its fast sorption, and the capacity of existing aeration systems were factors considered in determining the forced flow speed. Mortality of mixed age cultures of important stored grain pests, *Sitophilus oryzae*, *Tribolium castaneum* and a phosphine-resistant field strain of *Rhyzopertha dominica*, were assessed at 25°C over a range of VAPORMATE™ concentrations and exposure times, applied at a flow rate of 6 L min^{-1} to a 65 L model silo. Greater than 99.5% mortality of the *T. castaneum* and *R. dominica* cultures was achieved with an application of 83 g t^{-1}, held for 24 h or for faster treatment, 145 g t^{-1} held for 3 h. To achieve a similar level of mortality for a *S. oryzae* culture, an application of 207 g t^{-1}, held for 72 h, was required. Mortality was only slightly reduced at exposure temperatures as low as 15°C.